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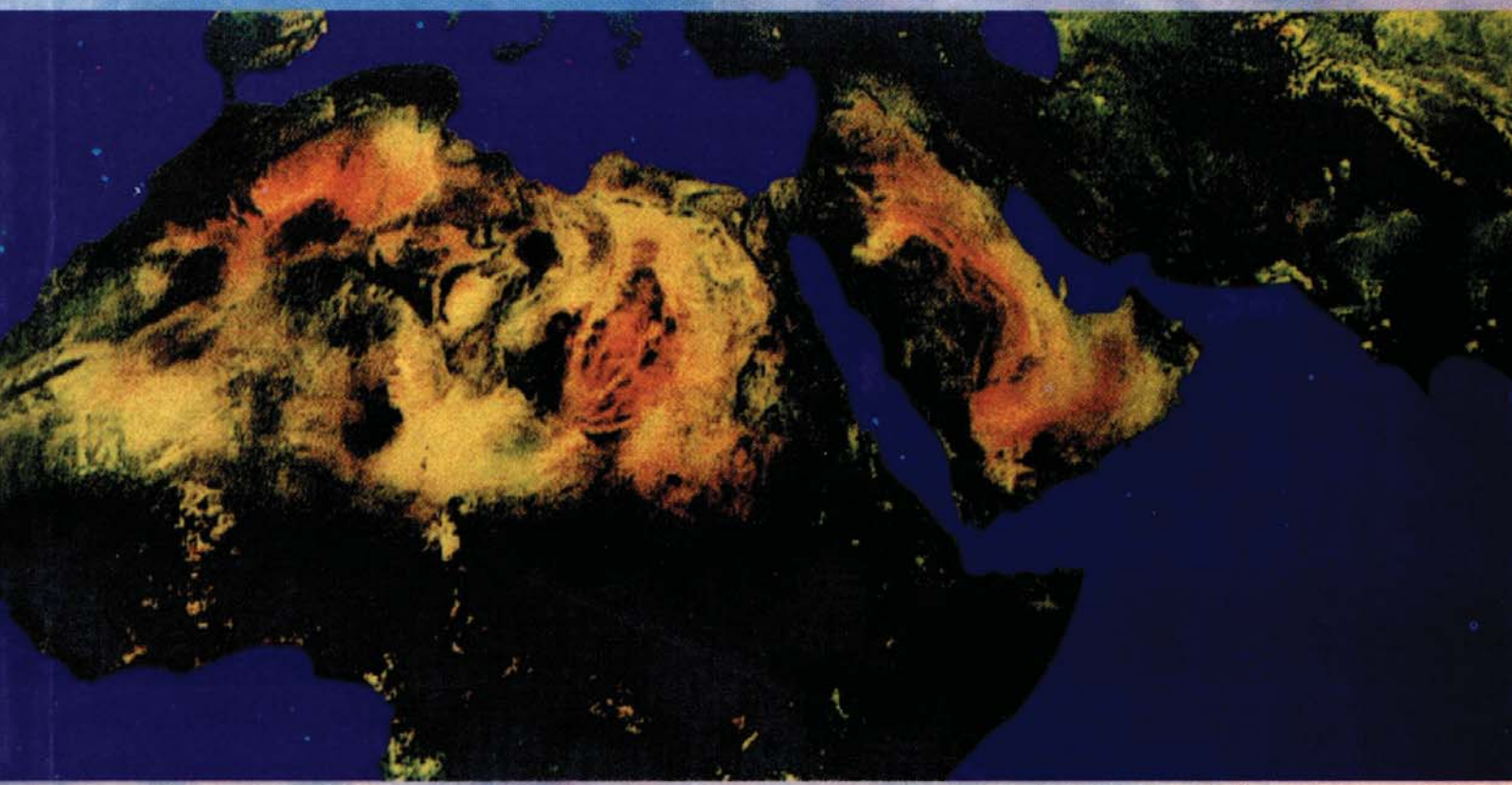

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المجلة الصحية لشرق المتوسط

هي المجلة الصحية الرسمية التي تصدر عن المكتب الإقليمي لشرق المتوسط بمنظمة الصحة العالمية. وهي منبر لتقديم السياسات والمبادرات الجديدة في الخدمات الصحية والترويج لها، ولتبادل الآراء والمفاهيم والمعطيات الوبائية ونتائج الأبحاث وغير ذلك من المعلومات، وخاصةً ما يتعلق منها بإقليم شرق المتوسط. وهي موجَّهة إلى كل أعضاء المهن الصحية، والكليات الطبية وسائر المعاهد التعليمية، وكذا المنظمات غير الحكومية المعنية، والمراكز المتعاونة مع منظمة الصحة العالمية والأفراد المهتمين بالصحة في الإقليم وخارجه.

EASTERN MEDITERRANEAN HEALTH JOURNAL

IS the official health journal published by the Eastern Mediterranean Regional Office of the World Health Organization. It is a forum for the presentation and promotion of new policies and initiatives in health services; and for the exchange of ideas, concepts, epidemiological data, research findings and other information, with special reference to the Eastern Mediterranean Region. It addresses all members of the health profession, medical and other health educational institutes, interested NGOs, WHO Collaborating Centres and individuals within and outside the Region.

LA REVUE DE SANTÉ DE LA MÉDITERRANÉE ORIENTALE

EST une revue de santé officielle publiée par le Bureau régional de l'Organisation mondiale de la Santé pour la Méditerranée orientale. Elle offre une tribune pour la présentation et la promotion de nouvelles politiques et initiatives dans le domaine des services de santé ainsi qu'à l'échange d'idées, de concepts, de données épidémiologiques, de résultats de recherches et d'autres informations, se rapportant plus particulièrement à la Région de la Méditerranée orientale. Elle s'adresse à tous les professionnels de la santé, aux membres des instituts médicaux et autres instituts de formation médico-sanitaire, aux ONG, Centres collaborateurs de l'OMS et personnes concernés au sein et hors de la Région.

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COVER: Remote sensing image of the area of the world that includes the Eastern Mediterranean Region. Cover image produced by the Canada Centre for Remote Sensing, Ottawa, Canada. (NOAA AVHRR Composite) Reproduced with permission

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Letter from the Editor

In this issue of the *EMHJ* we are collaborating with the Council of Science Editors and more than 220 other science journals in highlighting the Global Theme Issue on Poverty and Human Development. The aim is to raise awareness, stimulate interest, and encourage research into the links between poverty and development. To this end, journals from every part of the world are publishing related papers, reports and special issues, and the Council of Science Editors, the Fogarty International Center, and the National Library of Medicine will showcase some of the research on this theme in a media event on 22 October, 2007.

This theme is particularly relevant in the WHO Eastern Mediterranean Region. We have a large, growing population, currently over 500 million, most of whom live in areas of low or medium socioeconomic status. The relationship between socioeconomic status and health has been clearly demonstrated, and is recognized, specifically or by implication in most of the UN Millennium Development Goals, for example Goal number 1: "Eradicate extreme poverty and hunger" and Goal number 4: "Reduce child mortality".

Over the past few years, the Eastern Mediterranean Regional Office has actively promoted grass-roots approaches to improving health status such as primary health care networks and systems and the community-based initiatives (CBI) approach towards reducing poverty, a key determinant of health status and health inequity. One of the editorials included in this issue of the *Journal* describes experiences in the Region regarding community-based initiatives and their relation to poverty reduction and health development. There is also a report describing the impact of a relatively inexpensive rural health development programme in the Islamic Republic of Iran.

Experience gained within the Region has shown that the basic development needs (BDN) approach has gone some way to achieving the Millennium Development Goals: a report from Sudan exemplifies the effects of BDN implementation in a rural area in tandem with a programme to promote child health implemented by medical students.

In regions where poverty is a delimiting factor, it is of course the poorest in the community who are most affected and have least recourse to facilities. In many cases, these are the women. Women's health and socioeconomic status is, however, fundamental to development. A number of papers in this issue focus on their importance in a community, and the impact of empowerment of women and reducing gender inequity on the economic and health status of the woman, the family and the community as a whole.

رسالة من المحرِّر

في هذا العدد من المجلة الصحية، نتعاون مع مجلس محرِّري العلوم ومع أكثر من 220 من المجلات العلمية في إلقاء الضوء على قضية الفقر والتنمية البشرية، وهي قضية ذات طابع عالمي. ومقصدنا من وراء ذلك هو إذكاء الوعي بقضية الفقر والتنمية، وإثارة الاهتمام بها، وتشجيع البحث في الروابط بين الفقر والتنمية. ولبلوغ هذه الغاية، تنشر المجلات العلمية في كل منطقة من مناطق العالم ورقات بحثية وتقارير وأعداداً خاصة حول هذا الموضوع، كما سيقوم مجلس محرِّري العلوم ومركز فوغارتي الدولي والمكتبة الطبية الوطنية، بالولايات المتحدة، بعرض بعض البحوث حول هذا الموضوع في حدث إعلامي في 22 تشرين الأول/أكتوبر 2007. وهذا الموضوع وثيق الصلة بإقليم شرق المتوسط. فعدد سكان هذا الإقليم كبير ومتنام، إذْ يزيد على 500 مليون نسمة في الوقت الحاضر، يعيش معظمهم في مناطق ذات أوضاع اجتماعية واقتصادية متدنِّية أو متوسطة. كما أن العلاقة بين الوضع الاجتماعي الاقتصادي وبين الصحة قد تَبيَّنَتْ بجلاء، وأُقرت، صراحة أو ضمنياً، في معظم المرامي الإنمائية للألفية. فالمرمى الأول، على سبيل المثال، يدعو إلى استئصال شأفة الفقر والجوع؛ والمرمى الرابع يدعو إلى تخفيف معدل وفيات الأطفال. ولقد نشط المكتب الإقليمي في السنوات القليلة الماضية في تحسين الحالة الصحية في الإقليم، بانتهاج أساليب مجتمعية المُرْتَكَز، من قبيل نُظُم وشبكات الرعاية الصحية الأولية، والمبادرات المجتمعية الرامية إلى تقليص الفقر، الذي هو أحد المحدِّدات الرئيسية للحالة الصحية وللتفاوت في الحصول على الخدمات الصحية. ويتناول أحد المقالات المنشورة في هذا العدد من المجلة بيان خبرات الإقليم في المبادرات المجتمعية وعلاقتها بتقليص الفقر والتنمية الصحية. كما يَرِد في هذا العدد تقرير عن أثر برنامج ريفي للتنمية الصحية، غير باهظ التكاليف نَسبياً، في جمهورية إيران الإسلامية. وتبين الخبرة المكتسبة في الإقليم أن أسلوب تلبية الاحتياجات التنموية الأساسية قد قطع شوطاً نحو بلوغ المرامي الإنمائية: فيستعرض تقرير من السودان آثار تنفيذ هذا الأسلوب في منطقة ريفية في أعْقَابِ برنامج لتعزيز صحة الطفل نفَّذه طلاب كليات الطب. وفي المناطق التي يُعد فيها الفقر عاملاً مميِّزاً، نجد أن السكان الأشد فقراً في المجتمع هم الأكثر تأثراً والأقل تردُّداً على المرافق الصحية. وفي العديد من الحالات تكون المرأة هي الأشد تعرُّضاً لهذه الأوضاع. وبرغم ذلك، تُعتبر الحالة الصحية والاجتماعية الاقتصادية للمرأة عنصراً أساسياً في التنمية. ويركِّز عدد من الورقات البحثية المنشورة في هذا العدد على أهمية المرأة في المجتمع، وعلى أثر تمكين المرأة والحد من مظاهر الحَيْف بين الجنسَيْن على الحالة الاقتصادية والصحية للمرأة والأسرة والمجتمع بأَسْره.

Editorial

Human development and the legacy of women

Joanna Vogel[1]

Hagar was a mother who struggled alone in the desert to ensure the survival and nourishment of her infant son Ismail. Khadija single-handedly developed and ran a successful business. The queen of Sheba was a powerful leader who ruled by consultation, consensus and reason, as mentioned in the Quran. These are but a few well-known examples in the Eastern Mediterranean Region of courageous, innovative and strong women who overcame obstacles and left rich legacies for the communities to which they belonged. Yet many of their inheritors, the women of the Region today, have far less opportunity to contribute to their own communities. This is especially true for women at lower socioeconomic levels, who have less social space, fewer options and less access to resources with which to navigate their lives. Without their contributions, however, sustainable human development cannot be achieved.

Men and women are partners in life and enter and leave this world on equal terms. Accordingly, they must be equally nourished and provided with resources to build and protect their communities. Assumptions have sometimes been made that result in greater opportunities for boys in accessing education, employment and leadership opportunities, in part because it is reasoned they will carry the economic burden in their adulthood. And yet, who has nurtured these boys throughout their childhood, tended to their illnesses, distributed household medications, determined their nutritional needs, and taught them hygienic practices? Can anyone deny the mother's comprehensive need for education to successfully accomplish these tasks, which have lifelong consequences on the well-being and health of boys as well as girls? In fact, educational attainment of women has been found to be the single most influential factor in reducing child morbidity [*1*]. Education for women results in their greater capacities in directing family matters, less fatalistic attitudes in responding to children's illness, and greater awareness of health risks and behaviours that reinforce health.

Women directly impact the productivity of the population through their promotive and preventative health care roles and yet are insufficiently recognized for this crucial contribution. An unhealthy population cannot be productive. Macroeconomic calculations rarely consider the reproductive sector in the growth equation of economies and yet populations are maintained by the reproductive sector. The interaction that the mother has within society, the resources that are available for her use, and the roles that are expected of her form the background for her parenting abilities and influence the outcomes of her children's health and social, educational and economic development.

And yet we must be cautious not to assign women only to the reproductive

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role. This denies and suppresses their other talents and contributions to society. It also amounts to an injustice to women who do not marry or who marry but for various reasons do not, or cannot, have children. By linking the woman's role only to motherhood, we condemn those women not filling this role to a social vacuum, vulnerable to social exclusion by their communities. This is especially true in societies where women are valued only for the number of children, especially boys, that they can successfully give birth to.

Consigning and providing resources for women only in fulfilling the reproductive role in society ignores the economic reality many communities face, and fails to account for the economic productivity that women can contribute to societies. Limiting access to resources for women based solely on their assignment in the reproductive role leaves women with a life-long dependency on others for their income and unable to take care of themselves should their support for any reason fail. For example, many women find themselves the heads of household because of the unemployment of their spouses, death of their spouses, or abandonment by their spouses. Lack of education, lack of capacity in management skills, and lack of experience in the formal labour market means female heads of households have few viable employment options. While juggling household responsibilities, they must often turn for economic support to the informal labour market, where they are vulnerable to exploitation, receive insufficient compensation, and are not entitled to social protection measures such as health insurance because the informal market is not regulated.

Women must be given the resources necessary to navigate through life and to be equally prepared alongside their male partners for the challenges which life brings.

To ensure successful and sustainable development, women must be involved as decision-makers in community development committees and must be equal recipients of social sector projects and income-generation projects, including vocational training and micro credit support. Vocational skills for women should not be limited to gender stereotypical skills such as handicrafts, which are often not sustainable and provide limited market opportunities. Women and men must be equal recipients of capacity-building, including both health and academic literacy, and both men and women should have the responsibility to volunteer and contribute to the health of the community.

To deny women the skills and capacities to face life properly equipped is to deny them their human rights. The denial of equal resources and opportunities for women impedes the success of any sustainable human development programme. The needs and contexts of both men and women are essential components of any development measure and both voices must be heard from the conception to the planning, implementation and monitoring of development programmes.

Governments must recognize the necessity of building human capacity to ensure economic growth and must not limit capacity-building to only half their populations. To do so is to deny the contributions women make to their communities and to deny the rich heritage of their cultures.

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Editorial

Health, poverty and development

Belgacem Sabri[1]

The interplay between health, poverty and development is well known and has been studied by public health professionals, social scientists and development specialists and also by international agencies including the United Nations Development Programme (UNDP), the World Bank and the World Health Organization (WHO).

The Millennium Development Goals (MDGs), to which all countries of the world are committed, emphasize the linkages and synergies between health, poverty and development. These Goals put health at the centre of social and economic development by focusing on tackling the social determinants, including literacy, poverty reduction and environmental protection, and by scaling up public health programmes and improving access to quality health services.

As part of the studies on the social determinants of health initiated by WHO since Alma Ata [*1*] evidence has been collected on the positive impact of economic development, improved access to safe water and sanitation on health development [□]. Indeed, that these are important factors is clear from the fact that the decrease in general mortality and increase in life expectancy during the last century and half occurred long before the development of health systems and the important breakthroughs in medical technology.

The improvement of living conditions facilitated by economic growth and development in Europe, the United States of America (USA), Japan and other countries belonging to the Organisation for Economic Co-operation and Development (OECD) is considered the main cause of increasing life expectancy and decreasing mortality. Economic growth leads to an increase in income for individuals and communities and to improvement of housing and nutritional status, which are major determinants of health. However, ill planned and non-environmentally sensitive economic development projects may have negative impacts on health because of exposure of people to hazards resulting from the projects. Some major agricultural and industrial projects, including dams and plants, are known to have had an adverse effect on the environment where people live and hence on their health and development.

The economic growth experienced by developed economies later allowed greater investment in modern health care systems after the Second World War, which led to improved infrastructure, trained health workforce and access to biomedical technology. Furthermore, developed economies have invested in education which has a positive impact on health in terms of encouraging health protection and promotion.

Recognizing the importance of economic and social conditions, UNDP, since the 1960s, has promoted the concept of securing the basic minimum needs for development. Such an approach was also used in the field of health development and led

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to its implementation in Thailand and other Asian countries after Alma Ata. Similar approaches have been implemented in the Eastern Mediterranean Region of WHO as part of its commitment to health for all through primary health care. The concept evolved from initially simply meeting the basic needs to a more proactive and comprehensive developmental approach owned by the communities.

While economic improvement contributes to better health, health also contributes to economic growth and development by increasing the social capital in terms of: a healthy and productive workforce, reduced absenteeism, savings resulting from the prevention of occupational hazards, and increased number of disability-free years of life. Models of the contribution of health development to economic growth have been described by developmental economists worldwide and this concept was behind the focus of the 1993 [illegible]. The contribution of major public health programmes, including malaria and river blindness control in Africa and Asia, to freeing more land for housing and agricultural development, was clearly evident in economic terms.

In recent works, developmental economists, including Nobel prize-winner Amartya Sen and Nicholas Stern, have highlighted the importance of social engagement and empowerment. Without empowerment, argues Stern, economic growth will not bring improvement in health and education or relief from poverty. The active involvement of individuals, and communities, in decisions that affect their lives is crucial.

Health systems play an important role in securing access to health care provided that they are adequately financed, governed and managed at the various levels. Countries with low incomes spend less on health development which thus does not allow health systems to fund health programmes, to secure necessary health and biomedical technology and to develop a motivated personnel. As a consequence, effective coverage by health interventions and programmes is limited which results in poor health outcomes.

But funding is not the only issue; the way health systems are organized can also have a direct impact on poverty and development. Inequities in health care financing, for example the financial vulnerability caused by high levels of out-of-pocket spending on health care services, constitute a major barrier to access to health care by the poor in many low- and middle-income countries worldwide, including the Eastern Mediterranean Region. Poor patients, in the absence of social health protection mechanisms, often face catastrophic medical care expenditures when they become sick which may impoverish them and their families.

Studies implemented by WHO in 42 countries including in 2 in the Eastern Mediterranean WHO regional office have shown that 2%–3% of households face catastrophic health care expenditures and that 1%–2% are pushed into poverty when they become sick. Translating this into figures, health systems in the Eastern Mediterranean Region are producing an additional 10 million poor people every year.

Public health professionals throughout history have been keenly aware of the need to fight against poverty in order to achieve better health outcomes. Health professionals, dealing with poor and deprived populations, are often frustrated by the lack of response to their health and medical interventions as patients again become sick when they return to their home environment which lacks appropriate nutrition, safe water and sanitation. In dealing with patients, physicians have the obligation to

understand the root causes of the health problems and recognize that some of them are generated by the society and must be addressed. Many public health physicians thus become advocates of the idea of poverty being a preventable "disease . The history of public health includes many pioneering public health professionals, including Rudolph Virchow (1821–1902), who have contributed to the paradigm shift from the biomedical model of diseases to focus on the social, political, economic and cultural dimensions of ill health.

Research on the social determinants of health has led in some countries, including the United Kingdom and some Scandinavian countries, to a policy debate about the need to focus on comprehensive social and economic programmes aimed at reducing the social gradients in health outcomes. Studies have shown that social determinants such as illiteracy and poverty reduce access to health care services even though these may be provided without any financial barriers as part of the welfare package provided by some countries. Thus, investing more in health without addressing the major social determinants, such as literacy, female education and social health protection, may not lead to improved health outcomes. Indeed, life expectancy in the highest health spenders in the world, for example the USA, is similar to or even lower than in countries with limited income but with better access to education, sound nutritional policies and universal access to health care, such as Cuba, Costa Rica and Sri Lanka.

The Commission on Social Determinants of Health established by WHO has set up several knowledge networks to assess the magnitude of social determinants and to document working models in health systems. These networks are addressing the domain of social determinants, including gender, literacy, poverty, social exclusion, political and cultural factors and health systems.

The reports published by the networks convey important messages about the importance of social determinants in health development in both developing and developed economies. Lessons learned from these studies and research activities will be useful in reconfiguring health systems in order to achieve better health outcomes and improved performance.

The findings of these studies are also important for policy-makers who are entrusted to develop comprehensive social and economic programmes. Evidence has shown that the linkages between health, income and development can improve social development by maximizing the synergy between them. It is hoped that models found successful in some countries could be replicated in others.

In 2008 the world will be celebrating the 60th anniversary of WHO and the 30th anniversary of the Alma Ata declaration [*1*] and it is important to highlight the linkages between health and its major social and economic determinants. Investing in health system strengthening alone will remain insufficient to achieve the noble inspirational goal of health for all. The emphasis should be on the importance of social determinants and their incorporation in all endeavours aimed at improving health.

The revival of health systems based on primary health care should benefit from the new momentum characterized by the international commitment to MDGs and the renewed interest in the social determinants of health. Efforts should be made to develop accessible and pro-poor health systems and to better involve individuals and communities in their health development.

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Traditional medicine

Many countries use traditional medicine to help meet some of their primary health care needs: in Africa, up to 80% of the population uses traditional medicine for primary health care. In China, traditional herbal preparations account for 30%–50% of total medicinal consumption and in Germany, 90% of the population have used a natural remedy at some point in their life.

The World Health Organization (WHO) launched its first ever comprehensive traditional medicine strategy in 2002. The strategy is designed to assist countries to:

- develop national policies on the evaluation and regulation of traditional/complementary practices;
- create a stronger evidence base on the safety, efficacy and quality of the products and practices;
- ensure availability and affordability, including essential herbal medicines;
- document traditional medicines and remedies.

At present, WHO is supporting clinical studies on antimalarials in 3 African countries. Collaboration is also taking place with a number of countries, including Burkina Faso, Mali, Nigeria and Kenya in the research and evaluation of herbal treatments for HIV/AIDS, malaria, sickle cell anaemia and diabetes mellitus.

In Tanzania, WHO, in collaboration with China, is providing technical support to the government for the production of antimalarials derived from the Chinese herb *Artemisia annua*. Local production will bring the price of one dose down from US$ 6–7 to a more affordable US$ 2.

Editorial

Community-based initiatives and their relation to poverty reduction and health development: experiences in the Eastern Mediterranean Region

Mohammad Assai Ardakani[1]

Introduction

Human development does not depend simply on national income; it goes far beyond that. It is "about creating an environment in which people can develop their full potential and lead productive, creative lives in accord with their needs and interests… Development is thus about expanding the choices people have to lead lives that they value [*1*]. In order to have more choices requires building human capabilities, i.e. the things that people can do or be in life. "The most basic capabilities for human development are to lead long and healthy lives, to be knowledgeable, to have access to the resources needed for a decent standard of living and to be able to participate in the life of the community [*1*].

The United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil, in June 1992, led to the famous Rio declaration stating as principle 1 that "Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature [□].

Earlier, the Universal Declaration of Human Rights adopted by United Nations General Assembly Resolution 217A (III) of December 10, 1948 stipulated that all the individuals in society are equally entitled to the right of access to public services, social security, work, and free choice of employment. It is also said, "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services [□]. In poor countries, fulfilment of these rights remains a great challenge.

Poverty is a multidimensional concept: the most popular definitions relate poverty to income or to the provision of the basic needs. An often used definition of the poverty line is an income of US$ 1 per day per person. Poverty can also be viewed from the basic needs perspective where poor families are characterized by frequent illness, low birth weight, low education, social or political marginalization, and discrimination based on gender or age or other [□].

It has been shown that health and development go hand in hand; they have a

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reciprocal influence on each other and each enhances the effects of the other. Health deteriorates with poor socioeconomic conditions and is generally poor in circumstances where development is lagging. The poor health conditions associated with underdevelopment and poverty reduce productivity and worsen other aspects of life. On the other hand, holistic development improves health which further enhances levels of development.

Poverty remains one of the main causes of ill-health because poor people are less likely to have access to good quality healthcare services, proper education, safe water and sanitation and other basic needs. According to the World Health Organization (WHO), approximately 1.2 billion people in the world live in extreme poverty. Those people are five times more likely to die before reaching the age of 5 years, and two and half times more likely to die between the ages of 15 and 59 years, compared to those living in higher-income groups. Moreover, the gap between the rich and poor is growing with serious implications for health [□].

A less recognized reality is that improved health status can alleviate vulnerability and offer a route out of poverty. Both macro- and microeconomic studies indicate that better health translates into greater and more equitably distributed wealth because it builds human capital and increases productivity. Indeed, healthy children are better able to learn, while healthy breadwinner adults are more able to work and care for their families. The health sector has thus sufficient incentives to justify engaging in poverty reduction initiatives, and needs to develop both the skills and infrastructures necessary to work in partnership with other sectors and the community.

In the past few decades, the health sector has proved its catalytic role in health promotion, triggering appropriate initiatives for improving health and quality of life of communities. This effort was promoted within the WHO Eastern Mediterranean Region (EMR) through community-based initiatives (CBI) composed of basic development needs (BDN), healthy villages programme, healthy cities programme, and women in health and development, which have provided opportunities to integrate health interventions in local development processes. These initiatives have implemented flexible strategies at the local level in different cultures and societies by actively involving communities and the related sectors. The CBI approach addresses the major socioeconomic determinants of health within a broad perspective of development and creates access to the essential social services to provide optimum equity at the grass-roots level. The outcomes of these initiatives provide clear evidence that health is a human capital and investment to promote comprehensive development results in the improved quality of life and well-being of the communities [□].

This paper discusses how WHO/EMRO has advocated the importance of alleviating poverty in order to improve the health of individuals and their communities and fulfil other socioeconomic needs through community ownership and intersectoral collaboration.

Concept of community-based initiatives

The concept of CBI is a continuum of WHO's definition of health that encompasses a holistic approach to health with as much significance ascribed to the social well-being of the individual as to physical and mental health. In fact, CBI can be seen as an extension of primary health care that

focuses on the whole range of health determinants and addresses the related issues with the application of innovative ideas and appropriate technologies. CBI also recognizes and fosters the mutual links between health and multisectoral development, with proactive participation of the communities.

EMRO has been advocating poverty reduction as one of the most potent strategies to facilitate equitable development in order to achieve health-related goals, which will have a positive impact on the overall environment and quality of life of individuals and the community [□].

The CBI concept is an integrated bottom-up socioeconomic development concept, which is based on full community involvement supported through intersectoral collaboration. It is a self-sustained people-oriented strategy that addresses the diverse basic needs of the community and recognizes health as a socially cohesive factor. Community-based initiatives offer the added value of overcoming inequity which has positive implications for health. The most salient aspects of this approach are the organization, mobilization and enhancement of community capabilities and involvement in micro-development through social and income-generating schemes. These have an impact on basic needs, which constitute the most powerful determinants of good health, quality of life and productivity (Figure 1)

The CBI concept takes into account the interdependent needs of the countries, both within and outside the health sector, such as primary health care including nutrition and reproductive health, basic education, provision of shelter, safe drinking-water and sanitation. Projects have included establishing health centres, training community health workers and volunteers on health issues, using the community to accelerate the Expanded Programmes on Immunization, raising awareness on reproductive health and nutrition, implementing directly observed treatment, short-course (DOTS) for tuberculosis through community participation, organizing literacy classes and women's vocational training, establishing

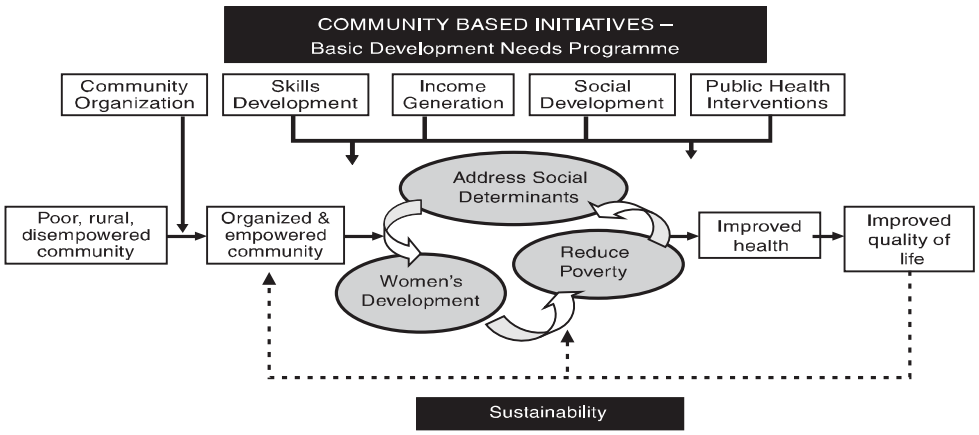

Figure 1 **Tackling the social determinants of health through the basic development needs component of community-based initiatives**

libraries and community-based information centres, supporting agriculture and livestock projects, and tree planting. The provision of microcredit schemes for income generation also falls within the purview of CBI. All these activities are, however, preceded by an elaborate exercise aimed at organizing and mobilizing the community with an emphasis on their enhanced awareness of health issues, active participation, gender mainstreaming and self-reliance. Local cluster representatives (CRs), district authorities and public sector line departments contribute and complement each other in programme implementation.

Representatives from various line departments constitute the CBI intersectoral teams, which are instrumental in providing the requisite guidance in building local organizations to enhance community involvement. The teams offer technical assistance in priority areas for community action related to social development and poverty reduction. These teams vigilantly support the implementation process of carefully selected social and income-generating ventures and develop an interactive working relationship with village/community development committees. They also constitute the bridge that conveys community concerns and perceived needs and priorities to the relevant line departments of the district government. CBI teams are thus helpful in generating the trust and confidence necessary for building a solid partnership between the government and civil society organizations. Furthermore, in most of the villages within the CBI area of operation, women's organizations are established to spearhead women's development activities at the community level.

Provision of interest-free loans for income-generating schemes targets the poorest members of the community with defined criteria. This is included as an integral part of the responsibilities of the village/community development committees who manage this revolving fund. The CBI intersectoral team reviews the feasibility of the proposals prior to finalization. The loans are repaid on instalment to the village development committee once the project is operational so that the money can be redistributed to other needy members of the community.

The CBI interventions assume added relevance for the countries of the Eastern Mediterranean in the light of a recent WHO initiative, the Commission for the Social Determinants of Health (CSDH). The social determinants of health refer to both specific features and pathways by which societal conditions affect health and which can potentially be altered by informed action. Many of the inequalities in health, both within and between countries, can be understood in terms of inequalities in the social conditions in which people live and work, such as literacy, housing, employment, etc. These social determinants of daily life have a major impact on health status and on general well-being. Tackling such underlying causes of poor health can contribute to improving health and health equity. CBI is thus seen as an appropriate grass-roots intervention to address key social determinants of health in EMR and beyond [□].

CBI status in the Eastern Mediterranean Region

The basic development needs programme, the healthy villages programme, the healthy cities programme and the women in health and development programme are being implemented in 17 countries in EMR. Currently, these interventions cover a population of 17 503 841 people.

EMRO is advocating the sustainability of CBI interventions as a vital strategy during the programme expansion in the member countries. This is achieved through community involvement in programme management, partnership approaches and institutionalization of the programme as an integral part of the system. Member States have demonstrated different degrees of institutionalizing CBI within the national development policy. For instance, Bahrain, Islamic Republic of Iran, Iraq, Jordan, Morocco, Oman, Pakistan, Saudi Arabia, Sudan, Syrian Arab Republic and Yemen have established a unit responsible for CBI within the Ministry of Health. Jordan, Pakistan and Syrian Arab Republic have also allocated an annual budget for maintenance and expansion of the programme. Jordan, Pakistan, Sudan and Syrian Arab Republic have linked the programme with national and international nongovernmental organizations. Djibouti, with the consent of 5 other ministries as well as the Ministry of Health, has included basic development needs as part of the national health and development strategy. This is a promising action paving the way for more programme expansion. Other countries implementing CBI are in the process of integrating the community-based approach within their health and development plans.

The Regional Office assists countries in developing model areas to implement CBI. These model areas can serve as the operational research projects and the basis for subsequent expansion to a national programme.

Figure 2 shows the improvement in health and in other social indicators in countries where the CBI programme has been evaluated.

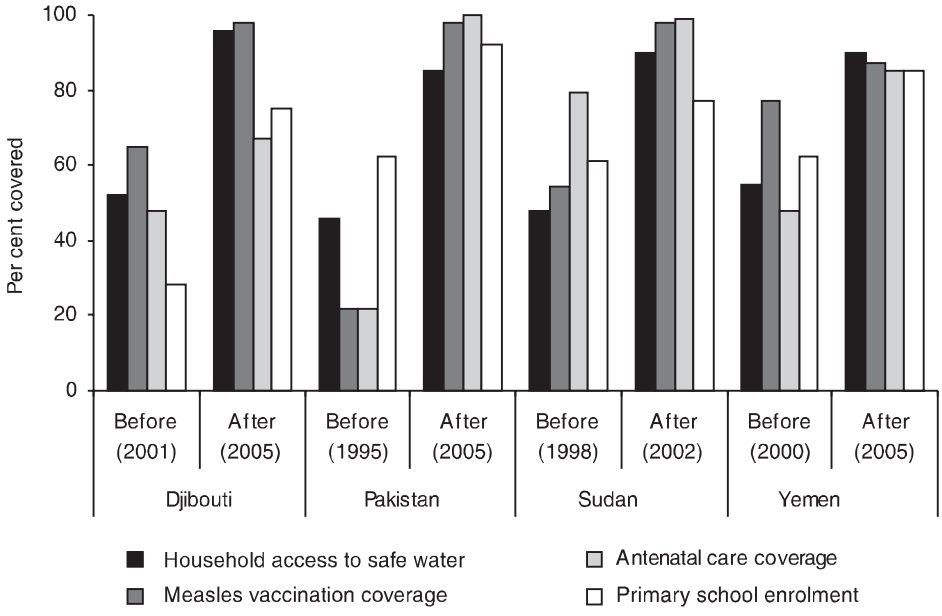

Figure 2 **Improvement in health and social indicators in areas with a basic development needs programme**

Towards sustainable community-based initiatives

Commitment of the national and local governments, collaboration with civil society and some form of external financial support are essential to meet the challenge of sustainability and scaling up of CBI. Monitoring, evaluation and documentation need to be improved, but at the same time care is needed not to compromise the participation of community members in the process of data collection and management, as this is essential to the local feeling of project "ownership . Nor must the emerging leadership roles of local women be undermined if work through formal government channels ignores the community voice.

Plans for future interventions build on current CBI experiences. Thus there are plans to expand community-based strategies to control malaria, tuberculosis and HIV/AIDS, applying the lessons learned from CBI. One objective is to make DOTS available in all BDN areas of the Region by the end of 2007. Another key intervention is the preparation of a plan to expand community-based health insurance schemes in Pakistan, Sudan and Yemen in 2008.

The experience in countries of the EMR with CBI, where health is central to the development process, provides a useful model for other regions for providing interventions at the grass-roots level that address the social determinants of health. CBI is especially effective in overcoming gender discrimination and in providing a social environment that supports women's development. Despite the effectiveness of CBI, the major challenge is its full ownership by the community and its institutionalization within national health and development policies and programmes. WHO continues its technical support to Member States to overcome these challenges and make CBI a part of the national health and development plans. This will eventually improve the quality of life of the people, particularly the poor and most vulnerable groups of the community.

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El Niño and malaria

The term El Niño is nowadays used to refer to periods of strong and prolonged warm weather in the eastern Pacific which influence the climate worldwide. Events occur every 2–7 years and last around 12–18 months. They begin with the weakening of the prevailing winds in the Pacific and a shift in rainfall patterns; the warm waters are accompanied by changes of air pressure in the Pacific. The whole cycle is now referred to as El Niño Southern Oscillation (ENSO). The regions where El Niño has a strong effect on climate are those with the least resources: southern Africa, parts of South America, South-East Asia.

The El Niño phenomenon provides good opportunities to study effects of climate variability on human health. Research is centred on the ability to predict El Niño events: seasonal forecasts are used to predict major climate trends for anything from several months to a few seasons ahead and are much more reliable during El Niño.

WHO is a member of the United Nations Inter-Agency Task Force on El Niño, which aims to develop strategies towards prevention, preparedness and mitigation as regards El Niño-induced disasters. ENSO is associated with increased risks of some of the diseases transmitted by mosquitoes, such as malaria, dengue and Rift Valley fever.

Malaria transmission is particularly sensitive to weather conditions. In some highland regions of the world, higher temperatures possibly linked to El Niño may increase transmission. This has been shown to occur in higher latitude parts of Asia such as northern Pakistan. A pilot study on the application of seasonal forecasting to malaria control has been undertaken in southern Africa.

WHO s Roll Back Malaria initiative targets control efforts to years when there is a high-risk of El Niño, increasing the cost-effectiveness of malaria control; the judicious use of insecticides can also delay the development of resistance.

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Editorial

The role of health promotion in poverty reduction

Haifa Husni Madi[1] and Syed Jaffar Hussain[2]

Introduction

Debate around poverty and health has been going on for decades. More central to this debate in recent times is the argument whether poverty leads to ill-health, or poor health is a precursor of poverty. Although ample scientific evidence currently supports both arguments, the fact remains the same: poverty and ill-health almost always co-exist.

In recent years, governments and development partners have placed greater focus on addressing the determinants of health. Health promotion, as defined in the Ottawa Charter in 1986, has been shown to be an important element of public health [*1*]. By virtue of this phenomenon, health promotion has been shown to address the "causes of the causes of health, thereby improving the health of the population. The nexus of health and poverty has also been reinforced in the United Nations Millennium Development Goals. The importance of these goals in health is, in one sense, self-evident. Improving the health and longevity of the poor is an end in itself—a fundamental goal of economic development. But it is also a □□□□to achieving the other development goals relating to poverty reduction [□]. The linkages of health to poverty reduction and to long-term economic growth are powerful, much stronger than is generally understood. Even in the most affluent countries, people who are less well off have substantially shorter life expectancies and more illnesses than the rich. Not only are these differences in health an important social injustice, they have also drawn scientific attention to some of the most powerful determinants of health standards in modern societies [□].

This paper frames a debate around the nexus between ill-health and poverty and articulates the various dimensions of health promotion, viz. exploring the dynamics of how health promotion interventions can be relevant in poverty reduction, and thus improving the health of the population.

Framing the debate

The definition of health promotion as outlined in the Ottawa Charter is "Health promotion is the process of enabling people to increase control over, and to improve, their health . To reach a state of complete physical, mental and social well-being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment. Health is, therefore, seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Therefore, health pro-

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motion is not just the responsibility of the health sector, but goes beyond healthy lifestyles to well-being [*1*]. This definition has been amplified in practice and has been the subject of 6 global conferences. To many, the [illegible] became the gospel and foundation stone of a new public health movement [illegible].

In many parts of the world, health promotion goals and processes are firmly embedded in national and multinational health policies, objectives and targets. The focus of health promotion on the prerequisites for health and equity in health is recognized nationally and globally through the Millennium Development Goals and other policies to address social and economic determinants of health and inequalities in health. The Ottawa Charter's call to work in partnership with other sectors to develop healthier public policy has been widely adopted and implemented. This has taken shape in various ways, reflecting social, cultural and economic contexts and the stage of development of health promotion practice [illegible].

The number of people living in absolute poverty and despair is growing steadily despite unprecedented wealth creation worldwide in the past 2 decades. Today nearly 1300 million people live in absolute poverty [illegible]. Poverty is a major cause of ill-health; it contributes to the spread of disease, undermines the effectiveness of health services and slows population control. Morbidity and disability among poor and disadvantaged groups lead to a vicious spiral of marginalization, to their remaining in poverty, and in turn, to increased ill-health. In the past, spending on health and health programmes was considered to be expenditure on welfare and welfare programmes. It was thought that economic growth would make more resources available to health systems and that as a result health outcomes would improve. This has, however, proven not to be an automatic process [illegible]. Moreover, studies in recent years have shown that improvements in health contribute significantly to economic growth.

Health is a continuum that ranges from the healthy, unexposed population through to the population that suffers from specific diseases and their consequences. Health promotion incorporates both upstream approaches (aiming to improve the contexts for health generation, improving social capital and community capacity to act on health) as well as downstream actions (risk reduction through behaviour change communication, promotion of self-help in disease and coping with the consequences of disease).

The focus is on upstream approaches, with the [illegible] [illegible] identifying actions and commitments in 4 areas:

- the global development agenda
- whole-of-government approaches
- action by communities and civil society
- health promotion as an integral part of good corporate practice.

The nexus between poverty and health

Health is unevenly distributed among social groups in the population. We have to acknowledge that we live in a stratified society, where the most privileged people, in economic terms, have the best health. These inequalities in health are socially determined, unfair and modifiable. At the same time there has been a paradigm shift in the perception and vocabulary of development in recent years. Where once development was equated with economic

growth, which was seen as the ultimate goal, now poverty reduction is seen as the overarching achievement of development. Where the route to economic growth was once seen as running through investment in physical capital, it is now recognised that many forms of capital, including human and social capital, contribute to the growth of output [9]. Poverty itself is recognised as a multifaceted concept, not simply a matter of insufficient income, but also a matter of insufficient or inappropriate earning capacities in relation to ill health, ignorance, and lack of power and voice. Where once it was assumed that the benefits of economic growth would eventually "trickle down to the poor, the delivery of welfare to the poor in the forms of improved livelihoods, social services, and benevolent governance is now seen as both a direct assault on those multiple deprivations and as an investment in the capacities of the poor to lift themselves out of poverty.

Economic growth is still perceived as desirable, but it is for its instrumental value in enhancing the resource base to deliver social services, productive employment opportunities and better governance, not as an end in itself.

As Williamson says, "poverty is ... a complex phenomenon rooted in an array of factors and conditions, many of which extend beyond the control of the health sector" [*10*]. Poverty reduction is not a feature that can be accomplished by any one person in any one sector because poverty is multi-faceted and deeply rooted in many socioenvironmental conditions. It calls for a community-based, multisectoral approach. The nexus between poverty and health is best articulated in Figure 1.

At a purely material level, income has an obvious impact on health insofar as it provides the means of obtaining the fundamental prerequisites for health such as shelter, food, warmth and the ability to participate in society. Low income, therefore, increases individuals' exposure to harmful environments, e.g. inadequate housing, and reduces a family's ability to purchase necessities such as a healthy diet. Poverty also reinforces health-damaging behaviours [*11*].

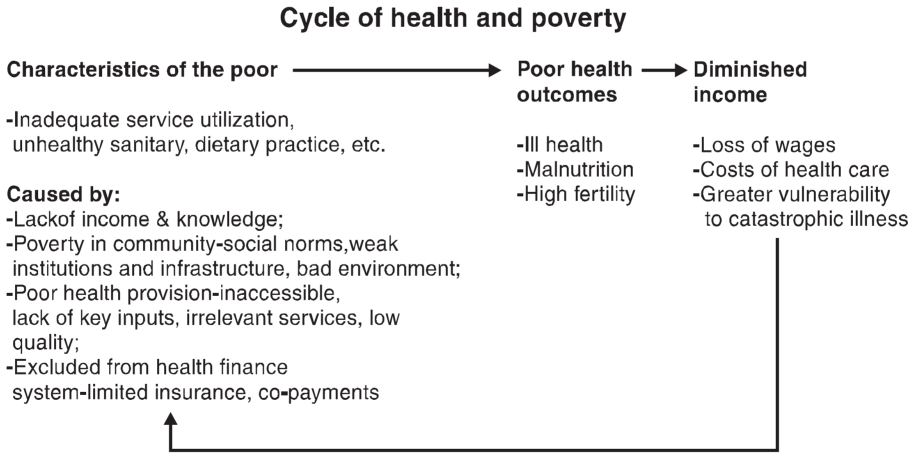

Figure 1 **Cycle of health and poverty, source: Claeson M et al. [*13*]**

The place of health promotion in poverty reduction

Health promotion is a basic building block of public health. Together with population health assessment, health surveillance, disease and injury prevention, and health protection, health promotion is a central public health function that furthers □□□public health work. Health promotion and disease and injury prevention can be approached by addressing individual risk factors for specific health outcomes (e.g. poor nutrition, physical inactivity, excessive sun exposure) or by addressing the underlying societal risk conditions (e.g. poverty and socioeconomic-related linked inequities) [*1*□]. For many years, the international health community has been pointing to the large gaps in health outcomes between rich and poor countries. Extensive scientific evidence is now available on the factors that contribute to good health outcomes in childhood, the reproductive period and adulthood. For example, much is known about preventive and curative health services that promote good health among small children, sound dietary and sanitary practices and the importance of stimulation for young children [*1*□].

Health—along with education—is seen as one of the key ultimate goals of development. Indeed, increasingly health is seen as a □□□ □□□□□□ of poverty in its own right. This is reflected in the fact that no less than 4 of the 7 Millennium Development Goals relate to health broadly defined. The role that health promotion can play in combating poverty is based on 3 essential components, namely:

- definition and implementation of priority interventions and health services, taking into account the major causes of morbidity and mortality among the poor;
- reinforcement and extension of health systems to provide better management of poor communities by increasing the budget of ministries of health and using their resources more effectively;
- strengthening inter-sectoral collaboration for the benefit of the poor in order to have a positive impact on the key determinants (education, employment, nutrition, participation of the poor in decision-making).

Priority interventions aimed at reducing poverty must be based on certain major principles such as equity and ethics, relevance of health interventions to the needs of the poor, accessibility, quality, efficiency and sustainability, participation of communities concerned, and the taking into account of gender specificity.

Interventions may comprise actions aimed at improving health through the intensification of the fight against practices harmful to health, tuberculosis, maternal and child mortality, tobacco use, malnutrition and HIV/AIDS, and also through immunization, education, environmental health and clean water supply.

A common claim that is incessantly reiterated in health promotion is lack of resources. There is a broadly held belief that economically poor countries have far fewer resources than others with which to engage in interventions to promote health. Moreover, this issue of resources seems to be a feature that distinguishes the practice of health promotion in the economically-developed world from that carried out in the economically-poor world. This may not, however, accurately represent the situation. The argument can surely be made that resources are more than purely financial, and that communities throughout the world have many different kinds of resources with which to support and carry out interventions

that are health promoting. In fact, an entire area of research and practice has arisen on how to recognize, foster and benefit from assets for health promotion. Nonetheless, in terms of visibility of health-promoting interventions, financial resources seem to be the cornerstone for subsistence and dissemination. It is, however, the case that quite often there are important and critical interventions occurring in the less economically developed world that are indeed effective, but these are not seen because the financial issues associated with evaluation, publication, diffusion, etc. are not available. The assumption that there are noteworthy and vital effective interventions occurring in the developing world has come to be an accepted belief among many in the field of health promotion [*1*].

Discussion and conclusion

Many factors play a part in creating and perpetuating social inequalities in health. The situation is complex, but we can nevertheless state that it is generally social circumstances that affect health and not the other way round. Although in many cases serious health problems lead to loss of income and work and difficulties completing education, social status still has a bigger impact on health than health does on social status.

The Ottawa Charter formally recognized that health services should incorporate health promotion concepts such as community development, empowerment and advocacy, and called upon the health sector to move in this direction. The charter states that "... the health sector must move increasingly in a health promotion direction, beyond its responsibility for providing clinical and curative services . The charter provides logic and order to health promotion. It also discusses normative approaches to managing and improving health at individual, community, national and global levels [*1*]. The commonplace of arguing for the place of health promotion in poverty reduction clearly has convergent theoretical foundations. They refer to the need to work "upstream , to address the "causes of the causes . They are founded on strong ideology and have complementary evidence bases. They recognize the need to operate on social structures, to involve non-health sectors and indeed to base the emphasis of their work on "whole-of-government commitment. Together, these areas demonstrate the scope, breadth and depth of actions that governments and society as a whole must undertake in order to achieve better health outcomes. Indeed, a key challenge for a unified approach to these areas would be to demonstrate what it would take for public health to navigate complex social and political processes that are driving the way in which health and resources for health are distributed.

Convergence, though, is not identity. The juxtaposition of the work of these fields raises a number of areas of difference such as those outlined below (World Health Organization, unpublished report, 2007). The following scenarios are simplified versions of actual situations that demonstrate the different contributions to be made within a unified structure that addresses all the determinants of health:

- □□□□□ □□□□□ □□□□□—How are policy-makers to reconcile efforts to improve the public health situation of the population generally (e.g. broad improvements in nutritional status) with the observation that this may be associated with worsening inequity (as better-off social classes get proportionally greater improvement)? Broad improvements, the population approach to prevention, may

need to be balanced against high-risk approaches (intensive targeted prevention for the poorest classes). But how are we to develop an investment framework for such activities?

- [illegible]—A soft drinks company mini-sizes its products (sells it in small bottles priced at a level affordable by poorer families) and uses microfinance strategies to ensure a distribution mechanism that extends to the farthest reaches of the poorest shanty towns. Is this an example of a pro-poor initiative offering a way out of poverty and generation of small businesses? Or is it an example of cynical marketing designed to maximize sales while diverting poor families' incomes into the purchase of "empty nutrients?
- [illegible]—Raising people out of poverty has an energy cost. If poorer countries develop via the use of environmentally unsound technologies, then the net effect of massive poverty alleviation programmes could contribute to intolerable global warming. For instance, biofuels, which supposedly have a neutral effect on the environment and promote income for poorer countries that export the raw materials (e.g. palm oil), have recently been documented as causing widespread environmental degradation as slash and burn agricultural techniques and clearance of peat areas are adopted to make way for increased palm oil production [*1*].
- [illegible]—Consider this scenario for a community which has a significant burden of chronic respiratory diseases. Most of the burden is due to tobacco smoking, concentrated in the richer parts of this middle-income country. A smaller portion of the burden is caused by indoor air pollution which is concentrated in the poorest segments of the population. Clearly, both are issues that need addressing, but capacity is limited and local public health officials need guidance on whether to primarily invest in tobacco control (the traditional public health approach) or in promotion of safer fuels (a primarily equity-based strategy).

That being said, fair distribution of resources is a good public health policy [*1*]. The primary goal of future public health work is not to further improve the health of the people who already enjoy good health: the challenge now is to bring the rest of the population up to the same level as the people who have the best health—levelling up.

In conclusion, it may be argued that health promotion has an in-built survival kit since it deals not only with disease prevention, but the changing or promotion of conditions within which health can thrive [*1*]. Health promotion seeks to promote conditions supportive of health improvement, and for this reason both the developed and developing countries must cooperate to ensure that the discipline is well established in the latter. All policymakers and programme managers are keen to see better health outcomes for the populations they serve. Better health outcomes are achieved through well-functioning health systems, characterized by good governance, adequate and fair financing, optimal distribution of resources and accessible services, priority health programmes targeting problems that are responsible for the major burden of diseases, and promotional components that tackle the upstream health determinants [*1*].

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Seroprevalence of hepatitis A among children of different socioeconomic status in Cairo

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الانتشار المصلي لالتهاب الكبد A بين الأطفال من مستويات اجتماعية واقتصادية مختلفة في القاهرة، مصر

إيمان إبراهيم سلامة، سامية محمد سامي، فاطمة أحمد السيد شعبان، أمل إبراهيم حسنين، ليلى أحمد أبو إسماعيل

الخلاصة: بُغْيَةَ تحديد الانتشار المصلي لأضداد فيروس الكبد A، وعوامل اختطار الإصابة، وسن التقاط العدوى الأعراضية بهذا الفيروس بين الأطفال من مستويات اجتماعية واقتصادية مختلفة، في القاهرة، أجرى الباحثون دراسة مستعرضة شملت 426 طفلاً تراوحت أعمارهم بين 3 و18 عاماً، من مستويات اجتماعية واقتصادية منخفضة، و142 طفلاً من مستويات اجتماعية واقتصادية مرتفعة. وتبيَّن أن الانتشار المصلي لهذه الأضداد يرتفع ارتفاعاً يُعتدُّ به إحصائياً مع تقدُّم العمر. كذلك، كانت إيجابية المصل لأضداد هذا المرض مرتفعة ارتفاعاً كبيراً بين الأطفال من المستوى الاجتماعي والاقتصادي المنخفض، والشديد الانخفاض، إذْ بلغت النسبة لديهم 90٪، مقارنة بالأطفال من المستوى المرتفع الذين لم تتعد النسبة لديهم 50٪. وتمثَّلت أهم عوامل الاختطار لإيجابية المصل لدى الأطفال، بالنسبة لهذا المرض، في إمدادات المياه، وطريقة التخلُّص من مياه المجاري. وكان الأطفال من المستوى الاجتماعي والاقتصادي المرتفع أكثر احتمالاً للتعرُّض للعدوى بهذا المرض في سن المراهَقَة، من الأطفال ذوي المستوى الاجتماعي والاقتصادي المنخفض.

ABSTRACT To determine seroprevalence of anti-hepatitis A virus (HAV) antibodies and potential risk factors for and age of contracting symptomatic hepatitis A infection among children of different socio-economic status (SES) in Cairo, we carried out a cross-sectional study on 426 children aged 3–18 years from low SES areas and 142 from high SES areas. Seroprevalence was significantly higher with age. Seropositivity to anti-HAV antibodies was significantly higher among children of low and very low SES, 90%, compared to children of high SES, 50%. Water supply and sewage disposal were the most significant risk factors for HAV seropositivity in children of low SES. Children of high SES were more likely to be vulnerable to infection in adolescence than those of low SES.

La s ropr valence de l h patite A che les enfants issus de diff rents milieux socio- conomiques au Caire

RÉSUMÉ Afin de déterminer la séroprévalence des anticorps anti-VHA (VHA = virus de l'hépatite A), les facteurs de risque potentiels de développement de l'hépatite A et l'âge de manifestation de l'infection chez les enfants issus de différents milieux socio-économiques au Caire, nous avons mené une étude transversale auprès de 426 enfants âgés de 3 à 18 ans de zones socio-économiquement défavorisées et de 142 enfants de zones socio-économiquement favorisées. Il a été constaté une augmentation significative de la séroprévalence proportionnelle à l'âge. La séropositivité pour les anticorps anti-VHA s'est avérée très élevée chez les enfants des milieux défavorisés et très défavorisés, s'élevant chez ceux-ci à 90 % contre 50 % dans les classes plus favorisées. Les conditions d'alimentation en eau et d'évacuation des eaux usées se sont imposées comme les facteurs de risque majeurs de séropositivité VHA chez les enfants de milieux défavorisés. Les enfants issus des classes plus favorisées sont apparus plus vulnérables à cette infection à l'adolescence que ceux appartenant aux milieux socio-économiquement faibles.

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Introduction

Viral hepatitis, which causes various forms of acute and chronic liver disease, presents a public health problem worldwide. Hepatitis A virus (HAV) is an enterically transmitted viral infection, endemic in many developing countries, where the prevalence can approach 100% in children by 5 years of age [*1*]. Most infections in children younger than this are asymptomatic or have mild, nonspecific manifestations (e.g. fever) that are indistinguishable from other viral infections. With increasing age symptomatic acute infection is more common; chronic HAV infection does not occur [□].

Seroprevalence of HAV infection varies from one country to another according to socioeconomic factors and standard of living. In the developing countries, HAV is acquired very early in life and nearly 100% of adults have detectable levels of anti-HAV and are therefore immune to infection. In such countries, epidemics of HAV are uncommon [□]. In the more developed countries, where there is good sanitation and hygiene, most people reach adulthood without experiencing infection. It is characterized by a low prevalence among children (10%), and a large susceptible pool of adults being negative for anti-HAV (about 63%) [□].

In the United States of America, because children account for at least one third of cases and are also a potential source of infection for others, routine vaccination of children is an effective way of reducing hepatitis A incidence [□]. Highly effective vaccines against hepatitis A have been available since the mid 1990s, but vaccination is expensive and there are numerous reports worldwide on the changing epidemiology of hepatitis A and its prevalence. Therefore, information on the prevalence of immunity in each population would be required for any national hepatitis vaccination programme [□].

In Egypt, which is considered an area of high endemicity for HAV infection, marked economic, hygiene, and sanitary improvements have taken place in recent years, especially in urban areas [□]. Improvements in living conditions may lead to changes in the epidemiology of HAV infection, with a decrease in antibody prevalence among children; consequently a significant proportion of the adolescent and adult population will be at risk of infection [□].

The aim of the present study was to assess the difference in the seroprevalence of anti-HAV antibodies and the age of symptomatic HAV infection among children of different socioeconomic status in Cairo, Egypt. We also aimed to identify potential risk factors for seropositivity for anti-HAV antibodies.

Methods

This was a cross-sectional study carried out in the Health Insurance Clinic at El Abasseya, Cairo during the 6 month period October 2003–March 2004. The clinic serves several areas, mainly of low SES. Approval from the General Institute of Health Insurance was taken to allow the researchers to conduct the study and to collect blood from the participants. All students referred to the health insurance services for further examination for minor medical problems (school accidents, falls, cuts, headache, pallor, problems in visual acuity, etc.) were asked to participate in this study. The clinic is one of the paediatric clinics of the General Institute of Health Insurance (Ministry of Health and Population). It serves schoolchildren referred from public schools in the area. Therefore the participants are representative of the school population in urban

and semi-urban areas. For younger children, parent's consent for taking a blood sample was taken; for those aged 11 years and over, consent was obtained from both the parent and the child. There were 10 refusals to participate and 2 children who had already been vaccinated against hepatitis A were excluded.

All children aged 3–18 years, consecutively attending the Health Insurance Clinic during the study period were invited to participate in the study without any selection. Children who attended more than once during the study period were included only once. Parents of young children were interviewed by a member of the research team, while adolescents were personally interviewed, in the presence of their parents, to complete a questionnaire to collect demographic data (age, sex, residence, level of education, number of family members, SES, etc.), home sanitary conditions (source of drinking water, sewage disposal, etc.) and previous history of symptomatic hepatitis A (history of jaundice, confirmed by elevated liver enzymes and positive antibody test).

Socioeconomic status (SES) was determined according to the scale of Fahmy and El-Sherbiny [□]; 7 items were assessed to categorize SES of the children into very low, low, middle and high. These items were: mother's education, father's education, family income, family size, water supply, refuse disposal and sewage disposal [□].

Residence was divided into 4 regions based on level of environmental sanitation and source of water supply: region 1: Hadaek El Kobbah and surrounding areas; region 2: Misr El Kademah and El Moneib; region 3: Mansheyet Nasser and El Duekah; region 4: Ain Shams and surrounding areas.

To compare between the children of low SES and children of high SES as regards the prevalence and age symptomatic of HAV infection, 142 children of high SES, children of physicians working in the National Research Centre, of comparable age and sex were also studied.

Blood was drawn aseptically by venepuncture by a physician in the outpatients' laboratory (clinical and chemical pathology) at the General Institute of Health Insurance. The serum was separated by centrifugation at 2000 rpm for 20 minutes; serum was stored at –20 °C until examined for determination of antibodies to HAV using competitive enzyme immunoassay commercial kits (Dia.Pro Diagnostic Bioprobes Srl, Milan, Italy). This is a solid phase sandwich enzyme (linked immunosorbent assay) [*10*]. Liver enzyme alanine aminotransferase (ALT) level was evaluated to assess liver function by a kinetic method (ELITech Diagnostic Kit, SEPPIM, Sees, France) [*11*].

Data entry and analysis were done using □□□, version 9. Statistical analysis of the results was made by applying the chi-squared test of significance.

The association between potential risk factors and past infection with HAV was evaluated using backward logistic regression analysis. Goodness-of-fit statistics were examined to determine appropriateness of the final models. Risk factors entered in the logistic analysis included age, sex, housing conditions and socioeconomic variables to detect the most significant predictive risk factors associated with HAV seropositivity.

Results

Among the children who participated from the Health Insurance Clinic, seroprevalence of anti-HAV antibodies was 86.2% overall, 85.3% among males and 86.9% females with no statistically significant difference

(□ > 0.05). In the high SES group (children of physicians), overall prevalence of anti-HAV antibodies was 50.2%, also with no significant difference between males and females.

A significantly higher prevalence of anti-HAV in relation to age was observed in the low SES children, 64.3% among those < 6 years, 85.3% among those aged 6–10 years, and 90.0% among older children (≥ 11 years) (□ < 0.05).

The relations between prevalence of anti-HAV antibodies and socioeconomic characteristics and sanitary housing conditions among the participants from the Health Insurance Clinic are shown in Table 2. There was a statistically significant association with education of parents: seroprevalence of anti-HAV antibodies was higher for children whose parents were educated to preparatory level or below (□ < 0.05). There was also a statistically significant association between HAV seropositivity and socioeconomic status (□ < 0.01). A higher proportion of children from the very low social level were HAV positive (91.7%) compared to the other social levels (Table 2). A higher prevalence of anti-HAV (90.0%) was also found among children living in slum areas (areas with non-hygienic water supply, sewage disposal and refuse disposal) compared to areas with a safe water supply and basic sanitation (77.6%) (□ < 0.01). There was a significant regional (based on sanitation and water supply) variation in the anti-HAV prevalence, it was lowest (73.2%) in region 1 and highest (95.8%) in region 4 (□ < 0.001).

Among the 367 HAV-seropositive children participating from the Health Insurance Clinic, 33 had had symptomatic disease. At the time of the study, 6 children had acute hepatitis with elevated serum ALT (range 74–422 U/L). Table 3 shows no significant statistical difference in the seroprevalence of HAV antibodies between children with a history of jaundice or contact with a jaundiced patient and those without (□ > 0.05). Excluding the 6 cases with acute infection, there was no significant difference in mean ALT levels among children positive for (9.7 U/L; standard deviation 4.5) and negative for (9.5 U/L; standard deviation 5.5) HAV IgG antibodies (□ > 0.05).

From multiple logistic analysis, water supply and sewage disposal were the most important risk factors for prediction of HAV seropositivity among the participants from the Health Insurance Clinic. The risk of infection with HAV was 3 times higher among children using a public water supply compared to those with piped water inside the home. Using non-hygienic sewage disposal increased the risk of HAV infection 2.6-fold compared to using a private toilet with flush (Table 4).

Table 1 **Seroprevalence of anti-hepatitis A virus (HAV) antibodies among a group of children from low socioeconomic areas in Cairo**

Variable	No.	Anti-HAV +ve		*P*
		No.	%	
Sex				
Male	190	162	85.3	0.673
Female	236	205	86.9	
Age (years)				
< 6	28	18	64.3	0.003
6–10	204	174	85.3	
11–15	154	139	90.3	
> 15	40	36	90.0	
Education[a]				
Kindergarten	14	10	71.4	0.104
Primary	222	195	87.8	
Preparatory	93	86	92.5	
Secondary	77	65	84.4	
Total	426	367	86.2	

[a] *20 children < 6 years old were not registered in kindergarten and stayed home with their mothers.*

Table 2 **Seroprevalence of anti-hepatitis A virus (HAV) antibodies among a group of children in Cairo according to socioeconomic variables**

Variable	Total (*n* = 426)	Anti-HAV +ve No.	%	*P*
Mother s education				
Preparatory and below	357	313	87.7	0.036
Secondary and above	69	54	78.3	
Father s education				
Preparatory and below	338	301	85.0	0.002
Secondary and above	88	67	76.1	
Monthly family income (Egyptian pounds)				
< 300	297	265	89.2	0.005
≥ 300	129	102	79.1	
Family size				
3–5 persons	206	172	83.4	0.278
≥ 6 persons	220	195	88.6	
Environment				
Slum	274	249	90.9	< 0.001
Urban	152	118	77.6	
Water supply				
Outside house	90	86	95.6	0.004
Inside house	336	281	83.6	
Refuse disposal				
Non-hygienic	89	83	93.3	0.028
Hygienic	337	284	84.2	
Sewage disposal				
Non hygienic	274	249	90.8	< 0.001
Private toilet with flush	152	118	77.6	
Residence[a]				
Region 1	83	61	73.5	< 0.001
Region 2	19	16	84.2	
Region 3	300	267	89.0	
Region 4	24	23	95.8	
SES				
Very low	223	204	91.7	0.003
Low	144	118	81.9	
Middle	47	37	78.7	
High	12	7	58.3	

[a]*Region 1: Hadaek El Kobbah and surrounding areas. Region 2: Misr El Kademah and El Moneib, Region 3: Mansheyet Nasser and El Duekah. Region 4: Ain Shams and surrounding areas.*
SES = socioeconomic status, determined according to Fahmy and Sherbiny [10].

Table 3 **Seroprevalence of anti-hepatitis A virus (HAV) antibodies in relation to history of hepatitis among children from low socioeconomic areas in Cairo**

Variable	Total (*n* = 367) No.	%	Anti-HAV +ve No.	%	*P*
History of jaundice					
Yes	35	8.2	33	94.3	0.210
No	391	91.8	334	85.4	
Contact with jaundiced persons					
Yes	86	20.2	77	89.5	0.476
No	340	79.8	290	85.3	
Serum ALT (IU/L)					
> 42	6	1.4	6	100.0	0.941
< 42	420	98.6	361	85.9	

ALT = alanine transaminase.

Table 5 shows the comparison between the children of very low and low SES (from the Health Insurance Clinic) and those from high SES (142 children of physicians from the National Research Centre). Seroprevalence of HAV antibodies was significantly lower among children of high SES (50.7%) than among those of very low and low SES (87.7%) (< 0.01). The proportion of children with history of symptomatic HAV infection contracted at 10 years of age or older was significantly higher among children of high SES than among those of very low and low SES (< 0.05). They also reported having more severe symptoms compared to younger children

Table 4 **Multiple logistic analysis identifying risk factors significantly predictive of hepatitis A virus seropositivity**

Predictive variable	Adjusted OR	95% CI
Water supply		
Inside house	R	
Outside house	3.0**	1.1–10.2
Sewage		
Private toilet with flush	R	
Non hygienic disposal	2.6*	1.4–4.8

*P < *0.05.*
**P < *0.01.*
OR = odds ratio; CI = confidence interval.
R = reference group.

Discussion

Results of the present study were compared with previous HAV seroprevalence studies done in Egypt [*1* *1*]. Direct comparison between these studies is difficult because different age strata and geographical distribution were studied. However, the overall seroprevalence of hepatitis A in all the previous studies ranges between 89.4% (in Alexandria) and 100% (in rural areas). In the present study, although the overall prevalence of anti-HAV was still very high (86.2%) it was slightly lower than in the previous studies. A similar high prevalence has been reported from Palestine (93.3%) and Syria (89%) [*1* *1*]. Intermediate prevalence of 52.4% has been recorded in Saudi Arabia [*1*].

Table 5 **Comparison of children regarding seroprevalence and history of symptomatic hepatitis A virus (HAV) infection according to socioeconomic status**

Variable	Socioeconomic status				OR	95% CI	*P*[b]
	Very low & low (*n* = 367)		High[a] (*n* = 142)				
	No.	%	No.	%			
HAV seroprevalence							
+ve	322	87.7	72	50.7	6.9	4.3–11.2	< 0.001
–ve	45	12.3	70	49.3			
History of symptomatic HAV infection, age contracted (years)							
< 10	18	75.0	4	33.3	6.0	1.1–37.2	0.028
≥ 10	6	25.0	8	66.7			

[a]*Children of physicians at the National Research Centre.*
[b]*Fisher exact test;* P < *0.05 considered significant.*
OR = odds ratio; CI = confidence interval.

Higher prevalence of anti-HAV in relation to age was observed in this study. A much higher prevalence was reported among preschool children in India (90.9%) [10]. Therefore, in out study, almost 10% of the low SES urban children over the age of 10 years in were still vulnerable to HAV infection. This is expected to be much higher among children of high SES, and in fact around 50% of children from the high SES group in our study were not immune and would be vulnerable to infection in early adulthood. This is in accordance with the expected pattern of HAV seroprevalence in a region of high endemicity [9,11].

In the current study, no statistically significant difference was observed between the seroprevalence of anti-HAV among males and females and this was in accordance with some studies in India [9,10]; in Latin America and South Africa, however, anti-HAV seroprevalence was significantly higher in females than males [11, 12].

Similar to the present study, in a Palestinian study a significant association was found between seroprevalence of anti-HAV and socioeconomic standard and family income: it was significantly lower in children of high SES and those from families with higher income [11]. In the present study there was a significant relationship between HAV seroprevalence and sanitary conditions: prevalence rates were higher among children living in poor sanitary conditions and water supply and sewage disposal were the most important significant risk factors for the prediction of HAV seropositivity. This is in accordance with studies done in Saudi Arabia and in Santiago [13,14].

Regional variation was observed in the current study, as very high prevalence of anti-HAV was found in the region of Ain Shams and surrounding areas (95.8%) compared to Hadaek El Kobbah and surrounding areas (73.2%). This could be explained in part by the diversity in standards for environmental hygiene and safety of water supply, despite the homogeneity of the population regarding cultural practices and habits: for example, region 4 has many slum areas with poor sanitary conditions compared to region 1 which has a piped household water supply and hygienic sewage disposal. Similar observations were made in a study done in Saudi Arabia [15].

A higher prevalence of anti-HAV antibodies was noted with greater family size but it was not statistically significant. However, Fix et al. found a significant association between the prevalence of anti-HAV antibodies and crowded living situations [□□]. The present study as well as other studies revealed that lower levels of maternal or paternal education were significantly associated with a higher seroprevalence [□□].

A history of hepatitis or of contact with a case of hepatitis has been shown to be associated with anti-HAV seropositivity [*1*□]. In the present study no statistically significant association was found. Regarding children who had history of symptomatic HAV infection, most contracted the infection before 10 years of age but more than 20% contracted the infection at age ≥ 10 years. While more than 80% of cases of hepatitis A occurring in children under 5 years of age are asymptomatic, infected children without jaundice can still shed the virus and serve as a source of infection for others [□□]. Tosun et al. reported a shift of seropositivity from children to adolescents in Turkey, especially in families with average or high SES [□□]. In the present study the majority of low SES children who gave a history of symptomatic HAV infection were under 10 years of age while for children of high SES the majority who gave history of symptomatic infection were aged ≥ 10 years. Children who got symptomatic infection above age of 10 years reported severe form of symptoms compared to younger children. Similarly, Arguedas and Fallon reported that the severity of HAV illness increases with age [□□].

To sum up, despite improvements in gross national products and in socioeconomic standards [□□], Egypt is still highly endemic for HAV infection, especially among those living in a low SES with poor housing conditions. While, nearly half of the studied children of high SES were susceptible to hepatitis A infection (non-immune). Raising the socioeconomic standard of the population, improving housing conditions and improving sanitary conditions are needed for these low SES regions. Further studies are needed for high SES children to assess their need for HAV vaccination.

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Breast cancer risk factors in south of Islamic Republic of Iran: a case control study

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عوامل اختطار سرطان الثدي في جنوب جمهورية إيران الإسلامية: دراسة حالات وشواهد

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الخلاصة: أُجريَت دراسة حالات وشواهدها في المدة من نيسان/أبريل 2000 إلى آذار/مارس 2002، لتقصِّي عوامل اختطار سرطان الثدي في مدينة بندر عباس، بجنوب جمهورية إيران الإسلامية. واستُخدم تحليل التحوُّف اللوجستي للمقارنة بين 168 سيدة، تأكَّدت إصابتهن بسرطان الثدي الأوَّلي مع 504 من الشواهد المماثلات في العمر. وشملت عوامل الاختطار الرئيسية: سوابق إصابة إحدى القريبات من الدرجة الأولى بسرطان الثدي، وصغر السن عند بدء الإحاضة، وعدم سبق الزواج، وزيادة السن في أول حمل تام المدة على 30 عاماً، وزيادة مرات الحمل لِتَمَام على خمس مرات. وبيَّن التحليل المتعدِّد المتغيِّرات أن سابقة عدم الإرضاع من الثدي تمثِّل أحد العوامل التي يُعْتَدُّ بها إحصائياً. ولم تُلاحَظ فروق بين الحالات والشواهد في ما يتعلَّق بعدد الولادات، وسوابق الإجهاض، واستخدام موانع الحمل الفموية، والحالة بالنسبة للإياس، والعمر عند الإياس، وسوابق استخدام المعالجة التعويضية بالهرمونات، وسوابق الإصابة بأمراض الثدي الحميدة، وسوابق التدخين.

ABSTRACT A case–control study was carried out from April 2000 to March 2002 to investigate risk factors for breast cancer in Bandar Abbas, south Islamic Republic of Iran. Using logistic regression analysis, 168 women with pathologically confirmed primary breast cancer were compared with 504 age-matched controls. Significant risk factors were: family history of breast cancer in a first-degree relative, younger age at menarche, never married, first full-term pregnancy age 30+ years and > 5 full-term pregnancies. In multivariate analysis, negative history of breastfeeding was also significant. Cases and controls did not differ with regard to parity, history of abortion, oral contraceptive use, menopausal status, age at menopause, ever-use of hormone replacement therapy, history of benign breast disease or history of cigarette smoking.

Les facteurs de risque de cancer du sein dans le sud de la R publique islamique d Iran : une tude cas-t moins

RÉSUMÉ Une étude cas-témoins a été menée entre avril 2000 et mars 2002 à Bandar Abbas, dans le sud de la République islamique d'Iran, afin d'évaluer les facteurs de risque de cancer du sein. Cette étude a comparé, sur la base de la régression logistique, 168 patientes présentant un cancer du sein primitif confirmé par l'anatomopathologie avec 504 femmes témoins appariées en âge. L'analyse a identifié les facteurs de risque significatifs suivants : histoire familiale de cancer du sein au premier degré de parenté, apparition plus précoce des premières règles, absence de mariage, primiparité à terme au-delà de 30 ans et plus de 5 grossesses menées à terme. L'analyse multivariée a également montré l'importance d'une histoire négative d'allaitement au sein. Les cas et les témoins se sont avérés comparables en termes de parité, d'histoire d'avortement, d'utilisation de contraceptifs oraux, de statut ménopausique, d'âge à la ménopause, de na veté de tout traitement hormonal substitutif, d'antécédents de pathologie mammaire bénigne et de tabagisme.

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Introduction

Similar to other human cancers, breast cancer arises from a multifactorial process. Recent attention has focused on genetic predisposition to breast cancer [*1,*□] and on its association with factors relating to modern affluence, including diet and alcohol consumption [□ □]. Furthermore, the effect of reproductive factors strongly supports a hormonal role in its etiology in some industrialized countries [□,□]. Earlier age at menarche [□ *10*] and later age at first full-term pregnancy [□ *1*□] are associated with a significant increase in the risk of the disease, whereas the few studies that have been conducted in northern and central parts of the Islamic Republic of Iran have not confirmed a significant effect of these factors [*1*□ *1*□].

While numerous studies have been conducted in industrialized countries to assess the epidemiology of breast cancer, there have been few studies in Eastern Mediterranean Region populations. Such studies are of interest because their different risk profiles may help to explain the different occurrence of the disease in different populations. Although breast cancer is the most common form of cancer in Iranian women [*1*□], few epidemiological studies have been conducted on its risk factors, especially in the south of the country. The age-adjusted incidence of the disease is estimated to be 22.4 per 100 000 [*1*□]. Epidemiological studies have revealed a lower age of Iranian patients compared with their counterparts in industrialized countries [*1*□,*1*□] and a moderately rapid increase in the incidence of the disease in recent years [*1*□]. The question therefore arises as to whether or not breast cancer in the south of the Islamic Republic of Iran is influenced by some of the risk factors previously established in studies of high or moderate incidence areas.

This case–control study was undertaken to investigate this subject and the inconsistency between the results of the studies in northern and central parts of the Islamic Republic of Iran and populations elsewhere.

Methods

A case–control study was conducted from April 2000 to March 2002 in Bandar Abbas city, Hormozgan, Islamic Republic of Iran. Hormozgan province is the southernmost province of the country located along the Straits of Hormoz.

The eligible cases were all incident (i.e. diagnosed within 2 years before the interview) breast cancer patients living in the city during the study period. We approached 173 women with primary breast cancer who were eligible for our study but only 168 agreed to participate, giving a participation rate for cases of 97.1%.

Women were entered into the study if they had a confirmed pathological primary breast cancer diagnosis from the pathology department of Bandar Abbas Shahid Mohammadi Hospital, the leading university-based hospital in the region. For each case, 3 age-matched (to within 3 years) women were recruited from patients without any history of breast problems or neoplastic diseases who attended the outpatient ophthalmology or dermatology clinic in the same hospital. Women with a history of hysterectomy or artificial menopause were excluded from the study.

After taking informed consent from the women, a structured questionnaire was administered was completed at the time of recruitment including the following: demographic characteristics, family history of breast cancer in a first-degree relative, age at menarche, marital status, parity, age at first full-term pregnancy, number of chil-

dren or full pregnancies, history of previous breastfeeding (defined as having breastfed for > 2 months), history of induced or spontaneous abortion, history of ever-use of oral contraceptives, menopausal status, age at menopause, history of ever-use of hormone replacement therapy (HRT), past history of benign breast disease and history of cigarette smoking. All interviews were carried out by 2 interviewers who had been thoroughly familiarized with the study protocol.

This study did not use 'blinding' procedures with respect to the case status of subjects and it is possible that women who were diagnosed with breast cancer were more likely to provide more detailed complete information about past exposure history than controls. However, the investigators and the interviewers were fully informed about the possibility of recall/interviewer bias and their potential impact on our study. A number of efforts were made to minimize such bias, including standardization of wording in the interview and repeat interviews for some participants.

Odds ratios from univariate logistic regression were used to estimate the relative risk of breast cancer associated with the various factors, and their predictive effects. Based on the univariate analysis, the odds ratios (OR) were adjusted for potential confounding variables and 95% confidence intervals (CI) were calculated. A forward multivariate logistic regression model was used for significant associated risk factors and $\square < 0.05$ was considered statistically significant.

Results

Of 173 women with breast cancer who were newly diagnosed, 168 patients were entered in the study as cases and 504 women were selected as controls. As controls were age-matched with cases, there was no significant difference between the mean age of the 2 groups: 48.6 [standard deviation (SD) 13.7] years for cases versus 48.4 (SD 13.6) years for controls (Table 1).

The results of univariate binary logistic regression analysis are shown in Table 2. There were no significant differences between cases and controls with regard to parity, history of breastfeeding, history of induced or spontaneous abortion, oral contraceptive use, menopausal status, age at menopause, history of HRT use, history of previous benign breast disease or having ever smoked cigarettes.

However, breast cancer history in a first-degree relative was a significant risk factor (OR 9.07, 95% CI: 4.06–12.26). Women with younger age at menarche (< 13 years old) were found to be at higher risk for breast cancer than women with older age of menarche (OR 4.00, 95% CI: 1.82–9.84). Never married women demonstrated a higher risk of breast cancer than the others (OR 2.69, 95% CI: 1.38–7.12). Breast cancer risk was significantly greater in women where first full-term pregnancy was at age 30+ years in comparison with the others with first full-term pregnancy at lower age

Table 1 **Distribution of breast cancer patients and controls according to age**

Age (years)	Cases (*n* = 168)		Controls (*n* = 504)	
	No.	%	No.	%
< 35	24	14.2	67	13.3
36–45	54	32.1	162	32.1
46–55	33	19.6	124	24.7
> 55	57	33.9	151	29.9
Mean (SD)	48.6 (13.7)		48.4 (13.6)	
Range	27–92		25–95	

SD = standard deviation.
n = *total number of respondents.*

Table 2 **Distribution of breast cancer cases and controls according to selected risk factors and associated odds ratios derived from univariate logistic regression analysis**

Parameter	Cases (*n* = 168) No.	%	Controls (*n* = 504) No.	%	OR (95% CI)	*P*-value
Family history of breast cancer						
No	154	91.7	499	99.1	1.00[a]	
Yes	14	8.3	5	0.9	9.07 (4.06–12.26)	*P* < 0.01
Age at menarche (years)						
< 13	49	29.2	47	9.3	4.00 (1.82–9.84)	*P* < 0.01
≥ 13	119	70.8	457	90.7	1.00[a]	
Marital status						
Married	128	76.2	425	84.3	1.00[a]	
Divorced/widowed	28	16.7	65	12.9	1.43 (0.88–3.76)	
Never married	12	7.1	14	2.8	2.69 (1.38–7.12)	*P* < 0.05
Parity						
Parous	154	91.7	490	97.2	1.00[a]	
Nulliparous	14	8.3	14	2.8	3.18 (0.77–12.26)	NS
Age at first full-term pregnancy (years)						
≤ 30	144	85.7	481	95.4	1.00[a]	
> 30	7	4.2	3	0.6	7.79 (4.25–9.12)	*P* < 0.01
(Nulligravida)	17	10.1	20	4.0		
No. of full-term pregnancies						
0	17	10.1	20	4		
1–2	26	15.5	98	19.4		
3–5	57	33.9	278	55.2		
> 5	68	40.5	108	21.4		
History of breastfeeding						
No	13	7.7	27	5.4	1.00[a]	
Yes	155	92.3	477	94.6	0.68 (0.12–0.97)	NS
History of induced or spontaneous abortion						
No	128	76.1	387	76.8	1.00[a]	
Yes	44	23.9	117	23.2	1.14 (0.48–2.26)	NS
History of oral contraceptive use						
No	137	81.5	403	79.9	1.00[a]	
Yes	31	18.5	101	20.1	0.91 (0.39–1.99)	NS
Menopausal status						
Premenopause	81	48.2	236	46.8	1.00[a]	
Postmenopause	87	51.8	268	53.2	0.95 (0.43–2.28)	NS
Age at menopause (years)						
< 45	8	4.8	29	5.7		
45–50	57	33.9	207	41.1		
> 50	22	13.1	32	6.4		

Table 2 **Distribution of breast cancer cases and controls according to selected risk factors and associated odds ratios derived from univariate logistic regression analysis** *(concluded)*

Parameter	Cases (*n* = 168)		Controls (*n* = 504)		OR (95% CI)	*P*-value
	No.	%	No.	%		
History of HRT use						
No	77	42.3	239	41.5	1.00[a]	
Yes	10	6.0	29	5.4	1.09 (0.53–1.82)	NS
History of previous benign breast diseases						
No	161	95.8	492	97.7	1.00[a]	
Yes	7	4.2	12	2.4	1.78 (0.83–3.12)	NS
History of cigarette smoking						
No	101	60.1	315	62.5	1.00[a]	
Yes	67	39.9	189	37.5	1.13 (0.58–2.16)	NS

[a]*Reference category.*
NS = not significant, CI = confidence interval; OR = odds ratio; HRT = hormone replacement therapy.
n = *total number of respondents.*

(OR 7.79, 95% CI: 4.25–9.12) (Table 2). Furthermore, it was shown that > 5 full-term pregnancies would be expected to correlate with an increase in the risk of breast cancer (χ□= 111.12, □< 0.05).

In forward multivariate logistic regression analysis, in addition to those factors which were significantly associated with breast cancer, parity and breastfeeding were included in the model because of their relatively high but not statistically significant OR. The final model revealed that in addition to those factors which were significant in univariate logistic regression analysis, negative history of breastfeeding was a significant factor in increasing risk of breast cancer (OR 1.55, 95% CI: 1.08–2.90), but nulliparity remained not significant.

Discussion

The purpose of the present study was to characterize breast cancer epidemiology, especially in determining the generally accepted or suspected risk factors in the Islamic Republic of Iran.

As in industrialized countries, we found that a family history of breast cancer was an important factor contributing to breast cancer in the south of the Islamic Republic of Iran. This observed familial association is likely to imply a genetic predisposition. Therefore, it is of interest to determine whether known breast cancer susceptibility genes, such as □□□□*1* [*1*□] and □□□□□ [*1*□], responsible for a proportion of breast cancers in other countries [□,□,□*0*], also play a role in breast cancer in Islamic Republic of Iran.

The relation between women's risk of breast cancer and reproductive history has been the subject of many investigations [□ *1*□,□*1* □*1*]. Despite the large number of studies, the findings for reproductive risk factors have been inconsistent. Our findings suggest an inverse relationship between age at menarche and breast cancer risk, which is consistent with findings in some studies

[□ *10*], although it was not a significant risk factor for breast cancer in some other populations [□,*11,1*□ *1*□,*1*□]. The basis of this difference in different populations is not clear and warrants further study.

The findings of our study show that never married women were at higher risk for breast cancer. However, results of multivariate logistic regression analysis revealed that nulliparity was not a statistical significant risk factor for breast cancer. These results are in agreement with the results of another study on the Iranian population [*1*□]. In some studies, single and nulliparous married women were found to have a similar increased risk for breast cancer as compared with parous women of the same age [□*1*]. Thus one possible explanation for these results is that marital status or nulliparity by itself is not a determining factor for increased or decreased beast cancer risk, and rather the main effect is due to age at first full-term pregnancy or parity number.

Our findings clearly suggest that older age at first full-term pregnancy increased the risk of breast cancer. Although this result is consistent with some studies in different nations and ethnic groups [□ *1*□], it is inconsistent with findings from some other studies and particularly from studies in northern and central parts of the Islamic Republic of Iran [□,□,*1*□ *1*□,*1*□].

Although on the basis of a suggested influence of full-term pregnancy on breast cells [□□] an increase in full-term pregnancies would be expected to correlate with a decreased risk of breast cancer in some women [□,*11,*□□], evidence suggest that there is a dual effect of parity on breast cancer risk with pregnancy [*11,*□□, □□]. Our findings showed that more than 5 full-term pregnancies would be expected to correlate with an increase in the risk of breast cancer.

The results of the few studies in northern and central parts of Islamic Republic of Iran do not indicate a significant relationship between history of breastfeeding and breast cancer rate [*1*□ *1*□], but according to the results of the present study, the protective effect of breastfeeding was clear on multivariate analysis. This finding is consistent with a large collaborative study [□□] and some other studies in different populations [□,□,□,*11,*□□,□□ □□] showing breastfeeding to be protective for breast cancer through hormonal or other mechanisms.

Recent reviews reach conflicting conclusions on breast cancer risk after spontaneous or induced abortion [*1*□,*1*□,□*0,*□*1*]. In our study, history of abortion, either spontaneous or induced, was not found to be correlated to breast cancer.

Disagreement remains in the literature on the direction and magnitude of effect, if any, of oral contraceptive use on breast cancer risk [□,□,□,*1*□,□□,□□ □□]. Despite large studies designed to address such differences, chance, selection factors, changes in formulations, pattern of use and different background risk for breast cancer might account for some of the variation in findings. No association was found between the use of oral contraceptives and breast cancer risk in our study participants.

Our results show that there was no large difference in ever-use of HRT among cases and controls, which was similar to some recent case–control studies [□,□□]. However, a small increased risk has been observed in larger studies [□□,□□], which might be accounted for by the specific questions about types of HRT and the small sample size of our study; future studies may need to examine the detail of different HRT regimens and duration or age of use.

Smoking history was not associated with breast cancer risk. This result is in

agreement with the results of some other studies [□,□].

A number of limitations such as the small sample size and the selection of case and controls may affect the interpretation of our results. Although the results cannot be generalized, the findings suggest that the associations between some known risk factors for breast cancer may differ in the south of the Islamic Republic of Iran as compared with other populations. Intensive studies of breast cancer risk factors in developing countries might reveal other important risk factors in these populations.

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Global age-friendly cities: a guide

Population ageing and urbanization comprise major forces shaping the 21st century. At the same time as cities are growing, their share of residents aged 60 years and over is increasing. Older people are a resource for their families, communities and economies.

The World Health Organization (WHO) regards active ageing as a lifelong process shaped by several factors that favour health, participation and security in older adult life. The purpose of this Guide is to engage cities to become more age-friendly so as to tap the potential that older people represent for humanity.

WHO asked older people, caregivers and service providers living in 33 cities in all WHO regions to describe the advantages and barriers they experience in eight areas of city living. The results led to the development of a set of age-friendly city checklists.

The challenge facing cities and the active ageing concept are outlined. Issues and concerns voiced by older people and those who serve older people are highlighted. The principal traits of the ideal age-friendly city are listed and the Guide shows how changing one aspect of the city can have positive effects on the lives of older people in other areas.

WHO collaborators are now undertaking initiatives to translate the research into local action, to expand the scope beyond cities, and to spread it to more communities. An age-friendly community movement is growing, for which this Guide is the starting point. It can be downloaded from: http://www.who.int/ageing/publications/Global_age_friendly_cities_Guide_English.pdf

tude pilote de la th rapie antir trovirale Djibouti

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دراسة ارتيادية للمعالجة المضادة للفيروسات القَهْقَرية في جيبوتي

عمَّار عبده أحمد، سيميو لتوندجي

الخلاصة: أُجريَت دراسة مستعرضة شملت 112 من المرضى الإيجابيِّين لفيروس الإيدز الذين تلقُّوا المعالجة بمضادات الفيروسات القَهْقَرية لمدة تزيد على 3 أشهر، بغرض تقييم نجاعة المعالجة (العبء الفيروسي يقل عن 400 نسخة/مل). وكان ناصف العمر عند الالتحاق بالمعالجة 36 سنة، وكان 90٪ من المرضى في مرحلة مرض الإيدز، وبلغت نسبة خلايا اللمفاويات التائية CD4 118/مم^3. وتلقَّى المرضى معالجة مشتركة من 2 NRTI + 1 NNRTI (51٪)، أو 3 NRTI (45٪) أو 2 NPTI + 1 PI (4٪). ولوحظت نجاعة فيروسية في 74٪ من المرضى، بغضِّ النظر عن المعالجة الموصوفة والمُرْتَسَم السريري والمناعي الأوَّلي. وبلغ متوسط التحسُّنات المقيسة 20٪ بحسب مَنْسَب كارنوفسكي، و2.1 كغ/م^2 في مَنْسَب كتلة الجسم، و82 خلية/مم^3 في خلايا CD4. وبلغ معدل انتشار الآثار الجانبية 84٪. وكانت العوامل المنبِّئة بنجاح المعالجة هي جودة الرعاية، وكَوْن مَنْسَب كارنوفسكي أعلى من 70٪.

RÉSUMÉ Une enqu te transversale a été menée parmi 112 patients séropositifs pour le VIH sous thérapie antirétrovirale depuis plus de trois mois afin d'évaluer l'efficacité du traitement (charge virale < 400 copies/mL). À l'inclusion, l'âge médian est de 36 ans, 90 % des patients sont au stade SIDA et le taux médian de CD4 est de 118/mm^3. Les patients ont reçu un traitement associant 2 INTI + 1 INNTI (51 %), 3 INTI (45 %) et 2 INTI + 1 IP (4 %). L'efficacité virologique est démontrée chez 74 % des patients quels que soient le protocole prescrit et le profil clinico-immunologique initial. Les gains médians en indice de Karnofsky (IK) sont de 20 %, en indice de masse corporelle de 2,1 kg/m² et en CD4 de 82 cellules/mm^3. La prévalence des effets indésirables est de 84 %. Les facteurs prédictifs du succès thérapeutique sont la qualité des soins et un IK > 70 %.

Pilot study of antiretroviral therapy in Djibouti

ABSTRACT A cross-sectional survey was conducted among 112 HIV positive patients who had received antiretroviral therapy for > 3 months to assess the efficacy of treatment (viral load < 400 copies/mL). The median age at enrolment was 36 years, 90% of patients were at the AIDS stage and median CD4 rate was 118/mm^3. Patients received a combined treatment of 2 NRTI +1 NNRTI (51%), 3 NRTI (45%) and 2 NRTI+1 PI (4%). Virological efficacy was seen in 74% of the patients, irrespective of the prescribed protocol and the initial clinical and immunological profile. Mean improvements measured were 20% on the Karnofsky index (KI), 2.1 kg/m² in body mass index and 82 cells/mm^3 in CD4. The prevalence of side effects was 84%. The predictors for treatment success were quality of care and KI > 70%.

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Introduction

La République de Djibouti, d'une superficie de 23 000 km^2, compte 690 000 habitants. La s□ropr□valence du VIH est de 2,9 % et l'on estime à 9100 le nombre de personnes vivant avec le VIH dans le pays [*1*]. La mise □ disposition du traitement antir□troviral a d□marr□en mars 2004. Est □ligible au traitement antir□troviral tout patient s□ropositif au stade IV de la classification SIDA de l'Organisation mondiale de la Sant□(OMS) ou ayant des CD4 (Lymphocytes T □□□-□□□ □□□ □□□□□□□□□□□□□□□ 4) ≤ 200/mm^3. Les sch□mas th□rapeutiques prescrits sont, pour le traitement de premi□re ligne, 2 inhibiteurs nucl□osidiques de la transcriptase inverse (INTI) + 1 inhibiteur non nucl□osidique de la transcriptase inverse (INNTI) ou 3 inhibiteurs nucl□osidiques de la transcriptase inverse (INTI), et pour le traitement de 2^e ligne, 2 INTI + 1 IP (inhibiteur de la prot□ase).

Il importe, apr□s une ann□e de mise en route du projet pilote, d'□valuer son efficacit□et sa tol□rance. Pour ce faire, nous nous sommes fix□s comme objectifs d'□valuer l'efficacit□et la tol□rance clinique et biologique du traitement, de v□rifier la corr□lation entre les CD4 et les lymphocytes totaux (LT) et d'identifier les facteurs influen ant le succ□s th□rapeutique.

M thodes

Sch ma d tude

Il s'agit d'une enqu te transversale multicentrique couvrant la p□riode d'octobre 2004 □mars 2005, soit une dur□e de 6 mois, qui regroupe l'ensemble des s□ropositifs □g□s de plus de 15 ans, trait□s depuis au moins 3 mois, quel que soit le protocole prescrit sur l'un des 9 sites : le Centre Yonis Toussaint (CYT), les deux centres de sant□ de l'Organisme de Protection Sociale (OPS), le Centre Hospitalier Bouffard (CHA), l'h pital g□n□ral Peltier (HGP), le centre d'Einguela, le Centre des Forces Nationales de Police (FNP), le Centre de l'Arm□e Nationale Djiboutienne et le Centre Paul Faure (CPF). Il s'agit d'une analyse en intention de traiter.

Cette enqu te a eu l'autorisation du minist□re de la Sant□et du Programme de lutte contre le SIDA. Le patient □tait inform□ de l'enqu te et son consentement libre et □clair□a □t□obtenu avant l'examen. Tout au long de cette enqu□te, le respect rigoureux et strict de la confidentialit□et du secret m□dical a □t□observ□.

Collecte des donn es

Le recueil des donn□es a □t□r□alis□□l'aide d'un formulaire. La variable d□pendante est la charge virale (CV). Les variables ind□pendantes sont au plan des renseignements g□n□raux (la date d'inclusion, la date de l'enqu□te, l'□ge, le sexe, l'□tat matrimonial, le district d'origine, le centre de traitement, la cat□gorie socio-professionnelle), au plan clinique (le poids, la taille, l'□tat g□n□ral cot□gr□ce □l'indice de Karnofsky [IK], les affections opportunistes, le stade clinique selon la classification OMS du SIDA au d□but du traitement, les troubles digestifs, neurologiques et lipidiques), au plan th□rapeutique (les associations d'antir□troviraux prescrits), au plan biologique (le taux de CD4, le taux d'h□moglobine, le nombre de globules blancs, le taux de plaquettes, le taux des lymphocytes totaux, la cr□atinin□mie, les transaminases glutamique oxalo-ac□tique [TGO] et glutamique-pyruvique [TGP], la triglyc□rid□mie). L'outil de collecte est un questionnaire. Les donn□es cliniques sont recueillies lors des consultations et les pr□l□vements sanguins r□alis□s au moment de l'enqu□te.

M thode d valuation

L'efficacit□ virologique est appr□hend□e □travers la charge virale. Au del□de trois

mois de traitement, on considère qu'il y a un échec virologique si la charge virale est supérieure ou égale à 400 copies/mL et un succès virologique si la charge virale est inférieure à 400 copies/mL. On considère qu'il y a un succès immunologique si on a une augmentation de plus de 20 % du taux de CD4 initial et un échec si on a moins de 20 %. Un taux d'hémoglobine < 12 g/dL correspond à une anémie, des leucocytes < 4 G/L correspondent à une leucopénie et des plaquettes < 150 G/L à une thrombopénie. L'association d'une anémie + leucopénie ou thrombopénie + anémie ou leucopénie + thrombopénie correspond à une bicytopénie et une pancytopénie correspond à anémie + leucopénie + thrombopénie. L'indice de masse corporelle (IMC) correspond au rapport poids / (taille)².

Techniques de laboratoire

Pour le suivi, le dosage des CD4 est réalisé grâce à deux appareils FACS-Count ([illegible]) de Becton Dickinson. La technique NASBA ([illegible]) développée par bioMérieux permet la réalisation de la charge virale. Sa sensibilité est à partir de 25 UI/mL. La numération formule sanguine (NFS) + plaquette est obtenue à l'aide de l'appareil Micros développé par Abis ; cet appareil ne donne pas la formule leucocytaire. Ces bilans sont réalisés au niveau du laboratoire de l'hôpital général Peltier, vers lequel tous les prélèvements convergeaient.

Analyse statistique

Les données, saisies à l'aide du logiciel Epidata 3.02 ([illegible] [CDC], Atlanta, États-Unis) sont analysées dans le logiciel Stata 8.1, ([illegible], [illegible], Texas, États-Unis).

Le critère principal de jugement de l'efficacité est une charge virale inférieure à 400 copies après trois mois de traitement. La charge virale est mesurée sur une échelle logarithmique décimale (log_{10}). Les tests de χ^2, de Fischer et de Mac Nemar sont utilisés pour la comparaison des variables qualitatives. La comparaison des différences des variables quantitatives clinique et biologique est réalisée à l'aide du test T de Wilcoxon. La comparaison d'une variable continue entre deux groupes est réalisée à l'aide des tests de Mann-Whitney et entre plusieurs groupes à l'aide du test de Kruskall-Wallis. Pour vérifier la corrélation entre le taux de CD4 et le taux de lymphocytes, le test du coefficient de corrélation de Spearman et une représentation graphique selon un modèle de régression linéaire sont utilisés.

Une analyse multivariée est réalisée à l'aide d'un modèle de régression logistique. La procédure de sélection pas à pas descendante est utilisée pour obtenir le modèle final contenant uniquement les variables significatives et les variables de confusion. Tous les tests ont été interprétés avec un seuil de significativité de 5 %, et les intervalles de confiance ont été calculés à 95 %.

Résultats

Description de la population d'étude

Pour l'enquête, 112 patients sont retenus. La durée médiane sous traitement antirétroviral des patients est de 196 jours (écart interquartile [EIQ] : 132-252). L'âge médian est de 36 ans (EIQ : 30-41). L'âge moyen des hommes est de 38 ans (IC 95 % : 35,9-40,3) et celui des femmes de 34,7 ans (IC 95 % : 32,6-36,9). Les femmes sont plus jeunes que les hommes (p = 0,03). Le [illegible] est de 1,04. Les patients vivant ou ayant vécu en couple sont majoritaires (82,14 %). Les sans-emploi représentent 54,46 %. Les patients des districts (15 %) s'approvisionnent en antirétroviraux (ARV) à Djibouti-ville ; 52 % des patients

de Balbala (arrondissements 4 & 5) suivent leur traitement à l'hôpital général Peltier. Les patients sont suivis à l'hôpital général Peltier (36 %), le centre Yonis Toussaint (27 %), le centre hospitalier des armées françaises Bouffard (21 %), le centre Paul Faure (8 %), les deux centres de santé de l'Organisme de Protection Sociale (7 %) et le centre communautaire d'Einguela (1 %). Les caractéristiques socio-démographiques sont présentées au Tableau 1.

Les principales affections opportunistes présentées à l'initiation du traitement sont les candidoses (51 %), la tuberculose (39 %), les lymphadénopathies (37,5 %), les diarrhées (12,5 %), les broncho-pneumonies (11,7 %), le prurigo (11,6 %), le syndrome cachectique (10,7 %), le zona (7,1 %) et la leucoplasie (4,5 %), la salmonellose (3,6 %), la toxoplasmose (2,7 %), la maladie de Kaposi (0,9 %) et une tumeur oculaire (0,9 %). Selon la classification du CDC d'Atlanta, 7 % sont au stade A, 26 % au stade B et 67 % au stade C. Au niveau des LT CD4 (Lymphocytes T [illegible]), 4,5 % ont plus de 500/mm^3, 16,1 % entre 500 et 200/mm^3 et 67 % ont au plus 200/mm^3. À l'inclusion, le taux médian de CD4 est de 118/mm^3 (EIQ : 52-186).

Quatre-vingt-dix pour cent (90 %) des patients sont au stade SIDA selon la définition du CDC d'Atlanta de 1993. Il existe une différence dans la distribution des CD4 entre les trois stades cliniques (p = 0,009). Les taux moyens de CD4 pour les stades A, B, et C sont respectivement de 89, 59 et 52 cellules/mm^3. La description clinique, biologique et thérapeutique de la population d'étude est résumée dans le Tableau 2.

Quant au profil virologique, le VIH 1 est prédominant avec 97,32 %. La moitié des patients ont reçu une trithérapie associant 2 INTI +1 INNTI (51 %). Les différentes combinaisons antirétrovirales sont présentées au Tableau 3.

Tableau 1 **Répartition de la population d'étude selon les caractéristiques socio-démographiques**

Caractéristiques	Nbre (%)
Âge (ans)	
≤ 30	29 (25,9)
> 30	83 (74,1)
Sexe	
Féminin	55 (49,1)
Masculin	57 (50,9)
État matrimonial	
Marié(e)	48 (42,9)
Célibataire	20 (17,9)
Veuf(ve)	19 (17,0)
Divorcé(e)	25 (22,3)
Catégorie socio-professionnelle	
Administration	17 (15,2)
Commerçant	10 (8,9)
Transport	4 (3,6)
Élève - étudiant	1 (0,9)
Artisan	2 (1,8)
Sans emploi	61 (54,5)
Autres	17 (15,2)

Efficacité du traitement antirétroviral

Pour l'ensemble des patients, le gain médian de CD4 est de 82 cellules/mm^3. La charge virale médiane est de 1,4 $\log_{10}$ (EIQ : 1,4-2,9). Toutefois, 18 patients (16 %) présentent un rebond virologique. Selon notre définition de l'efficacité, le traitement est efficace respectivement au plan virologique chez 83 patients (74 %) et au plan immunologique chez 80 (71 %) ; 72 (64 %) présentent un succès immuno-virologique contre 18 (16 %) en échec (Tableaux 4 et 5). On note une discordance immuno-virologique chez 20 %.

L'efficacité ne diffère pas selon le protocole prescrit (2 INTI + 1 INNTI, 2 INTI + 1IP ou 3 INTI ; p = 0,21) et le profil clinico-

Tableau 2 **Description clinique, biologique et th rapeutique de la population d tude**

Caract ristiques	Initiation
IK (%)	
Médiane (EIQ)	80 (70-90)
IMC (kg/m)	
Médiane (EIQ)	18,6 (15,9-21,5)
Affections opportunistes [Nbre (%)]	101 (90,2 %)
Stade clinique l inclusion [Nbre (%)]	
Stade A	8 (7)
Stade B	29 (26)
Stade C	75 (67)
Taux de CD4 (/mm^3)	
Médiane (EIQ)	118 (52-186)
Lignes th rapeutiques [Nbre (%)]	
2 INTI + 1INNTI	57 (51)
3 INTI	50 (45)
2 INTI + 1IP	5 (4)

IK : indice de Karnofsky.
IMC : indice de masse corporelle.
EIQ : cart interquartile.

immunologique initial (stades selon le CDC d'Atlanta, p = 0,065).

L'am lioration des indicateurs cliniques est statistiquement significative (Tableau 5). En effet, les gains m dians en IK sont de 20 %, en IMC de 2,1 kg/m . Une r duction de 62,2 % des affections opportunistes est retrouv e. Si l'on compare les patients en succ s et ceux en chec virologique, les patients en succ s ont moins d'affections opportunistes (p = 0,002), une meilleure am lioration de l' tat g n ral (gain en IK de 4 %, p = 0,04) mais l'IMC n'est pas distribu diff remment parmi les patients en succ s et ceux en chec (p = 0,33).

Corr lation entre les lymphocytes totaux et les LT CD4 l initiation du traitement

La Figure 1 permet de d celer que les deux variables voluent dans le m me sens dans une relation lin aire directement proportionnelle.

Tableau 3 **Les diff rentes associations de mol cules antir trovirales prescrites aux patients de l tude**

Type de combinaisons	Nbre	%
Zidovudine (AZT) + Lamivudine (3TC) + Nelfinavir (NFV)	3	2,68
Zidovudine (AZT) + Abacavir (ABC) + Lamivudine (3TC)	46	41,07
Lamivudine (3TC) + Didanosine (DDI) + Nelfinavir (NFV)	1	0,89
Zidovudine (AZT) + Lamivudine (3TC) + Efavirenz (EFZ)	40	35,71
Zidovudine (AZT) + Didanosine (DDI) + Efavirenz (EFZ)	1	0,89
Stavudine (D4T) + Lamivudine (3TC) + Efavirenz (EFZ)	2	1,79
Zidovudine (AZT) + Lamivudine (3TC) + Lopinavir/ritonavir (LPV/r)	1	0,89
Zidovudine (AZT) + Névirapine (NVP) + Lamivudine (3TC)	14	12,50
Stavudine (D4T) + Abacavir (ABC) + Lopinavir/ritonavir (LPV/r)	1	0,89
Zidovudine (AZT) + Abacavir (ABC) + Lopinavir/ritonavir (LPV/r)	1	0,89
Didanosine (DDI) + Stavudine (D4T) + Indinavir (IND)	1	0,89
Didanosine (DDI) + Abacavir (ABC) + Lopinavir/ritonavir (LPV/r)	1	0,89
Total	112	100

Tableau 4 **Efficacit immunologique et virologique**

	Nbre (%)
Niveau virologique (copies/mL)	
CV ≥ 400	29 (26)
CV < 400	83 (74)
Niveau immunologique : coefficient d ascension du taux de CD4 initial	
≥ 20 %	80 (71)
< 20 %	32 (29)

CV : charge virale.

Le coefficient de Spearman (r = 0,51 ; p < 0,0001) montre une forte corr lation entre les deux variables. Les lymphocytes permettent d'expliquer au d but plus de 50 % de la variance observ e des LT CD4.

Pour d terminer le seuil de lymphocytes totaux correspondant au taux de CD4 ≤ 200/mm^3, nous avons stratifi le taux de lymphocytes totaux selon le taux de LT CD4 de mise sous antir troviraux retenu dans les pays en d veloppement (≤ 200/mm^3). En se basant uniquement sur la recommandation de l'OMS qui est le seuil de 1,2 G/L de lymphocytes totaux, on retrouve que seulement 33 % des patients n cessitant un traitement auraient t mis sous antir troviraux.

Si l'on prend la valeur ≤ 1,7 G/L comme seuil de lymphocytes totaux pour la mise sous traitement, seuls 6 % des patients seraient mis sous traitement par erreur et 53 % des patients n cessitant le traitement l'auraient re u. Si l'on l ve le taux de CD4 pour la mise sous traitement 350/mm^3, seuls 3 patients auraient t mis par erreur sous traitement.

Tol rance clinique et biologique

La pr valence des effets ind sirables sous ARV est de 84 % ; 44 % des patients taient trois mois de traitement. Les patients se plaignent de naus es-vomissements (27,3 %), de diarrh es (18,2 %), de douleurs abdominales (9,1 %), de troubles du sommeil (18,2 %), de neuropathie p riph rique (18,2 %) et d' ruption cutan e (9,1 %). Les troubles digestifs (54,6 %) (naus es, vomissements, diarrh es, douleurs abdominales) sont en t te des effets ind sirables, suivis des troubles neuropsychiques (36,4 %) puis de la toxicit cutan e (9 %). Il est important de noter que 15 patients (13,39 %) ont eu un changement de traitement.

À l'initiation, une grande partie des patients soit 87 (78 %) pr sentent une an mie, 37 (33 %) une leucop nie et 26 (23 %) une thrombop nie. Au moment de l'enqu te, 78 (69,6 %) pr sentent une an mie, 6 (5,4 %) une thrombop nie et 34 (30,4 %) une leucop nie. Sous traitement, on retrouve un gain m dian de plaquettes de 53 G/L et de 0,35 g/dL d'h moglobine ; 36 patients pr sentaient une bicytop nie et 4 une pancytop nie contre 30 bicytop nies et 4 pancytop nies l'initiation du traitement. La distribution de l'an mie (p = 0,06), de la lymphop nie (p = 0,42), de la thrombop nie (p = 0,14) et de la leucop nie (p = 0,93) ne diff re pas chez les patients en chec et ceux en succ s.

Le dosage des transaminases retrouve 19 % des patients ayant des TGO et des TGP lev es mais une cr atinin mie et une triglyc rid mie normales. Les valeurs retrouv es des param tres biochimiques sont r sum es dans le Tableau 5.

En analyse multivari e, on retrouve deux facteurs associ s au succ s th rapeutique : un bon tat g n ral (IK > 70 %) et la qualit des soins. Les patients ayant un stade clinique avanc l'inclusion sont pr dispos s l' chec (Tableau 6).

Discussion

Une population cible peu diversifi e un stade avanc de la maladie

Djibouti, la couverture du traitement antir troviral est de 3 % jusqu' fin d cembre

Tableau 5 **Comparaison des param tres cliniques et biologiques de la population d tude en d but du traitement antir troviral et au moment de l enqu te selon des s ries appari es**

Param tres	Initiation (n = 112)	Enqu te (n = 112)	p
Plan clinique			
IMC (kg/m²)			
Médiane (EIQ)	18,6 (15,9-21,5)	20,7 (18,3-22,6)	0,0001[a]
IK (%)			
Médiane (EIQ)	0,8 (0,7-0,9)	1 (0,9-1)	0,0001[a]
Affections opportunistes [Nbre (%)]	101 (90,2)	31 (28)	0,0001[b]
Plan immuno-virologique			
CD4 (cellules/mm^3)			0,0001[a]
Médiane (EIQ)	118 (52-186)	200 (136-295)	
CV (log_{10})			
Médiane (EIQ)		1,4 (1,4-3,1)	
Plan h matologique			
Hémoglobine - (g/dL)			0,14[a]
Médiane (EIQ)	10,8 (9,4-11,7)	10.4 (8,9-11,8)	
Globules blancs (g/L)			
Médiane (EIQ)	4,5 (3,7-6,2)	4,5 (3,2-6,1)	0,16[a]
Plaquettes (g/L)			
Médiane (EIQ)	234 (158-300)	287 (240-382)	0,0001[a]
Param tres biochimiques			
Transaminase glutamique oxalo-acétique (UI/L)		23 (21-26)	
Transaminase glutamique-pyruvique (UI/L)		29 (27-33)	
Créatininémie (mg/L)		9,8 (8-11,3)	
Triglycéridémie (g/L)		0,9 (0,8-1,1)	

[a] *Test T de Wilcoxon.*
[b] *Test de Mac Nemar.*
IMC : indice de masse corporelle.
IK : indice de Karnofsky.
CV : charge virale.
EIQ : cart interquartile.

2004 contre 1 % en Afrique [ ]. Le jeune ge des femmes indique leur entr e pr coce en sexualit . En effet, elles se marient plus jeunes que les hommes. La majorit des contaminations se produisent au sein des couples h t rosexuels. La pr dominance des sans-emploi s'explique par le taux de ch mage lev ainsi que l'incapacit physique des s ropositifs d'exercer, vu la prise en charge tardive. Une assistance financi re s'av re utile pour permettre ces patients d'avoir un niveau de vie d cent et de poursuivre les soins. Les donn es socio-d mographiques rejoignent celles retrouv es en Afrique [ ].

La d couverte du VIH chez les patients tait le plus souvent la suite de la survenue d'affections opportunistes. Un travail ant

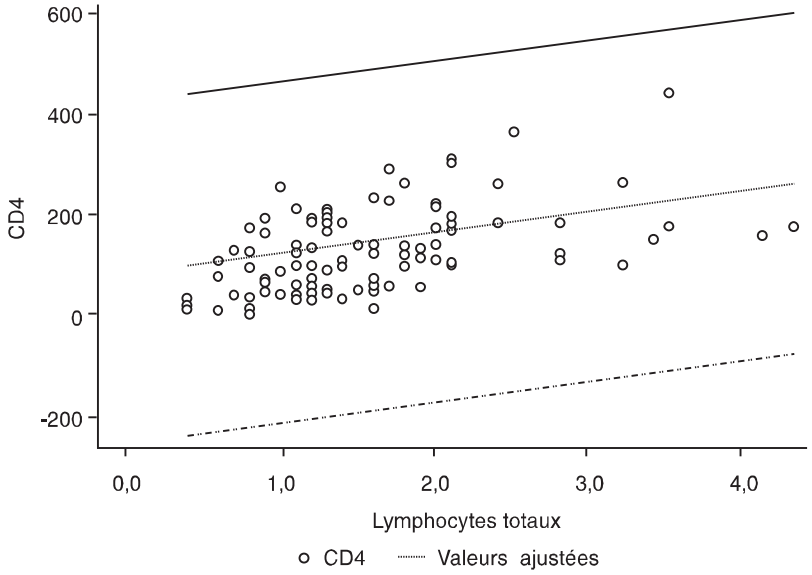

Figure 1 **Repr sentation graphique selon un mod le de r gression lin aire de la corr lation entre les lymphocytes totaux (LT) et les lymphocytes T CD4 l initiation du traitement antir troviral**

rieur Djibouti classait la tuberculose en t te des affections opportunistes [ ]. Les m mes proportions d'affections opportunistes sont retrouv es au Gabon [ ] au B nin [ ] et en Afrique du Sud [ ]. En outre, le VIH 1, plus transmissible que le VIH 2 et entra nant une progression plus rapide vers les stades de SIDA-maladie, repr sente la majorit des identifications r alis es contre 95,2 % au B nin [ ] et 95,8 % au S n gal [ ].

Un acquis clinique stable et une r ponse immuno-virologique soutenue

L'usage des inhibiteurs de la prot ase pr domine au S n gal [ ] et au B nin [ ] par rapport Djibouti. Les inhibiteurs de la prot ase sont reconnus pour la r volution de la th rapie antir trovirale dans les essais cliniques [*10,11*]. La faible proportion de leur utilisation s'explique par la pr cocit du traitement et la proportion lev e de tuberculeux emp chant l'association avec la rifampicine. Toutefois, cet acquis est conserver par un renforcement de l'observance afin d' viter l' mergence de souches r sistantes sachant que le d veloppement des r sistances aux INNTI est tr s rapide [*11*].

l'initiation, le poids et l'indice de masse corporelle m dians sont plus faibles que ceux des cohortes s n galaise et b ninoise [,]. Toutefois, au moment de l'enqu te, les niveaux atteints par nos patients sont importants. Cette nette am lioration des param tres cliniques s'explique par la prise en charge des affections opportunistes mais aussi l'hygi ne de vie.

l'inclusion, le taux m dian de CD4 est de 118/mm contre 117 au B nin [ ]

Tableau 6 **Analyse multivari e selon un mod le de r gression logistique permettant d identifier les facteurs pr dictifs du succ s th rapeutique**

Variables incluses dans le mod le	Analyse univari e OR (IC 95 %)	Analyse multivari e OR (IC 95 %)
Centre		
CHA	1,00	
CPF	0,4 (0,1-1,8)	0,4 (0,06-2,4)
CYT	6,4 (1,5-27)	6,1 (1,2-30,3)
HGP	0,9 (0,4-2,7)	1,3 (0,3-4,5)
OPS	2,1 (0,4-12,9)	3,5 (0,4-28,4)
Sexe		
Masculin	1,00	1
Féminin	0,5 (0,2-1,1)	0,5 (0,2-1,1)
ge (ans)		
≤ 35	1,6 (0,7-3,4)	
> 35	1,00	
Ch mage		
Oui	1,00	
Non	1,8 (0,6-5,4)	
Taux d h moglobine (g/dL)		
≥ 12	1,00	
< 12	0,9 (0,4-2,4)	
Taux de CD4 (/mm)		
≥ 200	1,00	
< 200	0,7 (0,4-2,6)	
Indice de Karnofsky initial		
≤ 0,7	1,00	
> 0,7	5,3 (2,2-12,5)	6,1 (2-19)
Stade clinique initial		
Stade A	1,00	1
Stade B	0,2 (0,02-2,2)	0,03 (0,001-0,1)
Stade C	0,2 (0,03-2,2)	0,01 (0,001-0,1)
Protocole th rapeutique		
2 INTI + 1 IP	1,00	1
2 INTI + 1 INNTI	1,9 (0,30-12,38)	2,1 (0,25-17,67)
3 INTI	5,3 (0,79-35,92)	5,6 (0,63-49,37)

Variable d pendante : 1 succ s (n = 83), 0 chec (n = 29)
CHA : Centre Hospitalier Bouffard.
CPF : Centre Paul Faure.
CYT : Centre Yonis Toussaint.
HGP : H pital g n ral Peltier.
OPS : Organisme de Protection Sociale.
OR : Odds ratio ; IC : intervalle de confiance.

et 124 au Sénégal [□]. L'efficacité thérapeutique rejoint celle observée au Bénin [□], au Sénégal [□], en Europe [*1*□] et aux États-Unis d'Amérique [*1*□,*1*□]. Cependant, on retrouve une discordance immunovirologique chez nos patients [*1*□].

Le dosage des lymphocytes totaux n'est pas spécifique aux LT CD4 puisqu'ils regroupent, en plus des LT CD4, les lymphocytes B et les lymphocytes □□□□□□□□□□. Pourtant □ l'initiation du traitement, on retrouve une corrélation entre les LT CD4 et les lymphocytes totaux aussi bien dans notre étude (r = 0,50) que dans les études béninoise [□] (r = 0,37), sud-africaine [□] (r = 0,61), américaine [*1*□] (r = 0,69) et éthiopienne [*1*□]. Ces études montrent indirectement aussi que des patients ont été mis inutilement sous traitement (27 % □ □□□ □□□□□□□□□ □ □□□□□□□[*1*□]). Le rebond viral constaté est plus lié □ un relâchement de l'observance qu'□ une sélection de virus mutant. Par contre, il n'est pas exclu de rechercher une résistance éventuelle, d'où l'intérêt du test génotypique de résistance [*1*□-□*1*]. Il est important de juguler précocement une situation d'échec.

Un traitement bien toléré et un avenir prometteur

La prévalence des patients présentant des effets indésirables est de 84 % ; elle est de 75,4 % au Bénin [□□] et de 49 % au Sénégal [□]. La majorité de ces événements sont d'ordre digestif et neuropsychique comme au Bénin [□□] et au Sénégal [□]. La toxicité hématologique est surtout marquée par l'anémie. Cette dernière est fréquemment associée □ la prise de la zidovudine et de l'indinavir. Plusieurs patients sous zidovudine ont été transfusés. En effet, la zidovudine provoque une anémie centrale macrocytaire. Toutefois, la proportion d'anémie élevée au sein de notre cohorte comparativement aux autres cohortes africaines est probablement due □ la zidovudine.

Cependant, l'importance des bicytopénies et des pancytopénies est liée aux stades avancés de l'infection. Parmi les patients ayant les transaminases élevées, la recherche de l'antigène Australia (HBs) est positive chez deux. Par contre, il n'y a pas d'atteintes rénales, ni de troubles du métabolisme lipidique ou de la répartition des graisses [□□]. En outre, deux facteurs peuvent influencer le succès thérapeutique : la qualité des soins et un bon état général □ l'initiation du traitement. Cette analyse confirme que le traitement antirétroviral n'est pas une urgence et qu'au lieu d'instaurer rapidement le traitement antirétroviral, il est préférable de prendre en charge les affections opportunistes et d'améliorer l'état général. L'analyse multivariée corrobore les résultats des études réalisées en Europe [*1*□] et aux États-Unis d'Amérique [*1*□,*1*□].

Biais et validité

Une grande partie des patients n'avait pas eu leur bilan de contrôle selon le calendrier de suivi. La peur de la stigmatisation et les longues files d'attente les dissuadent de se présenter au centre et des intermédiaires les ravitaillent en antirétroviraux. Les assistants psychosociaux et les accompagnateurs thérapeutiques les ont convaincus de se présenter pour les prélèvements. La population d'étude est représentative de la population sous traitement antirétroviral □ Djibouti puisque tous les patients éligibles ont été retenus. Les résultats obtenus ne peuvent être généralisés du fait du faible nombre de patients sous traitement au moment de l'enquête. Par contre, on peut avoir un biais d'information lié □ l'enregistrement des données. Le biais de classement des patients en succès ou en échec est possible.

Conclusion

Cette étude, portant sur la première cohorte djiboutienne mise sous traitement antirétroviral, montre que le traitement antirétroviral est faisable et efficace à Djibouti. Avant son extension à l'ensemble du territoire, il est nécessaire de renforcer les structures centrales et la prise en charge des infections opportunistes.

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valuation de l observance au traitement antir troviral au sein d une cohorte de 200 patients Djibouti (2005)

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تقييم امتثال مرضى الإيدز للمعالجة المضادة للفيروسات القَهْقَرية في جيبوتي، في عام 200

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الخلاصة: قام الباحثون بتقييم معدل الامتثال للمعالجة المضادة للفيروسات القَهْقَرية، وتقصِّي العوامل المؤثِّرة في مدى الامتثال بين 86 من مرضى الإيدز. وتم تقييم نسبة الامتثال (عدد الأقراص المأخوذة/ العدد المُوصَى به) عن طريق حساب عدد الأقراص. وبلغ متوسط نسبة الامتثال 2 ٪. وبيَّن حساب عدد الأقراص أن 77٪ من المرضى ملتزمون (نسبة الالتزام ≤ 0 ٪). وقد ارتبط عدم الامتثال ارتباطاً قوياً بالتأثيرات الجانبية، ودرجة الكتمان في مركز الرعاية، والسفر. كما ارتبط الامتثال ارتباطاً مهماً بالعبء الفيروسي. وبيَّن التحليل المتعدِّد المتغيِّرات أن الدعمَ المجتمعي ومستوى التعليم، هما من العوامل الداعمة للامتثال. وتبيَّن أن المرضى الذين فاتتهم جرعة أو غير الراضين عن مدى الكتمان في المعالجة، هم أكثر اختطاراً لعدم الامتثال بمقدار أربعة أضعاف.

RÉSUMÉ Nous avons déterminé le taux d'observance au traitement antirétroviral et identifié les facteurs qui l'influencent chez 86 patients. L'observance a été mesurée à partir d'un dénombrement des comprimés. Le ratio d'observance (nombre de doses prises/nombre de doses prescrites) moyen est de 92 %. En se basant sur le dénombrement des comprimés, il ressort que 77 % des patients sont observants (ratio ≥ 90 %). La non-observance est significativement liée à la survenue des effets indésirables, au degré de confidentialité du centre de soins et au voyage. Le taux d'observance est corrélé à la charge virale. En analyse multivariée, l'aide communautaire et le niveau d'étude sont protecteurs de la non-observance. Les patients ayant déjà manqué des prises et ceux qui ne sont pas satisfaits du degré de confidentialité ont un risque 4 fois plus grand d' tre non observants.

Evaluation of compliance with antiretroviral treatment of HIV patients in Djibouti, 2005

ABSTRACT We determined the rate of compliance with antiretroviral therapy and investigated the factors that influence it among 86 HIV patients. Compliance ratio (number of tablets taken/number prescribed) was assessed by tablet count. The mean ratio of compliance was 92%. By tablet count, 77% of the patients were compliant (compliance ratio ≥ 90%). Non-compliance was significantly associated with side-effects, degree of confidentiality of the care centre and travelling. Compliance correlated significantly with viral load. In multivariate analysis, community support and level of education protected against non-compliance. Patients having already missed a dose and those dissatisfied with confidentiality had a 4 times greater risk of non-compliance.

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Introduction

Dans les pays du Sud, seuls 12 % des personnes ont acc s au traitement antir troviral fin 2004 [*1*]. Les r gimes th rapeutiques prescrits sont, pour le traitement de premi re ligne, 2 inhibiteurs nucl osidiques de la transcriptase inverse (INTI) + 1 inhibiteur non nucl osidique de la transcriptase inverse (INNTI) ou 3 inhibiteurs nucl osidiques de la transcriptase inverse (INTI), et pour le traitement de 2e ligne, 2 INTI + 1 IP (inhibiteur de la prot ase). Les pays ayant d velopp des programmes d'acc s aux antir troviraux sont confront s l'organisation de l'observance. En effet, l'observance est la capacit du malade respecter les prises du traitement qui lui a t prescrit. Elle a t souvent consid r e comme un objectif irr alisable dans les pays africains. L'ⓔvaluation des programmes d'acc s aux antir troviraux (ARV) au S n gal [ ], en C te d'Ivoire [,] et au Burkina Faso [ ] montre qu'il n'y a pas de difficult sp cifique mais que le principal obstacle au suivi du traitement est d'ordre conomique (difficult financi re des patients, approvisionnement discontinu en antir troviraux) et g ographique (n cessit de d placement). La valeur moyenne de l'observance est pass e de 83 % en 1999 90 % en 2000, suite une r duction de la participation financi re [, ,].

Djibouti, le traitement antir troviral et les bilans biologiques n cessaires au suivi sont gratuits. Une grande partie des patients vit dans la capitale Djibouti, qui regroupe les neuf centres de traitement. Dans ce contexte de gratuit et de proximit des soins, quels sont les autres al as de l'observance ?

Du fait de la corr lation forte entre l'observance et l'ⓔvolution de l'infection VIH [*10*], il est opportun d'ⓔvaluer d s pr sent le niveau d'observance dans cette cohorte avant l'extension du programme afin de limiter l'ⓔmergence de souches r sistantes et de pr venir l'ⓔchec th rapeutique [*11-1*].

Nous nous sommes fix s comme objectif de d terminer le taux d'observance au traitement antir troviral et d'identifier les facteurs pr dictifs d'une mauvaise observance.

M thodes

Type d tude

Il s'agit d'une enqu te transversale sur une population qui regroupe l'ensemble des personnes vivant avec le VIH, g es de plus de 15 ans, sous antir troviraux, pr sentes dans le district de Djibouti du 31 janvier au 1er mai 2005.

Population d tude

Les patients s lectionn s pour l'enqu te sont les personnes vivant avec le VIH g es de plus de 15 ans, sous antir troviraux depuis au moins trois mois, suivies dans l'un des neuf centres de sant , figurant dans le registre du projet d'acc s au traitement, r sidant dans le district de Djibouti durant la p riode de l'enqu te, quels que soient le sexe, la nationalit , la situation familiale et le protocole prescrit. Les exclus sont les refus motiv s apr s information et les absents du district au moment de l'enqu te.

Collecte des donn es

Le dispositif de recueil des informations est un questionnaire anonyme avec des questions ferm es qui a fait l'objet d'un pr test. Chaque patient vient avec sa derni re ordonnance et avec les antir troviraux qui restent. Puis, on lui remet le questionnaire qu'il aura remplir seul. Les patients illettr s sont interrog s. Ont t combin es les m thodes de l'entretien pour les illettr s, de l'autoquestionnaire pour les autres et du

d nombrement des comprim s pour tous les patients [*14*]. Les autres variables explorent quatre composantes :

- la composante socio-d mographique : ge, sexe, tat matrimonial, niveau d' tude, revenu, adh sion à une association, aide communautaire, soutien de l'entourage ;
- la composante comportementale : dur e du traitement, khat, tabac, motifs de prise manqu e (financier, judiciaire, survenue d'autres affections, effets g nants, oubli, conflits familiaux, dur e longue, rupture de stock, prise simultan e d'autres m dicaments, sommeil, m decine traditionnelle, consommation de khat), participation financi re, conservation des produits, attitude ;
- la perception des soins : qualit de vie (chelle visuelle de qualit de vie), confidentialit , disponibilit du personnel, conseil, distance du centre, relation de confiance ;
- la composante biologique : charge virale.

Crit res d valuation

Le crit re principal d' valuation de l'observance a t le d nombrement des comprim s restants. Le ratio d'observance est calcul à partir du rapport entre le nombre de doses prises et le nombre de doses prescrites. Il est exprim en pourcentage. Le nombre de doses concerne l'ensemble des antir troviraux prescrits. On consid re un patient observant si le ratio d'observance est ≥ 90 % et non observant si ce ratio est < 90 %.

À la fin de l'interrogatoire, pour les patients n'ayant pas eu de contr le biologique dans les 15 jours pr c dant l'enqu te, un pr l vement sanguin pour le dosage de la charge virale est r alis . La technique NASBA (Nucleic Acid Sequenced Based Amplification) d velopp e par bioM rieux a t utilis e pour le dosage au niveau du Centre National de Transfusion Sanguine et de l'Unit de Biologie-SIDA de l'h pital g n ral Peltier. Le seuil de d tection de la charge virale plasmatique est de 25 copies/mL. L'efficacit virologique est appr hend e à travers la charge virale à au moins trois mois de traitement. On consid re qu'il y a :

- chec virologique si la charge virale est sup rieure à 400 copies/mL ;
- succ s virologique si la charge virale est inf rieure ou gale à 400 copies/mL.

Technique d analyse

La variable d pendante est l'observance. Les donn es sont analys es avec le logiciel Stata 8.1. La comparaison des variables qualitatives est r alis e avec le test de χ^2 ou le test exact de Fischer et les variables quantitatives à l'aide du test de Mann-Whitney. La corr lation entre la charge virale et le taux d'observance est test e à l'aide du coefficient de Spearman. Le mod le de r gression lin aire a permis un aper u visuel de cette corr lation. La charge virale est analys e sur une chelle logarithmique d cimale ($\log_{10}$). Tous les tests ont t interpr t s avec un seuil de significativit de 5 % et les intervalles de confiance calcul s à 95 %.

Pour identifier les facteurs pr dictifs de la non-observance, on a effectu une analyse multivari e à l'aide d'un mod le de r gression logistique. La proc dure de s lection pas à pas descendante a t utilis e pour obtenir le mod le final contenant uniquement les variables significatives dont le $p < 0,05$ et les variables de confusion.

Consid rations thiques

Le minist re de la Sant et le Programme de lutte contre le SIDA ont donn leur aval à cette tude. Les patients ont é inform s

et leur consentement libre et clair a t obtenu avant l'enqu te. Tout au long de cette tude, le secret m dical a t respect de mani re stricte et rigoureuse.

R sultats

Description de la population d tude

Fin janvier 2005, 200 patients ont t mis sous traitement antir troviral. Dans une p riode allant de mars 2004 janvier 2005, 145 recevaient ce traitement depuis au moins trois mois, 8 patients sont d c d s, 7 perdus de vue et 10 absents du district de Djibouti. Entre janvier et avril 2005, le questionnaire a t pr sent 110 patients. Sept patients n'ont pas r pondu, 6 ont refus de participer par peur de discrimination et 4 par insatisfaction de l'appui social, 7 n'ont pas eu de dosage de la charge virale suite une rupture des r actifs. Au total, 86 patients ont t retenus pour l'analyse. Les 86 patients taient na fs de traitement antir troviral. Aucun des patients n'a b n fici de consultations d' ducation th rapeutique. Les patients ont re u un traitement associant 2 INTI + 1 INNTI (52 %), 3 INTI (40 %), 2 INTI + 1 IP (8 %). Les proportions des associations en un comprim prescrites sont 86 % zidovudine/lamivudine, 5 % lopinavir/ritonavir et 8 % en g n rique zidovudine/lamivudine/n virapine. En outre, 34 patients prennent l' favirenz, 34 l'abacavir, 4 la n virapine, 4 la lamivudine, 4 la stavudine, 3 le nelfinavir, 2 la didanosine et 1 la zidovudine. La m diane de suivi des patients dans la cohorte est de 258 jours (cart interquartile [EIQ] : 151-336). Leurs caract ristiques socio-d mographiques sont pr sent es dans le tableau 1.

Trente-sept patients (43 %) suivent leur th rapie au Centre Yonis Toussaint, 30 (35 %) l'h pital g n ral Peltier, 12 (14 %) au Centre Hospitalier des Arm es Fran aises Bouffard, 4 (5 %) l'Organisme de Protection Sociale et 3 (3 %) au Centre de pneumo-phtisiologie Paul Faure. Seuls 28 % sont salari s et 8 % ont une activit g n ratrice de revenus mais 64 % sont sans emploi avec 27 % soutenus par un tiers et 37 % sans ressources.

Tableau 1 **Caract ristiques socio-d mographiques des patients (n = 86)**

Caract ristique	Effectifs (%)
ge : médiane [EIQ]	35 (31-40)
Sexe	
Hommes	52 (60)
Femmes	34 (40)
tat matrimonial	
Marié(e)	41 (48)
Célibataire	19 (22)
Veuf(ve)	8 (9)
Divorcé(e)	18 (21)
Niveau d tude	
Sans niveau	35 (41)
Scolaire	27 (31)
Secondaire	22 (26)
Universitaire	2 (2)
Membre d une association	75 (87)
Aide communautaire	43 (50)
Consommation de khat	25 (29)
Consommation de tabac	20 (23)

EIQ : cart interquartile.

Une tr s grande partie des patients (n = 74, 86 %) ont d clar avoir ressenti durant le mois pr c dant l'interrogatoire des effets ind sirables. Trente-six (42,1 %) signalent plus de quatre effets ind sirables. Les troubles digestifs viennent en t te (30 %), suivis des troubles neuropsychiques (29 %), des effets g n raux (21 %), dermatologiques (7 %) et articulaires (7 %).

Quatre-vingt-deux patients (95 %) sont observants si l'on se tient aux déclarations contre 66 (77 %) en se basant sur le dénombrement des comprimés (Tableau 2). Les deux mesures ne sont pas concordantes. Selon notre critère principal de jugement, 66 patients (77 %) sont observants au traitement antirétroviral. Parmi les 20 patients non observants, 2 (10 %) ont totalement arrêté leur traitement et 18 (90 %) ont manqué des prises.

Le ratio moyen d'observance de notre population d'étude est de 92 % (EIQ : 90-100].

En outre, 46 patients (53,4 %) déclarent avoir manqué au moins une prise depuis le début de leur traitement. Les raisons les plus fréquemment évoquées sont : l'oubli 12 (25 %), le sommeil 7 (15 %), le voyage 5 (11 %), la durée longue 5 (11 %), le doute sur l'efficacité 4 (9 %), la rupture de stock 3 (6 %) et les effets indésirables 3 (6 %).

Déterminants liés à l'observance

Le tableau 3 résume l'ensemble des variables étudiées.

En analyse multivariée, l'aide communautaire et un niveau d'étude sont protecteurs de la non-observance. Les patients qui disent avoir manqué des prises avant notre enquête et ceux qui ne sont pas satisfaits du degré de confidentialité ont un risque 4 fois plus grand d'être non observants (Tableau 4).

Discussion

Cette étude a permis de mettre en évidence des déterminants spécifiques à la non-observance dans un contexte de gratuité et de proximité géographique du centre de soins d'un pays du Sud.

Facteurs déterminants de la non-observance

Le rôle prédictif de la composante socio-économique sur la non-observance est minoré par l'aide communautaire et l'aide des associations. Nous avons montré que la gêne de prendre les médicaments en présence de l'entourage conduit le patient non seulement au non-respect des horaires de prise mais surtout à l'oubli. Les patients observants sont plus nombreux à être membres d'une association par rapport aux non-observants (p = 0,001). L'aide communautaire n'est pas liée à l'observance (p = 0,13). La durée sous traitement (p = 0,25) et le coût du transport (p = 0,46) au centre de soins ne diffèrent pas chez les observants et les non-observants.

Tableau 2 **Proportion des patients observants selon la mesure d'évaluation**

	Patients observants Nbre (%)	Patients non observants Nbre (%)
Dénombrement des comprimés	66 (77)	20 (23)
Déclaration des prises manquées les cinq derniers jours	82 (95)	4 (5)

Tableau 3 **Caract ristiques m dicales et socio- conomiques des patients selon l observance**

Caract ristique	**Patients non observants n = 20 Nbre (%)**	**Patients observants n = 66 Nbre (%)**	**p**
Sexe			0,57[a]
Hommes	11 (55)	41 (62,1)	
Femmes	9 (45)	25 (37,9)	
ge (ans)			0,74[b]
Médiane [EIQ]	35 [30-41]	35 [31-40]	
tat matrimonial			0,72[a]
Marié	8 (40)	33 (50)	
Célibataire	5 (25)	14 (21)	
Veuf	3 (15)	5 (8)	
Divorcé	4 (20)	14 (21)	
Revenu			0,91[a]
Salaire	5 (25)	19 (29)	
Activité génératrice de revenu	1 (5)	6 (9)	
Soutien régulier d'un tiers	6 (30)	17 (26)	
Aucun	8 (40)	24 (36)	
Niveau d tude			0,39[a]
Sans niveau	11 (55)	24 (36)	
Scolaire	4 (20)	23 (35)	
Secondaire	5 (25)	17 (26)	
Universitaire	0	2 (3)	
Membre d une association			0,001[a]
Non-adhérent	7 (35)	4 (6)	
Adhérent	13 (65)	62 (94)	
Aide communautaire			0,13[a]
Non	7 (35)	36 (55)	
Oui	13 (65)	30 (45)	
Consommation de khat			0,22[a]
Non	8 (40)	17 (26)	
Oui	12 (60)	49 (74)	
Consommation de tabac			0,41[a]
Non	6 (30)	14 (21)	
Oui	14 (70)	52 (79)	
Prise du traitement devant l entourage			0,5[a]
G né	8 (40)	32 (48)	
Indifférent	12 (60)	34 (52)	
Dur e sous ARV			0,25[b]
Médiane [EIQ]	294 [163-365]	251 [151-332]	

Tableau 3 **Caract ristiques m dicales et socio- conomiques des patients selon l observance** *(suite)*

Caract ristique	**Patients non observants n = 20 Nbre (%)**	**Patients observants n = 66 Nbre (%)**	**p**
Effets ind sirables au cours du dernier mois			0,03[c]
Oui	20 (100)	54 (82)	
Non	0	12 (18)	
Prise manqu e depuis le d but du traitement			0,03[a]
Oui	15 (75)	31 (47)	
Non	5 (25)	35 (53)	
Voyage + rupture de stock			0,02[a]
Oui	8 (53)	6 (19)	
Non	7 (47)	25 (81)	
Qualit de vie			0,49[b]
Médiane [EIQ]	8 [6-10]	8,5 [7-10]	
Observance per ue par le patient			0,007[c]
Très bien	8 (40)	44 (67)	
Bien	6 (30)	19 (29)	
Assez bien	5 (25)	3 (4)	
Mal	1 (5)	0	
Co t du transport			0,46[b]
Médiane [EIQ]	100 [80-190]	160 [80-220]	
Degr de confidentialit du centre de soins			0,006[c]
Bien	13 (65)	61 (92)	
Assez bien	3 (15)	1 (2)	
Mal	4 (20)	4 (6)	
coute du soignant			0,23[c]
Oui	18 (90)	64 (97)	
Non	2 (10)	2 (3)	
D claration d inobservance au m decin			0,79[a]
Oui	18 (90)	58 (88)	
Non	2 (10)	8 (12)	
Confiance aux dires du soignant			0,11[a]
Oui	16 (80)	61(92)	
Non	4 (20)	5 (8)	
Traitement antir troviral prescrit			0,60[a]
2 INTI + 1 IP	2 (10)	5 (8)	
3 INTI	6 (30)	28 (42)	
2 INTI + 1 INNTI	12 (60)	33 (50)	

[a] Test de χ^2 ; [b] Test de Mann-Whitney ; [c] Test exact de Fischer.
EIQ : cart interquartile.
ARV : antir troviraux.

Tableau 4 **Facteurs pr dictifs de la non-observance au traitement antir troviral**

Variables incluses dans le mod le	Analyse univari e OR univari (IC 95 %)	Analyse multivari e OR ajust (IC 95 %)
Niveau d tude		
Sans niveau d'étude	1	1
Ayant un niveau d'étude	0,5 (0,2-1,3)	0,2 (0,06-0,9)
Association		
Non-adhérent	1	1
Adhérent	0,1 (0,03-0,5)	0,2 (0,04-1,3)
Aide communautaire		
Non	1	1
Oui	0,5 (0,2-1,3)	0,2 (0,5-0,7)
D claration de prise manqu e		
Non	1	1
Oui	3,4 (1,1-10,4)	3,8 (1-15)
Prise du traitement devant l entourage		
Indifférent	1	1
G né de prendre	1,4 (0,5-4)	2,2 (0,6-9,1)
Degr de confidentialit		
Bien	1	1
Assez bien ou mal	6,6 (2-24)	5,6 (1,1-29)

Variable d pendante : 1 : non-observance (n = 20) ; 0 : observance (n = 66).
OR : odds ratio ; IC : intervalle de confiance.

En effet, chez les patients sous antir troviraux, les traits socio-d mographiques, psychologiques, cliniques, la qualit de la relation m decin-patient et le type de protocole prescrit sont associ s la non-observance. Cependant, 88 % des patients reconnaissent tre bien cout s par le personnel soignant et d clareront une inobservance ventuelle au soignant, 9 ne le d clareront pas de peur de reproches et 1 d'tre moins bien soign ; 90 % ont confiance dans les dires de leur m decin. Aucune diff rence significative n'a t trouv e entre les patients observants et non observants pour l'coute du soignant (p = 0,23), les d clarations d'inobservance au m decin (p = 0,79) et la confiance aux dires du soignant (p = 0,11). Par contre, l'observance est significativement li e au degr de confidentialit du centre de soins (p = 0,006). En effet, 35 % des non-observants qualifient le degr de confidentialit comme assez bien ou mal contre 8 % des observants. Mais l'observance n'est pas influenc e par le protocole prescrit (p = 0,60). La consommation des substances telles que le khat qui est une drogue douce (p = 0,22) et le tabac (p = 0,41) n'est pas associ e la non-observance.

Dans la litt rature, l'ge jeune [*1 -1*], le sexe f minin, les conditions de vie d favorables [*1 -1*] et l'absence de perception de soutien de l'entourage [*1 , 1 , *] sont des facteurs pr dictifs de la non-observance

[□□, □□]. Dans notre □tude, on ne retrouve pas d'association significative de l'observance avec le sexe (p = 0,57), l'□ge (p = 0,74), l'□tat matrimonial (p = 0,72), le revenu (p = 0,91) et le niveau d'□tude (p = 0,39).

L'□tude retrouve la relation entre les effets ind□sirables et la non-observance cit□e dans la majorit□ des □tudes [*1*□-□*0*]. Une tr□s grande partie des patients (n = 74, 86 %) ont d□clar□ avoir ressenti durant le mois pr□c□dant l'interrogatoire des effets ind□sirables. La non-observance est significativement reli□e □ la survenue des effets ind□sirables (100 % des non-observants contre 82 % chez les observants) (p = 0,03). Mais les effets ind□sirables ne sont pas distribu□s diff□remment dans les deux groupes. En effet, apr□s regroupement, on ne retrouve pas de relation significative entre la non-observance et les troubles digestifs (p = 0,23), les troubles neurologiques (p = 0,06), les effets g□n□raux (p = 0,18) et les autres effets (p = 0,29).

En outre, les patients ayant d□j□ manqu□ une prise donc ayant d□j□ eu, m□me avant notre enqu□te, un probl□me d'observance sont susceptibles d'□tre non observants [*1*□].

□ l'oppos□, les patients b□n□ficiant d'une aide communautaire sont plus observants. En effet, la proportion □lev□e de ch□meurs confirme cette situation de d□pendance du sujet vis-□-vis de la famille □largie et de la soci□t□. Ainsi, parmi les patients observants, nombreux sont membres d'une association (94 % contre 65 %, p = 0,001).

Le niveau d'□tude joue un r□le protecteur [*1*□,*1*□]. En revanche, nous n'avons pas pu confirmer certaines caract□ristiques de non-observance comme le co□t du d□placement [□], l'utilisation de la m□decine traditionnelle [*1*□,*1*□], la difficult□ financi□re [□-□], l'absence de connaissance du traitement [*1*□,*1*□]. L'am□lioration de la qualit□ de vie est la m□me dans les deux groupes (p = 0,49). Chez tous nos patients observants ou non observants, 46 (53,4 %) d□clarent avoir manqu□ au moins une prise depuis le d□but de leur traitement. Si l'on s'int□resse aux motifs ayant amen□ les patients □ manquer des prises depuis le d□but du traitement, nous retrouvons une relation statistiquement significative entre la non-observance et un saut de prise pour rupture de stock ou □ l'occasion d'un voyage (p = 0,02). Aucun des groupes de motifs de prise manqu□e que nous avons class□s en facteur personnel (doute de l'efficacit□ + dur□e longue + m□decine traditionnelle + oubli + sommeil, p = 0,78), facteur socio-□conomique (financier + judiciaire + conflit familial + prise de khat, p = 0,80), facteur m□dical (effets g□nants + survenue d'autres affections + prise d'autres m□dicaments, p = 0,11) n'est cit□ avec une fr□quence significativement diff□rente entre les patients observants et non observants.

Cependant, les diverses origines ethniques des patients et l'oubli justifient l'incrimination des voyages associ□s □ la rupture de stock dans la non-observance. La perception n□gative du personnel soignant favorise la non-observance. Cette liaison est d'autant plus forte que la confidentialit□ n'est pas bonne. La pr□occupation des patients concerne surtout leur statut s□rologique et l'attente du m□decin.

La th□rapie antir□trovirale est la seule exigeant un niveau d'observance excellent pour son efficacit□. Notre □tude montre une relation significative entre l'observance et l'efficacit□ th□rapeutique comme dans les autres □tudes [□,□-*10*,*1*□,*1*□]. Le taux d'observance est corr□l□ □ la charge virale (rho = -0,61, p < 0,001). Toutefois, la proportion de 77 % d'observants rejoint celle des autres pays africains au cours de leur premi□re ann□e de traitement (S□n□gal

[ ], C te d'Ivoire [ ], Burkina Faso [ ], Mozambique [*10*]) mais aussi celle des pays du Nord [*1*]. Ceci t moigne de la capacit des patients tre observants et donc la faisabilit de la trith rapie au Sud [,].

Une approche sant publique de l observance

Tout d'abord, il est important de r valuer l'observance au cours du traitement. Chez les patients pr dispos s tre non observants, nous pr conisons de les mettre sous inhibiteurs de la prot ase puisque le risque de d veloppement de r sistance est limit en cas d'interruption [ ].

Ensuite, le suivi m dical est renforcer par la mise en place d'une consultation d' ducation th rapeutique qui va s'inscrire dans un cadre bien d fini et rigoureux pour ne pas aboutir l'effet contraire [,].

Puis la fr quence lev e de l'oubli et l'extr me mobilit de notre population nous am nent pr coniser respectivement la pr f rence des antir troviraux combin s avec le moins de prises possible et de remettre au patient une quantit suffisante pour la p riode d'absence du lieu de r sidence. En effet, les r gimes succincts favorisent l'observance [,]. Les entretiens de motivation lors des rencontres avec le patient et la th rapie comportementale et cognitive am liorent l'adh rence au traitement [*0*].

En d but de traitement et lors du renouvellement de chaque ordonnance, la contribution des pharmaciens l'am lioration de l'observance s'est av r e efficace [*1*]. Les strat gies de la th rapie sous surveillance directe, les groupes de paroles, le , les piluliers lectroniques sont inadapt s notre contexte.

Biais et validit de l tude

Il n'existe pas de pour valuer l'observance. Cette tude est valid e par la corr lation entre l'observance et l'efficacit virologique. Le taux d'observance est corr l la charge virale (rho = -0,61, p < 0,001). En effet, cette association est d'autant plus forte que le taux d'observance est lev : 90 % (p = 0,25), 97 % (p = 0,02), 100 % (p < 0,001).

La m thode d' valuation de l'observance utilis e est peu co teuse, bien adapt e notre contexte et surtout cr dible [*1*]. En effet, l'indicateur d'observance bas sur la d claration du patient surestime l'observance effective. L'observance per ue par les patients refl te l'observance mesur e (p = 0,007). Toutefois, 70 % des patients non observants estiment tre observants au traitement tandis que 4 % des patients observants ont des doutes et pensent qu'ils ne sont pas assez observants. Ceci montre une surestimation de l'observance effective chez les patients non observants.

Toutefois, la faible proportion de patients sous antir troviraux (ARV) dans notre pays est une limite. Par ailleurs, nos r sultats montrent galement les limites de l'approche transversale pour l' valuation de l'observance qui est dynamique. Le biais de m morisation est relatif dans les enqu tes r trospectives. Nous ne retrouvons pas certains facteurs de l'inobservance trouv s dans les tudes du Sud du fait des diff rences entre les populations tudi es. Ainsi, on vitera de g n raliser les r sultats de notre tude des contextes diff rents du n tre.

Conclusion

Cette tude montre que la pr occupation principale des patients concerne l'acceptation de la maladie VIH/SIDA et le v cu sous traitement antir troviral. En pratique, il faudrait d s le d but aider les patients penser l'avance au traitement et leur assurer un soutien personnalis

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Economic cost of malaria on households during a transmission season in Khartoum State, Sudan

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التكاليف الاقتصادية التي تتحمَّلها الأسرة بسبب الملاريا في موسم سراية المرض في ولاية الخرطوم، بالسودان

منى حسن مصطفى، منيف عبد الباقي بابكر

الخلاصة: أُجريَت هذه الدراسة في عام 2004 بين 1200 أسرة مقيمة في ولاية الخرطوم، بهدف تقدير التكاليف الاقتصادية المباشرة وغير المباشرة التي تتحمَّلها الأسرة بسبب الملاريا. وجُمعت معلومات عن الأسرة وعن نوبات الملاريا (سلوك التماس الرعاية، وعدد أيام العمل المفقودة، والإنفاق على المعالجة). وقد دُرست 327 نوبة ملاريا؛ وأبلغ 25.2٪ من الأسر عن حدوث نوبة ملاريا واحدة على الأقل في الشهر الذي سبق المسح. وفي 18٪ فقط من نوبات الملاريا كان المصاب بالعدوى يمارس نشاطه الاقتصادي. وبلغ متوسط التكاليف غير المباشرة لكل حالة شُفيت تماماً 3.2 دولار أمريكي (بانحراف معياري 2.□)؛ وكانت التكاليف أعلى في حالة الأفراد العاملين في القطاع غير الرسمي، بالمقارنة مع العاملين في القطاع الرسمي.

ABSTRACT This study was conducted in 2004 among 1200 households in Khartoum to estimate the direct and indirect economic costs of malaria for households. Information on the household and the malaria episodes was collected (care-seeking behaviour, working days lost and expenditure on malaria treatment). There were 327 episodes of malaria; 25.2% of the households reported at least 1 malaria episode during the month preceding the survey. In only 18.0% of malaria episodes was the individual economically active. The average treatment expenditure per fully cured case was US$ 6.3 (SD 5.9). The average indirect cost per fully cured case was US$ 3.2 (SD 9.2); it was higher for individuals working in the informal sector than those employed in the formal sector.

Co t conomique du paludisme pour les foyers de l tat de Khartoum (Soudan) au cours d une saison de transmission

RÉSUMÉ Cette étude, menée en 2004 auprès de 1200 foyers de Khartoum, avait pour objectif d'évaluer les co ts économiques directs et indirects du paludisme pour les foyers. À cette fin, il a été procédé à la collecte d'informations sur les foyers et les accès palustres (comportement de recours aux soins, absentéisme et dépenses liées au traitement antipaludéen). Il a été recensé 327 accès palustres et 25,2 % des foyers ont rapporté au moins un accès dans le mois précédant l'enqu te. Seuls 18,0 % des accès palustres ont frappé un individu économiquement actif. Pour chaque cas de guérison complète, le co t moyen du traitement s'élevait à USD 6,3 (E.T. 5,9), tandis que le co t indirect était de USD 3,2 (E.T. 9,2), ce dernier s'avérant plus élevé pour les travailleurs du secteur informel par comparaison avec le secteur formel.

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Introduction

In addition to the health burden, malaria places an enormous economic burden on households in endemic regions [1]. The burden includes the direct cost (medical consultation, laboratory investigation, drugs and hospitalization) [□] and the indirect cost due to work days lost through morbidity and mortality for both malaria cases and individuals looking after them [□, □].

As in many other parts of Sudan, malaria represents a major public health problem in Khartoum State. In Khartoum, malaria accounts for 24% of all patients seen at outpatient departments and 13.4% of hospital admissions [□]. In terms of the health burden of malaria on the community, these figures mean that malaria not only consumes the greater share of the treatment-related expenditure of households than other diseseses, but is also the cause of the highest loss of working days.

Although the exact economic burden that falls on households in Khartoum is not known, it is expected to vary from one subgroup of the population to another. There are a large number of possible determinants that may affect the level of economic loss by households [□]. For instance, as regards direct cost, the level of treatment-related expenditure is affected by the care-seeking behaviour of the patient [□]. During malaria episodes patients can chose from a wide range of health care providers or they may resort to self-treatment. As drug and service prices differ from one health care provider to another, the level of expenditure will vary according to the provider chosen.

The indirect cost, on the other hand, depends on the economic activity and type of job of the malaria cases and the family member looking after him/her.

Estimating the total and differential economic cost in Khartoum State is vital to guide health planners and also to bring to their attention the full picture of the devastating effect of malaria.

The objectives of the study therefore were to estimate the direct and indirect costs associated with malaria episodes at the household level in Khartoum State, and to identify the possible effects of care-seeking behaviour and occupation of malaria cases on these costs.

Methods

Study design and setting

This was a descriptive cross-sectional community-based study. It was conducted in Khartoum State in 2004, the capital of Sudan; the state is the smallest state of Sudan with an area of 28 000 km^2. The total population is estimated as 7 million. Khatroum state consists of central urban areas, peripheral rural areas and camps established to accommodate the internally displaced populations (IDPs) coming from other states of the country. It is considered as an area of unstable malaria transmission with high peaks of incidence during, and immediately after, the rainy season, and during the winter months [□].

Sampling

The primary sampling unit was the household. To be included in the study a household had to have resided for at least 12 months in Khartoum State. For the sample size calculation it was assumed that the proportion treated for malaria during the previous month would be 25% based on the results of a previous study [□]. Thus a sample of 1200 households was required.

Using the probability proportional to size method, 25 geographically defined clusters were selected from a sampling frame provided by the Central Bureau of

Statistics. The frame was stratified by rural area, urban area and IDP camp. Systematic sampling was used to select 48 households from each cluster to give the total of 1200 households (in total 1203 household were included).

Data were collected in 3 phases to cover the period of the rainy transmission season of 2004. The rainy season usually extends from July to October. The first phase of the study was conducted during the second half of August 2004, the second phase during the first half of October 2004 and the last phase during the second half of November 2004. Thus 400 households were visited in each phase.

The inclusion criteria of malaria cases were:

- Malaria confirmed by positive blood film or other blood tests.
- Malaria diagnosed on a clinical basis by a health care provider.
- For non-confirmed cases the diagnosis was verified by asking about the presence of the following symptoms: fever, headache, sweating and vomiting. These were found to be associated with a positive blood film for malaria using binary logistic regression in a previous study [*10*].

An individual was considered to have 2 or more malaria episodes if a minimum period of 2 weeks had elapsed between the 2 episodes. In this study all episodes where included.

Questionnaires

Two questionnaires were used for data collection; both were adapted from the questionnaires used for estimating the malaria-related costs in Sri Lanka [*1*].

Questionnaire 1 was used with all selected households to collect background information.

Questionnaire 2 was used with all malaria cases to collect the following data: background information on malaria cases, care-seeking behaviour, working days lost and expenditure on malaria treatment.

The reliability and validity of the data were tested by reliability analysis using □□□□ and the analysis yielded an alpha value of 0.0009.

Data collection

Data were collected by 5 teams each composed of 1 field supervisor and 3 interviewers. The field supervisors were social science graduates who were previously trained on data collection methods and field supervision, and they had received further training on the field-work and the tools of the this study. The interviewers were university graduates, previously trained on data collection methods and had received training on the tools of this study. The training in both instances was conducted by the principal investigator and included lectures and role play.

Data analysis

Data were analysed with □□□□, version 11.5. The analysis included descriptive statistics for frequencies and averages [mean and standard deviation (SD)], and comparison between subgroups using the chi-squared test for proportions, and one-way analysis of variance and □-test for means of independent samples. A □-value less than 0.05 at 95% confidence interval was considered significant.

Cost calculations included treatment-related expenditure (direct cost) and indirect costs. Average treatment-related expenditure was estimated first for the household and then per fully cured malaria case. The measurement of indirect costs was based on an output-related approach. The estimates

included only days lost by malaria cases and their caretakers who were involved in productive work. Productive work was broadly defined as involvement in any economic activity with the potential to add to the disposable income of the household. This output-related method excluded time loss of economically inactive patients [*1*].

The total number of working days lost by both patients and their caretakers was recorded. The indirect cost was calculated for the level of both households and fully cured malaria cases.

Results

Sociodemographic data

The 1203 households included 6836 people. The majority (72%) of the households participating in the survey resided in urban areas, 20% in rural areas, while only 8% resided in IDP camps. The majority of the heads of the households were involved in some income-earning activity (95.2%). The average monthly income per household was equivalent to US$ 216.8 (SD 430.8).

Malaria incidence

Only 25.2% of the households reported at least 1 malaria episode during the month preceding the survey. A total of 327 malaria episodes occurred during the 3 phases of data collection and no individual reported having malaria more than once during the study period. The incidence of malaria episodes was 51/1000 in the first phase, 42.5/1000 in the second phase and 51/1000 in the third phase giving an overall incidence of 48.2/1000 per month during the whole period of the survey.

Table 1 shows the characteristics of the individuals who suffered a malaria episode. More than half of the malaria episodes (57.2%) occurred among females. About two-thirds occurred among the adult population (> 14 years). In only 18.7% of the episodes was the individual who contracted malaria covered by health insurance.

In only 18.0% of malaria episodes was the individual involved in economic activities. Of the economically active individuals, 44.1% worked in the formal sector and had regular salaries, i.e. government and private sector employees and public sector workers. The remaining 55.9% belonged to the informal sector (self-employed, farmers and casual labourers) and their earnings were irregular. The average monthly income per malaria case was US$ 127.9 (SD 72.9) (Table 2).

Care seeking behaviour

The majority of reported malaria episodes (78.9%) were diagnosed by a positive blood film, while 14.4% were clinically diagnosed at a health facility. Self-diagnosis was observed in only 6.7% of the episodes.

In 89.3% of episodes, the individual went to a health facility to seek care in the first instance; only 5.8% resorted to self-treatment. For the remaining 4.9%,

Table 1 **Characteristics of malaria episodes, Khartoum State, 2004**

Characteristic	No. (*n* = 327)	%
Sex		
Male	140	42.8
Female	187	57.2
Age group (years)		
0–14	110	33.6
> 14	217	66.4
Heath insurance coverage		
Covered	61	18.7
Not covered	266	81.3
Average income per malaria case [Mean (SD)]	US$ 127.9 (72.9)	

SD = standard deviation.

Table 2 **Distribution of episodes according to economic activity, Khartoum State, 2004**

Economic activity	No. (*n* = 327)	%
Economically active		
Formal sector (regular salary)		
Government employee	14	4.3
Private sector employee	8	2.4
Public sector workers.	4	1.2
Informal sector (irregular earnings)		
Farmer	2	0.6
Self-employed[a]	20	6.1
Casual labourer[b]	11	3.4
Economically inactive		
Housewife	79	24.2
Unemployed	36	11
Student	92	28.1
Pre-school child	58	17.7
Retired	3	0.9
Total	327	100%

[a]*Self employed denotes any individual who owns his/her business and works for himself/herself instead of as an employee of another person or organization, drawing income from a trade or business. He/she usually owns or shares the capital of the business.*
[b]*Casual labourer are unskilled or semi-skilled labourers who work in areas such as construction and domestic service - they usually work for very short duration of time for an employer, and are usually paid for their labour on a daily basis. Their earnings are irregular and depend on the availability of a job.*

the individual made blood investigations without consulting a health care provider, consulted a traditional healer or ignored the illness. The governmental health centres were the facilities most commonly used, by 46% of those seeking care from a facility. Private health facilities (clinics or hospitals) were the least used facilities, used by only 1% of the cases. After taking all the actions, 97.2% of the malaria cases were fully cured of the illness (as reported by the individual or his/her family), while in 2.8% the person was still taking treatment. The 318 fully cured cases were further analysed to estimate the costs.

Lost working days

The average number of working days lost by malaria cases was 6.2 (SD 6) days. Only 26 (8%) of the malaria cases needed another family member to absent him/herself from work or school to take care of them. Of these co-patients, 19 (73.1%) were involved in economic activities (employees, self-employed regular and casual labourers), while 7 (26.9%) were students. The average number of working days lost by co-patients was 3.1 (SD 1.6) days. The study showed that 35.1% of the economically active malaria cases and 47.6% of the economically active co-patients had obtained paid sick-leave for the period of absence from work. These were mainly employed in the formal sector.

Treatment related expenditure

The average monthly expenditure on malaria treatment per household was equivalent to US$ 1.7 (SD 4.1); this reduced the average monthly income per household by 0.8% (Table 3).

At the individual level, the average expenditure per fully cured malaria case was found to be US$ 6.3 (SD 5.9) and the median was US$ 6.6. This reduced the average monthly income per malaria case by 5.3% (Table 3). Table 3 also shows that seeking treatment from a health facility was associated with significantly higher expenditure per fully cured malaria case than resorting to self-treatment [health facility = US$ 6.4 (SD 5.6), self-treatment = US$ 2.5 (2.2); □ < 0.05]. Taking more than one action was associated the highest treatment-related expenditure (□ < 0.05).

As shown in Table 3, private clinics and hospitals were associated with significantly higher treatment expenditure per fully cured malaria case than all the other facilities [(private clinic = US$ 16.2 (SD10.1), gov-

Table 3 **Average monthly treatment-related expenditure according to actions taken and type of health facility visited, Khartoum State, 2004**

Expenditure	Mean (SD), US$	% reduction in monthly income
Monthly expenditure on treatment per household (n = 1203), excluding nutrients and food	1.7 (4.1)	0.8
Expenditure on malaria treatment per fully cured malaria case (n = 315[a])	6.3 (5.9)	5.3
Actions taken		
Self-treatment (*n* = 13)	2.5 (2.2)	*P* < 0.05 when comparing between different actions
Blood testing without consultation (*n* =7)	5.1 (2.2)	
Visited health facility (*n* = 265)	6.4 (5.6)	
More than one action (*n* = 30)	8.7 (8.9)	
Health facility chosen		
Governmental hospital (*n* = 61)	5.4 (2.1)	*P* < 0.05 when comparing between different facilities
Governmental health centre (*n* = 132)	5.0 (2.7)	
NGO health centre (*n* = 55)	5.0 (1.7)	
Private clinic (*n* = 37)	16.2 (10.1)	
Private hospital (*n* = 2)	12.2 (8.5)	

[a]*For 3 cases there was no expenditure and they were excluded from the analysis.*
Exchange rate at the time of the study: US$ 1 = 250 Sudanese dinars.
SD = standard deviation.
NGO = nongovernmental organization.

ernmental health centre = US$ 5.0 (SD 2.7), nongovernmental organization (NGO) centre = US$ 5.0 (SD 1.7); □ < 0.05)]. When breaking down the treatment-related expenditure, it was found that the highest proportion of treatment expenditure (42%) went for purchasing drugs. This was followed by doctor's fees which constituted 30.4% of the expenditure.

Indirect costs

Table 4 shows that the average indirect cost of malaria per household per month was US$ 0.8 (SD 4.9), reducing the average monthly income of households by 0.4%.

The average indirect cost per fully cured malaria case (patient days only) was US$ 2.6 (SD 8.7) reducing the average monthly income of malaria cases by 2%. The average indirect cost per fully cured malaria case (co-patient days) was US$ 0.5 (SD 3.4). The overall average indirect cost per fully cured malaria case (both patient and co-patient days) was US$ 3.2 (SD 9.2).

Individuals who were self-employed and casual labourers had significantly higher average indirect costs per fully cured malaria case than employees and public sector workers: self-employed = US$ 22.1 (SD 17.2), casual labourers = US$ 13.5 (SD 10.9), employees US$ 7.6 (14.7), public sector workers = US$ 9.0 (SD 14.3); □ < 0.0001.

Discussion

Information on the economic consequences of malaria on households is an important complementary tool needed for successful

Table 4 **Average monthly indirect cost of malaria, Khartoum State, 2004**

Average monthly indirect cost per:	Mean (SD), US$	% reduction in monthly income
Household (*n* = 1203)	0.8 (4.9)	0.4
Fully cured malaria case (patient days)	2.6 (8.7)	2.0
Fully cured malaria case (co-patient days)	0.5 (3.4)	0.4
Fully cured malaria case (patient and co-patients)	3.2 (9.2)	2.5
Type of job		
Employee (*n* = 22)	7.6 (14.7)	1.6
Self-employed (*n* = 20)	22.1 (17.2)	2.0
Public sector worker (*n* = 4)	9.0 (14.3)	5.8
Casual labourer (*n* = 11)	13.5 (10.9)	3.0
Farmer (*n* = 2)	40.6 (34.0)	14.3

P < *0.0001 when comparing between different jobs.*
SD = standard deviation.

formulation of policies in areas such as health financing, introduction of new therapies, and regulation of the private sector.

Direct cost of malaria

In Khartoum State, patients seeking care for malaria illness from governmental, NGOs, and private sector facilities – unless covered by health insurance – pay directly out of pocket for medical consultation, laboratory investigations and purchase of medicines. This user charge system, augmented by the limited coverage by health insurance, was most probably behind the high average treatment expenditure per fully cured case when compared with values from other countries. For instance, in Sri Lanka, Attanayake and colleagues reported a value equivalent to US$ 1.1 for malaria cases visiting public health facilities where services are provided free of charge [1].

Our study and many others have shown that the highest proportion of treatment expenditure for malaria goes on medicines [11,12]. Thus where chloroquine, the cheapest drug, is still effective, the average expenditure per case is expected to be relatively low. However, in Khartoum State, chloroquine was replaced with the more expensive artesunate plus sulfadoxine–pyrimethamine combination therapy during the year 2004, and the complete establishment of this replacement is expected to increase the treatment-related expenditure even further.

The difference in the pattern of care-seeking behaviour was also behind the inconsistency in treatment costs. Unlike the trend in other malaria-endemic countries [1,3,13], there was high use rate of health facilities and low rate of self-treatment during malaria episodes in Khartoum State. This practice is probably motivated by the high coverage of health facilities provided by both the public and private sectors [*1*□]. As reported by studies from other endemic countries [□*11,*□*1*□], the treatment-related expenditure was found to be significantly

higher for those using health facilities than for those who self-treat. It is worth mentioning that self-treatment is resorted to by malaria cases to cut down the treatment cost. However, the self-treatment can have serious repercussions. For example, it can result in under-dosing which will lead to drug resistance and increase the cost of treatment in the long run through the necessary introduction of expensive drugs.

Our findings agree with many other studies in that seeking care from private health facilities was associated with the highest expenditure per fully cured case [*1,1*□,*1*□]. The variations in treatment costs between the public and private sectors are due to the higher fees charged by the private sector for malaria management.

Indirect cost of malaria

The indirect cost of malaria depends on both the amount of time lost due to illness and the value of that time in financial terms. In Khartoum State □□□□ □□□□ □□□□□□□□ is responsible for around 90% of all malaria cases [□]. This species is associated with a more severe disease that is followed by a prolonged period of weakness and disability [*1*□,*1*□]. In addition to that, Khartoum is considered an area of unstable transmission of malaria where the intensity of transmission varies across the years [□]. Conditions of unstable malaria transmission are associated with low immunity levels, longer periods of disability, and a high degree of clinical illness in adults [*1*□ *1*□].

Both these factors would imply a high average indirect cost in Khartoum State. However, we used an output-related method in this study to estimate the indirect cost so as to avoid over-emphasizing the burden. The output-related method takes into consideration only time lost by economically active individuals and specifically those who actually suffered income or output loss [*1*], i.e. excluding economically inactive individuals and those who obtained paid sick leave. This leads to cost estimates that are less than the estimates generated by other methods that use some estimate of the average wage that includes all individuals above a certain age irrespective of whether they are economically active or not or if they actually lose any output or income due to malaria [*1*]. The output-related method was earlier used to estimate the indirect cost related to malaria in Sri Lanka [*1*].

The average indirect cost per fully cured malaria case of US$ 3.2 (SD 9.2) found in our study lies towards the lower limit of the range of US$ 0.68 to US$ 25 reported by Chima et al. [□]. The choice of method to measure and value time loss is potentially an important explanatory factor of the variations in household costs reported to date [*1*].

The indirect costs estimated by our study were less than the direct costs and this concurs with most studies estimating malaria costs [□].

Occupation of the malaria case was found to considerably affect the indirect cost; those working within the formal sector (government and private employees and public sector workers) had significantly lower indirect costs compared with those working within the informal sector (casual labourers and the self-employed). The reason behind this was that the majority of employees and public sector workers were able to obtain paid sick leave for the period of their illness thus avoiding salary cuts. On the other hand, casual labourers, who work in construction and domestic service are paid on a daily basis and any loss of activity is associated with loss of earnings. Moreover these individuals do not usually enjoy the benefits of health insurance, which is restricted mostly to the formal sector; this exacerbates the economic burden that falls

on them. However, although employees and public sector workers may not bear the direct effect of this indirect cost, the economy of a country suffers from the effect of these absences and, in the long run, this can have an impact on the individual.

Conclusion

Malaria places a great economic burden on households of Khartoum State in terms of direct and indirect costs. The indirect cost burden was especially tremendous on individuals belonging to the informal sector. High use rate of health facilities and the limited coverage by health insurance contributed to the high treatment cost. Reducing this burden requires strategies such as increasing coverage by health insurance to include all employees in the formal sector. For those belonging to the informal sector, provision of free malaria curative services should be considered. Regulation of prices of malaria services in the private sector should also be considered.

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Incidence and risk factors of neonatal hypothermia at referral hospitals in Tehran, Islamic Republic of Iran

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معدّل حدوث انخفاض حرارة الوليد وعوامل اختطارها في مستشفيات الإحالة في طهران، بجمهورية إيران الإسلامية

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الخلاصة: تم انتقاء 900 وليد عشوائياً لتحديد معدل انخفاض حرارتهم وعوامل اختطارها في مستشفيات الإحالة في طهران، بجمهورية إيران الإسلامية. وتم في إطار هذه الدراسة قياس درجة حرارة جسم الوِلْدان بشكل متكرِّر في نقاط زمنية مختلفة بعد الولادة. وتبيَّن انخفاض حرارة 50٪ من الوِلْدان فور الولادة. وبيَّن تحليل التحوُّف المتعدد أن انخفاض الوزن عند الولادة، وانخفاض العمر الحملي، وانخفاض درجة حرارة البيئة، وانخفاض حرز أبغار، وتعدُّد مرات الحمل، وتلقِّي الإنعاش القلبي الرئوي، كل ذلك ارتبط ارتباطاً يُعْتَدُّ به إحصائياً بانخفاض حرارة الوِلْدان. وتنم هذه النتائج عن حاجة عاجلة إلى توعية وتثقيف جميع مستويات المتعاملين مع الوِلْدان في البلد.

ABSTRACT To identify the incidence rate and risk factors of neonatal hypothermia at referral hospitals in Tehran, Islamic Republic of Iran, 900 neonates were randomly selected. Body temperature was measured repeatedly at different time points after birth. More than 50% became hypothermic soon after birth. Multiple regression analysis showed that low birth weight, low gestational age, low environmental temperature, low Apgar score, multiple pregnancy and receiving cardiopulmonary resuscitation were significantly associated with hypothermia. These findings suggested that there is an urgent need to sensitize and educate all levels of staff dealing with neonates in our country.

Incidence et facteurs de risque de l hypothermie n onatale dans les h pitaux de recours de T h ran (R publique islamique d Iran)

RÉSUMÉ Afin d'identifier l'incidence et les facteurs de risque de l'hypothermie néonatale dans les h pitaux de recours de Téhéran (République islamique d'Iran), il a été procédé à la sélection randomisée de 900 nouveau-nés. Leur température corporelle a été mesurée à plusieurs reprises à différents points-temps après la naissance. Plus de 50 % de ces nouveau-nés se sont révélés hypothermiques peu de temps après leur naissance. L'analyse de régression multiple a mis en évidence l'existence d'une association significative entre l'hypothermie et un faible poids de naissance, la prématurité, une température ambiante basse, un score d'Apgar faible, la multiparité et le recours à la réanimation cardiorespiratoire. Ces résultats semblent indiquer combien il est urgent dans notre pays de sensibiliser à ce problème et de former, à tous les échelons de la hiérarchie, les personnels amenés à prendre en charge les nouveau-nés.

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Introduction

Hypothermia is an important determinant of the survival of newborns, especially among low-birth-weight (LBW) babies [*1*]. An infant loses heat by evaporation, convection, radiation and conduction. If hypothermia persists, there is a risk of neonatal cold injury, in which case the infant usually becomes lethargic, with slow, shallow and irregular respiration and a slow heart rate corresponding to decreased body temperature. Prolonged cold injury leads to oedema, scleroderma, general haemorrhage (especially pulmonary haemorrhage), jaundice and death [□].

In many parts of the world, health personnel are not aware of the importance of keeping babies warm by simple methods such as drying and wrapping immediately after birth, avoiding harmful traditional practices, encouraging early breastfeeding and keeping newborns in close contact with their mothers [□]. A study on 160 medical and paramedical staff dealing with neonatal care in India showed that only 47.8% of the subjects defined neonatal hypothermia correctly. In addition, only 18.6% of the interviewees had knowledge about the correct method of recording the temperature in a newborn [□]. Previous reports from different Asian and African developing countries show that most of the neonates became hypothermic soon after birth [□]. In developed countries, however, awareness of the problem has resulted in improved care, and the incidence of neonatal hypothermia was mostly confined to outborn, premature and LBW infants.

In previous decades, most of the studies from countries of the Eastern Mediterranean Region focused on the prevention of neonatal hypothermia or its related complications among newborn infants. Therefore, adequate information about the prevalence of this problem is not available in the majority of these countries. For instance, a study on 50 Iraqi children with hypothermia showed that the majority of infants had evidence of infection, particularly septicaemia [□]. The overall mortality rate in that study was 26% (42% in LBW infants) and the most common finding was a high incidence of aspiration pneumonia in infants over 3 days old. The results from another study on 36 cases of neonatal intestinal obstruction in Iraq revealed that hypothermia was one of the main causes of death [□]. In a survey of paediatric mortality in Lebanon, the researchers recommended that prevention of 5 risk factors—acidosis, hypoxaemia, hypoglycaemia, hypotension and hypothermia—was important for reducing the death rate [□]. Neonatal hypothermia is also prevalent in Israel [□]. Different studies in that country have shown that mortality and morbidity in hypothermic infants are mainly related to the presence or absence of an associated septicaemia [□ *11*]. In Turkey, a study on 66 babies who had undergone surgery because of peritonitis showed 100% mortality in hypothermic neonates [*1*□].

In our country, Islamic Republic of Iran, previous reports about the prevalence and risk factors of neonatal hypothermia are confined to unpublished studies, small sample sizes or local surveys. Regarding this variable information, we believe that neonatal hypothermia is a serious health problem in our country, even among those born at university teaching hospitals. Therefore, we decided to design an epidemiologic survey to obtain more accurate information about the incidence rate and risk factors of this problem at referral university teaching hospitals of Tehran, which are expected to have better trained staff as well as higher level of medical resources compared to small or local centres in other cities of the Islamic Republic of Iran.

Here, it should be noted that while other surveys in the area of neonatal hypothermia have generally focused on its incidence, our study gives more attention to the severity of hypothermia through a longitudinal study. This repeated measures study helps us to assess the trend of improvement among hypothermic infants after recommended treatments. The results would provide a baseline for future health programmes in these hospitals.

Methods

Sampling technique

This study of neonatal hypothermia was an epidemiologic longitudinal survey at referral university hospitals in Tehran, Islamic Republic of Iran. Since one of the most important objectives of the study was to estimate the prevalence of neonatal hypothermia at these hospitals, the sample size formula for the prevalence studies ($\square = \square^2\square(1-\square)/\square^2$), with $\alpha = 0.02$, $\square = 0.04$ and $\square = 0.5$ (which yields the maximum sample size), was used to estimate the required sample size. Using simple calculation, it was found that the study sample should consist of at least 845 newborns.

There are 15 referral university teaching hospitals with a neonatal intensive care unit (NICU) in Tehran. To select the study sample, the city was divided into 5 districts (north, south, east, west and centre), each with 3 referral hospitals. Then 1 hospital was randomly selected in each district. In the next stage, 100 days were randomly chosen between February and November 2004 (to include 4 seasons with air temperature ranging from –5 °C to 40 °C). Finally, for each selected day, 2 newborn infants were selected at each hospital using a random numbers table. After excluding hyperthermic neonates (rectal temperature > 38 □C), outborn babies (because of inadequate sample size) and those with diagnosable anomalies at birth, 900 neonates were recruited to the study.

Repeated measurements

After obtaining consent from the parents, the neonate's rectal temperature was measured using a calibrated digital low-reading thermometer at 5 time periods: immediately after birth in the operating room, several minutes after admission to the neonatal unit (levels I, II, III of nursery care), and 1, 2, and 4 hours after admission to the neonatal unit. If a newborn was hypothermic, she/he was rewarmed according to the World Health Organization recommendations [□]. The outcome variable for each newborn was the severity of hypothermia, graded as follows: normal body temperature (rectal temperature 36.5–38.0 □C); mild hypothermia (rectal temperature 35–36.5 □C); moderate hypothermia (rectal temperature 32–35 □C); or severe hypothermia (rectal temperature < 32 □C).

At each hospital, body temperatures of the neonates were measured by 2 trained nurses. Since the body temperature for each baby was considered an ordinal outcome (severity of hypothermia according to the classification), the inter-observer and intra-observer reliability were assessed via a pilot study using generalized Kappa index [*1*□]. All the obtained inter- and intra-observer Kappa statistics were about 100% for these nurses. These findings indicated perfect inter- and intra-observer reliability in this study.

Risk factors

After preliminary analyses, the following explanatory variables were considered potential risk factors for neonatal hypothermia in the regression analysis: sex (0 = male, 1

= female), birth weight (0 = ≥ 2500 g, 1 = < 2500 g), gestational age (0 = ≥ 37 weeks, 1 = < 37 weeks), environmental temperature (temperature of the operating room and neonatal unit), Apgar score (0 = ≥ 8, 1 = < 8), pregnancy type (0 = singleton, 1 = multiple) and cardiopulmonary resuscitation (CPR) (0 = not received, 1 = received). Note that, sex, birth weight, gestational age, pregnancy type and CPR variables are time-stationary factors (which are constant at different time points of the study), but environmental temperature and Apgar score are time-dependent variables (which may vary at different time points).

Statistical analysis

The descriptive part of the statistical analysis was carried out using rates and frequency tables. For analytical purposes, a multivariate logistic regression model (marginal model) was utilized. The generalized estimating equations methodology was also used for estimating the regression parameters and accounting for the correlation between repeated outcomes. The analysis was performed using the □□□□□ procedure in □□□ software, version 8. □-values less than 0.05 were considered statistically significant.

Results

Description of the data

The study sample consisted of 900 neonates (452 males and 448 females). Of these, 298 (33.1%) had birth weight < 2500 g, and 323 (35.9%) were preterm (gestational age < 37 weeks). The mean temperature of the operating rooms and neonatal units at these hospitals was about 28.5 □C (standard deviation = 1.7). In addition, 174 neonates (19.3%) had Apgar score < 8 on at least one occasion. In this sample, the rate of multiple pregnancy was about 3.5%. Additionally, 104 neonates (11.6%) received CPR during the study.

Table 1 shows the severity of hypothermia among these babies at different time points. Summing the data for mild, moderate and severe hypothermia shows that 53.3% were hypothermic immediately after birth, 13.6% on admission to the NICU, 2.7% 1 hour after admission, 0.5% 2 hours after admission and 0.3% 4 hours after admission.

Analysis of risk factors and death rate

A multivariate logistic regression model was utilized to identify some of the most

Table 1 **Severity of hypothermia at different time periods for 900 neonates**

Time	Severity of hypothermia							
	Normal		Mild		Moderate		Severe	
	No.	%	No.	%	No.	%	No.	%
Immediately after birth	420	46.7	426	47.3	50	5.6	4	0.4
At admission to NICU	778	86.4	114	12.7	5	0.6	3	0.3
1 h after admission	875	97.2	21	2.3	2	0.2	2	0.2
2 h after admission	895	99.4	3	0.3	2	0.2	0	0.0
4 h after admission	897	99.7	2	0.2	1	0.1	0	0.0

NICU = neonatal intensive care unit.

important factors associated with neonatal hypothermia at these hospitals. To do this, the mild, moderate and severe categories of hypothermia were combined at different occasions in order to obtain a repeated binary response. In the regression analysis, thus, the repeated response data for each newborn can be written as: 0 = normothermic (body temperature 36.5–38 °C), 1 = hypothermic (body temperature < 36.5 °C), at different time periods.

Table 2 shows the results of multiple regression analysis for the illustrated model. These estimates show that all the described factors except sex of neonate were significantly associated with neonatal hypothermia. In other words, infants who were LBW, preterm, of low Apgar score, from multiple pregnancies and received CPR had higher risk of being hypothermic. Another notable result of regression analysis was that their body temperature was significantly related to the environmental temperature ($\alpha < 0.001$). The neonates had higher risk for being hypothermic when the operating room or neonatal unit temperature was lower.

In this regression analysis, interpretation of the estimates may be more comprehensible in terms of the odds ratios (OR). For example, since the estimate of gestational age effect is 0.549, it can be concluded that preterm neonates had OR = exp (0.549) = 1.73 times the odds of being hypothermic compared to term neonates. In addition, the estimate of environmental temperature

Table 2 **Results of multivariate logistic regression analysis**

Factor	Est[a]	SE	*P*-value	OR
Sex of neonate				
Female	0.162	0.149	0.293	1.18
Male	Reference			
Birth weight of neonate				
Very low/extremely low	1.186	0.252	< 0.001	3.27
Low	0.872	0.211	< 0.001	2.39
Normal	Reference			
Gestational age of neonate				
Term	0.549	0.136	< 0.001	1.73
Preterm	Reference			
Environmental temperature (°C)	–0.213	0.024	< 0.001	0.81
Apgar score				
< 8	0.328	0.152	0.031	1.39
≥ 8	Reference			
Pregnancy type				
Multiple	0.503	0.193	0.009	1.65
Singleton	Reference			
Cardiopulmonary resuscitation				
Received	0.648	0.193	0.001	1.91
Not received	Reference			

[a]*Est = estimate of the model parameter.*
SE = standard error of the estimate; OR = odds ratio (2 sided P-value).

effect (–0.213) tells us that a 1 °C increase in the operating room or neonatal unit temperature decreases the odds of neonatal hypothermia by exp (–0.213) = 0.81.

In order to provide more detailed information about the relationship between severity of hypothermia and the significant factors, we classified the severity of hypothermia immediately after admission to the neonatal unit in terms of weight, gestational age, environmental temperature, Apgar score, type of pregnancy and CPR. Table 3 shows the results. It is clear that the mild, moderate and severe hypothermia in infants who were LBW, preterm, of low Apgar score, from multiple pregnancies and received CPR were significantly more prevalent compared with infants who were not LBW, term, of normal Apgar, singleton and those not received CPR. For instance, the prevalence of mild, moderate and severe hypothermia in low Apgar score infants were respectively 35.2%, 3.7% and 5.5%, while these rates were 11.2%, 0.4% and 0.0% in normal Apgar score babies.

Finally, it is important to note that total mortality rate was 6% (54 neonates) during this study and the death rate in hypothermic babies was considerably higher than in normothermic ones. Table 4 shows the death

Table 3 **Severity of hypothermia few minutes after admission to the neonatal unit in terms of significant factors**

Factor	Total No.	Severity of hypothermia			
		Normal %	Mild %	Moderate %	Severe %
Weight (g)					
< 1000	26	69.7	21.2	6.1	3.0
1000–< 1500	65	69.8	28.6	1.6	0.0
1500–< 2500	207	78.8	20.3	0.9	0.0
≥ 2500	602	92.2	7.5	0.0	0.3
Gestational age					
Preterm	323	79.0	19.5	1.2	0.3
Term	577	90.6	8.9	0.2	0.3
Apgar score					
< 8	174	55.6	35.2	3.7	5.5
≥ 8	726	88.4	11.2	0.4	0.0
Pregnancy type					
Multiple	32 (labour)	73.4	25.0	1.6	0.0
Single	834	87.7	11.6	0.5	0.2
Cardiopulmonary resuscitation					
Received	104	71.2	26.0	1.9	1.0
Not received	796	88.4	10.9	0.4	0.3
Environmental temperature °C[a]	898	29.2 (1.7)	28.1 (1.4)	27.8 (1.9)	27.5 (2.0)

[a]*Mean (standard deviation).*

Table 4 **Cumulative neonatal mortality rate by severity of hypothermia at different time periods**

Time	Severity of hypothermia						*P*-value
	Normal		Mild		Moderate/severe		
	No. dead/ total	%	No. dead/ total	%	No. dead/ total	%	
Immediately after birth	11/420	2.6	31/426	7.3	12/54	22.2	< 0.001
At admission to NICU	35/778	4.5	16/114	14.0	3/8	37.5	< 0.001
1 h after admission	50/875	5.7	2/21	9.5	2/4	50.0	0.001
2 h after admission	52/895	5.8	1/3	33.3	1/2	50.0	0.004

NICU = neonatal intensive care unit.

rate by severity of hypothermia at different time periods. The results of chi-squared tests showed a significant relation between neonatal death and hypothermia (because of inadequate sample size for chi-squared test, the last time period was not shown in this table).

Discussion

Hypothermia is an important and independent risk factor for neonatal death [*1*□]. In addition, as indicated in previous studies, hypothermia is one the most important cause of neonatal morbidity. For instance, it has been shown that hypothermia is associated with neonatal complications such as pulmonary haemorrhage, acidaemia, scleroderma, jaundice and hypoglycaemia [*1*,□,*1*□ *1*□].

To control this health problem and its related complications, prevention is preferable to treatment. In this context, implementing WHO practical guides for thermal control of newborns is a helpful strategy for reducing the incidence of this problem in developing countries [□]. Among the proposed preventive methods, however, "kangaroo mother care (where the preterm infants are carried skin-to-skin with the mother) is the only effective, affordable and available method in most developing countries [*1*□], especially in rural areas.

Several traditional and modern methods have been previously suggested for the diagnosis of neonatal hypothermia. For instance, Singh et al. suggested a simple method for the assessment of a newborn baby's temperature by human touch [□*0*]. Using this method, mothers, traditional birth attendants, nurses and physicians can successfully undergo training to assess a newborn's temperature by touching the abdomen and feet. However, proper diagnosis usually requires a low-reading thermometer, lacking which, the diagnosis can be suspected but is often missed [*11*].

Methods of thermal control and managing hypothermic infants are strongly related to the traditional beliefs and medical resources in each country. A variety of articles are available from different countries about encouraging or discouraging the traditional or other commonly used methods. For instance, in developed countries, highly sophisticated incubators and radiant warmers are available, but there is increasing concern about the long-term effects of noise and light disturbance and unplanned procedures associated with the use of these tools [*1*□]. In Malaysia, cleaning newborn infants with coconut oil shortly after birth is a com-

mon practice in labour rooms. A study on 227 randomly selected normal-term infants in this country revealed that this traditional method of cleaning is significantly associated with hypothermia [□*1*]. The researchers concluded that the labour room temperature should be set at a higher level and cleaning infants using this method should be discouraged. In the Himalayan state of north India, a warm heated room for delivery and lying-in, early rooming in, oil massage and layers of warm clothing are traditional means for thermo-regulation [□□]. In Turkey, Sarman et al. randomly assigned 60 LBW hypothermic newborns admitted to a neonatal care unit for treatment either in a cot on a heated, water-filled mattress kept at 37 □C or in an air-heated incubator with a mean temperature of 35 □C. They demonstrated that normal temperatures were achieved within the first day and remained within this range during the subsequent days after admission in all the infants treated on the mattress, whereas they were not achieved until 3 days later in the incubator group. The neonatal mortality among those treated on a mattress was 21% and among those treated in the incubator 34%. They concluded that a heated, water-filled mattress provides a good alternative to skin-to-skin contact with the mother, and to the use of a complex and expensive incubator for rapidly attaining and maintaining normal temperatures in the LBW newborn [□□].

In developed countries, the incidence of neonatal hypothermia is mostly confined to LBW and small-for-gestational-age neonates. Therefore, the majority of studies have been focused on LBW, premature and other high-risk neonates. For instance, a study on very-low-birth-weight (VLBW) infants in Canada showed that the overall incidence of moderate to severe hypothermia (body temperature < 35 □C) on admission was 11.5%–12.5% among neonates [*1*□]. In a retrospective study in USA, it was revealed that 45% of outborn VLBW infants were hypothermic (body temperature < 36.3 □C) on admission [*1*□]. Another study, in Australia, showed that 17% of infants born during transport were hypothermic (axillary temperature less than 36 □C) [□□]. In the United Kingdom, a study on 4004 infants born before 26 weeks of gestation showed that among those admitted for intensive care, 66.7%, 80.0%, 58.3%, 42.7% and 29.6% were hypothermic at weeks 21, 22, 23, 24 and 25 of gestational age respectively [□□].

In developing countries, however, this problem is more prevalent even in healthy full term and normal-birth-weight (NBW) infants. In Nepal, a study on 500 inborns revealed that 85% of neonates were hypothermic (body temperature < 36 □C) 2 hours after delivery [□□]. In north India, research on 189 term healthy neonates delivered at home showed hypothermia in 19.1% and 3.1% respectively in winter and summer, 24 hours after delivery (axillary temperature < 35.6 □C) [□□]. In our study, 7.8% of NBWs and 9.4% of full-term babies were hypothermic after admission to the neonatal unit. Hypothermia is a serious health problem, even in tropical developing countries, despite warm environmental conditions, and it contributes to a high neonatal morbidity and mortality. A study on neonates admitted to a neonatal care unit in Tanzania revealed that 22.4% were hypothermic (axillary temperature < 35.6 □C). Severe hypothermia was found in 13% of these neonates (axillary temperature < 32 □C) and hypothermic infants had a 3-fold higher mortality and morbidity [□□]. In another study on 313 consecutive newborn infants admitted to a neonatal unit in Harare, Zimbabwe, it was found that the prevalence of hypothermia on admission was 85%, with a mean axillary temperature of 34.3 □C [□□]. In Zambia, a

prospective study at a university teaching hospital among 261 infants aged 0–7 days admitted to the paediatric unit during the warm season revealed that 44% were hypothermic (body temperature < 36 °C) on admission [10].

In the present study, 33.1% of infants were of LBW, 35.9% were premature and 19.3% had low Apgar scores. It should be noted that the selected hospitals are referral tertiary care centres, so a considerable proportion of high-risk pregnant women are referred to these centres from different parts of the country. This is the possible reason for the high rate of LBW, low Apgar score and preterm neonates.

The results of logistic regression analysis showed that infants who were LBW, premature, with low Apgar score, from a multiple pregnancy and had received CPR had higher risk of being hypothermic. Our study did not show any relation between hypothermia and sex of neonate. Kambarami and Chidede did not find any significant relationship between need for resuscitation, birth weight, sex and neonatal hypothermia [11]. However, recent studies from different parts of the world have shown a significant association between neonatal hypothermia and LBW, prematurity, low Apgar sore, deliveries from outside hospital, inadequate clothing after delivery, low socioeconomic status of the mother and air temperature [7, 11, 20 12]. Additionally, our study showed a strong correlation between environmental temperature and neonatal hypothermia. Kumar and Aggarwal reported a significant correlation between room air temperature and neonatal temperature among home-delivered newborns in north India [13]. In addition, Cheah and Boo found that lower labour room temperature was a significant risk factor for being hypothermic [21].

The above mentioned findings help us to sensitize and educate all levels of staff dealing with neonates about the risk factors of neonatal hypothermia in developing countries. Proper management of LBW and preterm neonates is of great importance to reduce the prevalence of hypothermia and subsequent problems among newborn infants. Recently, major studies have been undertaken about the management and outcomes of extremely preterm neonates in Sweden and the United Kingdom [22, 23].

In conclusion, it should be stated that the effect of hypothermia on neonatal mortality and morbidity is undeniable [7, 11, 20, 24]. The results from the present study showed that more than 50% of the infants suffered from hypothermia soon after birth at referral university teaching hospitals of Tehran. This concerning result shows that the extent and significance of neonatal hypothermia are not fully realized in our country. Here it should be emphasized that the nursing staff play a vital role for controlling this health problem in developing countries such as the Islamic Republic of Iran. Therefore, there is an urgent need to increase awareness about the consequences of hypothermia and train mothers and all levels of neonatal care staff to control this health problem in developing countries.

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BDN programmes and the effect of medical students interventions to promote child health in Sudan

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برنامج تلبية الاحتياجات التنموية الأساسية وأثر تدخلات طلاب الطب على تعزيز صحة الطفل في السودان

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الخلاصة: يمثّل أسلوب تنمية الاحتياجات التنموية الأساسية واحداً من أساليب التنمية المجتمعية التي تهدف إلى تحسين نوعية الحياة من خلال الإشراك الكامل، والإدارة الذاتية للمجتمعات، يدعمها التعاوُن المشترك بين القطاعات. والهدف من هذه الدراسة هو تقييم أثر تنفيذ برامج تلبية الاحتياجات التنموية الأساسية في إحدى المناطق في السودان، على جوانب أحد البرامج التي ينفّذها طلاب من كلية الطب، جامعة الجزيرة. وأوضحت الدراسة أن التنفيذ المشترك لبرامج تلبية الاحتياجات التنموية الأساسية، وللتدخلات التي أجراها الطلاب، قد أحدث تحسُّناً واضحاً على الممارسات الأسرية والمجتمعية، وأدَّى كذلك إلى تقليص معدل وقوعات جميع أمراض الطفولة الرئيسية التي شملها التقييم (الإسهال، والسعال، والحمى)، بقدر أكبر مما كان عليه لدى تنفيذ برنامج الطلاب وحده. كما سهَّل تنفيذ هذه البرامج أيضاً الحصول على نوعية جيدة من البيانات المجتمعية.

ABSTRACT Basic development needs (BDN) is an approach to community development that aims at improving quality of life through the full involvement and self-management of communities, supported by intersectoral collaboration. The objective of this study was to assess the effects of BDN implementation in an area of Sudan on aspects of a programme implemented by students from the Faculty of Medicine, University of Gezira. The study revealed that the joint implementation of BDN programmes and students' interventions brought about marked improvement of family and community practices as well as greater reduction in the incidence of all assessed major childhood illnesses (diarrhoea, cough and fever) than when the students' programme was implemented alone. BDN implementation also facilitated the retrieval of good quality community-based data.

Les programmes des besoins fondamentaux en mati re de d veloppement et l effet d interventions des tudiants en m decine dans la promotion de la sant infantile au Soudan

RÉSUMÉ La satisfaction directe des besoins fondamentaux d'une communauté est une stratégie de développement communautaire visant à améliorer la qualité de vie d'une population par le biais de l'implication totale et de l'autogestion des communautés, soutenues par une collaboration intersectorielle. Cette étude avait pour objectif l'évaluation des effets de l'application des stratégies BDN [pour *basic development needs*] dans une région du Soudan sur les différents aspects d'un programme mis en oeuvre par les étudiants de la Faculté de Médecine de l'Université de Gezira. Cette étude a révélé que l'application conjointe de programmes BDN et d'interventions d'étudiants en médecine a induit une franche amélioration des pratiques familiales et communautaires, ainsi qu'une diminution plus nette de l'incidence de l'ensemble des principales maladies infantiles évaluées (diarrhée, toux et fièvre), comparativement à la seule intervention des étudiants. Les programmes BDN ont également facilité la récupération de données de qualité sur les différentes communautés.

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Introduction

Basic development needs (BDN) is a comprehensive approach to community development that aims at improving the quality of life of communities through their full involvement, self-management and self-reliance, supported by intersectoral collaboration. Local management of BDN projects focuses on community organization, mobilization, capacity-building and needs-based bottom-up planning that supports intersectoral collaboration in the attainment of overall community development.

A BDN programme was first set up in Sudan in 1980 as a pilot programme. In 1997 the World Health Organization, in coordination with the Federal Ministry of Health, started an organized, structured implementation. In Gezira state, the programme has been implemented since 2001 in a model area (Um-Alghora locality, 1 of 7 areas in Gezira state) and later in 2 other areas (South Gezira and Almanagil).

The Faculty of Medicine, University of Gezira, was established in Wad Medani town, the capital of Gezira state in 1975. It adopts the philosophy of community orientation aiming at solving community problems. Thus, it implements an innovative problem-solving, integrated, student-centred community-based educational programme. Community-based courses comprise 22% of the total credit hours of its curriculum. The Faculty has actively participated in different programme activities throughout all phases of the evolution of BDN in Gezira, such as: training of technical support teams, village development committees and cluster representatives; community mobilization; and supervision of community surveys.

The interdisciplinary field training research and rural development (IDFTRRD) programme is a community-based course offered to medical students at the end of the summer semester (in the 2nd, 4th and 6th semesters). Its main aim is to provide practical field training for students in rural communities. The organization of the module is as follows. Groups of 15–18 students are posted to a village (with a population of at least a few hundred to few thousand) where they conduct field activities, supervised by a group of university staff members. The students are responsible for the development of their assigned village. The module consists of 3 phases:

- Phase 1: Students collect basic socio-demographic information and other data to identity priority developmental problems and to plan and design projects to investigate the causes of these problems with a view to identifying solutions.
- Phase 2: Students analyse data, draw conclusions and implement a project-targeted solution for the selected problem(s), with the full involvement of the community and through mobilization of necessary resources from different sectors.
- Phase 3: Students follow up their projects and make an evaluation of the outcomes and impact of their project and other related activities.

During their stay in the village in the 3 phases of the module, students usually conduct different activities aiming at the improvement of community health. Such activities include: 1-day clinics, sessions addressing prevailing health problems, cleaning campaigns, planting of trees and health education on issues such as immunization, breastfeeding, use of insecticide-treated bednets, correct nutritional practices and so on. They also engage the community in many cultural, sports and recreational activities.

The objective of this study was to investigate the effect of students of the Faculty of Medicine, University of Gezira on various indicators of community development

in Um-Alghora. A comparison was made between areas where BDN had been implemented before the University's IDFTRRD programme and areas where the students implemented the IDFTRRD programme alone to investigate the effect of BDN on various indicators of community development, the participation of local communities in students' activities and on students' access to and quality of data collected at community level.

Methods

Study design

A cross-sectional study design was adopted where the study population was students from the Faculty of Medicine, University of Gezira, implementing the IDFTRRD programme in 2 groups of villages of Um-Alghora area. Data collected as part of this study followed a prospective interventional longitudinal study design where the study population was families in the study area with children aged under 5 years.

Study areas

The study areas were 2 groups of villages in Um-Alghora area.

Group 1 comprised 4 villages (Ragwa Bakir, Ragwa Ahmed, Dahawi Bakir and Dahawi Karor), with a total population of 5000. This area hosted the students' IDFTRRD programme, and was also an area where the BDN community-based initiative had been introduced in the year 2001. As part of the BDN initiative, 86 income-generating projects (mainly breeding of cows and goats) were owned by local families. Cluster representatives also received training on family and community practices according to the integrated management of childhood illnesses (IMCI) approach plus vocational training on food processing and handicrafts. A training package for volunteers prepared by the Federal Ministry of Health was utilized for this purpose. The trained cluster representatives conducted training of community members within their clusters. For this they used the training module for community volunteers on key family and community practices, which is part of the IMCI community component (also prepared by the Federal Ministry of Health), as the IMCI programme was introduced into the area in 2001.

Group 2 comprised 3 villages (Almaiaa, Ghifar and Ki'wirra) that also hosted the students' IDFTRRD programme, but where the BDN project was not implemented. Villages were selected by stratified random sampling from the 3 administrative units in the Um-Alghora area. The total population in the 3 villages was 15 000.

Pre- and postintervention surveys were conducted in the 2 groups of villages in phase 1 and 3 of the students' training, utilizing a standardized questionnaire that is routinely used by the students during the IDFTRRD programme.

From each group of villages, 100 families with children aged under 5 years were included in the study. The families were selected by simple random sampling. The questionnaire was designed to assess the knowledge, attitudes and practices of the family (mainly mothers of children aged under 5 years) that affect the health of their children, and the morbidity rate due to diarrhoea, cough and fever among those under 5 years. The study variables included:

- Socioeconomic characteristics of the study population.
- Improvements in the health practices of families. These were assessed by students through the utilization of the Sudanese adapted IMCI mother card. Improvements were identified by comparing results of pre- and postintervention surveys regarding a number of

indicators: % of under 5s not vaccinated at all, % of under 5s up-to-date with their vaccination, % of families utilizing regular growth monitoring services, % of pregnant women utilizing antenatal services, % of married women using oral contraceptives for family planning, % of under 5s up-to-date taking vitamin A supplements, % of under 5s sleeping under insecticide-treated bednets.

- Improvement in the health status of the under 5s. A comparison was made pre- and postintervention of % of families seeking care from a professional health worker for an under 5 with an episode of diarrhoea, cough or fever during the past 2 weeks.
- Assessment of community participation in the students' programme.

Data were also collected from all student groups who were posted as part of the IDFTRRD programme in group 1 and group 2 villages. The data collection was done immediately after students returned from the villages to the university campus. A structured pretested questionnaire was used to assess:

- Participation of community members in the students' activities and interventions such as the survey, project, cleaning campaign, 1-day clinic and tree planting.
- Students' access to and quality of the data collected by them at the village level. Student's assessment of community participation and data were indicated on a 3-point scale (0–2), where 0 indicated poor and 2 indicated good.

Data analysis

Data was entered and analysed using □□□, version 10. All percentages were obtained through the program. The difference between percentages was tested using non-parametric tests, mainly binomial based on the Z-test, to find out if there were significant differences.

Results

Sociodemographic characteristics

There were no statistically significant differences in the distribution of age, educational status and occupation among the parents and caretakers of children aged under 5 years in the 2 groups of villages (data not shown).

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In group 1 villages most of the preintervention indicators for students' interventions were better than those of group 2 villages, a situation that could be attributed to the previous implementation of BDN in the group 1 villages. Furthermore, the effect of student's interventions on improving family practices was more marked in BDN villages in comparison with their effect in villages not implementing BDN (Table 1).

The students' impact was higher in BDN villages with regard to the following objectives of their interventions:

- Reduction of percentage of families with children under 5 years who were not vaccinated at all.
- Increase in percentage of families with children under 5 years who were up-to-date with their immunizations.
- Increase in percentage of families utilizing regular monthly growth monitoring services.
- Increase in percentage of married women utilizing antenatal care services.
- Increase in percentage of married women in childbearing age using oral contraceptives for family planning.

Table 1 **Comparison of the improvement in family and community practices in the 2 groups of villages, i.e. with and without basic development needs (BDN) approach**

Indicator	Group 1 (BDN) villages		Z	*P*-value	Group 2 (non-BDN) villages		Z	*P*-value
	Pre-intervention %	Post-intervention %			Pre-intervention %	Post-intervention %		
Under 5s not vaccinated at all	8.1	2.8	2.12	< 0.05	27.2	23.0	0.96	> 0.05
Under 5s with vaccination up-to-date	47.7	61.3	2.36	< 0.05	31.1	33.7	0.55	> 0.05
Families utilizing regular growth monitoring services	32.2	60.1	4.49	< 0.01	25.7	38.4	2.67	< 0.01
Pregnant women utilizing ANC services	50.0	60.0	2.00	< 0.05	43.0	53.3	1.77	> 0.05
Married women using oral contraceptives for family planning	38.7	68.6	5.40	< 0.01	42.0	51.5	1.88	> 0.5
Under 5s up-to-date with vitamin A supplements	78.6	84.4	1.30	> 0.05	68.3	79.2	2.51	< 0.05
Under 5s sleeping under ITB	15.6	35.0	3.80	< 0.01	3.7	8.3	1.84	> 0.05
Families seeking care from a professional health worker for under 5s with fever	51.9	71.7	3.60	< 0.01	53.7	58.1	0.88	> 0.05
Families seeking care from a professional health worker for under 5s with diarrhoea	64.5	76.7	3.34	< 0.01	47.8	68.4	4.25	< 0.01
Families seeking care from a professional health worker for under 5s with cough	57.1	61.2	0.71	> 0.05	44.9	47.8	0.57	> 0.05

ANC = antenatal care; ITB = insecticide-treated bednets.

- Increase in percentage of families with their children under 5 years sleeping under insecticide-treated bednets.
- Increase in percentage of families seeking care from a professional health worker for their children under 5 years who had fever.
- Increase in percentage of families seeking care from a professional health worker for their children under 5 years who had diarrhoea.
- Increase in percentage of families able to perform correct nutritional practices for feeding their children under 5 years.

The effects of students' interventions in non-BDN villages was only higher with regard to the following objectives:

- Increase in percentage of families whose children under 5 years were up-to-date with supplementary doses of vitamin A.
- Increase in percentage of families who seek care from a professional health worker for their children under 5 years with cough.

[illegible]

The reduction in the occurrence of diarrhoea and cough among the under 5s was more marked in group 1 villages, whereas the reduction in the occurrence of fever was more marked in group 2 villages. In group 1 villages the incidence of diarrhoea in the pre-intervention period (17.2%) was even lower than the postintervention levels observed in group 2 villages (21.2%), an effect that could be attributed to the BDN programme. Although the reduction in the occurrence of fever among under 5s was larger in group 2 villages, the postintervention level was still lower in group 1 villages (11.2%) compared with group 2 (16.1%) (Figure 1).

[illegible]

Table 2 presents a comparison between the number of community members (both sexes) who participated in different student activities in group 1and 2 villages. No specific denominator was identified to transfer the frequencies of participating community members into percentage indicators. However, in view of the total population in each of the 2 groups of villages (5000 in group 1 and 15 000 in group 2 and the almost equal numbers of participating individuals we can conclude that, overall, the community participation of group 1 villages was far greater than that of group 2 villages.

The most notable difference between the 2 groups of villages was the participation of women in group 1 villages. The number of women participants in the 2 groups was almost equal in activities such as the students' survey, tree planting and cleaning campaigns. The women in group 1 villages were organized and active as cluster representatives. They came out to welcome the students on their arrival to the villages and participated with the students in different parts of their project. Students described women from group 1 as "active and committed to developing their villages .

Regarding the students' access to and quality of data collected, families and community members in both groups of villages were very ready to provide students with the required sociodemographic data. Students commented that community members in group 1 villages were more cooperative and could understand students' requests more easily. The data of group 1 villages was more organized and complete than that of group 2 villages. Village information centres had been established in group 1 villages as part of BDN implementation and some trained cluster representatives assisted students in their surveys.

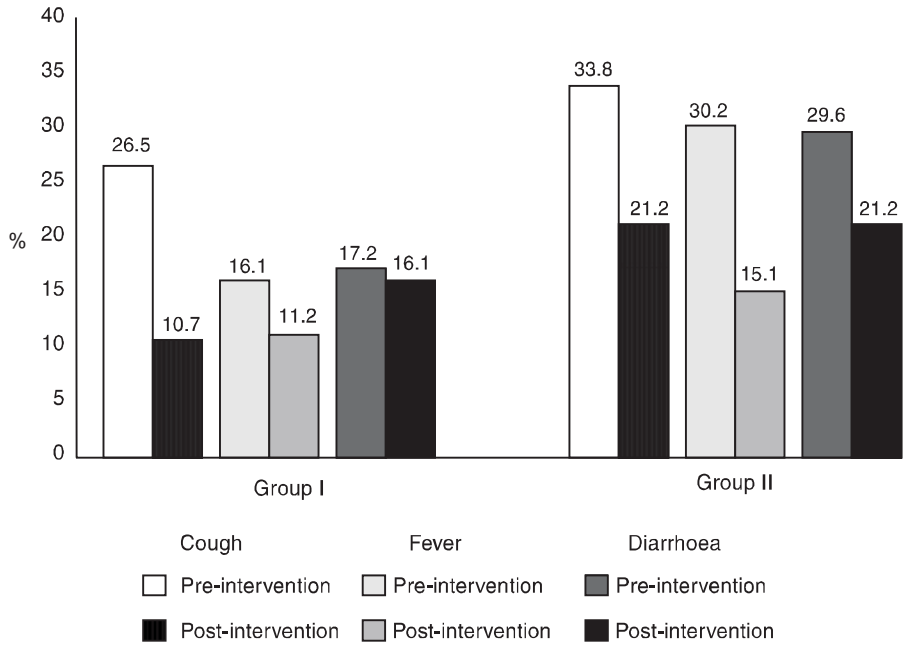

Figure 1 **Occurrence of cough, fever and diarrhoea in children aged under 5 years in the 2 groups of villages**

Discussion

As community-based interventions, both the BDN and students' activities of the university IDFTRRD programme, are based on similar principles as follows:

[illegible] BDN works through organization of the community into clusters and formation of village development committees. Students in the IDFTRRD programme also mobilize and work in the community through its existing organizations such as peoples' committees, students' unions, etc. They also address community leaders (traditional and religious) whose status and role in their communities cannot be overlooked. However, students working in non-BDN villages noted that villages expressed a willingness and commitment to organizing communities in a similar way to BDN villages in any future community-based projects.

[illegible] Both BDN and the university IDFTRRD programmes aim to achieve sustainable development and not only the provision of transient urgent services. Training of village development committees and cluster representatives in the BDN programme contributes effectively to raising social awareness of the community, enhancing self-reliance and thus ensuring sustainability of developmental activities. The involvement of communities by students throughout all phases of their programme has also contributed to raising the social and health awareness of villages.

Table 2 **Comparison of the participation of community members in students activities in the 2 groups of villages, i.e. with and without basic development needs (BDN) approach**

Activity	Group 1[a] (BDN) villages		Group 2[a] (non-BDN) villages	
	Women No.	Men No.	Women No.	Men No.
Welcoming students to the village	8	10	–	18
Students' survey	32[b]	57	14	60
Students' project	6	15	–	7
Cleaning campaign	51	78	57	78
Organization of the 1-day clinic	7	21	2	6
Tree planting	44	56	52	73

[a]Group 1 villages total population 5 000; group 2 villages total population 15 000.
[b]14 out of the total number of women who participated in the survey were cluster representatives.

[illegible] Health education was provided by trained cluster representatives to communities in group 1 villages. The community members in both groups of villages received organized education and training by the medical students who were formerly trained in IMCI family and community practices as part of the Faculty of Medicine curriculum. It is to be noted that house-to-house distribution of vitamin A doses had stopped in Gezira state in the period 2000–02. Students have thus promoted community-based distribution of vitamin A capsules.

[illegible] The important role of government and other sectors in different stages of developmental projects is addressed in BDN through involvement of trained technical support teams. Students' analysis of community problems has also enabled community members to realize the different determinants of health and illness and to identify the roles of relevant sectors in the solutions to their problems.

Although behaviour change usually takes a long time to be established, the results of the study showed a significant improvement, with varying degrees, in all the measured behavioural and health indicators in the 2 groups of villages. Evaluation of BDN programmes in many countries has demonstrated similar effects. In Yemen [*1*], where the tetanus toxoid coverage was previously low, the BDN intervention improved the situation considerably and resulted in a slight increase in the status of immunization and a slight decrease in the percentage of deaths in infants. In Djibouti [□], the principal effect of the BDN programme in the field of health has been the prevention of diseases through community health volunteers who educate communities about school health, immunization, nutrition, environmental health, prevention of malaria and HIV/AIDS. As a result, infant mortality, immunization coverage among infants (1 month to 1 year), percentage of children under 5 years followed for growth monitoring and percentage of women immunized against tetanus showed vast im-

provements against the national averages. In Jordon, the quality of life project villages also demonstrated improved utilization of family planning, antenatal care coverage (almost 100%), together with an increase in the expanded programme of immunization coverage, through health awareness sessions and motivation of mothers through community representatives [□].

The community-based training programme of the Faculty of Medicine, University of Gezira, sets a good model for how to adjust health manpower development to the real health needs and demands of the population and the national health system, which was formerly identified as the "health manpower development concept [□].

Community-oriented medical education was first defined in the first meeting of the network of community-oriented educational institutions for health sciences in 1979 as "a type of training of health personnel that focuses on both population groups and individuals and that takes into account the health needs of the community concerned [□].

The community-based education that is adopted by the Faculty of Medicine, University of Gezira, represents a tool to achieve the faculty objectives through students' postings in the community. Community-based education in itself is thus a means of achieving educational relevance to community needs and, consequently, a way of implementing the faculty's community-oriented educational programme [□].

The IDFTRRD programme implemented in Um-Alghora has satisfied the rationale of community-based education for the following reasons:

- Education of students during their residence in the community is an established approach to training doctors who are willing and able to work in underserved areas, particularly rural communities [□]. In addition, our students have the opportunity to learn, in real-life situations, about different community-based programmes such as BDN and the IMCI community component. Students in group 1 villages appreciated the role of BDN in community organization and awareness.
- During their posting, students deliver health education sessions and discuss the results of the health surveys with the community, including analysis of the causes and impacts of different community problems and needs. All these opportunities can enhance students' learning, as information is better understood, processed and retrieved if students have opportunities to elaborate on that information [□].
- Students posted in Um-Alghora have contributed to the availability of health services in the villages, ranging from curative services (1-day clinics) to promotion and preventive services such as health education, cleaning campaigns, tree planting and distribution of vitamin A capsules. This should be considered as an active contribution from our students to solving the problems of service delivery in those rural areas and to the improvement of the health system, as it works towards resolving priority health problems of the population [□].
- During their posting in villages or assignments in rural health facilities, students have had opportunities to practice a multidisciplinary and holistic approach to health care [□].

This educational programme of the Faculty of Medicine, University of Gezira, thus provides an excellent model for partnership between the community, the university and the government, being an advanced step in collaboration between the 3 parties, a goal that BDN aims to achieve in creating part-

nerships between communities and relevant sectors.

Community participation

Important determinants, which constitute preconditions, for community participation, include:

- Commitment of the professionals who engage in the process.
- Competences in areas such as communication and facilitating and managing change, to ensure effective work with and between decision-makers, middle managers, community leaders and community members.

Both preconditions were ensured by the BDN approach, through the commitment of higher-level and local authorities (by the commitment of technical support teams and training in BDN strategies and methods). As for student activities, the following factors and conditions coexisted:

- Commitment of the top administrators in the University of Gezira who conducted field visits and meetings with community leaders to express the university commitment to supporting students' activities.
- Faculty of Medicine staff conducted preliminary visits to all the concerned villages prior to each phase of the IDFTRRD programme to seek the permission of the community and to orient community leaders with the course objectives and the students' tasks.
- Field visits by Faculty of Medicine staff to supervise students' activities.
- Faculty of Medicine students usually receive training in communication skills as part of the faculty curriculum programme. In addition, students also learn about legal aspects of the medical profession and professional ethical principles regarding medical practice at individual, family and community levels.
- Faculty of Medicine staff (from the Department of Community Medicine) have participated as part of Gezira state BDN steering committee and core of trainers in the planning and implementation of all the project activities: training of technical support teams, village development committees and cluster representatives; community mobilization; and monitoring and follow-up of the project activities. This role puts the Faculty of Medicine more in touch with the community and its leaders in BDN (group 1) villages.

All these factors provide a favourable environment for community participation in students' activities in Um-Alghora, especially in BDN villages. It is well recognized that involving communities in assessing their own needs and assets is a key component of the overall planning process, often providing a starting point for community participation by increasing the understanding of both professionals and the community and enabling more responsive and participatory policy-making and service delivery [□]. Such involvement in the implementation, monitoring and evaluation stages were ensured by both the BDN project and the students' project in group 1 villages. The population of group 1 villages, exposed to the experience with the BDN project, were already organized and enabled in issues concerning quality of life and comprehensive development.

Conclusion

The study revealed that the collective implementation of community-based programmes such as BDN and students' interventions

brought about marked improvements in family and community practices and greater reductions in the incidence of all assessed major childhood illnesses (diarrhoea, cough and fever) than with the students' programme alone. It also demonstrated that BDN implementation resulted in an organized and ready-to-mobilize community in addition to the availability of easily retrieved and good quality community-based data.

Recommendations

- BDN areas should be the focus of all community-based health activities organized by different sectors (including academic institutions).
- Introduction of BDN concepts and strategies in the curricula of medical schools and other health professional training institutes.
- Adoption of community-based education as an educational strategy in different training institutes for health professionals.
- Medical students in phase 1 of their IDFTRRD programme should organize communities according to the BDN strategy, in order to facilitate positive interaction and community participation.
- Continuous research to measure the effect of BDN and medical students in promoting family and community practices and assess the different factors influencing these practices.

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Influence of parental and socioeconomic factors on stunting in children under 5 years in Egypt

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تأثير الخصائص الوالدية والاجتماعية – الاقتصادية على التقزُّم لدى الأطفال دون سن الخامسة في مصر

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الخلاصة: أجرى الباحثون تقييماً للعلاقة بين الخصائص الوالدية، والاجتماعية، والاقتصادية، والحالة التغذوية للأطفال دون سن الخامسة في مصر. واستُخدمت البيانات المأخوذة من المسح الصحي الديمغرافي في مصر لعام 2000، مع استخدام طريقة التحوُّف اللوجستي لتقدير احتمالية وجود سوء تغذية في هذه الحالات. وتبيَّن انخفاض عوامل اختطار الإصابة بالتقزُّم لدى أطفال الأمهات ذوات المستوى التعليمي الأعلى، والأطول قامة (< 150 سم)، عنها لدى أطفال الأمهات غير المتعلِّمات والأقصر قامة (≤ 150 سم). وتبيَّن أن قرابة الوالدين، والإقامة في الريف، وزيادة عدد الولادات، وقصر الفواصل بين الولادات، تُسهم إسهاماً يُعتدُّ به إحصائياً في زيادة احتمالية الإصابة بالتقزُّم، وأن احتمالية إصابة الأطفال الذين بلغوا اثنَيْ عشر شهراً أو أكثر بالتقزُّم هي أكثر منها الأطفال < 12 شهراً.

ABSTRACT We assessed the relationship between parental and socioeconomic characteristics and nutritional status of children under 5 years in Egypt. Data from the 2000 Egypt Demographic and Health Survey were used. A logistic regression technique was used to estimate the odds of being malnourished. Children whose mothers had a higher level of education and were > 150 cm had a lower risk of stunting than those of mothers with no education and shorter height (< 150 cm). Parental consanguinity, rural residence, high birth order and short birth interval significantly increased the odds of stunting. Children aged ≥ 12 months had greater odds of stunting than those < 12 months.

Influence des caract ristiques parentales et socio- conomiques sur le retard de croissance che l enfant de moins de 5 ans en gypte

RÉSUMÉ Nous avons évalué le rapport entre les caractéristiques parentales et socio-économiques et l'état nutritionnel des enfants de moins de 5 ans en Égypte. Pour ce faire, nous avons utilisé les données de l'enqu te 2000-EDHS (*2000 Egypt Demographic and Health Survey* – Enqu te sur la démographie et la santé en Égypte en 2000). La probabilité d'une malnutrition a été estimée selon la méthode de la régression logistique. Le risque de retard de croissance s'est avéré plus faible chez les enfants nés de mères possédant un niveau d'instruction relativement élevé et mesurant plus de 150 cm que chez ceux nés de femmes n'ayant reçu aucune instruction et de petite taille (< 150 cm). La consanguinité parentale, la ruralité, les premiers rangs dans la fratrie et la brièveté de l'intervalle génésique sont autant de facteurs augmentant significativement la probabilité de déficit staturo-pondéral. Cette probabilité s'est avérée plus élevée chez l'enfant de 12 mois et plus que chez celui âgé de moins de 12 mois.

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Introduction

Over the past 35 years, Egyptian demographic and survival indicators have shown marked improvement. For example, from 1970 to 2005 life expectancy increased from 52.1 years to 68.8 years, infant mortality dropped from 157 to 35 deaths per 1000 live births, and under-5 mortality dropped from 235 to 41 deaths per 1000 live births [*1*]. Despite these improvements in health conditions there are still important impediments to survival and development, especially for children. One of the most serious health concerns is under-nutrition. Figure 1 presents the trends in under-nutrition levels in children in Egypt from 1992–2000 [*1*]. While there are decreases in levels of child under-nutrition, approximately 1 in 10 children (11%) under the age of 5 years was under-weight and approximately 1 in 5 children (21%) was under-height for age [□].

The nutritional level in children is a vital component to their survival and development in their early years. Low levels of nutrition among children cause serious long- and short-term consequences in their physical and mental growth. Studies report high levels of mortality among malnourished children [□]. Further, malnourished children are more likely to have functional impairment in adult life [□] leading to a reduction in productive life and thus affecting the overall economic productivity of the society [□]. For example, it is widely accepted that adults who survive malnutrition as children are more likely to suffer from higher levels of chronic illness and disability [□,□].

Studies on the nutritional status of children often accept the notion that it is determined by a multiplicity of factors [□ □]. In this regard, several theoretical explanations of malnutrition among children are found in the literature [*10*]. These include family planning approaches [*11,1*□], socioeconomic approaches [□,*1*□] and the framework recommended by UNICEF [*1*□]. The former 2 approaches emphasize a set of factors to the exclusion of factors important to the

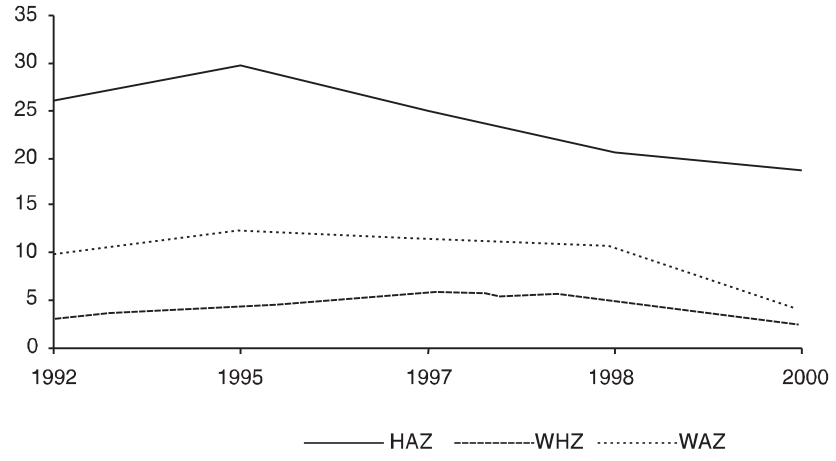

Figure 1 **Trends in nutritional levels in children, Egypt 1992 2000 (HAZ = height-for-age, WHZ = weight-for-height, WAZ = weight-for-age). Source: [*1*]**

other approach. However, the UNICEF framework provides a holistic and pragmatic approach, in addition to addressing the limitations in other approaches, to the study of nutrition of children in developing countries. This framework follows "The triple A approach (assessment, analysis and action) strategy to improve nutritional levels in children [*1*□]. Furthermore, the framework classifies the causes of malnutrition and death into 3 categories that account for the complexity of the nutritional status of children: basic causes at the societal level, underlying causes at the household/family level, and immediate causes. While this framework has strengths, one of the major limitations is that many existing secondary data sources do not allow researchers to follow this framework in its entirety in understanding child nutrition. The Egypt Demographic Health Survey [*1*], while not allowing as comprehensive an approach as would be ideal, provides variables that can be used within the basic and underlying causes identified in the framework. Furthermore, the present study incorporates family planning, demographic and socioeconomic approaches within the UNICEF framework.

Studies on child malnutrition in Egypt are often area-specific [*1*□,*1*□] and many studies are limited to clinical approaches [*1*□,*1*□]. These studies have not explored fully the influence of parental and socioeconomic characteristics within the UNICEF framework. While the earlier studies are important contributions to the literature on Egyptian malnutrition, further research is needed to understand the influence of the underlying and basic causes determining the nutritional status of children in Egypt. The purpose of this paper therefore was to explore basic and underlying factors determining the nutritional status of children in Egypt.

Methods

Data source

The data for the present study come from the 2000 Egypt Demographic and Health Survey (EDHS) [*1*]. The 2000 EDHS was the sixth in the series of Demographic and Health Surveys conducted in Egypt. Similar to the other surveys, data were collected on fertility, family planning, infant and child mortality, and maternal and child health and nutrition. A nationally representative sample of 15 573 ever-married women aged 15–49 years were interviewed. This survey included 2 questionnaires: a household questionnaire and an individual questionnaire. The household questionnaire consisted of questions related to household social and economic characteristics. The individual questionnaire included respondent's background (ever married women between 15–49 years), reproduction, contraceptive knowledge and use, fertility preferences and attitudes about family planning, pregnancy and breastfeeding, immunization and health, schooling of children and child labour, female genital mutilation, marriage and husband's background and woman's work and residence [*1*].

The primary objective of the EDHS 2000 survey was to provide reliable estimates for fertility and child mortality for the country and for 6 major administrative regions. The methodology of the survey is described in full in the EDHS report [*1*]. Briefly, a 3-stage design was used to collect a representative sample by which 17 521 households were selected for the survey. From these households, the fully trained field staff interviewed 16 957 of the sample households, for a response rate of 99%. All ever-married women between 15 and 49 years of age were eligible to participate in the survey. As a quality control measure

10% of the households were selected for re-interview [*1*].

Data analysis

To assess the nutritional status of individual children, WHO recommends the use of Z-score indicators of weight-for-age (WAZ) (under-weight), height-for-age (HAZ) (stunting) and weight-for-height (WHZ) (wasting). To compute the anthropometric indices, information on each individual's gender, age, weight, and height are needed. WHZ and HAZ are the most commonly used indices for determining nutritional status. The former is an indicator of wasting (i.e. thinness indicating acute malnourishment) and the latter is an indicator of stunting (i.e. shortness indicating chronic malnourishment). The third index, WAZ, is primarily a composite of WHZ and HAZ and is considered to represent acute and chronic malnourishment. These indices present the long- and short-term prevalence of malnutrition in children. In the ADHS 2000 survey, "heights for children younger than 24 months were measured lying on a measuring board and standing height was measured for older children. Weight data were obtained using digital scales with an accuracy of 100 g [*1*]. For measuring child's age a series of techniques were applied in order to maintain accuracy. In addition to asking mothers in what month and year the child was born, the mothers were also asked, "How old was your child at his/her last birthday? In addition, interviewers asked the mothers for birth cards or certificates in cases where one was available and cross checked the responses.

The procedure for the computation of these measures and their interpretation are well documented [*1*□ □□]. In our study, the values of WAZ, WHZ and HAZ were calculated using the □□-□□□program provided along with the □□-□□□□, version 6.03. This program transforms the international growth reference curves into a Z-score representation. These growth reference curves have been used worldwide since 1978 to assess the nutritional status of children in cross-sectional surveys. Smoothed normalized curves are fitted by polynomial regression and cubic spline techniques and these curves are used to calculate all other normalized Z-score values. The standard deviations are defined separately for the upper and lower half of the skewed reference distributions. It has been argued that the use of Z-score cut-off points provides interpretative guidance in that a known proportion of the reference population would be expected to be below the cut-off point at any given age or height and for all indicators [*1*□,□*0*]. The commonly used conservative cut-off value of Z-score less than –2 SD is followed in our analysis.

Once the measures of malnutrition were calculated for each of the 3 indices, measures of parental and socioeconomic conditions were identified. The basic causes at the societal level can be divided into 2 types: potential resources and quantity and quality of actual resources. Potential resources are understood in terms of political, cultural, religious, economic and social subsystems present in the society and include conditions such as women's status in the society [□□]. The potential resources, in turn, influence the quantity and quality of actual resources. The quantity and quality of the resources available is shaped by the human, economic, and organizational manner in which they are controlled [□□]. For the purposes of this paper, the basic causes at the societal level were measured in terms of place of residence, consanguinity between parents, parents' level of education, mother's employment status, mother's height, and child's sex.

Place of residence was identified as rural or urban. Consanguinity between the parents was measured as: no relation, first degree, second degree, or other blood relative. Father's education was measured as no formal education, primary school, secondary school, or higher education. Mother's education was measured as no formal education, primary school, secondary school, or higher education. Mother's employment was identified as working outside the home or not working outside the home. Mother's height was measured in centimetres as: < 150 cm, 150–160 cm, or >160 cm. The sex of the child was measured as male or female.

The second level identified in the UNICEF model considers underlying causes at the household/family level [□]. Central to these underlying causes are the maternal and child care practices and include many factors linked to family planning activities. In this paper, mother's age at birth of her last child, child's age, birth order and birth interval were included. The age of mother at birth was measured as < 19 years of age, 19–24 years, 25–34 years or ≥ 35 years. The age of the child at the time of data collection was measured in months as 0–11 months, 12–23 months, 24–35 months, 36–47 months or 48–59 months. The birth order was identified as 1, 2, 3, 4 or 5 and higher. Birth intervals were first born, 0–23 months, 24–35 months, 36–47 months or ≥ 48 months.

A logistic regression technique was used to estimate the odds of being malnourished. This technique permits control of the parental and socioeconomic variables. To create the dependent variable, the children whose Z-scores were less than 2 SD were coded as 1 and the children with Z-scores of –2 SD or higher were coded as 0. The following was the basic model used in the analysis: $Y_{ij} = a + bX_{ij} + cP_j + m_j + e_{ij}$ where: Y_{ij} outcome variable, X_{ij} individual control variables, P_j variables at the community (PSU) level, m_j error of unobserved community variables and e_{ij} error of unobserved individual variables. The basic assumption is that m_j is uncorrelated with the regressors; in other words, the above model considers the sample design as well. Specifically, the model predicting the probability that the Z-score value will fall below –2 SD (i.e. malnourished) takes the form: $\pi(z = 1) = \pi/(1 + \pi)$.

The predictor variables entered in the regression equation are sets of dummy variables. Thus, the results obtained were compared with the reference category. The predictor variables used in the logistic regression model were: current place of residence, sex of the child, mother's education, father's education, birth spacing between the child and the previous birth, birth order, age of mother at the time of the child's delivery and age of the child at the time of survey. The reference categories for the different variables mentioned above were: living in a rural area, female child, maternal illiteracy, paternal illiteracy, birth spacing < 24 months, birth order of ≥ 5, mother's age at child's birth < 19 years and age of child < 12 months old respectively. All outliers in anthropometric measures were deleted prior to data analysis. The □□-□□□program flagged 32 cases as outliers by default and further investigation of data did not show any additional outliers. The statistical analysis was performed using □□□9.1 statistical software for windows.

Results

Table 1 presents the percentage distribution of children below –2 SD units for the 3 anthropometric measures (wasting, stunting and underweight) according to selected

parental and socioeconomic characteristics. Based on a theoretical distribution, it would be expected that 2.2% of children would be below –2 SD. On this basis, the 3 measures of under-nutrition were greater than would be expected. Among children under 5 years of age in Egypt, 18.67% were stunted (low height-for-age), 2.52% were wasted (low weight-for-height) and 4.06% were underweight (low weight-for-age).

The prevalence of stunting was higher among rural children (21.79%) as compared to urban children (13.79%). The proportion of children with stunting fell as parents education increased. For example, among mothers and fathers with no education, 22.56% and 23.26% respectively of the children were stunted compared to 13.81% and 12.53% respectively among mothers and fathers with higher than secondary education. A sharp decline in stunting was observed with an increase in mother's height. Among mothers < 150 cm tall, 30.89% of the children were stunted; the percentage decreased to 13.61% of children with mothers > 160 cm tall. Children of mothers working outside the home had a lower prevalence of stunting (17.76%) than those whose mothers who did not (18.82%). Stunting was higher among children born to mothers married to close relatives; approximately 22% of children born to mothers married to their first cousins (father's or mother's side) were stunted compared to those born to mothers with no blood relation to their husbands. Stunting was higher in male children (19.85%) than female children (17.42%). Higher levels of stunting were found in children of higher birth order (24.31% for birth order ≥ 5 vs 17.26% birth order 1) and shorter birth intervals (23.44% for birth interval < 23 months vs 16.7% birth interval ≥ 48 months). Children born to mothers aged < 19 years and ≥ 35 years showed a higher prevalence of stunting than children born to mothers in other age groups, 19.53% and 21.35% respectively. Just over 15% of children aged 0–11 months at the time of the survey were stunted as were 23.44% of children aged 12–23 months.

While lower than the prevalence of stunting, at 2.52% wasting was still greater than the expected 2.2%. There were no generally clear patterns seen for stunting with the different variables (Table 1). As regards under-nutrition, 4.06% of children under 5 years were under-nourished. The patterns seen were generally fairly similar to those of stunting (Table 1).

Although all 3 measures of under-nutrition were higher than would be expected, the highest prevalence was found in stunting (chronic malnourishment) (HAZ); 18.67% of the children under age 5 years were stunted. As this was the most prevalent form of under-nutrition in Egypt, the subsequent analysis focused on stunting only. Multivariate analysis was carried out to find the odds of stunting among children (Table 2). Since the birth interval variable was calculated only for births of second and higher orders, the multivariate analysis excluded the first order births.

Several variables were found to have a significant influence on the prevalence of stunting in Egypt. The odds of children being stunted in urban areas were 0.71 times lower than for children in rural areas. While not all categories of mother's education were statistically significant, they were in the expected direction. That is, as the maternal educational level increased, the odds of children being stunted decreased. While no clear and significant pattern was observed with father's education on stunting, the odds of stunting were 0.76 times lower among children whose fathers had at least higher secondary education as compared to children born to fathers with no education. Mother's height was found to

Table 1 **Percentage of children under 5 years with Z scores below 2SD from the International Reference Population median by selected background characteristics, Egypt, 2000**

Characteristic	Height-for-age (stunting) %	Weight-for-height (wasting) %	Weight-for-age (underweight) %	Number of children included in the analysis
Place of residence				
Urban	13.79	2.34	3.01	3972
Rural	21.79	2.63	4.73	6222
Mother s education				
No education	22.56	2.47	5.35	4046
Primary	19.76	2.4	3.60	1573
Secondary	15.11	2.69	3.18	3722
Higher	13.81	2.19	2.61	853
Mother s working status outside the home				
Yes	17.76	2.54	3.31	1429
No	18.82	2.51	4.18	8765
Mother s height (cm)				
< 150	30.89	1.74	6.35	999
150–160	19.20	2.60	4.02	6085
160+	13.61	2.62	3.39	3077
Consanguinity of the parents				
No relation	16.72	2.49	3.48	6244
First degree	21.99	2.45	5.08	2322
Second degree	21.87	2.29	5.03	1016
Other blood relative	20.65	3.38	4.47	612
Father s education				
No education	23.26	2.34	5.72	2522
Primary	18.66	3.02	4.12	2106
Secondary	17.96	2.31	3.36	4182
Higher	12.53	2.7	3.06	1380
Sex of child				
Male	19.85	2.86	4.44	5252
Female	17.42	2.15	3.66	4942
Birth order of child				
1	17.26	2.89	3.64	2757
2	16.34	2.06	2.87	2420
3	17.71	2.57	3.44	1759
4	18.31	2.18	4.02	1185
5+	24.31	2.70	6.57	2073
Birth interval (months)				
First birth	17.26	2.89	3.64	2757
0–23	23.40	2.92	6.24	1748
24–35	19.83	2.3	3.46	2172

Table 1 **Percentage of children under 5 years with Z scores below 2SD from the International Reference Population median by selected background characteristics, Egypt, 2000** *(concluded)*

Characteristic	Height-for-age (stunting) %	Weight-for-height (wasting) %	Weight-for-age (underweight) %	Number of children included in the analysis
36–47	16.67	2.79	4.59	1359
48+	16.7	1.74	3.13	2121
Age of mother at birth (years)				
< 19	19.53	2.55	4.2	646
19–24	18.96	2.57	3.83	3774
25–34	17.74	2.53	4.11	4732
35+	21.35	2.23	4.6	1042
Age of child at survey time (months)				
0–11	15.1	4.65	4.13	2070
12–23	23.44	3.13	5.75	205
24–35	19.20	1.75	3.77	2114
36–47	17.24	1.11	2.86	2048
48–59	18.39	1.91	3.78	1911
Total[a]	18.67	2.52	4.06	10194

[a] *Total includes 4 children for whom information on father's education was not known and 37 and 33 children with missing information on birth interval and height of the mother respectively.*

have a significant influence on the odds of stunting. Children born to mothers whose height was 150–160 cm had 0.60 times lower odds of stunting than children born to mothers whose height was < 150 cm and odds were 0.41 times lower if mother's height was > 160 cm. Children whose parents were first cousins had 1.21 higher odds of being stunted compared to children whose parents were not blood relations; the odds of stunting were 1.22 times higher if the parents were second cousins. The odds of stunting were significantly lower among low birth order children (3 or less) compared to children of birth order 5 and above. The odds of stunting were higher among children age 12–23 months (1.79 times) and 24–35 months (1.28 times) than children aged < 12 months. Birth intervals had a significant influence on stunting; the odds of being stunted declined as the birth interval increased. Other variables found not to be significantly associated with the odds of stunting were: mother's working status, male sex and age of mother at time of birth (Table 2).

Discussion

Measuring the weight and height of the child actually measures much more than a single child, these also measure the future of a country. Child health has a prominent role in shaping and defining the structure of a society. It shapes the quality of future human capital, helps population stabilization and furthers future economic growth, among other factors. In the case of Egypt, there have been marked improvements over

Table 2 **Odds of being below 2 SD for height-for-age in Egypt, 2000**

Characteristic	Odds ratio	SE	95% confidence interval
Place of residence[a]			
Urban	0.71**	0.0975	0.5903–0.8656
Mother s education[b]			
Primary	0.95	0.1005	0.7776–1.1540
Secondary	0.77*	0.1176	0.6147–0.9753
Higher	0.73	0.2427	0.4553–1.1806
Mother s working status[c]			
Yes	1.13	0.1152	0.9002–1.4153
Mother s height (cm)[d]			
150–160	0.60***	0.0947	0.4975–0.7216
160+	0.41***	0.1100	0.3302–0.5086
Consanguinity of the parents[e]			
First degree	1.21**	0.0835	1.0280–1.4269
Second degree	1.22*	0.1097	0.9858–1.5165
Other blood relative	1.32*	0.1339	1.0155–1.7177
Father s education[f]			
Primary	0.82	0.1038	0.6726–1.0111
Secondary	0.95	0.1035	0.7748–1.1634
Higher	0.76	0.1910	0.5225–1.1059
Sex of child[g]			
Male	1.05	0.0705	0.9124–1.2032
Birth order of child[h]			
2	0.70***	0.1233	0.5496–0.8918
3	0.82*	0.1137	0.6537–1.0214
4	0.82	0.1087	0.6596–1.0108
Age of mother at birth (years)[i]			
19–24	0.76	0.2246	0.4918–1.1877
25–34	0.70	0.2298	0.4465–1.1008
35+	0.78	0.2560	0.4719–1.2895
Age of child (months)[j]			
12–23	1.79***	0.1055	1.4559–2.2032
24–35	1.28**	0.1097	1.0348–1.5921
36–47	1.03	0.1156	0.8186–1.2890
48–59	1.24*	0.1126	0.9949–1.5483
Birth interval (months)[k]			
24–35	0.79***	0.0871	0.6653–0.9364
36–47	0.67***	0.1020	0.5520–0.8238
48+	0.66***	0.1037	0.5385–0.8091
Constant	0.83	0.2721	0.4888; 1.4230

Reference categories: [a]rural; [b,f]no education; [c]not working; [d]< 150 cms; [e]no relationship; [g]female; [h]5+; [i]< 19 years; [j]< 12 months; [k]< 24 months.
*P < 0.05; **P < 0.01; ***P < 0.001.*
SE = standard error.

the past 10 years in the nutritional status of children but much work remains to be done. In order to further decrease levels of childhood malnutrition in Egypt, policy frameworks must be established that incorporate short-term, medium-term and long-term strategies to solve nutritional problems [□□]. The intervention strategies should be comprehensive, culturally sensitive and, as malnutrition is a public health concern, addressed at various levels of government.

Based on the findings of this research, policy development must take into consideration the rural–urban divide in malnutrition. It is clear that children raised in rural areas are at greater risk for under-nutrition. Our results support the findings of prior studies that have also described the urban–rural differences in health in Egypt. People living in urban areas are provided with better access to health services, education and other social support systems which are either not available or not easily accessible to residents in rural areas. For example, studies have shown that immunization rates are higher in urban areas as compared to rural areas of Egypt [□□]. Programmes should thus be developed to analyse and implement appropriate strategies to address rural and urban child malnutrition. For example, in Egypt most nutritionists are based in urban hospitals while cases of malnutrition in rural areas are unlikely to seek care in such hospitals [□□]. Improvements in access to care in rural areas together with the introduction of awareness programmes will have a significant impact on ameliorating the existing nutritional conditions in children.

Programmes should be developed that target higher risk groups such as young children and higher birth order children. Further research and needs assessments are required to examine this situation in order to design intervention programmes. The fact that risks are different at different ages suggests the need for age-specific interventions to address the nutritional needs of children. Additionally, family planning conditions such as birth interval, which was found to be very important in our study, need to be considered. This finding supports the idea that rearing children requires a large amount of resources and attention. When children are born closely together, the demands on resources such as mother's time, food, and other resources may be greater than the family can provide. Our findings therefore suggest that greater spacing of children could help to address under-nutrition by relieving competition and exhaustion of available resources.

While socioeconomic conditions certainly have an effect on the nutritional status of children, there is growing recognition that genetic factors must be considered as well. There have been calls for the inclusion of genetic characteristics in the study of child health and nutrition [□□,□□] but genetic components have not been adequately examined in many studies [□□]. The inclusion of 2 genetic factors in this study is an important contribution to the literature on childhood nutritional status. The 2 genetic characteristics (mother's height and parental consanguinity) emerged as significant factors influencing stunting of children in Egypt. Consanguinity in a population depends on several factors such as demographic, social and religious norms and values. Many studies have shown conflicting results on the impact of consanguineous marriages on childhood health [□0 □□]. Children born to consanguineous parents are at an increased risk of autosomal recessive disorders, multifactorial diseases [□0] and early postnatal mortality [□□,□□]. These disease processes can produce disorders similar to nutrient deficiency and may result in the appearance of stunting [□□]. Although there are conflicting opinions,

nutritional studies have seldom included this phenomenon. More studies are thus needed in this area to explore further the influence of genetic characteristics on early childhood nutrition in Egypt and elsewhere. From a policy implementation perspective, the issue of consanguinity will require cultural sensitivity to the issue [□□]. To address consanguinity, educational programmes could be instigated to create awareness, particularly among young unmarried males and females, about the potential risks associated with consanguineous marriage. Additionally, genetic counselling and risk assessment for consanguineous couples would assist families in making family planning decisions that could have an impact on the nutritional and health status of their children.

The results of our study show the importance of the UNICEF model incorporating parental and socioeconomic characteristics in understanding the prevalence of under-nutrition, especially stunting, in Egypt. The framework classifies the causes of malnutrition to account for the complexity of the nutritional status of children. At the basic level, rural conditions and the status of women in society have an important contribution to the nutritional status of children. Specifically, children in rural areas are at greater risk of stunting. Regarding women's status in society, education and the practice of consanguinity contributed to the childhood malnutrition. Family planning factors as underlying causes at the household/family level were also found to be important aspects of the UNICEF model. Specifically, birth order and birth interval were important factors and relate to inadequate maternal and childcare practices. Further research is needed to explore the influence of additional basic level causes and underlying causes at the family/household level as well as inclusion of immediate causes such as the presence of disease and dietary intake in the child.

These factors should be considered in the development of any policies or programmes aimed at alleviating the problem of under-nutrition. Among all factors, parental characteristics, mother's characteristics in particular, were found to have a significant impact on determining the nutritional status of children. Empowerment of women through increasing educational levels, choice in marriage, family planning, and other activities that improve the status of women in society must be a priority in programme and policy development aimed at addressing the factors associated with under-nutrition in children in Egypt.

Hameida and Billot argue that "to measure the weight and height of a child is to measure his or her health [□□]. In the present study we assessed the factors that contribute to the health condition of the child. More specifically, we considered basic and underlying conditions that affect the nutritional status of children in Egypt. The study results further strengthen our understanding about the nutritional status of children in Egypt. Although, at the national level, the prevalence of under-weight and wasting has decreased since 1995, these estimates are still higher than would be desired. Most alarmingly, the high prevalence of stunting signifies a public health problem; the anthropometric measures show estimates of stunting above international standards. Stunting is so prevalent that almost one child in every five children under the age of 5 years in Egypt is stunted. The documented decrease in childhood stunting in Egypt is promising but more work must be done to address the issues of childhood malnutrition if the gains are to be sustained and further progress achieved.

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Maternal risk factors associated with low birth weight in Karachi: a case–control study

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عوامل الاختطار الأمومية المترافقة بانخفاض وزن الولادة في كراتشي: دراسة للحالات والشواهد

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الخلاصة: قامت الباحثات بتقييم عوامل الاختطار الأمومية المترافقة بانخفاض وزن الولادة، وذلك بدراسة أُجْرِيَتْ في المستشفيات على نساء تتراوح أعمارهن بين 13 و35 سنة وشملت 262 حالة (أمهات لولْدان وزنهم 2.5 كغ أو أقل، و262 من الشواهد (أمهات لولْدان يزيد وزنهم على 2.5 كغ). وقد تَنَاقَصَ احتمالَ ولادة طفل منخفض الوزن مع ازدياد مستوى الهيموغلوبين لدى الأمهات [OR =: 0.701 مع CI = 95٪، (بمَجَال: 0.62 إلى 0.79)]. وقد زاد الاحتمال لدى الأمهات اللاتي لا يتناولن مكمِّلات الحديد أثناء الحمل [OR = 2.88 مع CI = 95٪، (بمَجَال: 1.83 إلى 4.54)]. ولوحظ انخفاض مستويات الهيموغلوبين قبل الولادة، لدى أمهات الأطفال المنخفضي وزن الولادة.

ABSTRACT To evaluate maternal risk factors associated with low birth weight (LBW) among women aged 15–35 years, we carried out a hospital-based, case–control study on 262 cases (mothers of neonates weighing ≤ 2.5 kg) and 262 controls (mothers of neonates weighing > 2.5 kg). Odds of delivering a low-birth-weight baby decreased with increase in maternal haemoglobin [odds ratio (OR): 0.701; 95% confidence interval (CI): 0.62–0.79]. Odds were greater among mothers not using iron supplements during pregnancy (OR: 2.88; 95% CI: 1.83–4.54). Mothers of LBW babies had lower haemoglobin levels before delivery.

Facteurs de risque maternels associés à un faible poids de naissance à Karachi : une étude cas-témoins

RÉSUMÉ Afin d'évaluer les facteurs de risque associés à un faible poids de naissance chez les femmes âgées de 15 à 35 ans, nous avons réalisé une étude cas-témoins en milieu hospitalier auprès d'un échantillon de 262 cas (mères de nouveau-nés pesant au maximum à la naissance 2,5 kg) et de 262 témoins (ayant accouché d'enfants d'un poids supérieur à 2,5 kg). La probabilité de mise au monde d'un enfant de faible poids de naissance diminue proportionnellement à l'augmentation de l'hémoglobinémie maternelle (odds ratio [OR] : 0,701 ; intervalle de confiance à 95 % [$IC_{95\ \%}$] : 0,62-0,79). Cette probabilité est d'autant plus grande que les mères n'utilisent pas de supplémentation en fer pendant la grossesse (OR : 2,88 ; $IC_{95\ \%}$: 1,83-4,54). Les mères de nourrissons de faible poids de naissance présentaient avant l'accouchement une hémoglobinémie basse.

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Introduction

Low birth weight (LBW) is a potentially preventable public health problem particularly prevalent in developing countries [*1*]. It contributes substantially to neonatal, infant and childhood mortality as well as to morbidity [*2*]. In addition, the weight of an infant at birth is an important indicator of maternal health and nutrition prior to and during pregnancy.

Striking variation exists in LBW prevalence within Asia: the highest rates are in South Asia and the lowest in East Asia [*3*]. In East Asia, the proportion of LBW ranges from 5% to 10%, with the exception of Thailand, where an estimated 36% of all infants are LBW [*4*]. In South Asia, the problem is most acute with up to 50% of all neonates having LBW [*3*]. Up to 25% of neonates in Pakistan are classed as LBW [*5*].

Infants with LBW have higher rates of morbidity and mortality from infectious disease, malnutrition and growth failure and are also more likely to have abnormal cognitive development, neurological impairment and poor school performance [*6,7*]. These babies are at greater risk of cardiovascular disease, hypertension and diabetes in adult life [*8–11*].

There are numerous factors contributing to LBW, both maternal and fetal. The maternal risk factors are biologically and socially interrelated; most are, however, modifiable.

In Pakistan, statistics are available, national nutrition surveys are carried out and the prevalence of LBW has been estimated at 12%–25% [*5*]. There has, however, been very little research done on risk factors of LBW among women aged 15–35 years. This group is not biologically at high risk, but as most childbearing occurs in this age range, preventable risk factors among this group need to be assessed. It would be especially beneficial to identify factors that are modifiable among this group of women.

The objective of the study was to identify the maternal risk factors associated with LBW among women aged 15–35 years in hospital births in Karachi.

Methods

We carried out a hospital-based case–control study on LBW in Karachi in the maternity wards of 3 hospitals that provide health services to the lower socioeconomic strata, to study risk factors of LBW among those of underprivileged social status. Each of these hospitals hosts about 3500 deliveries per year. Patients are drawn from urban, suburban and rural areas, and about 75% of users are classified as living in poverty. Civil Hospital, a 1400 bed hospital, is a general hospital working under the Sind government. This hospital is attached to Dow Medical College, Karachi. Jinnah Postgraduate Medical Centre is a federal government general hospital attached to Sind Medical College, Karachi. Lady Dufferin Hospital is a charity hospital for women and children, mainly catering to the needs of low-income families living in nearby Lyari, Shershah and other places in the Old City area. It began with 25 beds and it now has over 200 beds. In 2003 over 4000 deliveries were carried out there.

The high uptake of services at these hospitals is probably owing to their low cost. After admission, the majority of births take place within 2 days. The hospital stay is usually 1 day after delivery unless the mother or infant experience problems.

The study data were collected between July 2003 and September 2003 by trained interviewers by interviews with the mothers, abstraction of medical records and anthropometry.

Birth weight ≤ 2.5 kg was defined as LBW in this study. Cases were defined as mothers of LBW neonates while controls were mothers of neonates weighing > 2.5 kg at the time of birth. This modification in the definition of LBW (birth weight < 2.5kg) was adopted to avoid digit preference, i.e. a tendency in the observers to record a weight of 2.4 kg as 2.5 kg [*12*]. Controls were identified from birth records as the next eligible delivery of a non-LBW baby after a woman delivered an LBW baby.

Sample size was calculated using the method of Schlesselman for an unmatched case–control study [*13*] to detect the odds ratio (OR) of 2.0, power of 90%, specifying alpha at 5% with 22% prevalence of antenatal care (ANC) [*14*] and estimating the non-responders at 10%.

A total of 262 cases (vaginal delivery or caesarean section) and 262 controls of age 15–35 years with no known medical illness who delivered a live-born singleton baby through without congenital malformation and with gestational age 37–42 weeks were enrolled from hospital records within 1 day of delivery. Mothers with a known chronic illness (hypertension, tuberculosis, diabetes mellitus), or who had multiple births or delivered babies with congenital abnormalities were excluded. Only 10 women were excluded: 3 had twin pregnancies, 2 were > 35 years, 3 did not give consent, 1 had tuberculosis and 1 was 14 years old.

A pre-coded questionnaire was developed in English, translated into Urdu and then back-translated into English to check the phrasing to ensure that that the sense of the questions was not changed. Information was taken from interviews with mothers, medical records and post-partum maternal examination. Hospital records were used to identify cases. For every case selected, the next woman who delivered a non-LBW baby on the same date was selected as a control. Mothers were enrolled on a daily basis. The response rate was almost 99%. Only 3 mothers refused to participate (did not give consent) in the study. The reason for this was that they had delivered by caesarean section and at the time of interview they were in pain. Out of these 3 mothers, 1 had delivered a LBW baby.

Study information included demographic data, socioeconomic status, previous pregnancies, ANC during current pregnancy, morbidity during pregnancy, maternal nutritional status, strenuous physical activity and smoking. Socioeconomic status was assessed by employment of the mother and her spouse, mean household size, monthly household income and house type. In Pakistan house types are *pucca* (cemented), *kutcha* (mud houses) and *kutcha pucca* (made with asbestos sheets). The *pucca* houses are a sign of higher socioeconomic status. Maternal age was recorded as a continuous variable as completed years. Age was confirmed from the mother through interview, from her national identity card as well as from the hospital records. In case of disparity, the national identity card was used. Education status of both parents was coded to distinguish between parents who had received no school education (illiterate), had primary school education (< 6 years) or had completed secondary school (≥ 6 years). Parity was analysed as a continuous variable. History of abortion was classified as ever/never had abortion. Birth interval between the current and last pregnancy was taken as a continuous variable. Total numbers of ANC visits for the current pregnancy were categorized as ≥ 4 visits and < 4 visits, based on the World Health Organization (WHO) and UNICEF criteria that women should have ≥ 4 ANC visits with an appropriate health care provider [*15*]. Information given by the ANC provider was considered adequate

if the provider discussed the importance of healthy food and breastfeeding, weight gain during pregnancy, early labour and future family planning with the mother.

Maternal nutritional status was assessed by postpartum weight, haemoglobin level before delivery, and food consumption before and during pregnancy. Maternal haemoglobin was analysed as a continuous variable.

Use of iron and calcium supplements during pregnancy was dichotomized into daily and not daily. An account of a typical day spent by the mother was taken. This included travelling on foot, washing clothes by hand, sweeping floors and midday rest. These variables were categorized into every day, ~ 3 times a week and once a week.

Information about maternal haemoglobin, gestational age and morbidity during pregnancy was taken from the hospital records. Gestational age was calculated from the menstrual history or an ultrasound result if available. The expected date of each delivery was calculated from the menstrual history provided the dates were sure and the menstrual cycles regular and there was no history of use of oral contraceptives in the 3 months before conception. If any of the above criteria were not met then the results of the ultrasound scan, if available, were used to calculate the expected date of delivery.

Ethical approval for the study was taken from the Aga Khan University Ethical Review Committee.

Statistical analysis

Logistic regression was used to identify the factors associated with LBW using *SPSS*, version 10. Descriptive statistics were computed for all variables according to type. Frequency, mean and standard deviation were obtained for continuous variables while the categorical variable was assessed by computing frequencies. Crude odds ratio (OR) and 95% confidence interval (CI) for each variable of interest were calculated. *P*-values were calculated by likelihood ratio test for the significance of the beta coefficients; $P \leq 0.05$ was considered significant for all the independent variables in the model. Multiple logistic regression analysis was performed to identify factors associated with LBW, while adjusting for other variables.

Data gathered from the study were analysed according to WHO definition of LBW (< 2.5 kg) as well as ≤ 2.5 kg and it was found that the results were similar. Therefore, the original definition of ≤ 2.5 kg was used because the power of the study would have been reduced if the definition was changed. All analyses discussed were based on ≤ 2.5 kg.

Results

With regard to demographic and socioeconomic characteristics controls appeared to have better housing conditions while household income was similar among the 2 groups (Table 1). Cases and their husbands were less educated than the controls (Table 1) but the difference was only significant for the mothers ($P = 0.007$).

During the current pregnancy, a high percentage of both cases (96.9%) and controls (90.5%) received appropriate ANC (Table 2). The ANC experience of the mothers in the control group was slightly better than that of cases. Mean number of ANC visits was 4.3 [standard deviation (SD) 1.4] for cases and 3.8 (SD 1.8) for controls ($P = 0.002$).

Although both cases and controls were physically active during pregnancy, a greater proportion of women in the control group had a daily midday rest ($P = 0.044$) (Table

Table 1 **Univariate analysis showing association of low birth weight with demographic and socioeconomic characteristics among mothers aged 15–35 years in hospital births in Karachi, Pakistan, July–September 2003**

Variable	Cases (*n* = 262)		Controls (*n* = 262)		OR	95% CI	*P*-value
	No.	%	No.	%			
Maternal education (years)							
≥ 6	101	38.5	117	44.6	1.00	–	0.007
< 6	44	16.7	62	23.6	0.82	0.51–1.31	
Illiterate	117	44.6	83	31.6	1.63	1.12–2.45	
Maternal occupation							
Housewife	249	95.0	254	96.9	1.00	–	0.270
Employed	13	5.0	8	3.1	1.65	0.67–4.06	
Paternal education (years)							
≥ 6	128	48.9	142	54.2	1.00	–	0.201
< 6	28	10.7	33	12.6	0.95	0.54–1.66	
Illiterate	106	40.5	87	33.2	1.37	0.94–1.98	
Paternal occupation							
Business	220	84.0	218	83.2	1.00	–	0.896
Government	37	14.0	40	15.2	0.92	0.57–1.50	
Unemployed	5	1.9	4	1.5	1.25	0.33–4.07	
Type of house[a]							
Pucca	196	74.9	215	82.1	1.00	–	0.037
Kutcha pucca	33	12.5	31	11.8	1.77	0.69–1.99	
Kutcha	33	12.5	16	6.1	2.28	1.21–4.27	
	Mean	**SD**	**Mean**	**SD**			
Maternal age (years)	24.8	4.7	25.3	4.5	–		0.135
Monthly family income[b]	5019	2517	4690	2596	–		0.129
Household size	7.7	4.3	7.8	4.2	–		0.870

[a]*Kutcha = mud house; pucca = cement house, Kutcha pucca = made with asbestos sheets.*
[b]*Pakistan rupees; US$ 1 ≈ 60 Pakistan rupees 2003.*
OR = odds ratio; CI = confidence interval; SD = standard deviation.

3). Mean duration of the midday rest was 142 (SD 90) minutes for mothers of LBW babies and 148 (SD 103) minutes for the control group ($P = 0.493$).

The haemoglobin status and daily intake of iron supplements was significantly better among the control group ($P < 0.001$) (Tables 2 and 4).

The final logistic regression model included maternal haemoglobin before delivery, iron supplement intake of mother, maternal post-partum weight and maternal age. After adjusting for the effect of other variables in the model it was found that maternal haemoglobin level (measured before delivery) was independently associated with LBW (Table 4). Odds of delivering an LBW baby decreased with increase in maternal haemoglobin (OR: 0.70; 95% CI: 0.63–0.79). Mothers who did not take iron supplements during pregnancy had increased odds of having an LBW baby (OR:

Table 2 **Univariate analysis showing association between low birth weight and antenatal care (ANC) and intake of dietary supplements during current pregnancy among mothers aged 15–35 years in hospital births in Karachi, Pakistan, July–September 2003**

Variable	Cases (*n* = 262)		Controls (*n* = 262)		OR	95% CI	*P*-value
	No.	%	No.	%			
Appropriate ANC							
≥ 4 visits	254	96.9	237	90.5	1.00	–	0.053
< 4 visits	8	3.1	25	9.5	3.37	1.49–7.63	
ANC provider							
Doctor	219	83.6	247	94.2	1.00	–	0.094
Dai	18	6.9	7	2.8	2.42	1.02–5.72	
No ANC	25	9.5	8	3.0	3.56	1.57–8.06	
Information provided by ANC provider							
Adequate	99	37.8	107	40.8	1.00	–	0.519
No information	163	62.2	155	59.2	1.12	0.79–1.59	
Antitetanus toxoid vaccination during pregnancy[a]							
Received	217	82.8	237	90.5	1.00	–	0.026
Not received	44	16.8	25	9.5	1.80	1.07–3.04	
Daily iron supplement							
Yes	176	67.1	223	85.1	1.00	–	< 0.001
No	86	32.8	39	14.9	2.82	1.84–4.32	
Daily calcium supplement							
Yes	211	80.5	245	93.5	1.00	–	0.053
No	51	19.5	17	6.5	2.51	1.97–6.27	

[a]*Data missing for 1 person in the control group.*
OR = odds ratio; CI = confidence interval.
Dai = traditional female birth attendant (not formally trained).

2.88; 95% CI: 1.83–4.54). With increase in maternal post-partum weight, odds decreased (OR: 0.97; 95% CI: 0.95–0.99).

Discussion

In the present study the relationships between LBW and maternal haemoglobin status, iron supplement intake and post-partum weight were found to be statistically significant. All these factors are interrelated.

A strong relationship was found between anaemia and LBW [*16*]. The findings were in agreement with other studies of anaemic pregnant women carried out in Pakistan [*17,18*] and Syria [*19*]. Women can develop iron deficiency anaemia from the loss of blood during menstruation and from repeated pregnancies; it can also be caused by a lack of iron in the diet. During pregnancy, women may develop anaemia because the growing fetus draws upon the mother's iron for the development of red blood cells and other tissues.

Due to the natural decrease in haemoglobin level during pregnancy, the haematocrit measurement should be carried out prior to pregnancy. In the present study,

Table 3 **Univariate analysis showing the association of low birth weight with strenuous physical activity during pregnancy among mothers aged 15–35 years in hospital births in Karachi, Pakistan, July–September 2003**

Variable	Cases (*n* = 262)		Controls (*n* = 262)		OR	95% CI	*P*-value
	No.	%	No.	%			
Walk for 30 minutes							
Never	46	17.6	56	21.3	1.00	–	0.737
Once a week	67	25.6	62	23.7	1.22	0.77–1.94	
2 times a week	21	8.0	19	7.3	1.31	0.78–2.20	
Every day	128	48.8	125	47.7	1.34	0.64–2.80	
Washing clothes by hand							
Never	19	7.3	24	9.1	1.00	–	0.004
Once a week	47	17.9	73	27.9	0.81	0.40–1.64	
2 times a week	73	27.9	82	32.4	1.12	0.57–2.21	
Every day	123	47.0	83	31.6	1.83	0.94–3.56	
Floor sweeping							
Never	25	9.5	23	8.8	1.00	–	0.930
Once a week	2	0.8	1	0.4	0.90	0.15–21.67	
2 times a week	1	0.4	1	0.4	0.92	0.05–15.57	
Every day	234	89.3	237	90.4	1.84	0.49–1.63	
Midday rest							
Every day	210	80.1	226	86.2	1.00	–	0.044
2 times a week	27	10.3	10	3.8	0.99	0.53–1.84	
Once a week	4	1.5	3	1.14	1.44	0.32–6.34	
Never	21	8.0	23	8.0	2.92	1.38–6.19	

OR = odds ratio; CI = confidence interval.

Table 4 **Final multiple logistic regression model showing association of low birth weight with maternal haemoglobin, daily iron supplement intake, maternal post-partum weight and maternal age among mothers aged 15–35 years in hospital births in Karachi, Pakistan, July–September 2003**

Variables	Cases (*n* = 262)		Controls (*n* = 262)		Adjusted OR	95% CI	*P*-value
	Mean	SD	Mean	SD			
Maternal haemoglobin before delivery (g/dL)	9.4	1.7	10.6	1.4	0.70	0.62–0.79	< 0.001
Post-partum maternal weight (kg)	55.8	9.5	57.5	10.2	0.97	0.95–0.99	0.031
Maternal age (years)	24.8	4.7	25.3	4.5	1.03	0.98–1.07	0.153
	No.	%	No.	%			
Daily iron supplement							
Yes	176	67.1	223	85.1	1.00	–	< 0.001
No	86	32.8	39	14.9	2.88	1.83–4.54	

OR = odds ratio; CI = confidence interval; SD = standard deviation.

since the pre-pregnancy haemoglobin levels were not available, the haemoglobin levels were taken from the hospital records which measured the maternal haemoglobin at the time of admission for delivery. It was, thus, not possible to conclude whether the mothers became anaemic at some stage in pregnancy or they were already anaemic before getting pregnant.

Intake of iron supplements during pregnancy was also found to have a protective effect with respect to LBW. This is consistent with the findings of some other studies on iron supplementation and pregnancy outcome [*20–22*]. Iron supplementation during pregnancy protects a woman from becoming anaemic because the required amounts may not be supplied from dietary intake during this period.

In view of the fact that for the present study the pre-pregnancy weight and weight gain during pregnancy were not available, the post-partum weights were taken. The maternal post-partum weight was also found to be associated with the birth weight of the baby. This is in accordance with a study conducted in Cleveland, Ohio [*23*].

Our results showed that the risk of LBW increased to some extent with increasing maternal age. This was consistent with results from a number of other studies [*24–27*]. In Pakistan women generally get married early and begin childbearing soon after marriage. They are expected to have a high total fertility rate. Due to repeated pregnancies and short pregnancy intervals, the risk of having an LBW baby increases in older, grand multiparous women [*28*].

Limitations of the study

There were a number of limitations to this study. The international definition of LBW was not used. This criterion was adopted in order to resolve the problem of digit preference. Since maternal age, date of last menstrual period and ANC were determined from the mother, these variables may have been subject to recall bias. Due to logistic constraints maternal pre-pregnancy weight, weight gain during pregnancy and haemoglobin level before pregnancy could not be measured. This was a hospital-based study, while in Pakistan a large number of deliveries are conducted at home and only those neonates that are born in hospital are weighed, a small proportion of all births. Information regarding smoking status of the mother could not be analysed because altogether only 6 mothers admitted that they were smokers.

Conclusion

An important measure that can be taken to reduce anaemia in pregnancy is to determine whether a woman is anaemic before pregnancy. Haemoglobin assessments should be done in the early stages of pregnancy. In order to prevent anaemia during pregnancy, mothers should be advised to take iron supplements during pregnancy. For appropriate weight gain during pregnancy, pregnant women need to be counselled about a healthy diet. Weight before pregnancy as well as weight gain during pregnancy should be carefully monitored to promote optimal outcomes for mother and infant.

The problem of LBW in Pakistan needs focused attention, and research requires innovative strategies to attempt to identify protective factors among women who are at high risk.

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Maternal characteristics in relation to income in a semi-rural community in Pakistan

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الخصائص الأمومية وعلاقتها بالدخل في مجتمع شبه ريفي في باكستان

آمنة ريحانة صديقي

الخلاصة: لما كانت صحة المرأة ووضعها الاجتماعي والاقتصادي عناصر أساسية للتنمية، فقد أُجريَت هذه الدراسة التي هدفت إلى تقييم العلاقة بين الدخل الأسري الشهري والخصائص الديمغرافية والتغذوية والاجتماعية، لدى النساء اللائي يَعِشْنَ في منطقة شبه قروية بالقرب من باكستان. وأُجريَت مقابلات مع 1111 من النساء اللائي لديهن طفل واحد على الأقل دون الخامسة من العمر. وتبيَّن وجود ارتباط إيجابي بين الدخل الشهري، المبلَّغ ذاتياً، وبين عدد مرات الحمل، وقياس كِفَاف وسط العَضُد، وعدد مرات الطبخ في اليوم، وإلمام كل من المرأة وزوجها بالقراءة والكتابة. أما الارتباط السلبي فتمثَّل في عدد الأفراد الذين يعيشون في كل غرفة، واستخدام الأخشاب كوقود للطهو، وعمل الزوج في مهنة تتطلَّب مهارة معيَّنة. وبيَّنت الدراسة أن الدخل يعتمد على عوامل غير متعلِّقة بالإيرادات، مثل الإلمام بالقراءة والكتابة، والحالة التغذوية للمرأة وصحتها الإنجابية.

ABSTRACT Women's health and socioeconomic status is fundamental to development. The aim of this study was to evaluate the relationship of monthly household income with demographic, nutritional and social characteristics in women living in a semi-rural location near Karachi. Thus 1111 mothers with at least 1 child under 5 years of age were interviewed. Self-reported monthly income was positively associated with gravidity, mid upper-arm circumference, cooking frequency per day and self and spousal literacy; it was negatively associated with number of occupants per room, wood used as cooking fuel, and spouse in a skilled occupation. Income is dependent on non-income factors such as literacy, and the nutritional and reproductive health status of women.

Caractéristiques maternelles et revenus en zone semi-rurale au Pakistan

RÉSUMÉ La santé et le statut socio-économique des femmes sont l'une des clés du développement. Cette étude avait pour objectif d'évaluer le rapport entre le revenu mensuel des foyers et les caractéristiques démographiques, nutritionnelles et sociales des femmes résidant en zone semi-rurale près de Karachi. À ce titre, 1111 mères d'au moins un enfant de moins de 5 ans ont été enqu tées. Il est apparu une association positive entre le revenu mensuel autodéclaré et la gravidité, le périmètre brachial à mi-hauteur, la fréquence quotidienne de préparation des repas, le degré d'instruction de la femme et de son conjoint, tandis que cette association s'est révélée négative sous l'angle du nombre d'occupants par pièce d'habitation, de l'utilisation du bois comme combustible de cuisson et de l'emploi du conjoint comme travailleur qualifié. Le revenu est fonction de facteurs indépendants de lui-m me, tels que le degré d'instruction et les statuts nutritionnel et reproducteur de la femme.

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Introduction

Initiatives were taken in the year 2000 to work towards achieving the Millennium Development Goals (MDG) by the year 2015. The specific objectives of MDGs are to eradicate extreme poverty and hunger, achieve universal primary education, promote gender equity and empower women, reduce child mortality, improve maternal health, control infectious diseases, ensure environmental sustainability, and develop a global partnership for development [*1*]. Women's empowerment and improvement in women's health are linked to the issue of poverty. The World Bank report of 2003 on poverty in Pakistan indicated that poverty exists in various forms in Pakistan and will continue to exist if various dimensions of poverty are not addressed as increase in income alone will not help to reduce or eliminate it.

It is known that poverty is a feature of rural and semi-rural areas in Pakistan, compared to urban areas. Furthermore, poverty affects women in Pakistan through low income and vulnerability to gender-related non-income factors [*2–5*]. Women usually do not earn direct income and household income is low in rural and semi-rural areas and is associated with poor health status. In developing countries like Pakistan, human development indices are in fact largely dependent on women's health and socioeconomic status [*6*] and the intrahousehold status of women is related to food security, particularly for children [*7*].

Low educational status of women is the strongest predictor of poverty and women in rural and semi-rural locations are not literate [*8*]. Poverty and socioeconomic disadvantage to women leads to environmental exposures that may increase their risk of nutritional deficiencies, adverse reproductive outcomes and poor health status [*8–10*]. Along with under-nutrition, maternal health is affected by manual labour (getting water and fuel for their households) [*11–14*]. Moreover the fertility rates among such women are high. The high energy demands on poor women from their combined productive and reproductive roles together with under-nutrition thus have a substantial impact on their health. This is further compounded by poor health care.

Children born to underweight and stunted women are also likely to be underweight and stunted which will affect their future potential at the individual and community level, thus establishing a vicious cycle [*4*]. Overall 19% of the children born in Pakistan are of low birth weight (LBW) [*15*] (birth weight < 2500 g), which leads to high infant morbidity and mortality [*16–18*]. LBW varies within subgroups of a population and is reported to be associated with low socioeconomic status, parity, poor nutritional status, anaemia, maternal infections, smoking, hypertension, inadequate antenatal care and rural settings [*8–10,14,19,20*].

The serious implications for maternal and child health have been studied and reported on but there is less information on the maternal dimensions of poverty. To address the specific nature of such poverty, it is important to evaluate maternal characteristics related to poverty. Thus the main objective of this study was to evaluate the relationship of monthly household income with gravidity status and demographic, nutritional and social characteristics in women living in a semi-rural location in Pakistan with at least 1 child under 5 years of age.

Methods

Study setting

The study was conducted in a semi-rural area of District Malir, Rehri Goth and

adjoining communities located about 25 miles from the city of Karachi, Pakistan. The area is spread over 3 km and has a population of 35 000. It lacks basic utilities, transportation and health services [*21,22*]. It has a rural health centre, and general clinics run by nongovernmental organizations (NGOs). The Departments of Pediatrics & Child Health and Community Health Sciences have centre-based and outreach programmes for child health; in addition the Department of Community Health Sciences is involved in community-based developmental activities. These programmes are conducted with the support of a local community-based health management group. In this setting, participation from community residents is 100% as long as there has been mutual agreement with the community management group.

Sample size

Sample size was calculated using a correlation coefficient of at least 0.1 between monthly income and maternal gravidity (number of pregnancies), two-sided alpha of 0.05 and beta of 0.10; thus 1050 participants were required. The survey identified 1111 married women living in the study area with at least 1 child less than 5 years of age; hence data for all of them were analysed to determine the relationship between maternal characteristics and household (nuclear family) reported monthly income.

Study participants

All married women aged 15 to 45 years who delivered a singleton live birth during the years 2000 to 2002 were included; pregnancies were identified historically by house-to-house surveys in 2000–2002. This study was the first part of a study that was done to establish a historical cohort of women who delivered a singleton live infants during the years 2000–2002. This initial full survey of the study area was done from January to September 2005 to obtain complete house listings in order to assemble the cohort, whereby a map of the area was used to identify ever-married women with at least 1 child less than 5 years of age. In this survey participation was high.

Interviews

The survey and consent form were approved by the Institutional Review Board of the University of California (UC) at Davis and the Ethics Review Committee of the Aga Khan University, Pakistan. The author with a study team supervised the conduct of the survey. The study team consisted of 3 field supervisors and 7 field workers. Field supervisors were graduates and received training from the author about the manuals, key documents for the questionnaire, and anthropometric measurements. The author and field supervisors were certified to obtain consent after taking an online tutorial and quiz on the National Institute of Health website for research with human subject participation. Field workers were recruited from the area with the help of the local community management team and were trained for consent taking, conducting pilot and modified questionnaire interviews, and measuring participants' weight, height, mid-arm circumference and skin-fold thickness. After reading aloud the consent form, the women either signed the form or provided a thumb print if they were wiling to participate. Field workers conducted the interviews and measurements. Quality checks for missing values were made on a daily basis by field supervisors and corrected. The questionnaire was pilot tested on a sample of 30 women living in the area who had at least 1 child less than 5 years of age. The final questionnaire obtained information on demographic, socioeconomic, lifestyle, anthropometric and reproductive factors,

namely: participant's age, address, marital status, number of family members, number of persons living in the house, number of rooms in the house, and number of nuclear family members and rooms in use by them. Monthly household income was recorded in Pakistani rupees (Rs) (US$ 1 = Rs 60 at the time of survey). Literacy was categorized as ability to read and/or write and completed years of schooling. This variable was dichotomized as totally illiterate and literate. Husband's occupation was categorized as skilled (fisherman, tailor, driver and electrician) and unskilled (labourer and daily casual worker). Information was also obtained for the number of animals owned.

Information on smoking history and current use inside and outside the house was sought for the participant, spouse and other household members, including daily number of cigarettes smoked (local or available on the market) and duration of smoking. For participants, any use for cigarettes, *beedi* (a locally made cigarette from fragmented tobacco leaves rolled in dried tobacco leaves), and or *huqqa* (a traditional water pipe) was ascertained. Participants' use of chewing tobacco, including duration, frequency, and use with other substances, such as areca nuts and betel leaf, was also ascertained for current use and use during the past pregnancy. Tobacco use was dichotomized as tobacco user (cigarette, *beeri*, *huqqa* or chewing tobacco) and non-user. Tobacco use (as defined above) in the most recent past pregnancy was also recorded. Information was also sought on type of cooking fuel used, duration of cooking daily and amount of daytime rest per day. A structured grid was used to record history of all pregnancies by the year, and gravidity and parity were calculated for each participant.

Trained health workers used calibrated weighing scales to measure the women's weight in light clothing and bare feet in kilograms using a calibrated bathroom scale. A Lange skin caliper was used to measure left arm triceps skin-fold thickness. Standard measurement tapes were used by trained workers to measure participant's height, mid-arm, and mid-calf circumference in centimetres. Two measurements were taken for weight, height, skin-fold thickness, and mid-arm and mid-calf circumference. The first 50 measurements taken by health workers were standardized to those taken by the field supervisor and significant differences were not found.

Statistical methods

Continuous and ordinal variables were summarized first with descriptive statistics to check for distributions, and measures of central tendency were calculated. The Student *t*-test was used for comparing means for continuous variables. The chi-squared test for significance was used for comparing categorical covariates.

Self-reported household income was the dependent variable. Relationship with monthly income was determined for demographic, nutritional (anthropometric), reproductive, and non-income socioeconomic characteristics. The variable for income was dichotomized at the median level for comparison purposes. An index of crowding was calculated as the number of persons in the house divided by the number of rooms in the house; a similar index was calculated for the number of nuclear family members by number of rooms in use by the nuclear family. Gravidity was defined as the total number of pregnancies experienced by the woman irrespective of outcome; parity was the number of live births she had had. In multiple linear regression models, monthly income was regressed on demographic, nutritional (anthropometric), reproductive, and non-income socioeconomic variables that were associated with monthly income in

the bivariate analyses. The distribution and linear association of continuous variables were checked prior to its inclusion in the multiple regression models; when required transformation or addition of a quadratic to achieve linear association was done.

Data were double-entered and validated in *Epi-Info*, version 6 and analyses were conducted using *SPSS*, version 12.00. The level of significance was taken as $P < 0.05$.

Results

A total of 1111 mothers living in the area who had at least 1 child less than 5 years of age consented to participate in this interview-based survey. The median monthly income was Rs 3000. Table 1 shows descriptive characteristics of the participants and comparison of these with the median income variable. Mean age of the participants was 29.28 [standard deviation (SD) 5.4] years, with a significant difference by income (Table 1). Mean crowding index for participant's nuclear family was 5.0 (SD 2.0) in the higher income group which was not significantly different from the lower income group [4.9 (SD 1.9)] ($P = 0.10$). Mean gravidity and parity were significantly greater for the higher income group compared to the lower income group (Table 1). Anthropometric indicators showed a better nutritional status for the higher income group compared to the lower income group, as expected (Table 1). Most of the women (53.4%) in the higher income group used natural gas for cooking and most (62.2%) in the lower income group uses wood ($P < 0.001$). In addition, frequency of cooking was also greater in the high income group ($P = 0.048$). A significantly greater number of households possessed animals in the high income group (36%) than the lower income group (30%) ($P = 0.03$).

Smoking in past pregnancy was greater in women in the higher income group (Table 1) but did not differ for reported current smoking status ($P = 0.68$). Current spousal smoking was greater in the higher income group (21.6%) compared to the lower income group (15.2%) ($P = 0.007$); reported use by other family members was also greater in the higher income group (11%) than the lower income group (7.5%) ($P = 0.06$). More participants in the higher income group lived in houses made of a mix of straw and bricks and those made only with bricks than participants from the lower income group who lived in houses made of straw and a mix of straw and bricks (Table 1). The majority of the husbands were fisherman (77.7%) which was included as a skilled profession; there were more fishermen in the lower income group (80.7%) than the higher income group (75.4%) ($P = 0.04$). Participants were asked about their current and past occupation, whether they were working in 2005 or had worked for money during the past pregnancy. Reported duration of daytime rest by the women ranged from none to 3 hours; women in the high income group had significantly longer daytime rest than the low income group.

Maternal age and gravidity were significantly correlated (Pearson correlation coefficient = 0.73, $P < 0.01$). Figure 1 shows the relationship between increasing maternal age and mean gravidity status by median income level; with consistently higher mean number of pregnancies in the high income group. In the linear regression model, age was positively associated with income; but after inclusion of gravidity the association was inverse. The self-reported monthly income was earned mainly by spouses, as women generally did not work other than do the housework. Monthly income was taken as a dependent variable in the linear regression model and was positively associated

Table 1 **Maternal characteristics according to median monthly income**

Characteristic	Overall (*n* = 1111) Mean (SD)	Monthly income > median (*n* = 630) Mean (SD)	Monthly income < median (*n* = 481) Mean (SD)	*P*-value for income groups
Maternal age (years)	29.28 (5.4)	29.44 (5.7)	29.08 (5.9)	0.001
No. of persons in house	9.8 (7.2)	10.52 (7.3)	8.90 (7.0)	0.001
No. of rooms in house	2.6 (1.8)	2.7 (1.8)	2.4 (1.8)	0.037
No. of persons in nuclear family	5.8 (2.3)	6.0 (2.4)	5.4 (1.9)	0.001
No. of rooms in use by the nuclear family	1.1 (0.58)	1.2 (0.6)	1.1 (0.5)	0.001
Maternal gravidity	4.80 (2.8)	5.06(2.8)	4.47 (2.7)	0.001
Maternal parity	4.35 (2.5)	4.58 (2.6)	4.06 (2.4)	0.001
Maternal weight (kg)	50.14 (9.5)	51.01(9.9)	49.00 (8.9)	0.001
Maternal height (cm)	155.83 (6.0)	156.09 (6.1)	155.50 (5.9)	0.111
Body mass index (kg/m^2)	20.66(3.8)	20.94 (3.9)	20.30 (3.7)	0.006
Mid upper-arm circumference (cm)	24.50 (3.1)	24.82 (3.2)	24.09 (3.04)	0.001
	%	%	%	
Type of house				
Straw	15.5	13.0	18.7	
Straw and brick mix	65.5	66.8	63.8	
Brick	19.0	20.2	17.5	0.028
Fuel used				
Wood	52.7	45.7	62.2	
Natural gas	47.2	54.3	37.8	0.001
Cooking frequency: 3–4 times per day	71.4	76.7	81.8	0.048
Woman literate	20	23.7	15.2	0.001
Husband's years of schooling				
≤ 5	19.6	22.4	16.0	0.004
> 5	9.3	10.5	7.7	
Husband's occupation: skilled	77.7	75.4	80.7	0.042
Tobacco use by woman in last pregnancy	24.9	27.9	21.0	0.010
Daytime rest > 60 minutes	48.1	44.5	54.3	0.002

SD = standard deviation.

with cooking food 3 to 4 times per day per day, maternal literacy, gravidity, paternal literacy, mid upper-arm circumference and number of persons living in the house; it was negatively associated with wood used as cooking fuel, spouse in skilled occupation, and crowding index (Table 2).

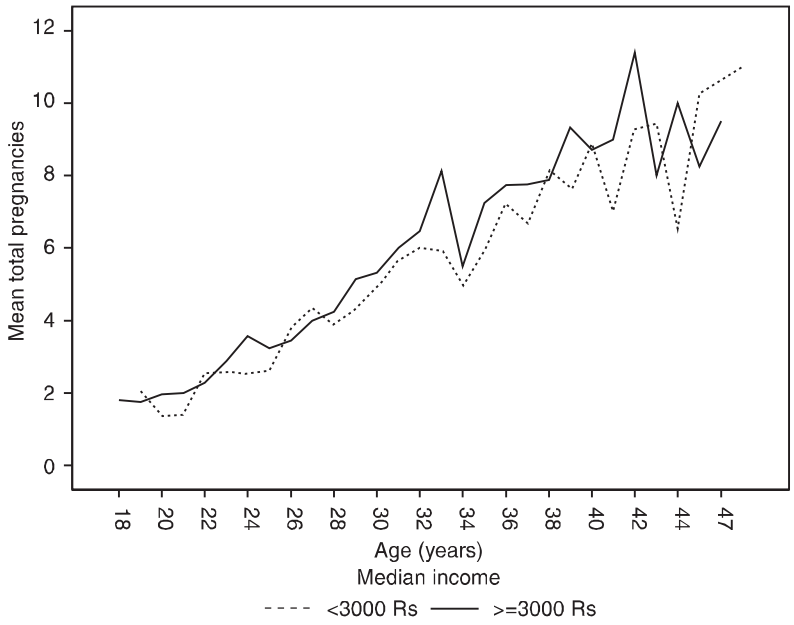

Figure 1 **Relationship between increasing maternal age and mean gravidity by category of median income (US$ 1 = Rs 60 at the time of the survey)**

Discussion

This study provides valuable information on the relationship between income and non-income aspects of maternal poverty in a semi-rural and poor community. These non-income factors rely on income [*2*], and the purchasing capacity of participants is dependent on spousal earnings. Women's use of wood as a cooking fuel for example had a strong relationship with lower income and higher frequency of cooking per day with higher income. This is relevant to MDGs related to reducing hunger and eating the appropriate number of calories per day. In Pakistan about 53% of the population uses wood as a cooking fuel, and when combined with use of crop residues and biomass, this figure rises to 70% [*12,13*]. In addition to being a correlate of poverty, fuel also contributes to indoor air pollution which women and children are likely to be more exposed to. The MDGs for environmental sustainability consider ambient air pollution, and rural families are vulnerable to indoor pollution if not to outside air pollution [*1,11*].

Housing structure was not significantly associated with income in the final model. However, the crowding index (occupants per room) was, and this was independent of wood use and other variables.

Higher income was associated with increased gravidity; hence it is likely that increasing income could lead to larger families. This observation suggests strategic planning is needed to address this factor. Rural parts of Pakistan have higher fertility rates [*5*] and this setting is comparable to rural areas, and in spite of it being near to a large city, it has limited accessibility to civic amenities [*22*].

Table 2 **Multiple linear regression model for reported monthly income (US$) and maternal characteristics**

Characteristic	Coefficients B	SE	*P*-value	95% confidence intervals for B
Constant	35.036	6.584	0.000	22.115 to 47.958
Total pregnancies	3.045	0.916	0.001	1.248 to 4.842
Total pregnancies (square term)[a]	–0.173	0.066	0.009	–0.303 to –0.044
Mid upper-arm circumference	0.505	0.209	0.016	0.094 to 0.915
Frequency of cooking per day: 0 = 1–2 times, 1 = 3–4 times	5.244	1.624	0.001	2.057 to 8.432
Woman literate: 0 = no, 1 = yes	4.550	1.658	0.006	1.297 to 7.803
Husband literate: 0 = no, 1 = yes	2.912	1.037	0.005	0.878 to 4.946
Cooking fuel used: 0 = natural gas, 1 = wood	–6.107	1.323	0.000	–8.704 to –3.510
No. of persons living in house	0.682	0.099	0.000	0.487 to 0.876
Occupation of spouse: 0 = unskilled, 1 = skilled	–3.425	1.592	0.032	–6.549 to –0.301
No. of nuclear family members/No. of rooms occupied by them	–0.953	0.424	0.025	–1.784 to –0.121
Maternal use of cigarettes/*beeri*/*huqqa*: 0 = no, 1 = yes	2.686	1.554	0.084	–0.363 to 5.735
Daytime rest > 60 minutes	–2.208	1.321	0.095	–4.800 to 0.384
Age (years)	–0.267	0.161	0.097	–0.582 to 0.048

[a]*The relationship of number of pregnancies reported by participants was positively associated with monthly income; but at the level of a very large number of pregnancies this relationship was negative; hence to make the relationship linear and to stabilize the residuals, the square value was used; this helped to improve the fit of the model.*
SE = standard error.

It is well known that education is the strongest predictor of reduction in poverty, especially female education. Our study found a positive association between the education of both the woman and her husband and monthly income. It is reported that improvement in maternal education from none or less than primary level to completed primary level has led to a reduction in extreme poverty [*8*]; furthermore it is not only the female financial contribution that is important but networking with other people also has positive effects. Two types of networking namely *bound* and *achie□ed* were reported. Bound networking is with close relatives, mainly developed by females, that helps prevent the family from falling further into poverty. Achieved networking is developing networks at the individual level; this is largely done by males and is known to move the household out of poverty [*8*].

In the current study, higher-income participants had a greater number of people living in the house. There is a cultural norm for families to live together and it is possible that some economic gains occur in this situation. However, the higher crowding index, indicating less space per person, had a negative relationship with income as expected.

Skilled occupation of the spouse was associated with decreasing income in the final model. This is perplexing and the data do

not provide a logical reason for this association. However, there are reports that many fishermen (defined as a skilled occupation) in this locality are in debt to the boat owner and this may be a possible explanation [*21*]. Alternatively, fishing may currently be facing problems whereby general unskilled labour can earn more than fishing. This could be associated with breeding season, environmental pollution, reasons related to net income for services and many other factors.

Maternal weight, body mass index and mid upper-arm circumference were associated with income; surprisingly, maternal height was not. Mid upper-arm circumference is a good indicator of protein reserves of a body and body mass index is a better indicator of obesity [*23*]. Among the nutritional indicators (weight, height, body mass index, mid upper-arm circumference) of participants, increasing mid upper-arm circumference was included in the model and was positively related to increasing income. However, the mean mid upper-arm circumference of participants in this study was at the lower end (10th percentile of standard values for age).

The final model of income in this study also showed nearly significant associations with maternal use of tobacco in the past pregnancy. This points towards increasing tobacco use in women, which was recently reported for rural areas of Pakistan [*24*]. Health education and other measures are required for its control.

The strength of this study lies in the large sample and evaluation of non-income dimensions of maternal poverty. Poverty is a complex condition and we found strong and at times unexpected relationships with income. One of the limitations of the study is that self-reported income cannot be checked and hence is not the most valid of measurements. The relationship of skilled occupation with lower income is perhaps unusual but it is possible that it exists in some population groups. Hence economic growth schemes must consider this in their strategies and evaluation. Similarly does the frequency of cooking reflect how often a family eats? Perhaps, but as conditions for storing cooked food are poor in the community, this cannot be concluded without further evaluation.

Income is dependent on non-income factors such as literacy, and the nutritional and reproductive health status of women and these must be addressed to achieve the MDGs for health. However, reduction in poverty by increasing income may not directly lead to improvement in non-income indicators and relevant concurrent strategies need to be formulated for social problems that may arise, such as increasing gravidity (with consequent maternal morbidity and mortality), tobacco use, and the age cohort effects related to those who have low literacy levels but contribute to indicators of the human development index.

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World Health Report 200

The World Health Report 200 - *working together for health*, available in English, French, Spanish and Portuguese, contains an expert assessment of the current crisis in the global health workforce and ambitious proposals to tackle it over the next ten years, starting immediately. The report reveals an estimated shortage of almost 4.3 million doctors, midwives, nurses and support workers worldwide. The shortage is most severe in the poorest countries, especially in sub-Saharan Africa, where health workers are most needed. Focusing on all stages of the health workers' career lifespan from entry to health training, to job recruitment through to retirement, the report lays out a ten-year action plan in which countries can build their health workforces, with the support of global partners.

The report can be downloaded at: http://www.who.int/whr/2006/en/

Fertility and its relationship with sociocultural factors in Kuwaiti society

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الخصوبة وعلاقتها بالعوامل الاجتماعية والثقافية في المجتمع الكويتي

يعقوب يوسف الكندري

الخلاصة: استهدفت هذه الدراسة الوقوف على تأثير بعض المتغيرات الاجتماعية والثقافية على خصوبة السيدات الكويتيات. وقد تم توزيع استبيان على عينة من السيدات المتزوجات قوامها □□□□ امرأة في عمر 1□ – □□ عاماً، تم انتقاؤهن عشوائياً من 10 عيادات للرعاية الصحية الأولية في الكويت. وقد كان معدل الخصوبة □□3 ولادة لكل امرأة. ولوحظ ارتفاع الخصوبة بين السيدات من المذهب السني والأصول القبلية، والمتزوجات من أقارب لهن (P <0.001). كما لوحظت علاقة سلبية يُعتَدُّ بها إحصائياً بين الخصوبة وبين المستوى التعليمي للمستجيبات، والمهنة، والعمر عند الزواج، والحالة الاجتماعية الاقتصادية، ونمط الزواج (زواج بين الأقارب أو بين الأباعد). وخلصت الدراسة إلى وجود علاقة إيجابية بين الخصوبة وبين عمر المستجيبات ومستوى دخل الأسرة.

ABSTRACT The aim of this study was to examine the effect of some sociocultural variables on the fertility of Kuwaiti women. A questionnaire was administered to a sample of 7749 married women (aged 15–78 years) selected randomly from 10 primary health care clinics in Kuwait. The fertility rate was 3.58 live births per woman. Fertility was higher among Sunni Muslim women, those of Bedouin ethnicity, and those in a consanguineous marriage ($P < 0.001$). There was a significant negative relationship between fertility and respondents' educational level, occupation, age at marriage, socioeconomic status and type of marriage (consanguineous or not). There was a positive relationship between fertility and the respondents' age and the family income.

Fécondité et facteurs socioculturels dans la société kowe tienne

RÉSUMÉ Cette étude avait pour objectif d'analyser l'effet de certaines variables socioculturelles sur la fécondité de la femme kowe tienne. Un questionnaire a été administré à un échantillon de 7749 femmes mariées, âgées de 15 à 78 ans, sélectionnées au hasard parmi les patientes de 10 consultations de soins primaires kowe tiennes. Le taux de fécondité était de 3,58 naissances/femme. Le taux de fécondité le plus élevé a été enregistré chez les Musulmanes sunnites, les femmes d'origine bédouine et celles ayant contracté un mariage consanguin ($p < 0,001$). Il est apparu une relation négative significative entre, d'une part, la fécondité et, d'autre part, le degré d'instruction, la profession, l'âge au mariage, le statut socio-économique et le type de mariage (consanguin ou non) des enqu tées. Il a été constaté une relation positive entre cette fécondité et l'âge des enqu tées ainsi que le niveau du revenu familial.

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Introduction

The number of children per household is decreasing in Kuwait. In 1970 the birth rate was about 45/1000 population and the total fertility rate was about 7. In 1987, the total fertility rate had dropped to 4.4, with 34 births/1000 population [*1*].

Several factors have been associated with this decline in the fertility in the Kuwaiti society. One such is the factor in the age at marriage among Kuwaitis, especially among females. For example, the age at marriage was estimated to be 22.4 years for Kuwaiti females in 1985 versus 20.9 years in 1975 [*1*]. Another factor that can affect the fertility rate and age at marriage is female education. Kohli and Al-Omaim found that illiterate women at marriage were younger than university educated females by about 5 years [*2*]. They also found that there was clear evidence of declining fertility in younger Kuwaitis but not in the older age groups. Abdal found that female university students had a stronger desire to limit fertility than male students, which emphasizes the effect of education on fertility [*3*]. The National Health Survey of 1984/5 revealed that 39% of married women in Kuwait were using contraception [*3*]. Shah reviewed the data of a labour survey between 1965 and 1993 and showed that female illiteracy declined as the number of females getting a higher education and going into the work force increased [*4*].

Another factor reported to affect fertility is ethnicity. Al-Gallaf et al. found differences between 2 major ethnic groups in Kuwait, Bedouin and non-Bedouin, with regard to their use of contraception; 42% of the Bedouin women and 65% of the non-Bedouin women were using contraceptives [*5*]. It has also been reported that there is a relationship between fertility and degree of religiosity, regardless of the person's Muslim sect, Sunni or Shiite [*3*]. Marriage type can also affect fertility. More closely related couples appear to desire more children [*6,7*].

As a result of the declining fertility in Kuwait, the Kuwaiti government, like some other governments of the area such as Iraq (during Saddam Hussain's regime), Israel, and Cyprus, have provided incentives to Kuwaiti females in an effort to raise the fertility rates [*8*]. The Kuwaiti government provides cash child allowances (at present 50 Kuwaiti dinars per child up to a maximum of 7 children) and maternity benefits (2 months paid leave and another 6 months off at half salary).

It is clear that the speed of economic growth in Kuwait has had many social consequences. Family structure is one of the main social aspects that has been affected. Ideas and thoughts regarding family size, spouse selection, and fertility have changed markedly in Kuwaiti families. There are few recent studies on fertility and its relationship with other sociocultural factors in Kuwait. For this reason, the main aim of this study was to examine this relationship and to see how certain sociocultural variables act as determinants in the fertility rate in Kuwaiti society today.

This paper will try to answer the following questions: is there a significant difference in the fertility rate between Kuwaitis from Bedouin versus non-Bedouin roots? Is there a significant difference in the fertility rate between the Sunni and Shiite sects? Is there a significant difference in the fertility rate between consanguineous and non-consanguineous couples? Is there a significant relationship between the fertility rate and some other sociocultural factors?

Methods

Sample

The sample was 8000 married Kuwaiti women aged 15–78 years. In order to approach this target, we distributed 8100 questionnaires to eligible women. Some were incomplete and final sample size was 7749. The sample represents about 1.7% of the total Kuwaiti female population aged 15 years and older [*9*]. The reason for using such wide age sample was to ensure better representatives of Kuwaiti females at age of marriage and reproduction. Another reason was to make sure of the experiences and opinions of older women concerning fertility and related variables, especially the impact of age on fertility.

The women were selected randomly from the records of 10 different primary health care (PHC) centres in Kuwait; 10 clinics were selected to ensure all ethnic groups in Kuwait were represented. Many areas in the Kuwait governorates are known to be representative of certain ethnic groups. The 10 PHC centres were selected using a cluster random sample method. These clinics are attended by individuals of all sociocultural backgrounds and ethnicities and this thus ensured that all population groups were involved in the study. No other places in Kuwait can represent all the general population. The sample was drawn from all females attending the PHC clinics for minor health problems, after they were asked if they were married or not.

Study tool

Data on the respondents' opinions about and attitudes toward fertility and the related variables were collected by a questionnaire developed locally by the author. In order to ensure validity of the questionnaire, 5 professors at the Department of Sociology and Social Work, Kuwait University reviewed it. According to their suggestions and remarks, the questionnaire was modified. A pilot study was conducted in which the modified version of the questionnaire was given to 70 married Kuwaiti women. The results of this pilot study indicated the questionnaire was a reliable tool to assess data related to fertility among Kuwaiti women.

The questionnaire included some demographic questions. Fertility, number of births per woman, was the dependent variable. The respondents were asked directly about the number of children they had. Education was divided into 8 categories (from "read and write and below = 1 to doctoral degree = 8). Annual family income was also divided into 8 categories. Work position had 6 categories (not working = 1 to professional = 6). Socioeconomic status (SES) was measured by using these 3 variables, i.e. annual income, educational level, and occupational position and was coded according to the Social Science Research Council [*10*]. The respondents were asked about their age at marriage and their kin relationship with their spouse, and the degree of the spousal relationship. Types of marriage were grouped into 9 categories: double-cousin marriage (2 categories), first-cousin marriage (cousins on the father's and the mother's side, 4 categories), second-cousin marriage, third-cousin marriage and non-consanguineous marriage. The respondents were asked directly about their Muslim sect, Sunni or Shiite, and their ethnicity, Bedouin and non-Bedouin.

Data collection

Data collection took about 6 months from January to June 2002. The questionnaire was distributed by 10 trained research assistants. The respondents answered the questionnaire voluntarily after an explanation of the aim of study by the research assistants. The research assistants helped any

respondents who were illiterate to complete the questionnaire.

Because of the direct contact between research assistants and the respondents, the response rate was high (96%). Most of the non-responders were excluded because they did not complete all parts of the questionnaire.

Statistical analysis

SPSS, version 11.0 was used for the data analysis. The data were analysed using both descriptive and inferential statistics. Descriptive statistics such as mean and standard deviation (SD) were used. To examine the differences between sect, origin, and marriage type, the Student *t*-test was used. Pearson correlation was used to assess the degree and nature of the relationship between fertility and some sociocultural variables. Finally a multivariate regression model was used to predict the outcome.

For statistical analysis purposes, type of marriage was dichotomized as consanguineous and non-consanguineous marriage and by the degree of relation between the spouses (4 categories) beginning with the double-cousin marriage and first-cousin marriage, second-cousin marriage, third-cousin marriage, and non-consanguineous marriage.

Results

The average fertility for the entire sample (n = 7749) was 3.58 (SD 2.45). Table 1 shows the difference between some sociocultural variables and fertility, namely ethnicity, type of marriage and sect. There were significant differences between all 3 variables in relation to fertility. Bedouin respondents had a higher mean fertility than non-Bedouin [3.71 (SD 2.67) versus 3.43 (SD 2.18) respectively, $P < 0.001$]. Respondents married to a relative had a higher mean fertility than those married to a non-relative [3.51 (SD 2.19) versus 3.34

Table 1 **Mean fertility of the sample of women in Kuwait according to ethnicity, consanguinity and Muslim sect**

Variable	No.	Mean no. of births per woman	Standard deviation	-value
Ethnicity				
Bedouin	4014	3.71	2.67	4.5***
Non-Bedouin	2845	3.43	2.18	
Type of marriage				
Consanguineous	4009	3.79	2.62	–6.54***
Non-consanguineous	3306	3.41	2.28	
Muslim sect				
Sunni	5463	3.64	2.53	4.37***
Shiite	1865	3.38	2.15	
Muslim sect				
Sunni (Bedouins excluded)	1591	3.51	2.19	4.37***
Shiite	1244	3.34	2.15	

****Significant at* P< *0.001.*

(SD 2.15) respectively, $P < 0.001$]. Sunni respondents had higher mean fertility than Shiites [3.64 (SD 2.53) versus 3.38 (SD 2.15) respectively, $P < 0.001$].

Shiites are considered a minority in Kuwait. They show a lower mean fertility. They come mostly from non-Bedouin society while those who come from Bedouin origins are Sunni. Even when comparing Sunnis (excluding Bedouins) with Shiites (Table 1) there was also a significant difference between the 2 groups. The non-Bedouin Sunni respondents had a higher mean fertility rate than the Shiites [3.51 (SD 2.19) versus 3.34 (SD 2.15) respectively, $P < 0.001$].

Table 2 illustrates this correlation between the fertility rate and selected sociocultural variables. The data show that there were significant relationships between fertility and all of the selected sociocultural variables. There was a negative relationship between fertility and the respondents' educational level, job position, age at marriage, SES and type of marriage ($P < 0.01$). On the other hand, there was a positive relationship between fertility and the respondents' age and family income ($P < 0.01$).

To predict the effect of selected sociocultural variables on fertility, multivariate regression was used. Independent variables were respondents' age, education level, age at marriage, sect, ethnicity, SES, and marriage type (Table 3). The analysis shows that Shiite respondents would be expected to have 0.17 fewer children than Sunnis, and non-Bedouin respondents 0.33 fewer children than the Bedouins. In addition, high education level, high age at marriage, and lesser degree of consanguinity of the respondents predicted lower fertility. An increase of 1 SD in the educational level of the respondents was associated with a 0.10 SD decrease in the family size. As expected also, an increase in 1 SD in the respondents' age at marriage was associated with a 0.26 SD decrease in the number of children. Also, an increase in 1 SD in the marriage type was associated with 0.02 SD decrease in the family size. In contrast, high family income of the respondents predicted an increase in the number of children. A 1 SD increase in the family income of the respondents was associated with a 0.10 SD increase in the number of children. As

Table 2 **Correlation of fertility of the sample of women in Kuwait with sociocultural variables**

Variable	*r*
Educational level	–0.40**
Occupation	–0.18**
Family income	0.10**
Age at marriage	–0.30**
Age	0.65**
Socioeconomic status	–0.28**
Type of marriage	–0.10**

***Significant at* P< *0.01.*

Table 3 **Effect of selected sociocultural variables on fertility (multivariate regression analysis)**

Variable	B	β	-value
Age	0.14	0.60	60.57*
Education	–0.14	–0.10	–7.15*
Age at marriage	–0.15	–0.26	–27.40*
Sect	–0.17	–0.03	–3.10***
Ethnicity	–0.33	–0.07	–6.73***
Family income	0.12	0.10	3.90*
Marriage type	–0.13	–0.02	–2.10**

Adjusted R squared = 0.52; multiple R = 0.72; F = *944.12*.*
P < 0.05;P < 0.01; ***P < 0.001.*

expected, the high age of the respondents predicted higher family size.

Discussion

Fertility is affected by sociocultural changes. In some societies, a decline in fertility has been related to a decline in polygyny [*11*]. In others there is a connection between lower fertility and the raising of the age at marriage [*12*]. Current ways of thinking and attitudes regarding fertility are a direct result of modernization.

The current study confirms the general decline in the fertility rate in Kuwait over time. The fertility rate was 3.58, while in 1970, it was 7.0 and in 1987 it was reported to be 4.4 [*1*]. One of the most probable reasons for this is the increase in the age at marriage for both male and female Kuwaitis. Recent studies show that the perceived ideal average age of marriage is 25.7 years for males and 21.4 years for females [*6,7*]. In the past, these ages for getting married were considered to be "very old for both males and females. The ideal age and time for getting married for both males and females appears to be almost immediately upon graduation from university for females and around 2 to 3 years after graduation for males. Modernization has played a major role in changing the attitudes regarding marriage and the age at marriage.

Fertility is affected by many different cultural, socioeconomic, and environmental factors, as seen in many different cultures and societies. For example, fertility is influenced by society type, such as urban and non-urban society [*13,14*]. Education and occupation, especially for women, are other important factors that influence fertility. Educated and employed women are more likely to use contraception than those who have little education and who are not employed [*15*].

The changing attitudes regarding the age at marriage are related to education for both genders but especially for females. University education and also higher education for females is increasing in Kuwait. Jobs have also become an important aspect of women's lives. As stated by Shah, female illiteracy has declined and the proportion of females with a degree in higher education and involved in the labour force has increased [*4*].

Another factor affecting age at marriage is that both males and females are less financially dependent on their families and extended families compared with the past. For this reason, education and work have become more important for females. Female awareness and dependency on herself are major changes in the family structure in Kuwaiti society and this has led to an increase in the age at marriage. For a man, dependency on himself and establishing himself financially is important before marriage and this can usually only be completed after graduation from university. These changes in the family structure have thus affected the fertility rate.

It has been shown that there is an inverse relationship between a household's socioeconomic status and its fertility level [*16*]. In this study, fertility was negatively associated with the socioeconomic status of the respondents. On the other hand, the data also showed that there was a positive relationship between fertility and family income. This is expected since the government of Kuwait now encourages couples to have children and provides cash child allowances for each family; around US$ 160 per month per child, which increases the family income. However, the general socioeconomic status was negatively correlated with fertility, although family income was one dimension of the socioeconomic measure.

Ethnicity is another factor affecting fertility. It is reported in the United States, for example, that the differences in fertility rates for American Indians, Hispanics, and Asian or Pacific Island Americans were considerable [*17*]. The findings in this study show that fertility was affected by ethnicity. The respondents who came originally from Bedouin society had a higher fertility rate compared with non-Bedouins. Children, especially males, in Bedouin life and family structure are very important. They are called e□□*a* or *sanad* which mean "supporter. Bedouins have now all settled in cities in modern Kuwait, but their ideas about the importance of children in the family still differ from non-Bedouins. This may explain why Bedouins have a higher fertility rate. Al-Gallaf et al. in 1995 reported that there was a significant difference in the level of contraception use between Bedouin and non-Bedouin women [*5*]. They found that the use of a contraceptive method was 42% for Bedouin women and 65% for non-Bedouin women.

There are differences in results of studies about the fertility of minorities compared with the whole population. Some studies have concluded that minorities have a higher fertility rate and others showed the opposite [*18,19*]. Muslim Shiites comprise around 20% to 30% of the total population of Kuwaiti nationals. The data in the current study show that this group had a lower fertility rate than the whole Kuwaiti population, even when ethnicity was controlled for. More studies are needed for a clear explanation of the low rate of fertility in this group.

Consanguinity plays a major role in fertility. It has been reported that consanguinity is related to high fertility rates in many different cultures [*20*]. In contrast, another study showed that women in consanguineous marriages had a lower mean number of conceptions [*21*]. The data in the current study show that non-consanguineous couples had lower fertility rates than related couples. There are 2 possible explanations for this: first, most consanguineous marriages occur among the Bedouins for whom children are very important; second, the age of marriage in consanguineous marriages is earlier than in non-consanguineous marriages. This has been also reported in other recent studies [*6,7*].

It would appear that some traditional attitudes that affect fertility are in decline in Kuwait as a result of modernity. Many sociocultural factors play a major role in determining family size. This suggests there may be an increase in some subgroups of the population compared with others.

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Utilization of family planning services by married Sudanese women of reproductive age

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استفادة السودانيات المتزوجات اللاتي هن في عمر الإنجاب من خدمات تنظيم الأسرة

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الخلاصة: قام الباحثون في إطار هذه الدراسة بتقصِّي 601 امرأة من المقيمات في المناطق الحضرية والريفية لولاية الخرطوم، لاستكشاف الفروق في الاستفادة من خدمات تنظيم الأسرة والعوامل المؤهِّبة. وبيَّنت الدراسة أن حوالي نصف السيدات يستخدمن طرائق تنظيم الأسرة الحديثة؛ و لم تُلاحظ فروق يُعتد بها إحصائياً بين الأماكن الريفية والحضرية في معدلات الاستفادة من هذه الخدمات. وكانت أقراص منع الحمل هي الوسيلة الحديثة الأكثر استخداماً (47.7٪) تليها اللوالب الرحمية (10.2٪) ثم الحقن (7.5٪). واستُخدم الإرضاع من الثدي من قِبَل 33٪ من السيدات في المجموعتَيْن. وكانت طريقتا النَظْم والعزل أكثر استخداماً من قِبَل السيدات الحضريات (22.2٪ و8.6٪ على الترتيب) بالمقارنة مع السيدات الريفيات (16.1٪ و3.6٪ على الترتيب). ولوحظ انخفاض شديد في استخدام الوسائل الذكرية، مثل العوازل الذكرية والتعقيم. واتضح من الدراسة أن الحالة الاقتصادية، والمعارف، ومستوى التعليم هي أهم العوامل المحددة لاستخدام وسائل تنظيم الأسرة الحديثة.

ABSTRACT To explore differences in utilization of family planning services and predisposing factors, we surveyed 601 women from urban and rural areas of Khartoum state. About half were using modern family planning techniques; there were no significant differences in utilization rates between urban and rural settings. Contraceptive pills were the most frequently used modern method (47.7%) followed by intrauterine devices (10.2%) and injections (7.5%). Breastfeeding was used by around 33% of both groups. The rhythm method and withdrawal were more often used by urban women (22.2% and 8.6% respectively) than rural women (16.1% and 3.6% respectively). Use of male methods (condom; sterilization) was extremely low. Socioeconomic status, knowledge and education level were the most important determinants of using modern methods.

Utilisation des services de planification familiale par les femmes soudanaises mariées en âge de procréer

RÉSUMÉ Afin d'analyser les différences en matière d'utilisation des services de planification familiale et les facteurs prédisposant à cette dernière, nous avons mené une enqu te auprès de 601 femmes des zones urbaines et rurales de l'État de Khartoum. Environ la moitié d'entre elles utilisait des méthodes de planification familiale modernes, les taux d'utilisation ne laissant appara tre aucune différence significative entre les secteurs urbains et ruraux. La pilule contraceptive était la méthode moderne la plus répandue (47,7 %), suivie par les dispositifs intra-utérins (10,2 %) et les injections contraceptives (7,5 %). Dans les deux groupes, la pratique de l'allaitement maternel atteignait près de 33 %. L'abstinence sexuelle périodique (méthode Ogino-Knaus ou cyclique) et la méthode dite du retrait (ou co t interrompu) étaient plus fréquemment utilisées par les femmes des zones urbaines (respectivement 22,2 % et 8,6 %) qu'en zone rurale (16,1 % et 3,6 %). Quant aux méthodes de contraception masculine (préservatif, stérilisation), leur usage était tout à fait négligeable. Le statut socio-économique, le niveau des connaissances et le degré d'instruction sont apparus comme les déterminants majeurs de l'utilisation des méthodes contraceptives modernes.

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Introduction

Countries with a large population and high density relative to available resources suffer tremendously from high fertility rates. High fertility rates are strongly associated with inadequate spacing between births, which in turn is associated with high maternal and infant mortality.

An estimated 600 000 maternal deaths occur worldwide each year, 99% of them in developing countries. The World Health Organization estimates that 13% of these are due to unsafe abortions. Worldwide, approximately 50 million women resort to induced abortion each year, frequently resulting in mortality and adverse health consequences [*1,2*]. Other causes of high maternal death rates in developing countries include complications of pregnancy and complications of childbirth.

In Sudan, maternal and infant mortality and fertility indicators are among the highest in the Region. Maternal mortality is estimated at 600 per 100 000 live births and infant mortality at 70 per 1000 live births; the fertility rate is estimated at 4.6 children per woman [*3*]. The total fertility rate of a nation is directly related to the prevalence of contraceptive use. On average, for every 15 percentage points increase in contraceptive use in the community there is a reduction of 1 birth per woman [*4*]. This suggests that countries with high total fertility rates tend to have low contraceptive use and vice versa. Unintended pregnancies have significant consequences and occur most frequently in adolescents, low-income groups and women from minority groups. Improving contraceptive compliance among high-risk adolescents is a key to reducing the rates of unintended pregnancy in this group of the population [*5*].

National family planning programmes and services in developing countries have been associated with notable increases in contraceptive use and consequent declines in fertility [*6*]. Oral contraceptives and condoms are the base of many programmes, but some earlier programmes relied, and continue to rely heavily, on methods such as the intrauterine device (IUD), that are less prominent in programmes that started later. Over time newer methods such as injectables and implants have found their own niches. The main trend has been towards permanent methods; sterilization, which has become simpler and more demanded, now accounts for half of all contraceptive use [*6*].

Family planning services were introduced in Sudan in 1965 with the foundation of the Sudan Family Planning Association, which provides services throughout the country (Federal Ministry of Health, Sudan, unpublished report, 1992). The total fertility rate for the age group 15–49 years suggests a sharp fall in fertility level in recent years. Total fertility was 6.5 births per woman during the 10–14 years before the 1999 safe motherhood survey, 6.2 births per woman 5–9 years before the survey, and 4.9 births per woman 0–4 years before the survey [*7*].

In January 2002 the government drafted a national population policy. This supports efforts to empower married couples to receive information about a range of contraceptive methods and access to the methods of their choice. However, availability and accessibility to services still vary greatly, especially between urban and rural areas. While many Sudanese women have heard of family planning, research indicates significant unmet needs. Although nearly 20% of married women in Sudan reported not wanting another child, contraceptive use is still low [*8*]. The proportion of women using modern methods of contraception in Northern Sudan increased slightly from 4% in 1977–1978 to 6% in 1989 and 7% in 1992–1993 [*8,9*].

Family planning practice is determined by many factors that can be considered obstacles to the use of family planning services. Caldwell and Caldwell emphasized the cultural imperatives of African communities that are important in maintaining high levels of fertility [*10*]. In many African cultures it is taboo to be childless: high fertility, therefore, enjoys both community and divine approval [*10,11*]. A woman's age, residence (urban or rural), education and income may have substantial effects on contraceptive use and are likely to affect how women choose family planning services [*12*].

Behaviour regarding contraception is known to vary widely according to education, which is likely to be positively correlated with the use of private sector services. Significant rural–urban difference exists in fertility levels in Sudan. On average, age specific fertility rates are lower in urban than in rural areas, which suggests greater use of contraception by urban women [*7*].

Objectives

This study describes the current family planning situation in Khartoum State, Sudan. The information gathered will be useful in designing programmes which will contribute in making family planning services more available and accessible to Sudanese women.

Specific objectives of the study were to:

- examine the differences in utilization between urban and rural areas in Khartoum State;
- describe the family planning methods that are used;
- assess the impact of socioeconomic status, women's level of education, age, area of residence and knowledge on the utilization of family planning services;
- examine the effect of government policy and providers on services distribution.

Methods

Study design

The study was a cross-sectional survey among a representative sample of married women aged 15–49 years from both urban and rural localities in Khartoum State in Sudan. The women were from varying socioeconomic, educational, employment and cultural backgrounds.

Conceptual framework

The model applied in this study was an extension of Dutton's access and utilization model for health services [*13*], which, in turn, builds upon Andersen and Newman's predisposing-enabling-need (PEN) explanatory model for health services utilization [*14*].

The dependent variable in this study was the utilization of modern family planning techniques. The independent variables were the demographic and socioeconomic variables of age, residence, socioeconomic status, and education level, and also the predisposing factor of knowledge about family planning. Place from which services are obtained (location) and knowledge are variables affected by government policy on family planning.

Utilization was defined as the respondents' state of using or having used ≥ 1 modern family planning techniques [contraceptive pill, intrauterine device, injection, male condom, diaphragm (known locally as "female condom), male sterilization, and female sterilization]. Traditional methods used were breastfeeding, rhythm method and withdrawal. No use was scored 0 and defined as never used; use of ≥ 1 modern methods was scored 1 and defined as using. Education was defined as completed educational status. It was scored 1 (no schooling), 2 (primary education), 3 (intermediate education), 4 (secondary education) and 5

(university and higher education). Age was defined as respondents' age at the time of interview. It was recoded as younger age (15–29 years) and older age (30–45 years). Location and distribution of services were defined as place from which respondents got access to techniques when they decided to use them, and was scored 0 for local health centre, 1 for other health centre, 2 for public hospital, 3 for family planning clinic, 4 for mother–child centre, 5 for private hospital/clinic, 6 for nongovernmental organization clinic, 7 for pharmacy, 8 for friends and relatives, 9 for other and 10 for not applicable. Knowledge about family planning methods was defined as the respondent status of having heard about the 10 different traditional (breastfeeding; rhythm; withdrawal) and modern techniques of family planning: heard about 0–7 methods and techniques was defined as poor knowledge and heard about 8–10 was defined as good knowledge.

Data about reasons for not using family planning services were collected from the non-users; answers included unavailability of services and services available only at full price.

The collection of data on socioeconomic status was guided by the methods used in the safe motherhood survey of 1999 [*7*]. Data collected covered ownership of durable goods (TV, refrigerator, car etc.) and standard of living (fuel used for cooking, source of water, etc.) were also considered as indicators. Using factor analysis, a new variable on socioeconomic status of individuals was derived and was scored 1 (low), 2 (medium) or 3 (high).

Selection of the study area and sampling

Utilization of family planning services were studied in Khartoum State by comparing urban and rural localities of the state that differed in socioeconomic status and living conditions. The total population in Khartoum State was 5 548 784 (Khartoum State Ministry of Health, Department of Statistics, unpublished data, 2004). The state comprises 3 provinces, Khartoum, Omdurman and Bahri, with heterogeneous urban and rural societies in each province. Khartoum province contains 1 rural locality and 6 urban localities; Omdurman province contains 2 rural and 7 urban localities while Bahri province contains 6 rural and 4 urban localities. The ratio of the total rural localities to the total locality number in the state is 9/26 = 0.346, and the ratio of the total urban localities to the total state localities is 17/26 = 0.654. Applying the above ratios within each province (owing to the heterogeneous nature of the population in the state), the single rural locality in Khartoum province was selected; the urban localities were selected using the equation: 0.654 □ 6 = 4. From the 2 rural localities in Omdurman province, 1 was selected by applying the equation: 2 □ 0.346 = 1, while from the 7 urban localities, 5 were selected applying the equation: 7 □ 0.654 = 5. In Bahri province, 2 out of the 6 rural localities were selected by the equation: 6 □ 0.346 = 2, while 3 out of the 4 urban localities were selected by the equation: 4 □ 0.654 = 3. So, a total of 16 localities were selected for the research throughout the state, 12 urban and 4 rural. Then within each province, the localities were randomly selected.

A sample size of 601 married women from the target population was used for the study. The sampling frame was the 2002 total women targeted for family planning in Khartoum State, Ministry of Health and the total households' baseline data for the 2003 population census of the Central Bureau of Statistics (Khartoum State Ministry of Health, unpublished data, 2003). The ratio of women aged 15–49 years to the total

population of the state for the year 2002 was considered the population frame. The total sample for the study group in all the state was derived using the formula:

$$n = (Z^2 \square P \square Q \square deff)/d^2$$

Where n is the projected number of the targeted study population (women 15–49 years old), Z is the Z-score, which is a standard ($1.96 \approx 2$); P is the expected prevalence of the study group population (targeted population ratio), 25.04% (0.2504); Q = 1–P; deff is the design effect (1.5–2) ≈ 2; and d is the marginal error (degree of precision). Alpha error = 0.05.

So:

$$n = (22 \square 0.2504 \square 0.7496 \square 2)/0.052 = 601$$

The total sample size was divided between the localities according to the ratio of number of households in each locality to the total number of households (482 854 households). In each locality, the every other household rule was applied for interviewing respondents. In all the localities, all selected households were covered. The overall response rate for the household questionnaire was 100%. The major factor explaining this high response rate was that the data collectors were females, who could easily get access to women; males would find it difficult to interview women due to the cultural and religious values in the country.

Data collection and analysis

The data were collected in the period August 2002–December 2002 after collectors were trained and questionnaires were tested. Bivariate (cross-tabulation and chi-squared tests, independent sample *t*-tests), factor analysis and logistic regression analysis were used for the analysis of data using *SPSS*, version 11. Factor analysis was applied to construct an indicator for socioeconomic status. Logistic regression analysis was used to measure the relative impact of the selected independent variables on utilization of family planning service.

Logistic regression analysis was used to identify the determinants of modern contraceptive use. The dependent variable "contraceptive use was coded 1 if the respondent was categorised as "user , and 0 if not. The statistical model was estimated with a range of independent variables and assessed the effect of changing one of the independent variables on the odds of the respondent being a user of family planning methods). One category of each of the independent variables was chosen as the reference category. Age was considered a continuous independent variable. The coefficient [Exp (B)] for the reference category was set at 1.0, and the coefficients for other values of the variable were interpreted relative to this reference category. A coefficient > 1.0 means that the value of the variable in question increases the odds of the individual using family planning compared with the reference category; a coefficient < 1.0 means that the odds are reduced compared with the reference category.

Results

Utilization of family planning services

After excluding traditional methods of family planning, about half (51.4%) the women in the entire sample used modern family planning methods (Table 1). Women from urban and rural settings had almost the same level of use. Women with high socioeconomic status (73.1%) reported using modern family planning methods more often than those with medium (51.1%) and low (28.0%) socioeconomic status. Signifi-

Table 1 **Utilization of modern family planning methods according to background characteristics**

Characteristic	Total	Use		Do not use		χ^2
		No.	%	No.	%	
Overall	601	309	51.4	292	48.6	
Area						
Rural	56	30	53.6	26	46.4	0.115 NS
Urban	545	279	51.2	266	48.8	
Socioeconomic status						
Low	200	56	28.0	144	72.0	82.975***
Medium	182	93	51.1	89	48.9	
High	219	160	73.1	59	34.5	
Age group						
15–30	285	133	46.7	152	53.3	4.576*
31–45	313	174	55.6	139	44.4	
Missing data	3					
Level of education						
No schooling	110	29	26.4	81	73.6	44.059***
Primary	165	78	47.3	87	52.7	
Intermediate	106	66	62.3	40	37.7	
Secondary	162	103	63.6	59	36.4	
University+	58	33	56.9	25	43.1	
Knowledge						
Poor	296	114	38.5	182	61.5	39.446***
Good	304	195	64.1	109	35.9	
Missing data	1					

*NS = not statistically significant; *significant at* P < *0.05; ***significant at* P < *0.001.*

cantly more of the older age group reported using modern methods (55.6%) compared to the younger women (46.7%). Utilization increased steadily with increase in level of education but fell slightly for women with university and higher education. Almost two thirds of the women with good knowledge of family planning reported using the modern methods while just over one third of those with poor knowledge reported using modern methods ($P < 0.001$).

Family planning methods and sources

Table 2 shows the use of different family planning methods in Khartoum State. Using contraceptive pills was reported by just under half the women surveyed (47.7%) followed by intrauterine devices (10.2%) and injections (7.5%). Levels of use of female and male condoms and male and female sterilization were very low and were only reported by urban women. No significant differences were found between women in urban and rural areas.

Breastfeeding rate was about the same for rural (33.9%) and urban (32.2%) women (Table 2). The rhythm method and withdrawal were used by urban women (22.2% and 8.6% respectively) more often than rural women (16.1% and 3.6% respectively) but the differences were not statistically significant.

Table 2 **Family planning methods used among a sample of women in Khartoum State, *n* = 601**

Method[a]	Using family planning					
	Rural		Urban		Overall	
	No.	%	No.	%	No.	%
Modern						
Pills	28	47.4	258	50.5	286	47.7
IUD	2	3.6	59	10.8	61	10.2
Injections	5	7.4	40	8.9	45	7.5
Male condom	0	–	24	4.4	24	4.0
Diaphragm	0	–	13	2.4	13	2.2
Male sterilization	0	–	3	0.6	3	0.5
Female sterilization	1	–	0	1.8	1	0.2
Traditional						
Breastfeeding	19	33.9	175	32.2	194	32.3
Rhythm	9	16.1	120	22.2	129	21.5
Withdrawal	2	3.6	47	8.6	49	8.2
Other	0	–	4	0.7	4	0.7

[a]*Not statistically significant for all methods.*
IUD = intrauterine device.

Rural women reported using public outlet agencies as sources of family planning services much more than urban women (44.7% and 29.9% respectively; $P = 0.025$), whereas urban women reported using the private sector much more than rural women (21.2% and 10.7% respectively; $P = 0.063$). For women in rural areas, local health centres were the core source of services compared to women from urban areas (37.5% and 19.9% respectively; $P = 0.002$).

Child spacing was the main reason encouraging women to use family planning services (58.4%), whereas the desire for more children was the main reason for not using these services. Very few women (0.8%) reported that the use of contraception was against religious or cultural beliefs.

Determinants of contraceptive use

Compared with respondents who had poor knowledge about family planning, those who had good knowledge were significantly more likely to report a high level of using the modern methods ($P < 0.001$) (Table 3).

Education level also had a statistically significant influence on the odds of the respondents using modern methods of contraception. Compared with those with no schooling; those with education were significantly more likely to report using contraception ($P = 0.003$). Socioeconomic status also appeared to play a significant role: women with a higher socioeconomic status were more likely than their counterparts to use modern methods of family planning. Area of residence and age did not appear to be associated with use of modern methods of family planning.

Discussion and conclusions

In the present study 51.4% of all women surveyed in the state of Khartoum used modern family planning methods. Compar-

Table 3 **Multivariate logistic regression analysis for dependent variable of utilization of modern family planning methods with other predictors**

Variable	Exp (B)	*P*-value	95.0% CI for Exp (B)
Knowledge (poor = 0, good = 1)	1.125	< 0.001	1.053–1.202
Education (none = 0)		0.003	
Primary	2.371	0.003	1.331–4.224
Intermediate	2.695	0.002	1.424–5.100
Secondary	2.714	0.001	1.484–4.962
University+	1.338	0.453	0.626–2.861
Age	1.024	0.147	0.992–1.056
Residence (rural = 0, urban = 1)	0.600	0.107	0.322–1.116
Socioeconomic level (low = 0)		< 0.001	
Medium	1.925	0.005	1.219–3.040
High	4.456	< 0.001	2.654–7.481
Constant	0.086		

CI = confidence interval.

ing with recent studies in the northern states of Sudan, the utilization rate in Khartoum State is far greater. The level of use of any method of contraception varies from < 1.0% in Western Darfur State to 21.0% in Khartoum State [*7*]. This could be attributed to the fact that Khartoum is the capital of the country and socioeconomic status, education level, availability and capacity of health care services as well as supplies of available modern family planning methods are considerably better compared with other states of the country.

The 2 types of location, urban and rural, used modern methods of family planning almost equally. Only very few women use methods such as injection or male and female sterilization. Although international family planning efforts have successfully integrated male methods [*15*] such as condoms and sterilization into their various programmes, our findings demonstrated that use of these methods by males was extremely low. This might partly be explained by the fact that these methods are perceived as being in conflict with traditional culture, patriarchal norms, native notions of maleness and religious doctrine [*16*].

The study identified public outlet agencies as being particularly important sources of family planning services for women from urban as well as from rural areas. Contrary to what was expected for Sudan, an Islamic country in the developing world, very few women reported that the use of contraceptive methods was against religion or cultural beliefs.

The principal predisposing and enabling factors affecting utilization of modern family planning methods by women were socioeconomic status, knowledge, and education of the mother. This leads to the conclusion that the main limiting factors to the utilization of modern family planning methods in the state are poverty, ignorance, and illiteracy. The study has clearly evidenced that knowledge of family planning among

married Sudanese women is far from being universal.

Although education was associated with increase in the use of modern family planning methods, a drop was noticed in women with university and higher education. This might partly be explained by the fact that these women start their family life after their education, i.e. at a later age, and try to have the number of children they wish before their menopause begins.

The findings of this study evidenced the need to empower the population through income-generation and improving standards of living. Increasing education might help in solving the income problem as well and would increase knowledge about modern family planning methods and hence, increase predisposition to their use. Basic education programmes must be effectively run for people who are illiterate. Specific programmes about family planning should be developed and implemented. Such programmes need to target urban as well as rural communities as in both areas women were found in conditions predisposing them for non-use of family planning. In order to satisfy the needs for family planning services, expansion of existing family planning services to cover all urban as well as rural areas is essential. Policy makers may introduce legislation that would make it easier for states to extend family planning services to reach more low-income women. Other efforts to provide coverage through establishing new family planning centres and clinics and providing existing ones with modern services are needed. Implementing efficient reproductive health programmes would also make a difference.

Apart from the development and implementation of programmes targeting women, planners might also attempt to overcome resistance of men to family planning methods. As a first step, research would be needed to analyse the psychosocial and cultural determinants of non-use and barriers to the use of modern family planning methods by men. Based on such research, concerted programmes could be developed to encourage men to participate in family planning and use modern male methods.

There were some limitations and shortcomings to our study that may qualify our results. The first was the exclusion of unmarried women from the sample, in spite of the fact that local religious values and norms prohibit sexual activities outside marriage, some unmarried women still get pregnant and seek induced abortions. The most important limitation of our study was that data about men on family planning was collected from their wives and not directly. Specially designed family planning research involving men would be needed to explore their role in family planning and in using male methods. Last, overlapping of some urban–rural localities of the country's capital city and similarities in standards of living in some of them may have affected the accuracy of the results regarding differences in utilization according to residence.

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Family planning and unmet need among Iraqi Kurds

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تنظيم الأسرة والاحتياجات غير الملباة لدى الأكراد العراقيّين

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الخلاصة: تم في إطار هذه الدراسة التي أُجريَت في عام 2003 في منطقة دهوك، بإقليم كردستان، في شمال العراق، تقدير معدل استخدام وسائل منع الحمل، والاحتياجات غير الملباّة، إضافةً إلى تقصِّي المعارف والمواقف والممارسات المرافقة. وتمت مقابلة عينة قوامها 00 سيدة متزوجة تتراوح أعمارهن بين 1 و عاماً، تم انتقاؤهن على عدة مراحل. وبيَّنت الدراسة أن المعدل الحالي لاستخدام أي وسيلة من وسائل منع الحمل بين من السيدات غير الحوامل هو .0 ٪، وكانت نسبة استخدام موانع الحمل الحديثة . 2٪ ونسبة استخدام الموانع التقليدية 1. 3٪. وكانت نسبة الاحتياجات غير الملبَّاة لأي نمط من موانع الحمل، بين جميع المستجيبات، هو 3. 2٪ (تركَّزت بين السيدات ذوات الأوضاع الاجتماعية الاقتصادية المنخفضة)، ونسبة الاحتياجات غير الملبَّاة لموانع الحمل الحديثة (الفعَّالة) هو . 2٪ (وتركَّزت بين السيدات ذوات الأوضاع الاجتماعية الاقتصادية المرتفعة). وخلصت الدراسة إلى أهمية تنفيذ برنامج شامل وغير مركزي لتنظيم الأسرة في المنطقة.

ABSTRACT This study in Dohuk district of Kurdistan region, northern Iraq, in 2003 estimated the prevalence of contraceptive use and unmet need, and investigated associated knowledge, attitudes and practices. With multi-stage sampling, 800 married women aged 15–49 years were interviewed. Current prevalence of contraceptive use (any method) among 668 non-pregnant women was 60.6%: use of modern methods was 26.5% and traditional methods was 34.1%. Among all respondents, current unmet need for any contraception was 29.3% (most commonly among women of low socioeconomic status) and that for modern (effective) contraception was 28.5% (most commonly among women of high socioeconomic status). A comprehensive and decentralized family planning programme needs to be implemented in the region.

La planification familiale et ses lacunes chez les Kurdes iraquiens

RÉSUMÉ Cette étude menée en 2003 dans le district de Dohuk dans la région du Kurdistan au nord de l'Iraq avait pour objectifs d'évaluer la prévalence de l'utilisation de méthodes contraceptives et des besoins de contraception non satisfaits et d'analyser les connaissances, attitudes et pratiques en la matière. Recourant à la technique de l'échantillonnage à plusieurs degrés, l'enqu te a porté sur 800 femmes mariées âgées de 15 à 49 ans. La prévalence effective de la contraception (toutes méthodes confondues) chez les 668 femmes non gestantes était de 60,6 %, avec 26,5 % pour les méthodes modernes et 34,1 % pour les méthodes traditionnelles. Sur l'ensemble des enqu tées, 29,3 % - essentiellement des femmes socio-économiquement défavorisées - ont manifesté un besoin non satisfait de contraception, sans distinction de méthode, tandis que 28,5 % - appartenant majoritairement à un milieu socio-économique plus favorisé – exprimaient le besoin non satisfait d'une méthode contraceptive moderne, c'est-à-dire efficace. La mise en place d'un programme de planification familiale global et décentralisé s'impose dans cette région.

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Introduction

Family planning implies the ability of individuals and couples to anticipate and attain their desired number of children through the spacing and timing of their births, achieved through the use of contraceptive methods and the treatment of involuntary infertility [*1*]. A planned family is the best environment for a child's overall development [*2*]. Large families and rapidly growing populations hold back development at both the household and national level [*3*]. High parity and close child spacing are related to increased maternal and childhood morbidity and mortality [*4*]. Worldwide, millions of women desire to have longer spaces between births or to limit the total number of births, but, especially in the developing world, they have unmet needs for contraception [*5,6*].

Dohuk governorate is composed of 6 districts with a population of 850 000. It is currently one of the 3 main governorates comprising Kurdistan region in northern Iraq, and its centre, Dohuk district, is the 3rd large district in this region. Apart from private services, the current family planning programme in Dohuk governorate is limited to 2 government clinics; one opened in 1997 at the main general hospital in the centre of the governorate and the other opened in 2002 in Zakho district.

The aim of this study was to help inform the development of family planning services in the area by estimation of the prevalence of contraceptive use and of unmet need for contraception among currently married women aged 15–49 years in Dohuk district. The study included an investigation of the sociodemographic factors associated with unmet need and of knowledge, attitudes and practices (KAP) about family planning.

Methods

Study area

Dohuk district is a semi-mountainous area that is located in upper northern Iraq. Its population, about 350 000, are mostly Moslem Kurds, plus some other ethnic and religious minorities, living mainly in 28 urban areas (Dohuk city) and 9 periurban areas.

Sample

The current survey was conducted from 9 June 2003 to 30 September 2003.

A sample size of 800 currently married women in the reproductive ages of 15–49 years was estimated from: $N = (PQZ^2D)/E^2$, where N = sample size, P = estimated prevalence of unmet need = 0.50, Q = 100 – P, Z = 95% confidence level = 1.96, D = design effect = 2, E = accepted standard error = 0.05 [*7*].

Multi-stage sampling was used. In stage 1, the 37 areas of Dohuk district were stratified into 4 socioeconomic strata: high (n = 6), medium (n = 8), low (n = 14) and very low (n = 9), using a scoring system based on the type of building, sanitation, furniture and educational attainment (husband and wife) [*8*]. To facilitate sampling, this was done prior to the survey by visiting each area, all of them well-known to the authors. Areas within each stratum were randomly sequenced. In stage 2 the proportion of areas for each stratum was multiplied by the total sample size to obtain the number of women to be interviewed in that stratum. In stage 3, areas were surveyed by random sequence, selecting every 5th household until the required number of women for each stratum was achieved.

Data collection

Selected women were interviewed by a female doctor in their homes using a pre-

tested questionnaire designed for this family planning KAP survey. Probing was used to encourage mothers to answer sensitive questions. When an eligible woman was absent, the interviewer returned to her home later. The questionnaire form collected the following information about each woman:

- Personal particulars: socioeconomic stratum (as described above), age, marital age, educational attainment and employment outside the home, if any.
- Fertility experience: including gravidity, abortions, number of live births and deaths of children aged under 5 years.
- Family planning: all respondents were asked about their knowledge of the socioeconomic benefits of family planning, contraceptive methods and the main source of such information. They were asked if they ever used contraception and which type. Currently non-pregnant women were asked about any contraception they were using at the time of the survey, its type and source. Non-users were asked about the reasons for not using a contraceptive. Pregnant women were asked whether their pregnancy was planned, due to failure of contraception or due to non-use of contraception (unmet need). All respondents (except nulligravidas) were then asked about any history of successful or attempted induced abortion, and about their history of unwanted or mistimed pregnancies. All respondents were asked about their preferred family size.

The definition of current unmet need (point prevalence) was either: current non-use of contraception when more children were not wanted, now or ever, usually with a statement of reasons for non-use; or current pregnancy due to non-use. This is the Demographic Health Survey (DHS) formulation of unmet need [*5,9,10*] and in the current study it was regarded as unmet for any contraception. For countries with a high prevalence of traditional methods, an expanded formulation from the Johns Hopkins Reproductive Health Survey added traditional methods to the standard formulation [*5*], and in the current study this addition was regarded as unmet need for modern contraception. The sum of both types was regarded as all current unmet need for contraception. To estimate the size of the problem over the last 3 decades (period prevalence), any respondent who had current unmet need or gave a history of induced abortion or unwanted or mistimed pregnancy(ies) at any time during her reproductive life, was classified as ever having unmet need.

Continuous variables were categorized, ordinally when applicable, and described by frequency distributions. Associations of sociodemographic and KAP variables with current family planning use and unmet need were analysed by chi-squared tests using *SPSS*, version 12. Yates' continuity correction was used in the case of 2 □2 tables, and adjacent cells were combined as necessary in other cases.

Results

All the women selected for the study agreed to be interviewed, although 61 (7.8%) needed a 2nd or 3rd visit.

Table 1 shows the characteristics of all respondents (pregnant and non-pregnant). About one-quarter of all respondents were living in periurban squatter areas and were classified as very low socioeconomic stratum. Nearly two thirds (62.4%) of all women had married before the age of 20 years. The ages of more than two thirds (71.8%) of respondents were between 20–40 years at the time of the survey. Half of the respondents were incapable of reading and writing. Two fifths of all women had at least

Table 1 **Characteristics of all women respondents to the family planning survey, both pregnant and non-pregnant (*n* = 800)**

Characteristic	No. of women	%
Socioeconomic status		
Very low	192	24.0
Low	304	38.0
Medium	176	22.0
High	128	16.0
Marital age (years)		
12–15	152	19.0
16–19	347	43.4
20–23	200	25.0
24–40	101	12.6
Present age (years)		
10–19	31	3.9
20–29	292	36.5
30–39	282	35.3
40–49	195	24.3
Education		
Illiterate	427	53.4
Primary school	200	25.0
Secondary school	89	11.1
Higher education	84	10.5
Employment		
Not employed	734	91.8
Employed	66	8.2
Total no. of abortions		
0	496	62.0
1	280	35.0
2+	24	3.0
Total no. of live births		
0	44	5.5
1–3	300	37.5
4–6	224	28.0
7–9	144	18.0
10+	88	11.0
No. of under-5 child deaths		
0	696	87.0
1	80	10.0
2+	24	3.0
Know benefits of family planning	659	82.4
No. of methods known		
1–3	217	27.2
≥ 4	582	72.8
Source of information		
Health practitioners	86	10.7
Acquaintances	680	85.0
Media	34	4.3
Ever attempted induction of abortion[a]	156	19.9
Ever had unwanted pregnancy[a]	504	64.3
Ever had mistimed pregnancy[a]	551	70.3
Ever-use of contraception	592	74.0

[a] *Excluding 16 nulligravidas.*

1 abortion, spontaneous or induced. About three fifths had 4 or more offspring and 13% had experienced the death of a child aged under 5 years.

Knowledge about family planning and its benefits was very good as almost every respondent knew what family planning was, 82.4% knew some of its benefits and two thirds knew at least 4–6 methods. Most of the women (85%) obtained their information from acquaintances; only 10.7% got information from health practitioners (Table 1). One fifth of respondents had a history of (attempted) induced abortion, and around two thirds had experienced unwanted or mistimed pregnancy(ies). The median fertility preference for all respondents was 4 children.

Among pregnant women ($n = 132$), pregnancies were planned for 61 (46.2%), due to failure of used contraception for 24 (18.2%) and due to unmet need for contraception (non-use) for 47 (35.6%). Three quarters (74.0%) of all respondents had ever-used family planning in a similar pattern to that of non-pregnant women alone shown later.

Table 2 shows current sources of family planning and reasons for non-use among the 668 non-pregnant women. Non-public sources, in form of private clinics and pharmacies, represented 73.8% of family planning services used by non-pregnant respondents. It also shows that about half of non-users stated the desire to have more children as the reason for non-use, while the other half stated reasons associated with unmet need.

Table 3 shows that among non-pregnant respondents (n = 668) current use of family planning by any method was 60.6%; 26.5% were using modern methods and 34.1% were using traditional methods, namely withdrawal, lactation amenorrhea and periodic abstinence. Overall lower contraceptive use was associated with low socioeconomic and educational status, increasing maternal age and number of live-births and a history of death of a child aged under 5 years. Use of withdrawal and all traditional methods increased as the socioeconomic and educational standard improved. Female sterilization was most common among grand multiparas, particularly those who were illiterate.

Of all respondents, 80.8% ever had unmet need for contraception throughout their fertile life (period prevalence).

Table 4 shows that current unmet need for contraception was 29.3% by the standard DHS definition (unmet need for any contraception). However, another 28.5% also had current unmet need by the expanded Reproductive Health Survey formulation which adds traditional contraceptive users to the standard definition. This makes the total current unmet need 57.8%. Table 4 also shows the distribution of all respondents by type of current unmet need according to important characteristics. Low socioeconomic and educational status, increasing maternal age and live births and a history of child death were all associated with high unmet need for any contraception and all current unmet need. Unmet need for modern contraception increased as the socioeconomic and educational standard improved and decreased with high fertility and a history of a child death.

Table 2 **Current sources of family planning and reasons for non-use among non-pregnant women (n = 668)**

Characteristic	No. of women	%
Sources of family planning service among users		
Private clinics	166	41.0
Private pharmacies	133	32.8
Governmental clinic	106	26.2
Total	405	100.0
Reasons for not using contraception		
One or both partners want more children	126	47.9
Religious beliefs	70	26.6
More than one reason	37	14.1
Mother-in-law objection	19	7.2
High price of contraception	6	2.3
Insufficient knowledge	3	1.1
Contraception not required for medical reasons	2	0.8
Total	263	100.0

Discussion

As in some other developing countries, people in Kurdish northern Iraq still value early marriage, large families and a role for woman inside the house. Additionally, the previous Iraqi government, particularly in the 1980s, encouraged high fertility to compensate for human loss during its wars. Until the middle of the last decade, therefore, the Iraqi Ministry of Health neglected family planning in the country. This explains why Iraq's crude birth rate was among the

Table 3 **Percentage distribution of non-pregnant women (*n* = 668) by current family planning use according to background characteristics**

Characteristic	No. of women	Traditional methods				Modern methods						Any method	Non-users
		Withdrawal	Lactation[a]	Abstinence	Total	IUD	OC	Female sterilization	Male condom	Other modern methods	Total		
Socioeconomic stratum													
Very low	152	19.1	5.3	2.0	26.4	9.5	1.9	4.5	3.8	1.3	21.0	47.4	52.6
Low	257	24.9	7.8	1.9	34.6	9.4	5.9	3.1	3.5	0.7	22.6	57.2	42.8
Medium	149	30.9	5.4	2.7	39.0	20.1	5.4	5.4	4.0	0.7	35.5	74.5	25.5
High	110	36.1	1.0	2.9	40.0	10.0	4.1	5.0	5.8	3.3	28.2	68.2	31.8
Present age (years)													
10–19 years	20	30.0	15.0	0.0	45.0	5.0	0.0	0.0	0.0	0.0	5.0	50.0	50.0
20–29 years	224	21.8	5.2	1.5	28.5	10.4	1.8	0.0	4.4	0.8	17.4	45.9	54.1
30–39 years	230	33.3	7.1	2.2	42.6	17.0	7.6	2.5	5.5	2.5	35.2	77.8	22.2
40–49 years	194	18.9	2.1	3.2	24.2	6.1	4.0	11.6	1.5	0.5	23.7	47.9	52.1
Education													
Illiterate	375	21.0	5.1	1.9	28.0	8.9	36.7	7.1	3.9	0.8	24.3	2.3	47.7
Primary school	155	31.5	6.5	0.7	38.7	20.2	4.4	0.6	3.2	0.6	29.0	67.7	32.3
Secondary school	69	37.7	2.9	5.8	46.4	8.7	8.7	0.0	5.8	1.5	24.6	71.0	29.0
Higher education	69	35.8	9.0	4.5	49.3	12.4	5.5	1.4	5.5	5.5	30.4	79.7	20.3
Total no. of live-births													
0–3	258	27.9	7.7	2.2	37.7	9.7	20.3	0.0	4.9	12.1	17.8	55.5	44.5
4– 6	187	35.7	6.0	2.7	44.4	13.1	6.8	2.1	3.1	2.1	27.3	71.7	28.3
7– 9	138	25.3	3.6	2.2	31.1	17.4	6.5	10.6	5.9	0.7	40.6	71.7	28.3
10+	85	12.5	3.8	2.5	18.8	9.1	4.5	12.4	2.3	1.1	29.4	48.2	51.8
No. of under-5 child deaths													
0	572	28.6	5.8	2.3	36.7	12.7	4.5	3.8	4.3	1.4	26.6	63.3	36.7
1+	96	15.3	4.4	2.2	21.9	7.0	5.0	7.0	3.0	0.9	22.9	44.8	55.2
Total	668	26.5	5.4	2.3	34.1	12	4.6	4.3	4.2	1.4	26.5	60.6	39.4

[a]*Lactational amenorrhea.*

IUD = intrauterine contraceptive device, OC = oral contraceptive pills.

Table 4 **Percentage distribution of all women (*n* = 800) by type of current unmet need according to background characteristics**

Characteristic	No. of women	Unmet need for any contraception	Unmet need for modern contraception	All unmet need[a]	Met need
Socioeconomic stratum					
Very low	192	43.0	20.7	63.7	36.3
Low	304	32.6	29.3	61.8	38.2
Medium	176	18.2	33.0	51.2	48.9
High	128	16.4	32.0	48.4	51.6
Present age (years)					
10–19	31	29.0	29.0	58.1	41.9
20–29	292	28.7	26.3	55.0	45.0
30–39	282	19.5	34.0	53.5	46.5
40–49	195	44.6	23.6	68.2	31.8
Education					
Illiterate	427	38.6	24.3	62.9	37.1
Primary school	200	26.0	29.5	55.5	44.5
Secondary school	89	13.5	36.0	49.4	50.6
Higher education	84	7.1	39.3	46.4	53.6
Total no. of live births					
0–3	344	25.0	25.3	50.3	49.7
4–6	224	27.5	36.9	64.4	35.6
7–9	144	29.9	29.9	59.7	40.3
10+	88	50.6	17.2	67.8	32.2
No. of under-5 child deaths					
0	696	26.6	29.8	56.4	43.6
1+	104	48.1	19.2	67.3	32.7
Total	800	29.3	28.5	57.8	42.2

[a]*According to the expanded reproductive health survey formulation [5].*

highest in the world in the late 1980s and early 1990s [*11*]. At the time of the survey, health services in northern Iraq, including family planning, were almost free of charge at government clinics, when these were accessible, but expensive at private clinics and pharmacies.

The sociodemographic and fertility characteristics of our study population are consistent with the above. The notable features include high teenage marriage, high illiteracy and fertility rates and a very low employment rate of mothers. Knowledge about family planning was good, but information was mainly derived from acquaintances rather than from health practitioners.

For many mothers, sources of family planning services were private clinics and pharmacies, due to the limited and centralized nature of related public services. Apart from the desire to have more children, non-use of contraception among the studied population reflected local norms and religious beliefs.

Current use of modern contraception in this study (26.5%) was low compared

with countries such as the United States of America and Canada (70%), Hungary (68%), the Islamic Republic of Iran (56%) and Egypt (53.9%), but was higher than that for Yemen (9.8%), Azerbaijan (11.9%) and Sudan (7%) [*3,12*]. However, in the study population, more women were using traditional methods than in any other country in the Eastern Mediterranean Region [*12*]. Worldwide, levels of use of traditional contraception are generally much lower than that of modern methods [*10*], but a high prevalence of traditional contraception, in particular withdrawal, has been reported in neighbouring Turkey [*13*] and in Azerbaijan [*10*].

The high rate of female sterilization (tubectomy) among grand multiparas, especially illiterate women, is probably due to its being performed during caesarean section to deliver the last child. High rates of caesarean section have been reported in Iraq [*14*].

The relatively high rate of male condom use compared with neighbouring countries [*12*] may be due to availability of condoms free of charge, as for the intrauterine device and oral contraceptives, at the governmental family planning clinic in Dohuk. However, similar rates of male condom use have been reported for Iraq [*14*], Islamic Republic of Iran [*12*] and among Palestinian refugees [*15*].

A high prevalence of history of unintended (mistimed or unwanted) pregnancies and (attempted) induced abortion reflects the magnitude of the unmet need for contraception in this area over the past 3 decades. This is shown by a prevalence of ever-unmet need of 80.8%. Unintended pregnancy, as an expression of unmet need, has always been a problem when women do not use contraception, or use traditional methods, for example in Egypt [*16*], Japan [*17*] and other developing countries [*18*]. Worldwide there are an estimated 87 million unintended pregnancies and 46 million induced abortions per year [*19*]. As abortion is generally illegal in Iraq, most induced abortions in this study were failed self-attempts, using heavy exercise or local herbs. However it is powerful evidence that women want to control their fertility when they have not been able to use effective contraception.

Current unmet need for contraception in the studied population by the standard DHS formulation (29.3%), may be compared with countries such as Pakistan (32%), Bangladesh (15%), Egypt and Jordan (11%) and Morocco (20%) [*10*]. However, because many women were using traditional methods, the expanded RHS formulation was applied to give an estimated prevalence of all current unmet need of 57.8%, and this would be higher than in any other region. Whether unmet need was for spacing or limiting births was not considered in this study, but based on the almost equal prevalence of history of unwanted and of mistimed pregnancy(ies), it may be assumed that an equal distribution of unmet need for spacing and for limiting births exists in the area.

Low socioeconomic and educational status, long fertile life, high parity and history of child death were associated with a high current unmet need for contraception (but not unmet need for modern contraception) in the present study as well as in other KAP and DHS studies locally, regionally and globally [*20–23*]. In particular, we can predict that mothers with a history of child death would be more likely to disregard family planning. Globally, DHS demonstrated this as a cause for continued high fertility in the less-developed countries [*24*].

In the current study the women with high socioeconomic and educational stratus had low unmet need for any contraception and all unmet need, but a high unmet need for modern contraception. Among this

group, family planning use was high, but because of local traditions and difficulties with access to family planning services, they were relying on traditional contraception. Increasing rate of contraceptive use has been found to be accompanied, over time, by shifts toward use of more effective methods [*25*] and it is hoped this can occur among the studied population. Levels of unmet need have been found to rise as more and more women want to control their fertility and then fall as more and more women use contraception to do so [*9*]. That is why it is important to make modern contraception available to all couples.

It seems that in the study population, there has been a vicious cycle of low, or high but ineffective, contraceptive use resulting in many unwanted or mistimed pregnancies and even attempts at induced abortion. This unmet need for contraception leads to high use but ineffective family planning and high fertility. However, a sign of change in the study population is apparent from a fertility preference of 4 children. Average family size for all women, including many young mothers who have not yet completed their families, is in fact currently almost 4, but for mothers above 40 years, average family size is almost double that.

Conclusions and recommendations

In the studied population, the women with low socioeconomic/educational status have high unmet need for any contraception; those with high socioeconomic/educational status had high unmet need for modern contraception. Both situations lead to high unwanted fertility. There is a need to provide comprehensive, accessible, client-sensitive and modern family planning services through all primary health care services in all districts of Dohuk. The community, in particular women's groups such as the Women's Union, should participate in planning (e.g. selecting the types of contraceptives to be made available), implementation (e.g. distributing contraceptives and educating the community in their use) and evaluating the services (e.g. by contributing to annual KAP surveys).

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Unintended pregnancy in Egypt: evidence from the national study on women giving birth in 1999

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الحمل غير المقصود في مصر: بيِّنة من الدراسة الوطنية عن النساء اللاتي وَلَدْنَ عام 1999

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الخلاصة: تهدف هذه الدراسة إلى تقدير مدى انتشار حالات الحمل غير المقصود بين النساء المتزوجات والعوامل المرتبطة به. وشملت عيِّنة الدراسة 2349 سيدة جميعهن متزوجات، تتراوح أعمارهن بين 15 و49 عاماً، ووَضَعْنَ أحمالهن في عام 1999. وعُرِّف الحمل غير المقصود بأنه الحمل غير المرغوب فيه والسيِّئ التوقيت. وأبلغت 431 سيدة (18.5٪) من بين نساء العيِّنة بأن الحمل لم يكن مقصوداً، بينما أبلغت 137 (5.9٪) منهن بأن الحمل كان سيِّئ التوقيت، و294 (12.6٪) بأنه لم يكن مرغوباً فيه. وكان الإبلاغ عن حالات الحمل غير المقصود أكثر احتمالاً لدى النساء اللواتي هنَّ أكبر سناً، واللاتي يَعِشْنَ في المحافظات الحدودية، واللاتي لا تتوفَّر لديهن معرفة جيدة بالدورة الإباضية، واللاتي لديهن أسر بحجم يفوق الحجم المثالي ويستخدمن طرقاً لمنع الحمل، واللاتي لديهن أربعة أطفال أو أكثر. وكان هناك ارتباط يُعْتَدُّ به إحصائياً بين قلة زيارات الرعاية السابقة للولادة، وانخفاض وزن الطفل لدى الولادة، وبين حالات الحمل غير المقصود.

ABSTRACT The current study aimed to estimate the prevalence and correlates of unintended pregnancy among ever-married women. The study sample was 2349 ever-married women aged 15–49 years who gave birth in 1999. Unintended pregnancy was defined as unwanted and mistimed pregnancies. Of these, 431 (18.5%) women reported unintended pregnancy: 137 were mistimed (5.9%) and 294 were unwanted (12.6%). Women of older age, living in frontier governorates, with poor knowledge of the ovulatory cycle, having a more than ideal family size, using contraceptive methods and having 4 or more children were at increased odds of reporting unintended pregnancies. Fewer antenatal care visits and low child weight at birth were significantly associated with unintended pregnancy.

Les grossesses non désirées en Égypte : la situation révélée par l'étude nationale sur les femmes ayant accouché en 1999

RÉSUMÉ La présente étude avait pour objectif d'évaluer la prévalence des grossesses non désirées et les variables qui leur sont associées chez les femmes non célibataires. L'échantillon de l'étude se composait de 2349 femmes, toutes non célibataires, âgées de 15 à 49 ans et ayant accouché en 1999. Une grossesse non désirée a été définie comme une grossesse non volontaire ou accidentelle et inopportune ou non programmée. Sur l'ensemble de l'échantillon, 431 femmes (18,5 %) ont reconnu avoir eu une grossesse non désirée, inopportune dans 137 cas (5,9 %) et accidentelle dans 294 cas (12,6 %). La probabilité de grossesse non désirée se trouve augmentée chez les femmes plus avancées en âge, résidant dans les gouvernorats frontaliers, ayant une méconnaissance du cycle ovulatoire, appartenant à une famille déjà nombreuse, utilisant une méthode contraceptive et ayant au moins 4 enfants. Il est apparu une association significative entre les grossesses non désirées et l'insuffisance du suivi prénatal et un faible poids de naissance.

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Introduction

The most common cause of reproductive mortality is pregnancy and its related problems [*1*]. At the time of conception, pregnancy may be intended or unintended. Unintended pregnancies can be defined as "pregnancies reported to have been either unwanted (i.e. occurring when no children, or no more children, were desired) or mistimed (i.e. occurring earlier than desired) [*2*]. Unintended pregnancy is an important issue to address because the risk factors of unintended pregnancies are similar to those of maternal mortality, and unintended pregnancy is often an indicator of the presence of risk factors for maternal mortality [*3*].

One of the common results of unintended pregnancy is abortion [*1*], an outcome for which there are few, if any, data in developing countries as it is not generally reported. In addition, unintended pregnancy is associated with an array of risky health behaviours, such as domestic violence [*4*], decreased likelihood of breastfeeding initiation or continuation [*5,6*], and poor antenatal care [*7*]. In Egypt, poor antenatal care is considered the second most important preventable factor in maternal mortality after substandard obstetric care [*8*].

The results of studies looking at the relationship between low birth weight and unintended pregnancy are inconsistent. A study using data from the National Longitudinal Study of Youth found "little association between unwanted pregnancy and low birth weight [*9*], whereas another study conducted in Ecuador indicated that unwanted, but not mistimed, pregnancies were associated with a higher odds of low birth weight [*10*].

Concerning the determinants of unintended pregnancy, a recent prospective study in 2 governorates of Upper Egypt revealed that the majority of women never used contraception, and unintended pregnancy was more prevalent in this category compared to those who had ever used [*11*]. In Harare, a significant association was found between unintended pregnancy and age, with women aged 19 years and below or 35 years and above having a higher risk of unintended pregnancy [*12*]. Moreover, women with more than 5 children, and women who were unemployed, nulliparous and with low income, were significantly more likely to present with unplanned pregnancy [*3*].

The objectives of this study were:

- To estimate the prevalence of unintended pregnancies that ended in birth in 1999 among ever-married Egyptian women.
- To assess the sociodemographic, reproductive and nonreproductive health correlates of unintended pregnancy, in particular contraceptive use.
- To explore some health-related outcomes of unintended pregnancy in Egypt.

Methods

Study sample

Data were obtained from the most recent Egypt Demographic and Health Survey 2000 (EDHS 2000), which was a cross-sectional survey conducted in the first half of the year 2000 by the Ministry of Health and Population and the National Population Council in Egypt [*13*]. The EDHS 2000 sample included 15 573 women from 16 357 households from all governorates of Egypt. A total of 2352 respondents were ever-married women aged 15 to 49 years who had given birth in 1999. Out of these, 3 did not provide information about their pregnancy intention, thus making the sample size in the current study 2349.

Outcomes

Pregnancy intention was the main variable of interest for this study. Pregnancies were classified as those that were wanted at the time of conception (intended pregnancy) or mistimed or unwanted (unintended pregnancies) at the time of conception.

Measures

Selected reproductive health determinants for each woman were: previous terminated pregnancy (yes/no), family planning history (never used contraceptives, used just before the last pregnancy, ever-used), age of woman at first birth (< 18, 18–25, ≥ 25 years), birth order of the child (1st, 2nd, 3rd, 4th or more), knowledge about the ovulatory cycle (woman knows/does not know), difference between achieved and desired family size (have ideal number, have more than ideal, have less than ideal) and couple agreement on the reproductive desire (agree, disagree, woman does not know).

Sociodemographic variables included were: age of woman (< 18, 18–34, ≥ 35 years) and her education (no education, primary, secondary, higher education). Because of the high percentage of unemployed women, the husband's occupation was used and classified into 3 categories (professional, managerial, clerical and sales; agriculture workers; service persons and manual workers). In addition, place of residence was studied according to type of governorate [urban, frontier, Upper Egypt (rural and urban) and Lower Egypt (rural and urban)].

The selected outcome measures for unintended pregnancy were: child size at birth as reported by the mother (average, large, small); 2nd dose of polio vaccination status (yes/no), child status in 2000 (alive/dead) and antenatal care (ANC), measured by the numbers of ANC visits (0, < 4, ≥ 4 visits) where 4 is the adequate minimum number of ANC visits according to the World Health Organization [*14*].

Data on all the above-mentioned variables were obtained from the women's answers.

Statistical analysis

Bivariate associations between unintended pregnancy and each of the determinants and outcomes were checked. These associations were described by computing odds ratios (OR) with 95% confidence intervals (CI) and *P* values, where $P \leq 0.05$ indicated a significant association. Only variables that were significant at the bivariate level were entered into a multivariable logistic regression model to estimate adjusted odds ratios (AOR) of unintended pregnancy and the corresponding 95% CI and *P* values. All analyses were conducted using *SPSS* for Windows, version 12.0.

Results

Sociodemographic characteristics

The mean age of the sample of women was 26.4 years, standard deviation (SD) 6.03. The study respondents were similar to the overall EDHS respondents regarding region of residence, education, husband's occupation and contraceptive use. There were observed differences in the age of women and family size (measured as number of live children at the time of the survey). The proportion of the study sample aged ≥ 35 years was lower than the overall EDHS respondents (10.4% and 40.6% respectively) and most of the study respondents had 1 or 2 children, while most of the overall EDHS respondents had ≥ 4 children (Table 1). However, these differences were not statistically significant and the study sample was representative of EDHS 2000 participants and all Egypt governorates.

Table 1 **Distribution of ever-married women aged 15–49 years who gave birth in 1999 (study sample) compared with all married women who participated in the Egypt Demographic and Health Survey 2000 (EDHS 2000)**

Variable	Study sample (*n* = 2349)		EDHS 2000 (*n* = 15 573)	
	No.	%	No.	%
Region				
Urban governorates	369	15.7	3102	19.9
Lower Egypt, urban	256	10.9	1831	11.8
Lower Egypt, rural	608	25.9	4277	27.5
Upper Egypt, urban	262	11.2	1670	10.7
Upper Egypt, rural	699	29.8	3743	24.0
Frontier governorates	155	6.6	950	6.1
Age (years)				
< 18	86	3.7	359	2.3
18–34	2019	86.0	8899	57.1
≥ 35	244	10.4	6315	40.6
Family size (no. of children)				
0	232	9.8	1489	9.6
1–2	962	40.9	5159	33.1
3	540	23.0	2987	19.2
≥ 4	618	26.3	5938	38.1
Woman's education				
None	866	36.9	6613	42.5
Primary	336	14.3	2827	18.2
Secondary or higher	1147	48.8	6133	39.4
Partner's occupation				
Professional, managerial, clerical or technical	775	33.0	5092	32.7
Agriculture	452	19.2	2858	18.4
Service or manual	997	42.4	5921	38.0
Don't know or missing	126	5.4	1702	10.9
History of contraceptive use				
No	456	19.4	4044	26.0
Yes	1865	80.6	11529	74.0

Prevalence and determinants of unintended pregnancy

Unintended pregnancy that ended in birth in 1999 was reported by 431 women (18.4%): mistimed pregnancies were 137 (5.8%) and unwanted pregnancies were 294 (12.5%). In the bivariate analysis of pregnancy intention and sociodemographic variables the following variables were significantly associated with unintended pregnancy: age, place of residence, education and husband's occupation. Thus unintended pregnancy was more prevalent among older age groups, women living in Upper (rural and urban) Egypt,

Table 2 **Distribution of ever-married women aged 15–49 years who gave birth in 1999 (*n* = 2349) by pregnancy intention, according to selected sociodemographic characteristics**

Variable	Intended pregnancy (*n* = 1918)		Unintended pregnancy (*n* = 431)		OR	95% CI	*P*-value
	No.	%	No.	%			
Age (years)							
18–34	1698	84.1	321	15.9	1		
< 18	84	97.7	2	2.3	0.13	0.03–0.52	0.004
≥ 35	136	55.7	108	44.3	4.20	3.18–5.55	< 0.001
Region							
Urban governorates	315	85.4	54	14.6	1		
Lower Egypt, urban	219	85.5	37	14.5	0.99	0.63–1.55	0.950
Lower Egypt, rural	514	84.5	94	15.5	1.07	0.74–1.53	0.727
Upper Egypt, urban	207	79.0	55	21.0	1.55	1.02–2.35	0.038
Upper Egypt, rural	527	75.4	172	24.6	1.90	1.36–2.66	< 0.001
Frontier governorates	136	87.7	19	12.3	0.82	0.47–1.43	0.474
Woman's education							
None	663	76.6	203	23.4	1		
Primary	263	78.3	73	21.7	0.91	0.67–1.23	0.526
Secondary or higher	992	86.5	155	13.5	0.51	0.41–0.64	< 0.001
Partner's occupation							
Professional, managerial, clerical or technical	636	82.1	139	17.9	1		
Agriculture	349	77.2	103	22.8	1.35	1.01–1.80	0.040
Service or manual	829	83.1	168	16.9	0.93	0.72–1.19	0.549

Totals may be less than 2349 due to missing observations.
OR = odds ratio; CI = confidence interval.

women having primary or no education and those whose husband worked in the agriculture sector (Table 2).

The relationship of unintended pregnancy with reproductive health variables showed that previous termination of pregnancy, ever-use or use of contraception before last pregnancy, having more than 2 children, < 18 years or ≥ 25 years of age at first pregnancy, lack of knowledge about the ovulatory cycle, having more than the ideal number of children, 3rd or 4th birth order and disagreement or ignorance about husband's desire for having children were significantly associated with increased probability of unintended pregnancy (Table 3).

The binomial logistic regression analysis indicated that region, women's age, knowledge of the ovulatory cycle, ideal family size, use of contraceptive methods and the child's order in family were significantly related to unintended pregnancy (Table 4). Compared with women living in urban governorates, women living in frontier governorates were less likely to report their pregnancy as unintended (AOR = 0.49, 95% CI: 0.26–0.92). Women aged 35 years or older were more likely to report their pregnancy as unintended compared with women aged 18–35 years, (AOR = 1.61, 95% CI: 1.14–2.26). Women who did not know about their ovulatory cycle were

Table 3 **Distribution of ever-married women aged 15–49 years who gave birth in 1999 (*n* = 2349), by pregnancy intention, according to selected reproductive health characteristics**

Variable	Intended pregnancy (*n* = 1918)		Unintended pregnancy (*n* = 431)		OR	95% CI	*P*-value
	No.	%	No.	%			
Ever had terminated pregnancy							
No	1549	83.7	302	16.3	1		
Yes	369	74.1	129	25.9	1.79	1.42–2.27	< 0.001
Contraceptive history							
Never used	660	86.5	103	13.5	1		
Just before last pregnancy	241	75.8	77	24.2	2.05	1.47–2.85	< 0.001
Ever-used	1014	80.3	249	19.7	1.57	1.23–2.02	< 0.001
Birth order of child							
1st or 2nd	1107	93.5	77	6.5	1		
3rd	365	85.9	60	14.1	2.36	1.65–3.38	< 0.001
4th or more	446	60.3	294	39.7	9.48	7.21–12.5	< 0.001
Woman's age at first birth (years)							
18–24	1276	82.3	274	17.7	1		
< 18	300	73.9	106	26.1	1.65	1.27–2.13	< 0.001
≥ 25	342	87.0	51	13.0	0.69	0.50–0.96	0.026
Woman's knowledge of ovulatory cycle							
Knows	481	87.0	72	13.0	1		
Does not know	1437	80.0	359	20.0	1.57	1.37–1.80	< 0.001
Difference between ideal and achieved family size							
Ideal	515	86.0	84	14.0	1		
More than ideal	210	52.4	191	47.6	5.58	4.12–7.55	< 0.001
Less than ideal	1193	88.4	156	11.6	0.80	0.60–1.07	0.128
Couple's desire for family size							
Agree	1226	84.3	228	15.7	1		
Disagree	455	78.6	124	21.4	1.47	1.15–1.87	0.002
Don't know	213	76.1	67	23.9	1.69	1.24–2.30	0.001

Totals may be less than 2349 due to missing observations.
OR = odds ratio; CI = confidence interval.

more likely to report unintended pregnancy than those who knew (AOR = 1.57, 95% CI: 1.10–2.25). Women who had achieved more than their ideal family size had higher likelihood of unintended pregnancy than those who had achieved ideal family size (OR = 2.70, 95% CI: 1.90–3.84). Compared with women who had never used contraceptive methods, the odds of unintended pregnancy were higher among those who had ever used these methods and those who had used them just before last pregnancy (OR = 1.55, 95% CI: 1.12–2.14 OR = 1.64, 95% CI: 1.10–2.43, respectively). Considering the birth order of the child, women who had ≥ 4 children were 4.42 times (95% CI:

Table 4 **Adjusted odds ratios (AOR) from binomial logistic regression of pregnancy intention by selected determinants**

Variable	AOR	95% CI	*P*-value
Region			
Urban	1		
Lower Egypt, urban	0.86	0.51–1.46	0.576
Lower Egypt, rural	0.79	0.51–1.23	0.294
Upper Egypt, urban	1.35	0.83–2.19	0.223
Upper Egypt, rural	1.36	0.89–2.08	0.161
Frontier	0.49	0.26–0.92	0.028
Father's occupation			
Professional or managerial	1		
Agriculture	0.93	0.63–1.37	0.714
Service or manual	0.84	0.62–1.15	0.281
Woman's' education			
None	1		
Primary	1.05	0.73–1.52	0.778
Secondary or higher	1.03	0.72–1.47	0.868
Age of woman (years)			
18–34	1		
< 18	0.37	0.09–1.58	0.181
≥ 35	1.61	1.14–2.26	0.007
Ever had terminated pregnancy			
No	1		
Yes	1.14	0.86–1.51	0.365
Woman's knowledge of ovulatory cycle			
Knows	1		
Does not know	1.57	1.10–2.25	0.012
Difference between ideal and achieved family size			
Ideal	1		
More than ideal	2.70	1.90–3.84	< 0.001
Less than ideal	0.85	0.61–1.18	0.328
Couple's desire for family size			
Agree	1		
Disagree	1.08	0.80–1.45	0.633
Don't know	1.38	0.94–2.03	0.101
Age at first birth (years)			
18–24	1		
< 18	0.95	0.68–1.31	0.739
≥ 25	1.23	0.83–1.82	0.302
History of contraceptive use			
Never used	1		
Used before last pregnancy	1.64	1.10–2.43	0.015
Ever-used	1.55	1.12–2.14	0.008

Table 4 **Adjusted odds ratios (AOR) from binomial logistic regression of pregnancy intention by selected determinants** *(concluded)*

Variable	AOR	95% CI	*P*-value
Birth order of child			
1st or 2nd	1		
3rd	1.38	0.92–2.07	0.125
4th or more	4.42	3.02–6.48	< 0.001

Totals may be less than 2349 due to missing observations.
OR = odds ratio; CI = confidence interval.

3.02–6.48) more likely to report their pregnancy as unintended compared with those who had 1 or 2 children (Table 4).

Outcome of unintended pregnancy

Among the selected pregnancy outcomes, only the size of the newborn, as reported by mothers, and the number of ANC visits were significantly associated with unintended pregnancy. Women who reported unintended pregnancy were more likely to report the child size at birth to be smaller or larger than average size compared with women who did not report unintended pregnancy (OR = 1.34, 95% CI: 1.02–1.76; OR = 2.25, 95% CI: 1.48–3.44, respectively). In addition, women who reported unintended pregnancy were significantly more likely to receive no ANC or < 4 ANC visits compared to those who did not report unintended pregnancy (OR = 1.56, 95% CI: 1.24–1.96; OR = 1.41, 95% CI: 1.03–1.93 respectively) (Table 5).

Discussion

With an annual population growth rate of 1.8 and a total fertility rate of 3.3, unplanned pregnancy in Egypt—the most populous Arab country—is an important reproductive issue to address, especially given that over one-third of all pregnancies were reported to be unintended in 1995 [*15*]. This rate is lower than that reported in the United States (US), where almost half of the pregnancies in 1994 were unintended [*16*], and in Japan, where the rate of unintended pregnancy according to a 2002 survey was 46% [*17*]. However, the US and the Japan rates were calculated among all females, while the Egypt rate is only among ever-married females. On the other hand, the Egyptian rate of unintended pregnancy is closer to that found in the Islamic Republic of Iran, where the rate was 35% [*18*]. It is much higher however than other African countries such as Nigeria, where the rate was 14% in 2003 [*19*].

Almost 1 in 5 women in the 1999 survey in Egypt reported an unintended pregnancy, mostly unwanted. This prevalence does not reflect the true magnitude of the problem, but can rather be considered as an underestimate since it was only calculated among ever-married women, and those whose pregnancies ended in birth. However, it is lower than the prevalence of unintended pregnancy that ended in birth in 1995 (36.0%) [*15*]. This decline could be due to the effect of various intervention programmes in the area of maternal health that were implemented in Egypt in the 1990s. In 1984, the National Population Council was established and headed by the

Table 5 **Distribution of ever-married women aged 15–49 years who gave birth in 1999 (*n* =2349), by intention of pregnancy, according to selected pregnancy outcome characteristics**

Variable	Intended pregnancy (*n* = 1918)		Unintended pregnancy (*n* = 431)		OR	95% CI	*P*-value
	No.	%	No.	%			
Child size at birth							
Average	1540	80.3	314	72.9	1		
Large	74	3.9	34	7.9	2.25	1.48–3.44	< 0.001
Small	304	15.8	83	19.3	1.34	1.02–1.76	0.035
Received 2nd polio dose							
No	129	15.6	25	12.8	1		
Yes	698	84.4	171	87.2	1.26	0.80–2.00	0.318
Child alive in 2000							
No	44	2.5	6	1.5	1		
Yes	1687	99.5	394	98.5	1.71	0.73–4.05	0.220
No. of antenatal care visits							
≥ 4	953	49.7	170	39.4	1		
0	698	36.4	194	45	1.56	1.24–1.96	< 0.001
< 4	267	13.9	67	15.5	1.41	1.03–1.93	0.033

Totals may be less than 2349 due to missing observations.
OR = odds ratio; CI = confidence interval.

President of Egypt because political leaders were concerned about the population demography in Egypt and government efforts were directed toward increasing the awareness and prevalence of family planning [*20*]. Effective policies were in place after the International Conference on Population and Development (ICPD) in 1994 where the role of nongovernmental organizations was strengthened. The number of family planning units rose from 3764 in 1980 to 4356 in 1990 [*20*]. Prevalence of contraceptive use increased from 24.2% for any method and 22.8% for modern methods in 1990 to 47.9% for any method and 45.5% for modern methods in 1995. Furthermore, the total fertility rate dropped from 5.28 in 1980, to 4.41 in 1988, then to 3.63 in 1995 [*20*].

One important determinant of unintended pregnancy is the use of contraception. However, the direction of the relation between these 2 variables is inconsistent within the literature. In the present study, women who had tried contraceptive methods prior to the last pregnancy which ended in birth in 1999 were more likely to have unintended pregnancy than those who never tried these methods. Casterline et al. studied unintended fertility in 2 governorates in Upper Egypt in 1997 and reported that the majority of women were nonusers of contraceptives (73.6%) and had higher unintended pregnancy rates compared with those who have ever-used contraceptive methods [*11*]. Casterline et al. encouraged family planning programmes to address nonuser groups [*11*]. The findings of this study shed light on the important issues of contraceptive failure and the quality of contraceptive services.

The selection of a suitable contraceptive method, its quality and efficiency, knowledge about its utilization and the woman's compliance are important factors to be assessed and addressed in Egypt. The present national study offers evidence that providing family planning methods to target more women is not enough to prevent unintended pregnancies, and that this provision should be associated with high quality service. In other words, it might be time to address the qualitative aspects of reproductive health programmes rather than only their quantitative aspects. Looking at the components of reproductive health services and the way they are delivered are important challenges to improving the quality aspects. In addition, other comprehensive and holistic social and economical services and programmes should be taken into consideration. Furthermore, our study revealed that nonusers of contraceptives comprised 55.1% of the sample and they had the lowest unintended pregnancy rates, which further emphasizes contraceptive failure, rather than nonuse, as a predictor of unintended pregnancies. Consequently, higher programme priority should entail providing contraceptive users with good quality services and information to avoid unintended pregnancy [*21,22*].

The current study also showed a strong association between unintended pregnancy and deficient knowledge about the ovulatory cycle. This relationship should be interpreted with caution, as the information about knowledge of the ovulatory cycle was obtained by only 1 yes/no question. However, this finding highlights the need for health education regarding family planning and for further investigation of this issue. Obviously, a deficient knowledge of the ovulatory cycle for this group of women might lead to contraceptive failure and thus unintended pregnancies.

Overall, our study findings were consistent with the published literature regarding the sociodemographic determinants of unintended pregnancy. Analysis of the data at the bivariate level showed a significant relationship between pregnancy intention and women's age, education and area of residence. Women aged $\geq$ 35 years were more likely to have unintended pregnancy compared with those aged 18–34 years. In contrast, those aged < 18 years were less likely to report unintended pregnancy. The most obvious interpretation of this finding is that the former group, as opposed to the latter, could have achieved their desired family size. Unintended pregnancy in the < 18 years group is a high figure and considered a serious problem [*3*]. Education was also an important determinant of unintended pregnancy at the bivariate level as women with secondary or higher education had lower odds of having unintended pregnancies. This could be explained by the potentially higher ability of the educated women to receive and understand the family planning messages, and their use of effective contraceptive methods. Concerning the residence, Upper Egypt governorates, both urban and rural, had the highest proportion of unintended pregnancies. Upper Egypt governorates are remote areas characterized by a high prevalence of illiteracy, poor housing conditions, higher rates of fertility and limited provision and utilization of social services [*11*].

With respect to health outcomes, only child size and ANC were associated with unintended pregnancy. On the other hand, the results regarding child status should be interpreted cautiously as the numbers of live children were 2081 (88.5%), dead children 50 (2.1%) and unknown status 220 (9.4%). Taking the last 2 categories into consideration could have influenced

our estimates. The absence of a significant association between unintended pregnancy and the polio vaccination status of the child could be due to the compulsory vaccination and the availability of free medical services for children.

Study limitations

The EDHS Egypt 2000 was a cross-sectional survey that looked retrospectively at women's pregnancy intention and its related determinants and outcomes. Our study results should be cautiously interpreted in view of the limitations of the cross-sectional design.

Women with unintended pregnancy are usually at a higher risk of abortion. Because of the unavailability of data on abortion in Egypt, the current study only addressed women who had pregnancies that ended in childbirth. Furthermore, this study only surveyed ever-married women. These 2 factors together mean that a key limitation of the study was underestimating the prevalence of unintended pregnancy.

Unintended pregnancy in this study refers to unwanted and mistimed pregnancies. It has been suggested in the literature that unwanted and mistimed pregnancies differ with respect to their determinants and outcomes [*23*], which necessitates further studies to examine these differences.

The prevalence of contraceptive use might have been underestimated due to recall bias. The variables "child size and "knowledge of the ovulatory cycle are based solely on the mother's response, thus making these measures subjective.

Conclusion

There is no doubt that understanding of the determinants of unintended pregnancy will lead to improvements in efforts to avoid such pregnancies, and improve the well-being of women and children [*7*]. The study of unintended pregnancy offers public health practitioners and demographers the chance to understand fertility patterns and to plan and implement more efficient and successful interventions regarding maternal and child health. Moreover, this study targets Egyptian women of different sociodemographic status and with different reproductive health behaviours than their peers in developed countries. In Egypt, due to the high population density, looking at unintended pregnancy and its determinants provides valuable information for policy-makers and public health professionals to address maternal and child health policies and implement interventions. Addressing this issue is timely and should be linked with the important reproductive health programmes and interventions addressing maternal and child health, which took place during the last decade in Egypt [*8*]. Unintended pregnancy may be a major outcome measure for such programmes and understanding and addressing its determinants could improve these programmes.

Based on the findings of the study, we recommend more interventions concerning reproductive health programmes and services, whereby qualitative aspects of the programmes should be taken into consideration and more care given to promoting reproductive health awareness of women in Upper Egypt. Since pregnancy intention is not recognized as an "individual product , but as a multidimensional product of social, cultural and economical power [*7*], other social and economical interventions should be implemented in Upper Egypt. Further prospective cohort studies on pregnant women are also required.

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Note from the Editor

We wish to draw the kind attention of our potential authors to the importance of applying the editorial requirements of the EMHJ when preparing their manuscripts for submission for publication. These provisions can be seen in the *Guidelines for authors*, which are published at the end of every issue of the Journal. We regret that we are unable to accept papers that do not conform to the editorial requirements.

Condom use among males (15–49 years) in Lower Egypt: knowledge, attitudes and patterns of use

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استخدام العازل لدى الذكور (15 – 49 عاماً) في صعيد مصر: المعارف والمواقف وأنماط الاستخدام

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الخلاصة: أجرى الباحثون دراسة مستعرضة لعينة عشوائية قوامها 2304 من الذكور في عمر 15 – 49 عاماً في 4 محافظات في دلتا مصر، بهدف تقييم استخدامهم للعوازل ومعارفهم ومواقفهم إزاء استخدامها. وبيَّنت الدراسة أن 60.5٪ من العينة يَرَوْن أن العوازل وسيلة فعَّالة لمنع الحمل وأن 60٪ يَرَوْن أن العوازل تقي من العدوى المنقولة جنسياً. وبيَّنت الدراسة كذلك أن 23.9٪ فقط سبق لهم استخدام العوازل، وذلك كوسيلة لمنع الحمل أساساً، وأن 26.8٪ سينظرون في استخدامها مستقبلاً. وأفاد ربع العينة عن معرفتهم بالطريقة الصحيحة لاستخدامها. أما العوامل التي تعوق استخدام العوازل فتشمل عدم الحاجة إليها (75.7٪)، ورفض الشريك الجنسي (57.6٪)، ومخاطر استخدامها (31.9٪). وبيَّنت الدراسة أن معظم أفراد العينة يعرفون معلومات عن مرض الإيدز والعدوى بفيروسه (90.8٪)، وأن نسبة قليلة منهم يشعرون بمخاطر التعرُّض للعدوى المنقولة جنسياً (11.2٪) أو للعدوى بفيروس الإيدز (10.3٪).

ABSTRACT We conducted a cross-sectional study on a randomly selected sample of 2304 males aged 15–49 years from 4 governorates in Lower Egypt to assess their condom use and knowledge and attitudes towards condom use. Condoms were considered an effective method of contraception and prevention of transmission of sexually transmitted infections (STIs) by 60.5% and 60.0% respectively. Only 23.9% had ever used condoms, mainly for contraception, but 26.8% would consider using them in the future. A quarter reported knowing how to use condoms properly. Obstacles to condom use included perceived lack of need (75.7%), rejection by partner (57.6%) and hazards of condoms (31.9%). The majority knew about HIV/AIDS (90.8%) but a few felt at risk of STIs (11.2%) or HIV infection (10.3%).

L'usage du préservatif dans la population masculine (15-49 ans) de Basse-Égypte : connaissances, attitudes et profil des utilisateurs

RÉSUMÉ Nous avons mené une étude transversale sur un échantillon randomisé de 2304 sujets de sexe masculin, âgés de 15 à 49 ans et originaires de 4 gouvernorats de Basse Égypte, dans le but d'évaluer l'utilisation du préservatif masculin et les connaissances et attitudes à l'égard de ce dernier au sein de cette population. Le préservatif masculin est jugé efficace comme méthode contraceptive ou comme moyen de prévention contre les infections sexuellement transmissibles (IST) respectivement par 60,5 % et 60,0 % de l'échantillon. Seuls 23,9 % des participants avaient déjà utilisé un préservatif, principalement à des fins contraceptives, mais 26,8 % en envisageaient l'utilisation dans l'avenir. Vingt-cinq pour cent (25 %) des enqu tés déclaraient en conna tre parfaitement le mode d'emploi. Les principaux obstacles à l'utilisation des préservatifs étaient la méconception de la nécessité (75,7 %), le rejet de la part du/de la partenaire (57,6%) et les risques propres au préservatif (31,9 %). La majorité des enqu tés (90,8 %) était informée de l'existence du VIH/sida, mais seul un petit nombre admettait le risque de contamination par IST (11,2 %) ou le VIH (10,3 %).

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Introduction

Men play a powerful role in reproductive decisions. Their actions can have unhealthy and even dangerous results. Men's participation is a promising strategy for addressing some of the world's pressing reproductive health problems. With HIV infection now spreading faster among women than among men, the AIDS epidemic has focused attention on the health consequences of men's sexual behaviour. At the same time surveys, mostly in Africa, have found that a considerable per cent of men (about 70% in some countries) favour and are concerned about family planning. Such findings suggest that men's reproductive health behaviour is ready to change [*1*]

Since the 1930s, latex condoms have been available to prevent both pregnancy and sexually transmitted disease, but in most parts of the world they have never been widely used [*2*]. Estimated pregnancy rates during perfect use of condoms is 3% at 12 months [*3*]. Numerous studies have been conducted on the risk of sexually transmitted infections (STIs) in condom users. Virtually all clinical and epidemiological studies have found substantial reductions in the risk of disease among condom users [*4,5*]. A multi-country European collaborative study enrolled 378 seronegative regular partners of HIV-infected men or women. About one-half of the couples used condoms at every intercourse, and no seroconversions occurred among these couples. About 10% of the couples who used condoms inconsistently or not at all seroconverted with an incidence rate of 4.8% [*6*].

In Egypt, results of the 2003 Demographic and Health Survey showed that male methods of contraception are still less widely recognized than female methods [*7*]. In another study, it was found that 87% of Egyptian men were agreeable to using family planning. However, few were using a condom although more than 18% of married men surveyed reported having used a male method of contraception in the past including condoms [*8*]. Another study on the male role in reproductive health in Egypt showed that 64.7% of husbands did not wish to use male contraceptives including condoms [*9*]. A study in Pakistan, a country in the same region, showed low knowledge levels regarding the appropriate use and efficacy of condoms even among contraceptive users [*10*].

While perceived unreliability is often a problem, many other issues present greater barriers to overall acceptability of condoms. Many people do not believe they are at risk of STIs/AIDS. Others do not like the feeling of condoms or worry about their partner's reactions to suggesting condom use. Some are embarrassed by the buying and using of condoms or lack the skills to add their use to sexual activity [*11*].

In the era of HIV/AIDS, it is essential to study the pattern of condom use which is now not only important for family planning and reducing fertility indices but is also a live saver by preventing HIV infection.

This study aimed to study:

- the pattern of condom use among adult Egyptian males in Lower Egypt;
- the pattern of risky behaviour of Egyptian adult males necessitating condom use as a protective measure;
- the knowledge and attitudes of Egyptian adult males towards condom use and barriers to use.

Methods

Study setting and subjects

This was a cross-sectional study conducted during 2004 in 4 governorates randomly

selected from the 13 governorates of lower Egypt. They were Gharbia, Damietta, Dakahlia and Menoufiya. Two randomly selected localities in each governorate (1 urban and 1 rural) were selected for data collection. The sampling frame for urban localities was based on the list of cities in each Governorate from which 1 city was chosen randomly. For the rural locality, a list of related villages to the chosen city was obtained from which 1 village was chosen randomly.

The target population of this study was adult males aged 15–49 years representing a sexually active group of the population. They were chosen from different educational levels and occupational groups; industrial workers, taxi and minibus drivers, university and secondary school students and government employees.

Sample size

Gharbia governorate, with a population of 3 735 700, lies in the centre of the Nile Delta. Damietta governorate, with a population of 1 005 243, lies on the northern coast. In Gharbia governorate, the population of males aged 15–49 years was 997 859 while that of Damietta was 270 198. The estimated sample size in these 2 governorates was 1270 individuals (1000 in Gharbia and 270 in Damietta).

Dakahlia governorate is located in the east of the Nile Delta and has a population of 4 825 882. Menoufiya is located in the south of the Nile Delta and has a population of 3 058 362. The population of males aged 15–49 years in the 2 governorates was estimated to be 2 275 493. The sample size represented 1/1000 of the target population based on the CAPMAS census 1996 and estimated increase by end of 2003 [*12*]. Thus the total sample size in this study was 2304.

The sample size was drawn proportionally from the different study groups according to expected percentages of each in the community as estimated by the researchers because exact figures were not available.

Sampling technique

Random sample selection was done from strata representing different educations and occupations. The identified strata included: government employees, taxi and minibus drivers, industrial workers and university and secondary-school students.

Full lists of the available places of gathering of the target population of each stratum were obtained from the Governorate office and multiple places were chosen randomly. The total population of the chosen places were divided into clusters and 1 or 2 clusters were randomly chosen from each place to reach the required sample size. Clustering was based on the circumstances of each place; number of offices in governmental premises, different student sections in the faculties, workplace divisions. Drivers were all taken from the station of the chosen locality which was always one station for internal and another for external transportation (between governorates). Refusal rate to participate ranged between 2% (among students) and 7% (among drivers).

Data collection

A pre-designed questionnaire sheet (available on request from the corresponding author) was used for data collection. This questionnaire included the following data:

- Sociodemographic data (name not included)
- Perception of condoms as a method of protection against STIs and as a contraceptive method
- Pattern of condom use and barriers to use
- Practice of risky behaviours necessitating condom use as a protective measure against STIs.

Content validity of the questionnaire was tested by 3 experts. A pilot study including 30 individuals, not included in the study sample, was performed to ensure the suitability of the questionnaire for data collection relevant to the study design and objectives. Results of the pilot study showed that direct enquiry about sexual behaviour was not acceptable to respondents. Therefore, the questions related to personal sexual activity were replaced by questions enquiring about friends with extramarital relations. This was found to be more acceptable and allowed projection of the prevalence of unsafe sexual relations in the studied community. Test–retest reliability was conducted to ensure intra-rater reliability. Inter-rater bias was not likely because the questionnaire was designed to be self-administered. Only those who could hardly read were helped in completing the questionnaire by the interviewers (about 5%–7% depending on the locality).

Data collection was done through direct interviewing by members of the research team who were trained on communication interviewing skills by senior experts in a 2-day workshop before starting data collection activities. Group interviewing was arranged with the study subjects before distribution of the study questionnaire to explain the importance of proper and complete filling of the questionnaire. Only fully completed sheets of those aged 15–49 years were included in the study (6%–7% were excluded of the total distributed).

Data management and statistical analysis

The collected data were organized and statistically analysed using *SPSS*, version 12. The number and per cent distribution were calculated and the chi-squared test was used for statistical analysis. The 5% level of significance was used for interpretation of the chi-squared results.

Results

Table 1 shows the characteristics of the 4 occupation groups. The study included 2304 males aged 15–49 years. These comprised 590 industrial workers (25.6%), 382 drivers (16.6%), 627 government employees (27.2%) and 705 students (30.6%). The majority of industrial workers and drivers had received primary and secondary education (98.0% and 95.0% respectively) while 45.1% of government employees had received a higher education. Regarding students, 12.9% were secondary-school students while 87.1% were university students. Of the entire sample, 44.1% were urban residents and 42.2% were unmarried. The majority of industrial workers, drivers and employees were married (79.0%, 67.8% and 84.1% respectively) while the majority of students were single (98.2%).

Table 2 presents the knowledge and attitude of the sample towards condom use. In all, 60.5% perceived condoms as an effective method of contraception. The highest percentage was reported by industrial workers and drivers (63.6% and 63.1% respectively) while the lowest percentage was that of government employees (56.5%). Condoms were reported as an effective measure for prevention of sexually transmitted infections (STIs) by 60.0% of the respondents; drivers (61.8%) and industrial workers (65.8%) reported the highest percentage.

About 27% accepted the possibility of using condoms in the future with the highest percentage reported by drivers (34.0%) and the lowest by employees (22.2%). Regarding knowledge about the proper use of condoms 25.3% claimed to have this with the highest percentage being industrial workers (32.7%). About 32% thought that condom use may be associated with harmful effects and about 58% believed that the partner might possibly reject condom use.

Table 1 **Characteristics of the participants**

Characteristic	Industrial workers		Drivers		Government employees		Students		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Governorate										
Gharbia	305	30.0	160	15.7	220	21.6	333	32.7	1018	100.0
Dakahlia	87	17.7	108	21.9	141	28.7	156	31.7	492	100.0
Menoufiya	113	22.3	50	9.9	178	35.1	166	32.7	507	100.0
Damietta	85	29.6	64	22.3	88	30.7	50	17.4	287	100.0
Total	590	25.6	382	16.6	627	27.2	705	30.6	2304	100.0
Residence										
Urban	187	31.7	110	28.8	377	60.1	343	48.7	1017	44.1
Rural	403	68.3	272	71.2	250	39.9	362	51.3	1287	55.9
Education										
Primary	286	48.5	124	32.5	0	0.0	0	0.0	410	17.8
Secondary	292	49.5	239	62.6	344	54.9	91	12.9	966	41.9
Higher	12	2.0	19	5.0	283	45.1	614	87.1	928	40.3
Marital status										
Single	98	16.6	104	27.2	78	12.4	692	98.2	972	42.2
Married	466	79.0	259	67.8	527	84.1	12	1.7	1264	54.9
Widowed	10	1.7	9	2.4	6	1.0	0	0.0	25	1.1
Divorced	16	2.7	10	2.6	16	2.6	1	0.1	43	1.9
Age (years)										
Range	16–49		17–49		18–49		15–24		15–49	
Mean (SD)	35.00 (8.42)		31.91 (7.81)		36.69 (7.21)		19.27 (1.74)		30.14 (9.89)	

More than two-thirds of the sample (69.6%) reported availability of condoms in their neighbourhood; 53.1% reported that they would be embarrassed to buy condoms in the presence of somebody known to them. There were statistically significant differences between the 4 groups in their attitudes and knowledge (Table 2).

Only 23.9% had ever used condoms with the highest percentage reported by industrial workers (33.9%) and the lowest by students (10.4%). Among single males 11.6% reported using condoms while 32.9% of married males had used condoms. Among the 552 participants who reported using condoms, the main reasons for condom use were for contraception (56.2%) and for prevention of STIs (35.0%); 5.6% used them for both contraception and prevention of STIs. Only 3.3% reported using condom during menses. The main reasons for not using condom were: no need being single or married but wanting children (75.7%) and condoms decrease sexual pleasure (18.3%) (Table 3). There were statistically significant differences between the groups.

The majority of the studied population reported having knowledge about HIV/AIDS (90.8%). Less than one-fifth reported that their behaviour put them at risk for STIs and HIV infection (11.2% and 10.3% respectively). On the other hand, 28.9% reported having friends who engaged in extramarital sexual relations; drivers and students reported the highest percentages (33.2% and 37.7% respectively). Differences

Table 2 **Distribution of the participants in relation to knowledge of and attitude towards condom use**

Studied items	Industrial workers (*n* = 590)		Drivers (*n* = 382)		Employees (*n* = 627)		Students (*n* = 705)		Total (*n* = 2304)		χ^2	*P*-value
	No.	%	No.	%	No.	%	No.	%	No.	%		
Condoms are an effective method of contraception	375	63.6	241	63.1	354	56.5	425	60.3	1395	60.5	7.681	0.053
Condoms are effective for prevention of STIs	388	65.8	236	61.8	370	59.0	389	55.2	1383	60.0	15.759	0.001
I might use condoms in the future	183	31.0	130	34.0	139	22.2	165	23.4	617	26.8	26.541	0.001
I have enough knowledge about proper condom use	193	32.7	90	23.6	169	26.9	131	18.6	583	25.3	33.325	0.001
I need more information about the proper use of condoms	277	38.5	183	47.9	308	49.1	455	64.5	1223	53.1	54.123	0.001
Condom use has some harmful effects	178	30.2	65	17.0	196	31.3	295	41.8	734	31.9	72.027	0.001
Use of condoms could be rejected by partner	340	57.6	161	42.1	322	51.4	504	71.5	1327	57.6	103.050	0.001
I would feel embarrassed when buying condoms	317	53.7	168	44.0	295	47.0	444	63.0	1224	53.1	49.700	0.001
Condoms are available in the neighbourhood	467	79.2	226	59.2	507	80.9	403	57.2	1603	69.6	134.170	0.001

P < *0.05 was considered significant.*
STIs = sexually transmitted infections.

Table 3 **Distribution of the participants in relation to reasons for using or not using condoms**

Condom use	Industrial workers (*n* = 590)		Drivers (*n* = 382)		Employees (*n* = 627)		Students (*n* = 705)		Total (*n* = 2304)		χ^2	*P*-value
	No.	%	No.	%	No.	%	No.	%	No.	%		
Total users[a]	200	33.9	106	27.7	173	27.6	73	10.4	552	23.9	111.167	0.001
Reasons for use												
Prevention of STIs	57	28.5	49	46.2	44	25.4	43	58.9	193	35.0	44.335[b]	0.001
Birth control	126	63.0	47	44.3	118	68.2	19	26.0	310	56.2		
Both	15	7.5	7	6.6	6	3.5	3	4.1	31	5.6		
During menses	2	1.0	3	2.8	5	2.9	8	11.0	18	3.3		
Total non-users	390	66.1	276	72.3	454	72.4	632	89.6	1752	76.1		
Reasons for non-use[c]												
No need	298	76.4	218	79.0	308	67.8	502	79.4	1326	75.7	21.740	0.001
Decreases sexual pleasure	80	20.5	43	15.6	109	24.0	89	14.1	321	18.3	20.040	0.002
Not comfortable	52	13.3	25	9.1	56	12.3	43	6.8	176	10.0	14.946	0.002
Not effective	40	10.3	13	4.7	30	6.6	38	6.0	121	6.9	9.726	0.021
Difficult to use	18	4.6	9	3.3	32	7.0	19	3.0	78	4.4	11.245	0.011
Religious reasons	0	0.0	6	2.2	8	1.8	26	4.1	66	1.5	19.175	0.001

[a]*Those who ever used condom were 11.6% of single men and 32.9% of married ones.*
[b]*Comparing prevention of STIs and birth control between different jobs*
[c]*More than 1 reason was reported for non-use of condoms.*
P < *0.05 was considered significant.*
STIs = sexually transmitted infections.

between the 4 groups were statistically significant in relation to risk perception for STIs and HIV infection and having friends engaging in extramarital sexual relations. The participants reported that these unsafe sexual relations of their friends happened frequently (44.5%) and with multiple partners (66.6%). Regarding condom use in the extramarital relations of their friends, 53.5% said condoms were never used while 18.4% said condoms were always used. The majority of the respondents who had friends engaged in extramarital relations (73.1%) believed their friends were at risk for HIV/AIDS (Table 4).

Discussion

Men play a powerful and even dominant role in reproductive decisions sometimes regardless of their partner's wishes or the health consequences to themselves or their partners. For these reasons, it is important to direct the action of health programmes to healthy male sexual behaviour [*13*]

This study shows that slightly about 60% of the studied sample believed in the effectiveness of condom as a contraceptive method and for the prevention of STIs. Government employees had the lowest level of confidence in condoms in this regard. Properly used, male condoms are a proven and effective means of family planning and for preventing transmission of HIV/AIDS and other STIs [*14*]. Laboratory tests showed that no STI organism, including HIV, can pass through an intact synthetic condom. In fact, a condom protects against any STI that is transmitted through bodily fluids [*15*].

Many people, especially young men, may not be adequately informed about the protective effect of condoms against STIs and AIDS. In some countries, only a minority of never married men who had heard of AIDS knew that the use of condoms could prevent infection with HIV. In addition, some are too embarrassed by their lack of skills to add condom use to sexual activity [*15*]. Therefore, with more information and encouragement more men would be willing to use condoms [*16*].

Although condoms were reported by the majority of the participants in the present study to be easily available, only around a quarter had ever used condoms and or said they might be potential users in the future. Among all married persons only a third had ever used condoms. This figure is different from that reported by the Egypt Demographic and Health Survey (3.2%) which gave the per cent of married couples using condoms only for family planning. Our study included all those in the community as a whole who had ever used condoms for any reason [*2*].

The low level of condom use in this study should be considered in relation to the observation that only about a quarter of the studied population reported having enough information about proper condom use and that just over half were in need of more information. The main reasons for not using condoms in the present study were: not needing it (being single or married but wanting children) and decreased sensation during sexual relations. In addition, about 30% believed that there may be harmful effects associated with condom use. Rejection by partner was another reason for non-use.

Despite the importance of condoms for protection against both pregnancy and STIs and HIV/AIDS, use of male condoms for family planning is rare, especially in developing countries [*17*]. While perceived unreliability is often a problem, many other issues present greater barriers to overall acceptability of condoms and may explain this wide gap between awareness and use. Insufficient knowledge about the proper method of condom use and the places to obtain

Table 4 **Distribution of the participants in relation to risky behaviours necessitating condom use**

Studied item	Industrial workers (*n* = 590)		Drivers (*n* = 382)		Employees (*n* = 627)		Students (*n* = 705)		Total (*n* = 2304)		χ^2	*P*-value
	No.	%	No.	%	No.	%	No.	%	No.	%		
Have ever heard about HIV/AIDS	538	91.2	292	76.4	590	94.1	673	95.5	2093	90.8	121.40	0.001
Engage in risky behaviours for STIs	81	13.7	32	8.4	34	5.4	111	15.7	258	11.2	42.545	0.001
Engage in risky behaviours for HIV/AIDS	73	12.4	43	11.3	38	6.1	83	11.8	237	10.3	16.994	0.001
Have friends engaged in extramarital sexual relations	158	26.8	127	33.2	114	18.2	266	37.7	665	28.9	66.660	0.001
Reported frequency of sexual relations of friends												
Only once	25	15.8	17	13.4	25	21.9	73	27.4	140	20.1	17.897	0.007
Occasional	52	32.9	51	40.2	46	40.4	80	30.1	229	34.4		
Frequent	81	51.3	59	46.4	43	37.7	113	42.5	296	44.5		
Number of sexual partners												
Single	66	41.8	35	27.6	40	35.1	81	30.5	222	33.4	8.114	0.044
Multiple	92	58.2	92	72.4	74	64.9	185	69.5	443	66.6		
Using condoms												
Never	96	60.8	59	46.4	67	58.8	134	50.4	356	53.5	57.466	0.001
Sometimes	47	29.7	55	43.3	23	20.2	50	18.8	175	26.3		
Always	15	9.5	8	6.4	24	21.1	75	28.2	122	18.4		
Don't know	0	0.0	5	3.9	0	0.0	7	2.6	12	1.8		
Risk perception for HIV/AIDS	119	75.3	102	80.3	77	67.5	188	70.7	486	73.1	6.338	0.096

P < *0.05 was considered significant.*
STIs = sexually transmitted infections.

them has also been reported to be a cause for under-utilization [*15,18*]. Among other obstacles are social disapproval that stigmatizes condom buying and use, difficulties in obtaining condoms due to restricted availability, high price, and lack of privacy at the point of sale or distribution. Fear, lack of trust in their partners, personal reluctance due to decreased sensitivity and unpleasant odour, inhibition of sexual gratification and the possible irritation of the partner's sexual organs that may interfere with intercourse are other reasons for non-use of condoms [*19,20*]. In a study among adolescents, barriers to condom use among adolescents engaged in risky behaviour were:, suddenness of the sexual event (21%), lack of awareness of the nature of the risk and the role of condoms as a protective method (16%), reduction in pleasure (15%), not knowing how to use (8%), partner is married and it is her responsibility, too shy to buy (6%), condoms not available (5%), partner's insistence not to use (2%), and no response (23%) [*21*]. Furthermore, many people do not believe they are at risk of STIs or AIDS and may think they do not need protection.

Among the 4 groups in our study, industrial workers and drivers were the group with the highest confidence in condom use and the highest frequency of ever use. They were also the groups that were most willing to consider using condoms in the future and were the least likely to believe that condom use has harmful effects (30.2% and 17.0% respectively). However, fewer drivers (59.2%) reported knowing where to obtain condoms than the other groups. These observations should be considered on trials to encourage condom use among these groups.

Sexual behaviour patterns vary widely between countries and there may be large differences in the sexual norms and practices between different groups [*22*]. Risky sexual behaviour includes unprotected sex, irregular use of condoms, multiple partners and relationships, and particular sexual initiation rituals [*23*]. Risky sexual behaviour is accompanied by increased risk of contracting STIs especially HIV [*24*]. Despite the AIDS epidemic, and even when men know that unprotected sex is risky, many still take the risk and engage in risky sexual behaviour [*15*].

The majority of the sample (90.8%) knew about HIV/AIDS. While the participants were not asked about their own sexual behaviour, their knowledge of friends engaged in extramarital relations clearly shows that unsafe, risky behaviour is present in the population. Furthermore, in spite of the low condom use observed by this study, 11.6% of single males had previous experience with condom use, suggesting they had extramarital sexual relations. Again among students, only 2.1% were married but 10.4% reported previous experience with condoms. While 73.1% of those with friends engaging in unsafe sex believed that these friends were at risk of contracting HIV/AIDS, the perception of the respondents of their own risk of STIs and HIV infection was low (11.2% and 10.3% respectively).

Conclusion and recommendations

Condom use is still low among Egyptians. Reasons for non-use include low confidence, low perception of risk, lack of information, perceived harmful effects, decreased sensation during intercourse and social stigma of buying condoms. The presence of unsafe sexual behaviour necessitates increasing the level of condom use in Egypt through:

- Family planning, communication and social marketing campaigns to promote

the dual role of condoms in preventing pregnancy and transmission of STIs.

- Sexual education with more information about condoms to encourage more men to play a positive role in reproductive health. Sex education for unmarried young people should stress on sexual abstinence before marriage and use of condoms for protection from STIs and HIV/AIDS.
- Voluntary counselling and testing to explore unsafe behaviours associated with STIs including HIV/AIDS, to promote condom use and to disseminate more information concerning their proper use.
- Cooperation of governmental sectors, the commercial sector and nongovernmental organizations. This will help meet condom needs and disseminate information about condom use.

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Prevalence of and reasons for domestic violence among women from low socioeconomic communities of Karachi

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انتشار العنف الأسري وأسبابه بين النساء في المجتمعات ذات المستوى الاجتماعي والاقتصادي المنخفض في كراتشي

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الخلاصة: أجرت الباحثتان دراسة مستعرضة لتقدير مدى انتشار العنف الأسري وتحديد أسبابه بين 400 من النساء المتزوجات، تتراوح أعمارهن بين 14 و45 عاماً، ويَعِشْنَ في مناطق ذات مستوى اجتماعي واقتصادي منخفض، في ضواحي كراتشي. وجُمعت البيانات من خلال استبيان سبقت تجربته. وبلغت نسبة انتشار السُباب اللفظي من قِبَل الزوج 97.5٪، ومن قِبَل الأصهار 97٪، أما نسبة انتشار الإيذاء البدني فبلغت 80٪ و57.5٪ من قِبَل الزوج والأصهار على التوالي. وكانت الأمور المالية هي السبب الأكثر شيوعاً للعنف الأسري، يليه عدم الإنجاب ثم عدم إنجاب طفل ذكر. وذكرت الباحثتان أن معدل انتشار العنف الأسري في عينة الدراسة كان مرتفعاً، وأن هناك حاجة لمعالجة هذه المشكلة من خلال جهود العاملين الصحيِّين، وراسمي السياسات، والمنظمات غير الحكومية، وغيرها.

ABSTRACT We conducted a cross-sectional study to estimate the prevalence of domestic violence and identify the reasons for it among 400 married women aged 15–45 years in low socioeconomic areas in urban Karachi. Data were collected with a pretested questionnaire. The prevalence of verbal abuse was 97.5% by the husband and 97.0% by the in-laws; the prevalence of physical abuse was 80.0% and 57.5% by the husband and in-laws respectively. Financial issues were the commonest reason for domestic violence followed by infertility and not having a son. The prevalence of domestic violence in our sample of women is high. There is a need to address this problem with efforts from health workers, policy-makers, nongovernmental organizations and others.

Prévalence et causes de la violence domestique chez les femmes des milieux défavorisés de Karachi

RÉSUMÉ Il a été procédé à une étude transversale ayant pour objectif l'évaluation de la prévalence de la violence domestique et de ses causes chez 400 femmes mariées âgées de 15 à 45 ans résidant dans les secteurs défavorisés de la zone urbaine de Karachi. Les données ont été collectées par le biais d'un questionnaire prétesté. La prévalence des violences verbales émanant respectivement du conjoint et de la belle-famille était de 97,5 % et 97,0 %, tandis que celle des violences physiques s'élevait respectivement à 80,0 % et 57,5 %. Les problèmes financiers arrivent en t te des causes de violence domestique, suivis par la stérilité et l'absence de descendance mâle. Dans notre échantillon de femmes, la prévalence de la violence domestique est élevée. Les personnels de santé, les responsables de l'élaboration des politiques, les organisations non gouvernementales et autres parties prenantes se doivent de conjuguer leurs efforts pour venir à bout de ce problème.

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Introduction

Violence against women in developing countries is emerging as a growing concern for public health practitioners as it is well known that women are vulnerable to many forms of violence, and domestic violence represents the commonest form [*1*]. Domestic violence, or intimate partner violence (IPV), is defined by the American Medical Association as a pattern of physical, sexual and/or psychological abuse by a person with whom the victim has had an intimate relationship [*2*]. The World Health Organization (WHO) defines domestic violence as any act of "gender-based violence that results in, or is likely to result in, physical, sexual or mental harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life. [*3*]. Domestic violence is an important cause of morbidity and mortality for women in every country where these associations have been studied [*3*]. In a literature review of population-based studies, Krug et al. found that 10%–69% of women reported that they had experienced physical abuse from a male partner [*4*]. There have been numerous studies in other communities in which women have reported experiencing domestic violence: 34% (n = 6566) in an Egyptian study [*5*], 17% in Canada [*6*], 16.4% in Haiti [*7*]. The reported reasons for abuse included non-compliance with female contraception, talking to strangers, jealousy; abuse has also been found to be associated with low income [*5–8*].

There are many forms of violence against women. These includes psychological (e.g. controlling behaviour, economic abuse, social isolation), physical and sexual abuse [*1,9–11*]. Physical violence can often result in multiple injuries and may lead to chronic conditions [*12–14*], while emotional abuse can have severe long-term effects [*15*].

In developing countries, women are more susceptible to domestic violence. For example, one study in Karachi in 2000 reported that all husbands surveyed admitted that they shouted at their wife, even when she was pregnant [*16*]; 32.8% admitted to having slapped their wives and 77.1% admitted to having engaged in non-consensual sex with their wives. Another study conducted in Karachi in 1999 reported that 34% of the women had been physically abused by their husbands and 15% had been abused even while pregnant. As a result, 72% of physically abused women were anxious/depressed [*17*]. Another study in 2005 on 176 married men showed that 94.9% had ever used verbal abuse during their marital life and 49.4% had used physical abuse [*18*].

According to our recent study, it is not only the husband but also the in-laws who commit violence against women [*19*]. In Pakistan a joint or extended family system is the common practice where the husband and his wife live with his parents, sisters and brothers in one household. The wife is placed in a submissive position where she faces harassment from the whole family [*19,20*].

The situation of domestic violence against women in Pakistan is far from clear but what is clear is that it is an issue and not much is being done to prevent it either by the government or nongovernmental organizations (NGOs). To be able to address the issue properly it is important to have baseline data about its prevalence and reasons behind violence against women [*21*]. Although some studies have been conducted in Pakistan, none has been entirely community based. Therefore we conducted a community-based study in a low socio-

economic area with the following research objectives.

- To estimate the prevalence of domestic violence among a selected sample of women from low socioeconomic communities in Karachi, Pakistan.
- To identify the reasons for domestic violence among the women.

Methods

Setting

This was a cross-sectional descriptive study conducted from March to August 2003 in 5 low socioeconomic communities where populations of mixed ethnicity live: Korangi, Sohrab Goath, Orangi town, Mohajir camp and Layree. The inhabitants were the *Mohajir* (people who migrated from India at the time of partition), and urban migrants from Punjab (Punjabi) and Balouchistan (Baluchi). There are 3 types of dwelling: *pucca* which have cement walls, floors and roofs; *katcha-pucca* which have cement walls with roofs of asbestos/tin/wood; and *kutcha* which have walls and floor made of mud/tin/wood and roof made of asbestos/tin. Public utilities, such as water, electricity and health care centres, are very limited in these areas. The 5 communities were selected based on the presence of a household surveillance system. At Korangi, Orangi town and Mohajir camp a national health workers programme is present working for maternal and child heath. At Sohrab Goth there was no such programme present. At Layree the Layree Community Development Project is doing developmental work.

Study sample

Sample size was calculated to assess the prevalence of violence against women of low socioeconomic areas in Karachi, Pakistan. The proportion of urban women experiencing violence was estimated at approximately 30% [*17*]. Using *Epi-Info* for sample size calculation at the 95% confidence level with 5% error, sample size was estimated as 333. To be able to capture variability of the reasons for violence identified in our study we finally enrolled 400 currently married women using purposive sampling. The participants were identified by community health workers of the programmes and projects present in the selected communities based on the following inclusion criteria.

- Informed consent to participate in this study given
- Resident of the community for more than 3 years
- Married
- Age between 15 and 45 years (reproductive age)
- Having at least 2 children.
- Registered for at least 2 years with the community health worker of the NGO or the national health programme of the government of Pakistan.

Data collection

The data collection instrument (questionnaire) was based on the main objectives of the study. Five focus group discussions (FGD) were held with currently married women in the selected communities. Data gathered from the FGD were used to develop the questionnaire. The questionnaire was originally developed in English and then translated into Urdu. Two rounds of pre-testing were run. Sociodemographic data of the participants were collected, including age of respondent/husband, age at marriage, duration of marriage, number of pregnancies, occupation (respondent and husband), education (respondent and husband), monthly household income, type of house and ownership of the house. Using

a closed-ended pre-coded questionnaire, information was also collected on verbal and physical abuse experienced by the respondent from the husband and/or in-laws. The reasons for violence were also elicited from the respondents with closed-ended questions.

The data were collected by 5 interviewers who were selected by the investigators, 1 for each study site. All the interviewers held masters degrees in Sociology, had taken some health-related training and had at least 2 years of data collection experience. All spoke Urdu and at least 1 other regional language. The interviewers were given 4 days of theoretical and practical training including explanation of the study objectives, sampling strategy, communication skills, questioning techniques, ethical considerations and completing the questionnaire. The training sessions included demonstration of communication skills, role-playing, lectures and case studies. Each data collector had to demonstrate their acquired skills until their performance was found to be satisfactory. Field supervisors, who were also sociologists with 10 years of field supervision, were involved in the training and conducted the qualitative work to develop the questionnaire.

The interviews were conducted during the day at the homes of the women, when the husbands were not around. The families were already comfortable with the health workers so it was not difficult to come into the house and collect data in private. Nonetheless, the data were collected with other information, to avoid any problems for the women. The women gave verbal consent easily and they were open in their answers.

The field supervisor was responsible for checking the data quality. The questionnaires were edited by the field supervisor on a daily basis both in the field and in the office. Incomplete questionnaires were returned to the interviewers to complete by revisiting the women in their homes. Surprise reinterviews were done by either the principal investigator or the co-investigator so as to recheck various variables of the questionnaire.

Definitions

The definition of domestic violence was developed from the literature review prior to the study.

- Conceptual definition (domestic violence): a pattern of physical, sexual, and psychological abuse by a person with whom the victim has had an intimate relationship [*2*].
- Operational definitions (domestic violence): violence as perceived by the women under study.

The following forms were seen as types of violence.

- Verbal violence (conflict): taunting, blaming, criticizing and shouting.
- Physical violence: beating, pushing, shoving, using any means such as hands, legs, sticks.
- Emotional violence: feeling anxious, depressed or upset due to conflicts with husband and/or in-laws.

Ethical considerations

The Ethics Review Committee of our institution approved the study. Before data collection, verbal informed consent was taken from all the women and they were assured that all the information would be kept confidential. There were 30 women who refused to participate and were replaced by women residing in the next neighbourhood who fulfilled the criteria.

Data management

Data were double entered into *Epi-Info*, version 6. For analysis, the data were trans-

ferred in to *SPSS*, version 10. Descriptive statistics were computed at The Aga Khan University by the principal investigator.

Results

Sociodemographic characteristics

The mean age of the women was 29.0 [standard deviation (SD) 4.6] years (range 19–39 years). The mean duration of marriage was 10.5 (SD 5.0) years and age at the time of marriage was 18.8 (SD 3.3) years. A total of 1661 pregnancies were reported by the 400 women with a mean of 4.1 (SD 1.7) pregnancies. Of the 400 women, 33.8% were illiterate and 25.5% of the husbands were illiterate. Only 24.0% of the women were employed, whereas the majority (94.7%) of the husbands were employed. Most of the women lived in *katcha pucca* dwellings; only 69% owned their homes (Table 1).

Prevalence of domestic violence

The majority of women (97.5%) reported that they had experienced verbal abuse (conflict) from their husbands and 97.0% experienced such abuse from their in-laws. As regards physical violence, 80.0% reported receiving beatings by their husbands and 57.5% experienced such violence from their in-laws. The majority of women reported feeling stressed by the conflict with their husbands (98.5% of the women) and with their in-laws (97.3%).

Reasons for conflicts with husband and in-laws

The main reasons for conflicts with husbands were reported as: financial causes (65.0%), infertility (33.3%), not having a son (32.0%), husband beating or hitting the children (21.3%) and husband being addicted to drugs (15.8%) (Table 2).

The main reasons for conflicts with in-laws were reported as: household chores

Table 1 **Sociodemographic characteristics of the 400 women in urban Karachi**

Characteristic	Mean (SD)	
Respondent's age (years)	29.0 (4.6)	
Duration of marriage (years)	10.5 (5.0)	
Age at marriage (years)	18.8 (3.3)	
Number of pregnancies	4.1 (1.7)	
Monthly income of household in Pakistani rupees[a]	4000 (3777)	
	No. (*n* = 400)	**%**
Years of schooling of respondent		
None, illiterate	135	33.8
1–5	77	19.3
6–10	132	33.0
11–14	48	12.0
University	8	2.0
Years of schooling of respondent's husband		
None, illiterate	102	25.5
1–5	52	13.0
6–10	165	41.3
11–14	60	15.0
University	21	5.3
Occupation of respondent		
Housewife	304	76.0
Employed outside the home	96	24.0
Occupation of respondent's husband		
Unemployed	21	5.3
Employed	379	94.7
Type of dwelling[b]		
Katcha	18	4.5
Pucca	33	8.3
Katcha pucca	349	87.3
Owned the house		
Yes	276	69.0
No, pay rent for it	120	30.0
Provided by employer	4	1.0

[a] *US$ 1 = 60 Pakistani rupees at the time of the study.*
[b] Pucca *have cement walls, floors and roofs;* katcha-pucca *have cement walls with roofs of asbestos/tin/wood;* kutcha *have mud/tin/wood walls and floors with roofs of tin/asbestos.*
SD = standard deviation.

Table 2 **Reasons for abuse according to the 400 women of low socioeconomic status in urban Karachi**

Reason[a]	Abuse inflicted by			
	Husband		In-laws	
	Verbal abuse (%)	Physical abuse (%)	Verbal abuse (%)	Physical abuse (%)
Financial	65.0	19.8	20.8	4.8
Infertility	33.3	22.6	33.8	0.0
Not having a son	32.0	18.8	28.5	19.3
Husband beating the children	21.3	7.3	7.0	4.8
Husband's drug addiction	15.8	15.8	0.0	20.5
Refusal of sex by wife	4.8	1.8	0.0	0.0
Disobeying/arguing with in-laws	4.8	38.8	2.5	7.5
Arguing with husband	4.3	0.0	0.8	0.8
Not understanding the household chores needed or knowing how to do them	3.0	0.5	4.5	1.3
Not doing the household chores properly	2.5	3.0	80.3	28.8
Going out without permission	2.3	0.5	2.3	0.0
Going to parent's home without permission	2.0	0.0	3.3	0.0
Interference by wife's parents	2.0	1.6	2.0	4.0
Conflicts about family planning	1.3	1.0	0.5	0.0
Incitement by in-laws	1.3	0.0	0.0	0.0
Husband taking another wife	0.5	0.0	0.0	0.0
Dowry (too little or none)	0.0	0.0	9.5	13.0
Exchange marriages *(watta satta)*[b]	0.0	0.0	2.8	0.0
Husband favouring wife over parents	0.0	0.0	1.0	0.0
In-laws dislike wife	0.0	0.0	3.8	0.0
Wife's extramarital affairs	0.0	0.3	0.0	1.3

[a] *Multiple responses were possible so the total does not sum to 100%.*

[b] *2 siblings in one family are married to 2 siblings of another family. If one misbehaves (usually a girl) as perceived by the family she has married into, the other (usually a girl married into the same family) may be mistreated.*

(80.3%), infertility (33.8%), not having a son (28.5%) and financial reasons (20.8%) (Table 2).

Reasons for physical violence from husband and in-laws

The main reasons reported for physical violence by the husband included: disobeying and arguing with in-laws (38.8%), infertility (22.8%), financial reasons (19.8%), not having a son (18.8%) and husband being addicted to drugs (15.8%) (Table 2).

The main reasons reported for beating by in-laws included: household chores (28.8%), husband addicted to drugs (20.5%), not having a son (19.3%), dowry issues (13.0%), and disobeying and arguing with in-laws (7.5%) (Table 2).

Discussion

Violence affects the lives of millions of women worldwide, of all socioeconomic and educational classes. However, a study conducted in medical clinics in Sudan in 2001 reported that women with low educational status and unemployed women and newly married women were more frequently abused [*22*]. Domestic violence cuts across cultural and religious barriers, undermining the right of women to participate fully in society [*23*].

Our community-based study found that the prevalence of conflict with the husband as perceived by the wife was about 98% and with in-laws about 97%. The prevalence of physical abuse by husbands reported by the women was 80% and by the in-laws 58%. Our findings support those of previous studies done in Egypt (34%) [*5*], Canada (17%) [*6*], Haiti (16.4%) [*7*], Bangladesh (42%) [*24*], India (30%) and some squatter settlements of Pakistan (34%) [*8,16–18*], but our figures are much higher. The high prevalence of perceived violence against women in this study could be attributed to the fact that 50% of our participants were either not educated or had had only limited schooling. It has been reported generally that a woman's ability to make decisions is acquired when she has had at least 10 years of schooling [*7*]. As reported by one study, many women perceived that education improved women's status and increased their contribution to their households, thereby awarding them more freedom and less dependency [*24*]. In the women's view, education has both a direct effect on women's status and an indirect effect that operates through increased earning potential. On the other hand, the study identified that a husband's violence against his wife was associated with the woman being more financially independent. This indicates that a shift in the balance of power between husband and wife can lead to violence.

A predisposing factor for our participant's perception of domestic violence is the power bestowed upon males which subjugates women and makes them submissive to men. In Pakistan, the bride generally lives with her in-laws and looks upon them as the ultimate authority figure in the household. This gives power to the in-laws. The bride's parents are not supposed to interfere with the life of their daughter once she is married. Any attempt on the part of the bride's parents to influence her may lead to conflicts with the husband and the in-laws. It may even go as far as the husband and in-laws beating the wife to show their power.

Financial issues were an important reason for domestic violence in our study. This finding has been reported by many other studies. For example, studies on Haitian and Native American women showed that because of their lack of financial contribution they perceived themselves as powerless [*7,8*]. In Pakistan, a number of NGOs are working to raise the economic status of women by offering them microcredit. However, these programmes are providing protection only to a very few because many women are not aware of the schemes or may not be allowed by the husband/the family to go to a bank or NGO to learn about the system.

Infertility and not giving birth to a son were 2 other reasons for violence found in our study. In the communities studied, it is believed that the woman alone is responsible for the sex of a child. The concept of male involvement in providing X and Y chromosomes to the female is either unknown, unclear or completely ignored. In addition, such families are not aware of how much the male can contribute to the cause of infertility. It is the woman who is held responsible for infertility, becomes so-

cially stigmatized and possibly the victim of verbal and physical abuse too [*20*]. In China and India, some women choose to terminate their pregnancies when expecting daughters but carry their pregnancies to term when expecting sons [*25,26*]. Further an Egyptian study identified that women are not aware of their reproductive rights [*27*].

Another perceived reason for the abuse suffered by our participants was the drug addiction of the husband. Other studies have reported on the association between domestic violence and drug and alcohol use [*25,28*].

Domestic chores are one of the reasons reported by women in our study particularly in relation to the in-laws. The wife will work for 24 hours without recognition and rest because little social value is given to her by her husband and in-laws. This may result in the woman becoming stressed and irritable which then often gives the husband and in-laws the opportunity to physically abuse her. Many men and in-laws have false socioreligious belief that women have lower intellects than men and are thus not able to understand what is right for them and make proper decisions. Therefore, they are overprotective of the woman and completely limit her mobility and contact with others [*16*]. In addition in our culture women's exposure to men other than the husband tends to be restricted. The women in our study reported that their husbands were jealous if they talked to other men. This result is supported by the qualitative study we conducted to develop the questionnaire that found that when women talk to another man, it is viewed almost as an extramarital affair.

The major limitation in this study was the non-random purposive sampling technique used whereby only women of low socioeconomic level were recruited. This was done because domestic violence in our culture is a very sensitive issue and people tend not to wish to discuss it especially with strangers. Therefore, the health care workers were used to collect the data as they were known to the women and her family and had a rapport with them. We collected information only about physical (beating), and verbal (conflict) violence. Due to the sensitivity of the topic, we did not collect information on sexual violence, which is another limitation of our study. The findings of this study should be taken in the light of these limitations. Despite this, we believe the study contributes to our understanding of the prevalence of and possible reasons for domestic violence among urban women of low socioeconomic status in Karachi, Pakistan.

We conclude that the prevalence of domestic violence among such women is high and this violence puts the women under considerable stress. The main reported reasons for the violence are public health issues which should be addressed by health professionals. There is therefore a need for women's empowerment through increased schooling and improved financial capacity so that they are able to participate in the decision-making process of a household. The media could play a leading role in persuading society to be more supportive of women and their role in society. Awareness is the first step towards a more supportive and tolerant society.

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Violence and injury prevention: road traffic injuries

http://www.emro.who.int/vip/roadtrafficinjuries-regionaldata.htm

In 2002 there were an estimated 132 207 road traffic deaths in the WHO Eastern Mediterranean Region (362 deaths/day).

The Region has the highest rate of road traffic deaths among males. In low- and middle-income countries, the annual road traffic death rate for males (117.0/100 000) is more than double the rate for low- and middle-income countries across the world (53.3/100 000). For males aged 45–59, the rate in low- and middle-income countries in the Region (63.9/100 000) is 50% higher than that in low- and middle-income countries across the world (43.2/100 000).

Similarly, the annual road traffic death rate for females aged 60 and over in the Eastern Mediterranean Region as a whole (46.0/100 000) is 241% higher than the rate for females in this age group across the world (19.1/100 000).

Assessment of the pharmaceutical quality of omeprazole capsule brands marketed in Egypt

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تقييم الجودة الصيدلانية لأصناف كبسولات الأوميبرازول في الأسواق المصرية

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الخلاصة: أجرى الباحثون تقييماً لسبعة أصناف محلية لكبسولات الأوميبرازول المتوافرة في الأسواق المصرية، مقارنةً بالمنتج المحفوظ الملكية (® Losec). وتم في هذه الدراسة تحديد المحتوى الدوائي، وتجانُس المحتوى، واختبارات انطلاق الدواء (باستخدام اختبار دستور الأدوية الأمريكي المتعلِّق بالمواد ذات الكسوة المعوية، إلى جانب اختبار آخر معدل). وأُخضعت هذه المنتجات لدراسة ثبات لمدة ثلاثة أشهر. وجاءت النتائج مرضية في ستة من الأصناف السبعة التي أخضعت للدراسة، وذلك من حيث المحتوى الدوائي وتجانُس المحتوى. واجتازت الأصناف كلها اختبار انطلاق الدواء المذكور في دستور الأدوية الأمريكي. وثبت أن اختبار الإنطلاق المعدَّل هو الاختبار الأكثر قدرة على التمييز. وظل المحتوى الدوائي، في ثلاث من هذه الأصناف، بعد تخزينها لمدة ثلاثة أشهر، أعلى من 0 ٪، واحتفظ اثنان منها بمقومات الإنطلاق الدوائي بنسبة تجاوزت ٪. وأشارت التغيرات التي طرأت على مظهر الحُبَيْبات، خلال فترة التخزين، إلى تحلُّل الأوميبرازول كيميائياً.

ABSTRACT The pharmaceutical quality of 7 local omeprazole capsule brands in Egypt was assessed relative to the proprietary product (Losec®). Drug content, content uniformity, drug release (using USP test for enteric coated articles and a modified release test) were determined. Products were subjected to a 3-month stability study. Of the 7 brands, 6 had satisfactory drug content and content uniformity. All brands passed the USP drug release test. The modified release test proved to be more discriminative. After 3 months storage, drug content of 3 brands remained > 90% and 2 of these brands maintained drug release above 75%. Changes in pellet appearance during storage were indicative of omeprazole chemical degradation.

Évaluation de la qualité pharmaceutique des différentes spécialités d'oméprazole gélule commercialisées en Égypte

RÉSUMÉ La qualité pharmaceutique de 7 spécialités génériques d'oméprazole gélule fabriquées par des laboratoires égyptiens a été évaluée par comparaison avec la spécialité originale de référence (Losec®). Ont été déterminés le dosage du principe actif, l'uniformité de la composition et la libération du principe actif (*via* le test pour formulations à enrobage entérique de l'USP [Pharmacopée américaine] et un test pour formulations à libération modifiée). Les produits ont été soumis à un essai de stabilité de 3 mois. Le dosage du principe actif et l'uniformité de la composition se sont avérés satisfaisants pour 6 des 7 génériques étudiés. Tous les génériques ont passé avec succès le test de libération du principe actif de l'USP. Le test pour formulations à libération modifiée s'est révélé plus discriminant. Au bout de 3 mois de conservation, la teneur en principe actif de 3 génériques demeurait > 90 % et pour deux d'entre eux la libération du principe actif était supérieure à 75 %. Les modifications de l'aspect des microgranules constatées pendant l'essai de stabilité étaient révélatrices de la dégradation chimique de l'oméprazole.

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Introduction

Omeprazole, a proton pump inhibitor which has greater anti-secretory activity than H_2 antagonists, has been widely used in the treatment of reflux oesophagitis, Zollinger–Ellison syndrome and peptic ulcer disease [*1*]. Being unstable in acidic pH [*2*], omeprazole is marketed as enteric-coated pellets encased in hard gelatin capsules. Pellets may undergo changes upon storage involving mainly enteric performance and release characteristics [*3*]. After encasing into capsules, additional storage-induced changes in the capsule shell may take place [*4,5*]. Thus, post-marketing follow-up is necessary to monitor probable changes which may affect the performance of omeprazole capsules.

Omeprazole is currently marketed in Egypt by a number of pharmaceutical companies using coated microgranules from different origins and using different types of packaging (Table 1). Differences in the quality of granules coating may be a source of variability in the *in vitro* and consequently *in vivo* availability of omeprazole [*1*]. Packaging types have been reported to be an additional factor significantly influencing formulae stability and performance [*6*]. Moreover, there are wide variations in price in the marketed omeprazole products, particularly between generic products and the proprietary one. The price per capsule ranges from Egyptian pounds (LE) 1.5 to 7 (US$1 = LE 6.8 at the time of the study) (Table 1). Recurring gastrointestinal tract (GIT) conditions necessitate long-term therapy with long-term cost implications. Remak et al. suggested an economic model to compare the cost and effectiveness of 7 proton pump inhibitors (PPIs) in patients suffering from gastro-oesophageal reflux disease (GERD) [*7*]. Accordingly, there appear to be many sources of variation in the pharmaceutical performance of omeprazole capsules.

The objective of the present study therefore was to assess the quality of different brands of omeprazole capsules available on the Egyptian market and the efficiency of the national regulatory system to ensure the pharmaceutical quality of multisource products or product components.

Methods

Omeprazole standard was obtained from Astra Hässle AB, Sweden. Seven commercial generic brands of omeprazole capsule products (20 mg) marketed in Egypt (Table 1) were purchased from local pharmacies and compared to the original innovator product (Losec®) manufactured by Astra. Variations in manufacturing–expiry date ranges were small. Acetonitrile (Fisher Scientific, United Kingdom) and methanol (Riedel-de Haën, Germany) were of high performance liquid chromatography (HPLC) grade. Other chemicals were of analytical grade.

Determination of omeprazole content

The omeprazole content of the products was determined using the HPLC method reported by Storpirtis and Rodrigues [*8*] with slight modification. The HPLC system used (Perkin Elmer series 200, United States) was equipped with a pump, vacuum degasser, ultraviolet/visible detector, autosampler and a chromatography interface 600 series link operated by a software system version 6.2. A reserved phase column, Spheri-5, RP-18, 5µ, 220 × 4.6 mm (Perkin Elmer, Brownlee columns) was used. The mobile phase consisted of 40% (v/v) acetonitrile and 60% (v/v) phosphate buffer solution pH 7.6 flowing at a rate of 1 mL/minute; the detection wavelength was 302 nm. Analysis was performed at room temperature with an injection volume of 20 µL.

Table 1 **Price and packaging of the innovator product and 7 omeprazole capsule brands[a] available on the Egyptian market**

Product[b] code	Price/ capsule (LE)[c]	Packaging
Innovator	7	White high-density polyethylene plastic bottle with screw security plastic cap and containing a desiccant disc
Brand A	1.5	White high-density polyethylene plastic bottle with screw security plastic cap and containing a desiccant disc
Brand B	3	PVC/PVdC–aluminium blister; each blister contains 5 capsules
Brand C	3.14	Amber glass bottle containing a desiccant disc and having screw aluminium cap
Brand D	2.36	Amber glass bottle containing a desiccant disc and having screw aluminium closure
Brand E1[d]	3	Laminated aluminium–aluminium strip. Each strip contains 4 capsules
Brand E2[d]	3.03	Amber glass bottle containing a desiccant disc and having screw aluminium closure
Brand F	3.03	White high-density polyethylene plastic bottle containing a desiccant disc and having screw security plastic cap. The whole bottle is wrapped in a clear plastic second wrapping that is removed during opening of the bottle.

[a]All capsule products contained 20 mg omeprazole.
[b]For each product, the selected capsules had the same batch number.
[c]US$ 1 = Egyptian pound (LE) 6.8 at the time of the study.
[d]Brands E1 and E2 were from the same source and the same batch but had different packaging materials.

An amount of the pellets equivalent to 20 mg of omeprazole was accurately weighted and sonicated with 60 mL of 0.1 N NaOH (ultrasonic bath) for 10 minutes. Methanol (20 mL) was added and the mixture sonicated for 5 minutes. The volume was completed with 0.1 N NaOH to 100 mL, and the mixture filtered through a Millipore nylon filter (0.45 µm □ 25 mm). The filtrate was kept in the refrigerator protected from light; under these conditions it is expected to be stable for 3 days [*8*]. Before analysis, the filtrate was diluted with water/acetonitrile mixture (60:40) to a final concentration of 5 µg/mL.

A standard solution was prepared by dissolving 20 mg of omeprazole standard powder in 20 mL methanol (HPLC grade). The volume was completed to 100 mL with 0.1 N NaOH and the solution filtered

through a Millipore nylon filter (0.45 µm □ 25 mm). The filtrate was kept in a refrigerator protected from light. Concentrations used for the calibration graph ranged from 0.125 to 15 µg/mL.

Content uniformity testing

Ten capsules were assayed individually and the content was expressed as a percentage of the label claim. The mean and relative standard deviation (SD) were calculated and compared as directed by United States Pharmacopeia (USP) 28.

Drug release testing

The evaluation of the biopharmaceutical quality of omeprazole capsules, regarding its dissolution characteristics, is not specifically regulated in the commonest pharmacopeias (USP28 includes a general monograph for enteric-coated products).The *in □itro* release from the studied capsules was thus assessed using the official method and compared to a modified method.

Standard USP method

Drug-release studies were performed according to the USP 28 procedure for delayed-release (enteric-coated) articles. In each study, 6 capsules were tested using dissolution apparatus type 2. Initially, the capsules were exposed to a simulated gastric fluid (750 mL 0.1 N HCl, pH 1) maintained at 37 □ 0.5 □C and rotated at 100 rpm for 2 hours. After withdrawal of a 2 mL sample, 250 mL of 0.2 M Na_3PO_4 solution equilibrated at 37 □C were added to the acidic medium and the pH was adjusted to 6.8 □ 0.5. Two mL samples were withdrawn at 5, 10, 20, 30 and 45 minutes and transferred to tubes containing 1 mL 0.3 N NaOH. Samples were then filtered through a 0.45 µm cellulose nitrate membrane filter and kept in a refrigerator protected from light pending analysis. The analysis followed the same HPLC procedure described above.

Modified release method

The pH of the release medium used in the initial acid stage of the standard USP method was changed from pH 1 to pH 4 □ 0.5 [*9*] by adding Na_2HPO_4. Three capsules per brand were tested.

Stability testing

All products were subjected to the accelerated stability testing conditions recommended by the International Conference on Harmonization (ICH) guideline [*10*]. Samples of omeprazole capsules in their original packages were stored in an incubator at temperature of 40 □2 □C and relative humidity (RH) of 75 □5%. The capsules were monitored over the 3-month study period for changes in the appearance of the pellets, drug content and drug release using the official USP release test.

Data analysis and statistics

Interbrand variation was evaluated using the one-way analysis of variance (ANOVA) followed by the Dunnett multiple comparison post-test to compare each of the local brands with the innovator's. $P < 0.05$ was considered significant.

Results

Among the 7 brands tested, only brand C failed to conform with the USP requirements for content and content uniformity; its initial assay value was 121.02% and its content uniformity ranged from 118.17% to 127.44%.

Figure 1A and B show the release profiles of the different brands of omeprazole capsules using the official method and the modified one respectively. Pre-exposure to pH 1 (Figure 1A) did not result in drug release; this was only initiated by switching the release medium pH to 6.8. Significant differences were observed in omeprazole

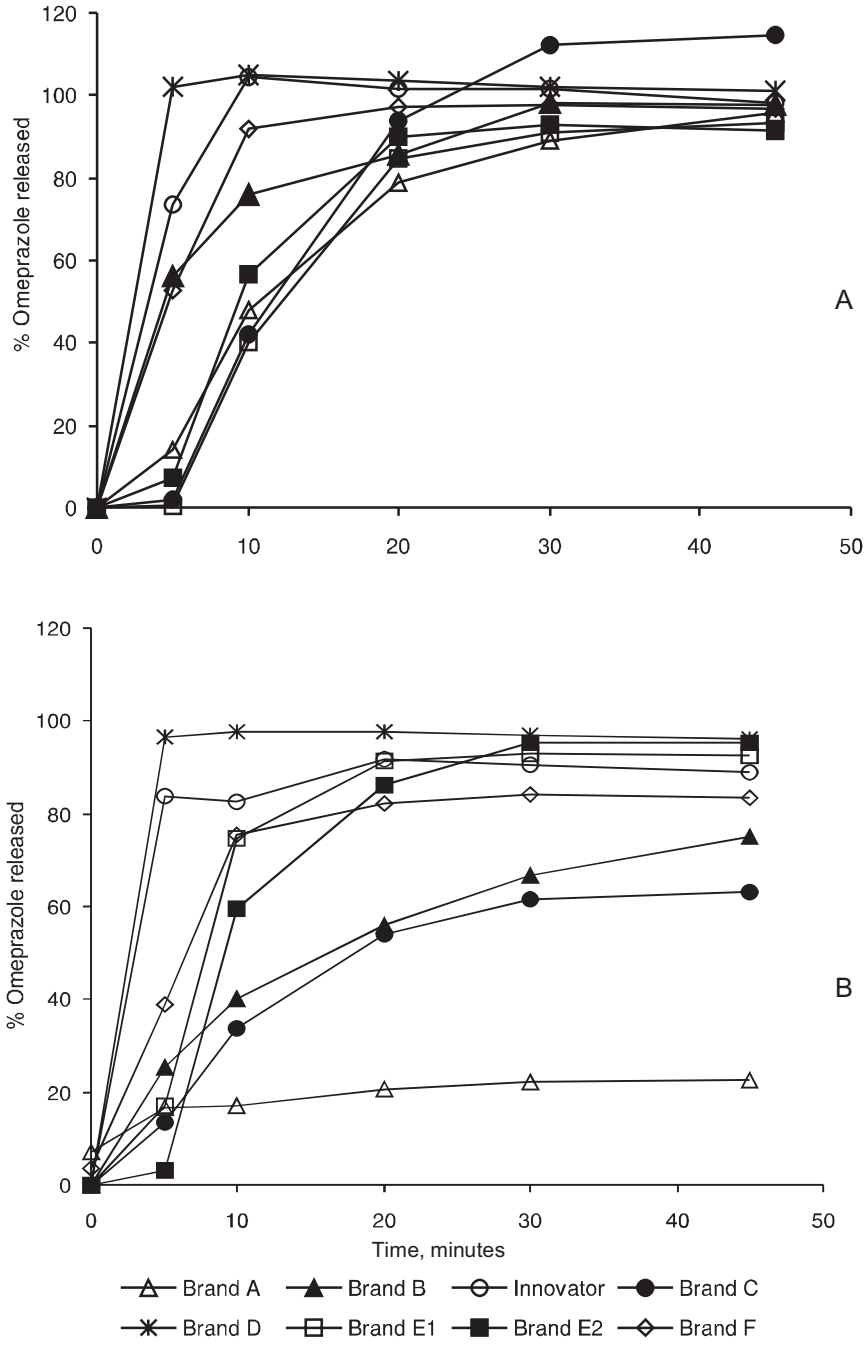

Figure 1 **Release profiles of different brands of omeprazole capsules at pH 6.8 after pre-exposure to pH 1 (A) or pH 4 (B) for 2 hours**

release time between the innovator product and the tested brands for up to 10 minutes, except for brand D which had a release profile similar to that of the innovator. According to USP 28, not less than 75% of the labeled omeprazole must be released, from a 20 mg capsule, in 45 minutes; all tested brands exceeded 90% release (Figure 1A). It is worth noting that brand C achieved 120% release at 45 minutes, which is consistent with its higher drug content (121.02%). Figure 1B shows obvious interbrand variations concerning both rate and extent of drug release after pre-exposure to pH 4. In addition, brands A and F released 7.1% and 3.7% of their drug content at zero-time respectively. This may point to loss of coat integrity during the acidic stage (pH 4).

Statistical evaluation of the release data indicated significant interbrand variability in the first 10 minutes of the release test, as well as significant differences between the innovator and each of brands A, B, C and E2. In addition, the innovator showed statistically significant differences regarding the extent of omeprazole release (% released at 45 minutes) when compared to brands A, B and C.

Stability of the studied brands was monitored over a 3-month period at 40 °C/75% RH using changes in pellet appearance, drug content and release stability as parameters (Table 2, Figure 2). At zero time, the majority of the observed pellets were white, except for brand B and D. Brand A and F showed progressive stickiness and darkening of the pellets (Table 2). The drug content of the tested brands was within the acceptable range (90%–110%) at the end of 2 months storage, except for brand B which showed a drastic decrease to 1.79% (Figure 2A). After 3 months, 3 other brands, A, D and F, in addition to brand B, failed to maintain omeprazole content above 90%. The initial omeprazole content of brand C was higher than the upper limit of the acceptable range (121.02%); this decreased after 2 and 3 months storage to 103.6% and 102.33% respectively (Figure 2A).

Percentage drug release at 45 minutes over the 3 months storage is shown in Figure 2B. Brands A and B showed a significant decrease in omeprazole release at 45 minutes at 2 and 3 months; after 3 months omeprazole release at 45 minutes for brands D and F was also significantly lower.

Table 2 **Changes observed in the *in vitro* performance and appearance of omeprazole capsules after 3 months storage at 40 °C/75% relative humidity**

Brand	Decrease in drug content (%)	Decrease in drug release at 45 minutes (%)	Decrease in dissolution efficiency (%)	Pellet appearance
Innovator	6.48	5.88	13.5	White coloured/remained unchanged
A	29.44	88.43	64.9	White coloured/became dark and sticky
B	93.91	95.25	79.7	Light grey coloured/changed to dark grey
C	18.69	13.51	22.0	White coloured/remained unchanged
D	11.71	77.72	75.7	Creamy coloured/darkened to brown
E1	8.66	19.84	26.6	White coloured/remained unchanged
E2	3.03	9.42	16.7	White coloured/remained unchanged
F	12.03	89.59	81.4	White coloured/became dark and sticky

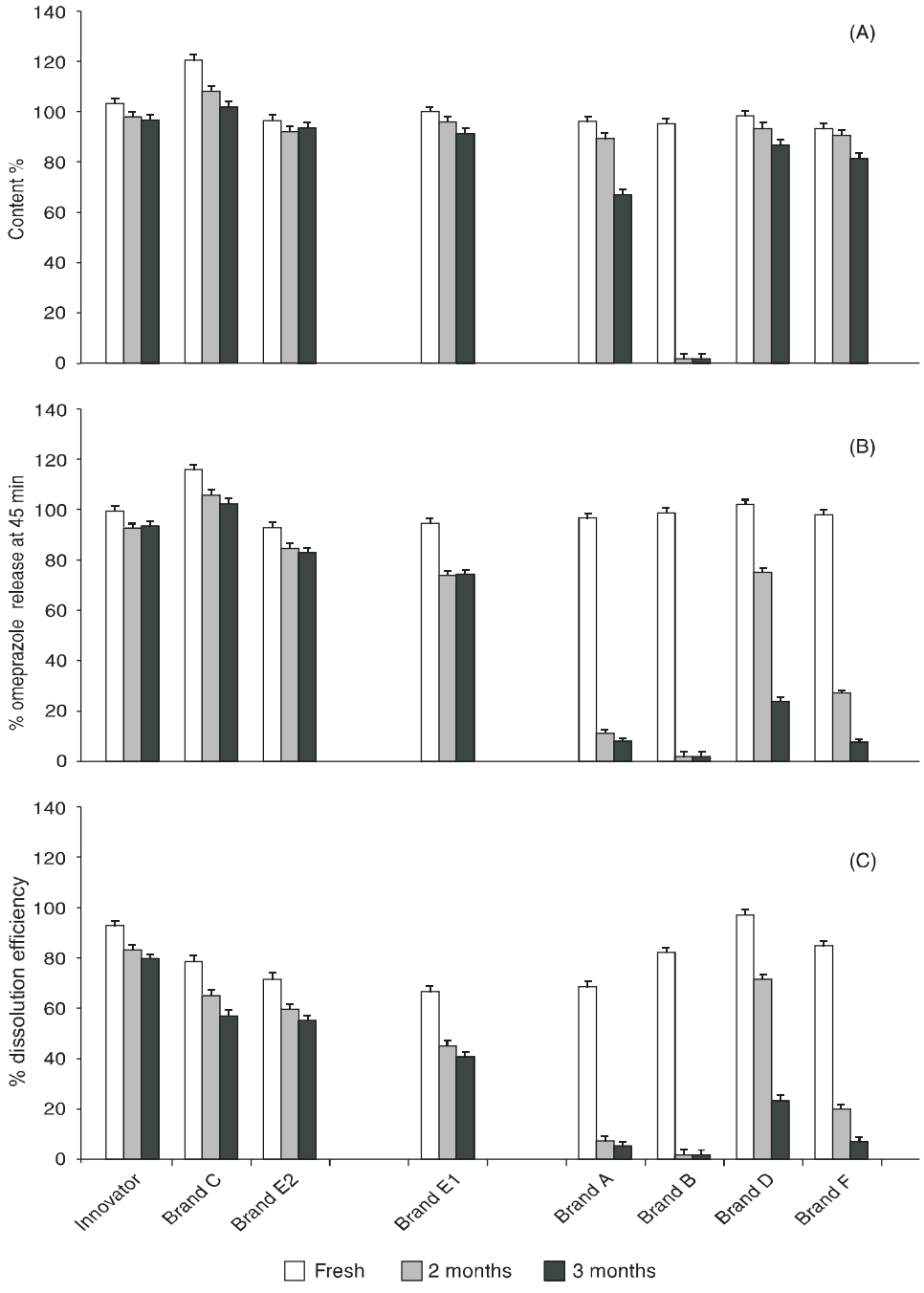

Figure 2 **Changes in % omeprazole content (A), % release at 45 minutes (B) and % dissolution efficiency (C) upon storage for 3 months at 40 °C and 75% relative humidity**

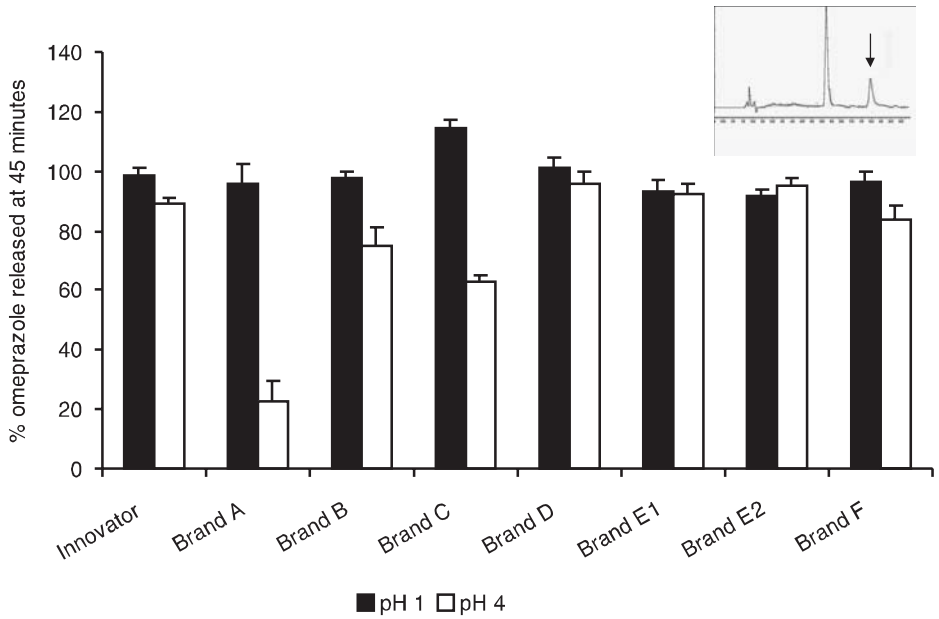

Figure 3 **Influence of pre-exposure of omeprazole capsules to pH 1 or pH 4 on the % omeprazole released at 45 minutes. The insert shows an extra peak in a chromatogram of a release sample at pH 4.**

Release stability of omeprazole capsules upon storage was also studied using per cent dissolution efficiency (% DE) (Figure 2C). Again, for brands A, B, D and F, the %DE decreased significantly at 3 months.

Regarding the influence of packaging materials on capsule stability (Tables 1 and 2), the results show the superiority of the innovator packaging. The PVC/PVdC-aluminium blister of brand B proved to be the least protective. Amber glass bottles were the most protective of the locally used packaging materials.

Figure 3 shows the influence of pre-exposure of omeprazole capsules to pH 1 or pH 4 on the % omeprazole released at 45 minutes. There was a decrease in % released at 45 minutes for brands A, B and C after pre-exposure to pH 4 compared to pH 1. The insert shows an extra peak in a chromatogram of a release sample at pH 4.

Discussion

Inspection of the *in vitro* performance of omeprazole capsules produced by Egyptian companies revealed remarkable inter-brand variations and significant differences between some of the local brands and the innovator.

Omeprazole, being a proton pump inhibitor (PPI), induces an increase in stomach pH up to 4 upon repeated administration [*11*]. Accordingly, performing the release test at this pH provides more realistic conditions for drug release from capsules [*9*].The protective capacity of the enteric coat has been reported to be threatened at elevated gastric pH [*12*]. Our results showed a decrease in % released at 45 minutes for brand A, B and C after pre-exposure to pH 4 compared to pH 1. This could be explained by the probable loss of gastric resistance of the enteric coat-

ing polymers with consequent omeprazole degradation at pH 4. The appearance of a new peak, in addition to the omeprazole peak, in the release samples analysed confirmed this degradation.

Mathew et al. mentioned the appearance of 4 extra peaks when omeprazole was subjected to drastic acidic conditions [*2*]. One of the degradation products (H 238/85-Astra) was identified by Storpiritis and Rodrigues [*8*]. In addition to its capability to evaluate the protective capacity of the coating, the modified release method is more discriminative and can reveal differences in pharmaceutical quality of different omeprazole capsule brands, which might be obscured under the conventional USP test. Elkoshi et al. showed that pre-exposure of omeprazole capsules to pH 3 or 4 was more discriminative and resulted in release data that could correlate well with *in vivo* availability, while the official test results did not reflect the actual *in vivo* behaviour [*12*].

The stability of the tested capsule brands was monitored over 3 months of storage; the results revealed that the tested brands could be classified in 3 categories (Figure 2). The first one includes the innovator and brands C and E2, which showed drug content and % release at 45 minutes above the USP limits throughout the 3-month study period. The second category comprised brand E1, which maintained omeprazole content above 90% but failed to maintain drug release above 75%. The observed decrease in drug release was not merely due to drug degradation, but rather may be attributed to changes in coating polymer properties [*13*]. The third category included products that suffered decrease in both omeprazole content (< 90%) and drug release (< 75%); this included brands A, B, D and F. These products showed a more pronounced decrease in release when compared to the decrease in content, indicating probable degradation during the acid stage of the dissolution test. The appearance of new peaks in the dissolution samples analysed of the 4 brands confirmed this degradation. The loss of the gastroresistance of enteric-coated formulae with ageing has been previously reported [*14,15*]. Moreover, the polymer structure may influence omeprazole stability [*16*]; the acid structure of the enteric coating polymers as well as the acidic by-products induced degradation of omeprazole.

The results revealed that colour change in pellets may be indicative of alteration in the coating polymer which in turn may influence drug release [*8*] and content stability [*17*]. Moreover, the influence of packaging materials on product stability was obvious when comparing brands E1 and E2; both were from the same source but with different packaging. The packaging material was most probably responsible for the differences in stability observed between the 2 brands.

Release stability of omeprazole capsules upon storage was further assessed using per cent dissolution efficiency (% DE). The % decrease in DE after 3 months storage was statistically significant between the innovator and each of the tested brands except brand E2. This parameter is more realistic for comparison of release data as it takes into consideration all release data points rather than a single point [*18*].

Conclusion

Wide variations in the *in vitro* performance of omeprazole capsule products marketed in Egypt were observed and the modified release method proved to be more discriminative than the conventional USP one. The nature of the packaging materials had a clear influence on the performance of omeprazole capsules when stored: amber

glass bottles ensured higher protection than blisters, strips or plastic bottles. The progressive darkening of the pellets indicated, qualitatively, the level of degradation of the product. The innovator was the brand most resistant to changes followed by brand E2. In addition, brand E2 is less expensive and thus could be considered more cost-effective for long-term therapy compared to the innovator.

The data obtained in this study strongly point to the need for assessment of the performance of drug products post-marketing and for strengthening the role of the national regulatory system to ensure the quality of multisource products.

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Safet of children's medicines

The lack of thorough and reliable clinical data on the way medicines affect children requires strengthened safety monitoring and vigilance of medicinal products. This is the fundamental message of *Promoting safet of medicines for children*.

Intended for policy-makers, manufacturers, medicines control bodies and researchers, the publication gives an overview of the problem and offers solutions on how best to address side effects from medicines in children. It is part of a broad effort WHO is initiating to expand children's access to quality-assured, safe and effective medicines.

For instance, countries should establish national and regional monitoring systems for the detection of serious adverse medicine reactions and medical errors in children; regulatory authorities need to make an effort to refine the science of clinical trials in children, create an active post-marketing surveillance programme and develop public databases of up-to-date information about efficacy and safety in paediatric medicines.

In addition, regulatory authorities need to make an effort to refine the science of clinical trials in children, create an active post-marketing surveillance programme and develop public databases of up to date information about efficacy and safety in paediatric medicines.

This publication can be ordered from the WHO bookshop (contact: bookorders@who.int) or can be downloaded as a PDF file at: http://www.who.int/entity/medicines/publications/essentialmedicines/Promotion_safe_med_childrens.pdf.

Environmental behavioural modification programme for street children in Alexandria, Egypt

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برنامج تغيير السلوك البيئي لأطفال الشوارع في الإسكندرية، مصر

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الخلاصة: نُفِّذ في مدينة الإسكندرية، بمصر، برنامج لتغيير السلوك البيئي بغرض مساعدة أطفال الشوارع على تغيير سلوكهم، واستكشاف قدراتهم، واكتساب مهارات ومعارف جديدة. واشتمل البرنامج على رحلات ميدانية ومخيمات، وأنشطة وألعاب ترفيهية، وعروض مسرحية، ورواية قصص، وأنشطة لتنمية مهارات الحياة، وزراعة الحدائق ورعاية الحيوانات. وتم جمع المعطيات من الملاحظات المدوَّنة عن السلوك التكيُّفي ومن جلسات المحادثة قبل وبعد التدخل الذي غطَّى 35 طفلاً من أطفال الشوارع في عمر 7 إلى 15 عاماً. ولوحظ تحسُّن يُعْتَدُّ به إحصائياً في الأحراز المتوسطة لكل بند سلوكي على حدة، ولجميع البنود معاً، قبل التدخل وبعده، في عدد من المجالات، باستثناء تعاطي مواد الإدمان واضطرابات الكلام.

ABSTRACT An environmental behavioural modification programme was implemented in Alexandria city, Egypt, in order to help street children to change their behaviour, discover their abilities and develop and acquire new skills and knowledge. The programme included camping and field trips, recreational activities and games, role play and theatre, story-telling, life-skill activities, and gardening and animal care. Data were collected from observational sheets of adaptive behaviour and conversation sessions before and after the intervention on a sample of 35 street children aged between 7 and 15 years. The mean scores for each behavioural item and all items together before and after the intervention were significantly improved in a number of areas, except for speech disorders and substance use.

Programme de modification des comportements environnementaux des enfants des rues en Alexandrie (Égypte)

RÉSUMÉ Un programme de modification des comportements environnementaux a été mis en œuvre dans la ville d'Alexandrie (Égypte) afin d'aider les enfants des rues à modifier leur comportement, à découvrir leurs aptitudes et à développer et acquérir des compétences et des connaissances nouvelles. Ce programme comportait différents volets : camping et excursions, activités récréatives et jeux, spectacle et théâtre, narration, activités d'acquisition de compétences pour la vie, jardinage et soins aux animaux. Les données ont été collectées auprès d'un échantillon de 35 enfants des rues, âgés de 7 à 15 ans, sur la base de fiches d'observation du comportement adaptatif et de séances d'entretien avant et après l'intervention. Les scores moyens de chaque item comportemental et de l'ensemble des items avant et après l'intervention ont laissé appara tre une amélioration significative dans un certain nombre de domaines, à l'exception des troubles de la parole et de l'usage de substances psychoactives.

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Introduction

The phenomenon of street children today has become an important subject of international concern. A street child has been defined as: "any girl or boy who has not reached adulthood (3–18 years) for whom the street has become his/her habitual abode and/or source of livelihood and who is inadequately protected, supervised or directed by responsible adults [*1*]. In industrial countries, this definition may be extended to include those who spend all day in the street unsupervised [*1–4*]. The United Nations has estimated the population of street children worldwide at 150 million, and the number is rising daily; 40% of those are homeless and the other 60% work on the streets to support their families [*5*].

In Africa, the problem of street children is poorly documented [*4*]. Most street children are boys. The percentage of girls among street children in various developing countries ranges from only 3% to 29% [*6*]. Miserable living conditions and domestic violence are major reasons why these young people leave home or are sent out to the streets in order to make money to support their families. Very often women abandoned by the father of their children are left to support the house alone. As a result, family ties are broken and these children move away from their communities and form alliances with other street children in order to survive [*7,8*]. Research indicates that families with single mothers and children make up the largest group of people who are homeless in rural areas [*8*]. Increasingly these children are defenceless victims of violence, sexual exploitation, neglect and criminal activities [*5,8*].

The reasons why children live on the street vary. However, there is one explanation that holds true for both developed and developing countries: poverty. Most street children go onto the street to look for a better way of living, to earn money for themselves and support their families and to find shelter [*2,3,9*]. In general, street children share common problems which may be social, physical, psychological and mental [*2,3,9*]. Social problems include poverty and illiteracy, discrimination and lack of accessible resources, a violent environment and stigmatization. Physical problems include lack of adequate nutrition, intentional and unintentional injuries, sexual and reproductive health problems and some common diseases such as skin diseases, parasitic diseases, tuberculosis and dental problems. Psychological and mental problems can be precipitated by a stressful past, transitory lifestyle, psychoactive substance use and include mental health problems such as emotional aggression, psychiatric disorders and learning difficulties [*2,3,9*].

An earlier cross-sectional descriptive study was conducted on 100 street children attending rehabilitation institutions in order to define their problems and needs. The results of this preliminary study are reported in an earlier paper [*10*] and showed that street children are disproportionately victims of family breakdown, and sexual and physical abuse. They suffer from malnutrition, health problems and lack of education and they tend to display aggressive and violent behaviour. They are extremely vulnerable to communicable diseases such as tuberculosis. They are thus a potential hazard to themselves and the public at large. A behavioural modification intervention was therefore designed to address the needs, psychological issues and problems of street children in Alexandria via a programme to improve their environmental behaviour and raise their self-esteem. This paper reports an evaluation of the intervention programme.

Methods

Sample

The original sample of 100 street children was a non-random, purposive sample, chosen from 3 central districts of Alexandria (Middle, East and West districts) that have a high concentration of street children (although all children attended the same rehabilitation institution) [*10*]. Children eligible for the study were those who met the definition of street child adopted by UNICEF [*8*].

A representative sample from the original 100 street children was chosen to take part in the environmental behavioural modification programme. A total of 42 street boys aged between 7 and 15 years were selected from the El-Horreya Institute for community development in Alexandria (an institution that only provides shelter). Boys were included in the programme if they had more than 1 behavioural problem, had not been exposed to a previous environmental behavioural modification programme, remained in the Institute during the programme, did not try to leave and had an IQ within the normal range. Most of the boys had been on the streets since before the age of 6 years. Behavioural problem include aggression and violence, stealing, begging, scavenging, commercial sex, illicit drug trafficking or substance use.

From the initial sample 7 children were excluded: 2 brothers returned to their family; 4 children had jobs outside the institute during the day and could not attend the programme activities and 1 child left the institute due to family problems. Thus, the final sample for the intervention was 35 boys: 28 aged 7–11 years and 7 aged 12–15 years. All gave their full consent to participate in the programme.

Data collection

Data on the children were collected using a specially designed questionnaire. The questionnaire was structured according to the handbook of the World Health Organization [*2*]. It assessed the family background, education status of the children and their parents, reasons for being on the street, duration of street life, presence of responsible adults, activities performed to earn money and history of police arrest. The interview was repeated twice to ensure the reliability of the data.

Each child was given the Arabic version of the Weksler IQ test for intelligence [*11*] and was observed using an observational sheet for adaptive behaviour, as previously described [*12*]. The IQ test was performed for every child in order to ensure that the chosen sample was within the normal range of IQ.

All children were medically examined at the clinic of the rehabilitation institution and interviewed in more than one setting.

An observation sheet was used in order to monitor the adaptive behaviours for each child through conversation sessions. Data were collected through conversation sessions recorded on videotape, to identify the main environmental behavioural problems. Priorities were settled and a strategic plan was developed to fulfil their needs.

The invention programme was planned and adapted from several publications concerning behaviour modification [*12–19*] and the researchers supervised its activities for the different age groups of children.

Pre- and postprogramme tests using the observational sheets were performed approximately 1–2 weeks before the intervention and after application of all the programme units.

The programme

The behavioural modification programme ran from October 2001 to April 2003. The programme was designed in 7 main units: outdoors and recreational education; urban and health education; heritage and museum education; moral and religious education; human rights and peace education; economic and civic education; and future and sustainable education. The programme was applied through several activities, including: camping and field trips, recreational activities and games, role play and theatre, positive actions and experiences, storytelling, life-skill activities and gardening and animal care.

The 1st unit of the programme concerned with outdoors and recreational education was conducted through trips and camping. The unit aimed to provide opportunities to encourage enjoyment, appreciation and awareness of the environment so as to help change attitudes by exposing children to new and relevant experiences that would lead to better understanding of themselves as well as their environment [*13,14,16*].

The 2nd unit included urban and health education. The urban education part aimed to create understanding of the social, physical and natural characteristics of the urban environment and their interrelationships so as to help children deal with their urban environment [*15,17,18*]. The health education unit was designed to give the boys basic information about the changes that take place in their bodies during the different ages, teaching them skills to help them adopt positive attitudes for sustaining healthy lifestyles and avoiding risk behaviours. The major items covered by the health education were nutrition and dietary practices, personal health, correct lifestyles for health promotion and disease prevention, and first-aid skills in order to help them survive street life, as they face problems such as accidents, sexual abuse, violence and substance use [*20,21*].

The 3rd unit of heritage and museum education aimed to help children acquire new skills related to national history; increase their awareness of their environment; develop feelings of respecting and belonging to society and its culture, values, thoughts and traditions; help them to change their attitudes towards historic places; and understand how the past can affect the present positively. The activities of heritage and museum education can also help children to find jobs such as selling small things they have made or plan small income-generating projects [*20*].

The 4th and the 5th units were concerned with moral and religious education, and human rights and peace education, respectively, and were considered complementary to other programme units. Religious and moral values were encouraged through certain activities such as religious stories, prayer and guidance conversations to help the children to have real internal change, understand their rights and be peace seekers. Street children all over the world have common problems, one of which is aggression [*1,4*], so they need peace and human rights education which can help them to respect themselves, others and others' possessions.

The 6th unit of economic and civic education was concerned with understanding the developmental processes within and between countries and rich and poor people, in order to give the children an understanding of the economic and political system. It was designed to be learned through activities to help children know their rights and duties, acquire new skills to find jobs and to make plans for their future.

Finally, the 7th unit of future and sustainable education was designed to help the children learn suitable ways to develop their

skills and personality in order to find jobs and plan for their future.

Data analysis

The data were analysed by *SPSS*, version 10. They were checked for accuracy and normality using the Kolmogorov–Smirnov and Shapiro–Wilk tests. The data were found to be not normally distributed and were presented as means and standard deviations (SD). The Wilcoxon signed rank test was used as a non-parametric test for comparison between the results before and after the intervention (paired comparison of the 13 items). Percentage change was calculated for each item and for total scores of the programme before and after the intervention. The Mann–Whitney test was used for comparison between the 2 subgroups while the Kruskal–Wallis test was used for comparison between more than 2 subgroups. Spearman rank correlation coefficient was calculated to measure the mutual correspondence between 2 variables. $P \leq 0.05$ was the level of significance.

Results

In the current study a behavioural modification intervention was designed for a sample of 35 street children in order to raise their self-esteem and ameliorate their behaviour. The characteristics of the sample of street children selected for the intervention are presented in Tables 1 and 2. In the present study the observation sheet that was designed to characterize the children preintervention showed the main behavioural factors were: antisocial behaviour (46%), aggressive behaviour (43%), substance use (43%), helper (one who offers help to others and tries to provide help to others if required) (42%), destructive behaviour (37%) and paranoia (31%). Street activities performed to earn money were:

Table 1 **Descriptive data of the selected sample of street children before the intervention (*n* = 35)**

Variable	%
Family background	
Parents still married	14
Parents divorced or separated	52
Death of 1 or both parents	11
Step-parents	23
Child's relation with his family	
Good	9
Moderate	34
Bad	46
None	11
Age of going on the streets (years)	
< 6	83
6–9	17
> 10	0
Reasons for going on the streets	
Earn money	12
Escape family conflicts	57
Find shelter	11
Escape physical abuse at home	11
Escape from children's institution	3
Live the way he wants to live	6
Educational status of the child	
Student	3
Can read and/or write	62
Illiterate	35
Place of sleeping at night	
In the street	92
At home	8
Street activities	
Selling small items	40
Washing cars	31
Scavenging	9
Stealing	6
Begging	9
Survival sex	3
Drug trafficking	3
Favourite activity	
Fishing	100
Cycling	46
Games	46
Dancing	37

Table 1 **Descriptive data of the selected sample of street children before the intervention (*n* = 35)** *(concluded)*

Variable	%
Arts	29
Gardening	29
Handicrafts	23
Singing	20
Reading	3
Type of peer relations	
Few	37
Many	29
Few and superficial	11
Many and deep	8
Many and for a purpose	6
Few and deep	3
Few and for a purpose	3
Few, superficial and for a purpose	3

Table 2 **Behavioural profile of the selected sample of street children before the intervention (n = 35)**

Variable	%
Child abuse suffered	
Verbal	94
Physical	94
Sexual	89
Emotional	8
Smoking and substance use	
Smoking	100
Always use substances	43
Sometimes use substances	57
Never use substances	0
Behavioural issues	
Antisocial behaviour	46
Aggressive behaviour	43
Helper	42
Destructive behaviour	37
Paranoia	31
Homosexuality	26
Jealousy	26
Narcissism	25
Nail biting	20
Avoidance	17
Lying	17
Nocturnal enuresis	17
Schizoid behaviour	17
Dependence	14
Nutrition disorders	11
Speech disorders	11
Phobia	8
Stealing	6
Temper tantrums	6
Sleep disorders	3
Depressive disorders	3

selling small items (40%), washing cars (31%), begging (9%), scavenging (9%), stealing (6%) and drug trafficking (3%); 3% engaged in survival sex (i.e. sex for rewards but not money) but none reported being involved in commercial sex. Favourite activities were fishing (100%), cycling (46%), games (46%) and dancing (37%).

From the results of the preliminary study the intervention programme was designed to target and modify the behaviour problems identified. Table 3 shows the results of each behavioural item and the items combined, before and after the intervention. The Z-test values, the percentage change values and the correlation coefficients showed improvements in the targeted behaviours and suggest that the programme had been successful.

The percentage change of total scores on behavioural items before and after the intervention were used to compare children who had a behavioural disorder and those who did not (Table 4). The only behaviours disorders that showed a significant difference were helper personality, narcissistic personality and passive aggressive personality ($P \leq 0.05$, between children displaying the behaviour and those not). No other behaviours were significant. Other items of behaviour that showed a significant decrease were speech disorders, homosexuality and substance use ($P \leq 0.05$), suggesting an effect of the programme.

Table 3 **Comparison of street children's scores for behavioural items before and after the behaviour intervention programme (*n* = 35)**

Behaviour item	Before		After		Z-test[a]		Correlation		%
	Range	Mean score (SD)	Range	Mean score (SD)	*Z*-value	*P*-value	*r*-value	*P*-value	change
Independent behaviour	16–36	7.89 (3.20)	3–14	28.97 (6.44)	5.163	< 0.001	0.0285	0.096	267
Economic activities	6–15	5.57 (1.24)	3–8	11.46 (1.85)	5.190	< 0.001	0.457	0.001	106
Vocational activities	6–14	3.89 (1.57)	1–6	9.23 (2.33)	5.174	< 0.001	0.475	0.004	137
Responsible behaviour	7–18	4.26 (1.88)	1–8	12.23 (3.68)	5.169	< 0.001	0.526	0.001	187
Social relations	10–20	5.23 (1.26)	3–7	15.09 (2.08)	5.175	< 0.001	0.205	0.237	189
Destructive behaviour	8–19	4.77 (1.29)	3–8	16.94 (2.41)	5.151	< 0.001	–0.099	0.571	255
Antisocial behaviour	3–6	1.14 (0.85)	0–3	5.23 (0.97)	5.218	< 0.001	0.102	0.559	359
Rebellious behaviour	6–11	2.77 (1.09)	0–5	9.91 (1.15)	5.188	< 0.001	–0.063	0.718	258
Non-trustable behaviour	3–6	1.45 (0.85)	0–3	5.23 (1.06)	5.201	< 0.001	–0.138	0.430	261
Withdrawal behaviour	5–10	2.11 (0.99)	0–4	8.29 (0.96)	5.191	< 0.001	–0.283	0.100	293
Non-acceptable habits	10–22	5.26 (1.17)	3–8	19.31 (2.82)	5.169	< 0.001	0.007	0.966	267
Psychological and emotional disorders	20–26	7.63 (1.54)	5–11	24.09 (1.74)	5.174	< 0.001	–0.131	0.453	216
Complementary information[b]	5–10	2.40 (1.12)	0–4	8.60 (1.35)	5.183	< 0.001	0.051	0.773	258
Total	152–195	54.31 (7.99)	41–73	174.57 (12.42)	5.161	< 0.001	0.337	0.047	221

[a]*Z-values were statistically significant for the scores given for behavioural items before and after intervention at* P < *0.001.*

[b]*Moral and religious information; health information; human rights; environmental education; economic information, etc.*

SD = standard deviation.

Discussion

Street children constitute a considerable part of the homeless population, who are highly disadvantaged and forgotten. They represent a hazardous environmental problem in all societies due to the behaviours they acquire from street life and the psycho-

Table 4 **Comparison of the percentage changes of total behavioural scores after the intervention, for street children who have or do not have the specific behaviour**

Behaviour item	Does not have the behaviour		Has the behaviour		Z-test	
	n	Mean (SD)	*n*	Mean (SD)	*Z*-value	*P*-value
Dependent	32	225 (43)	3	246 (23)	–0.825	0.446
Schizoid	29	223 (43)	6	243 (29)	–1.051	0.312
Helper	21	206 (48)	14	241 (31)	–2.627	0.008*
Avoidant	29	224 (42)	6	239 (39)	–0.919	0.379
Loving	29	224 (44)	6	238 (29)	–0.657	0.535
Enthusiastic	14	242 (34)	21	217 (44)	–1.919	0.056
Peacemaker	34	227 (42)	1	209 (15)	–0.475	0.743
Paranoid	23	237 (36)	12	206 (47)	–1.894	0.057
Phobic	32	289 (43)	3	202 (11)	–1.473	0.157
Passive aggressive	22	242 (31)	13	200 (45)	–2.936	0.003*
Narcissistic	26	237 (36)	6	196 (43)	–2.435	0.013*
Sleep disorders	34	227 (42)	1	231 (44)	–0.099	0.971
Nocturnal enuresis	29	229 (29)	6	213 (55)	–0.863	0.356
Jealous	26	229 (28)	9	220 (53)	–0.491	0.643
Nutrition disorders	30	229 (44)	5	214 (21)	–1.108	0.277
Destructive	21	236 (32)	14	212 (51)	–1.751	0.083
Aggressive	22	237 (31)	13	210 (52)	–1.844	0.067
Temper tantrums	33	231 (38)	2	160 (68)	–1.706	0.101
Lying	29	230 (42)	6	209 (37)	–1.247	0.218
Stealing	24	236 (31)	11	207 (55)	–1.670	0.099
Substance use	20	243 (33)	15	205 (43)	–2.834	0.004*
Speech disorders	31	231 (43)	4	196 (91)	–2.022	0.043*
Homosexuality	27	237 (39)	8	193 (36)	–2.730	0.005*

**Z-values were statistically significantly different at* P ≤ *0.05.*
n = *number of children with behaviour; SD = standard deviation.*

logical problems that leave them vulnerable. Sometimes orphaned children have taken the decision to run away from residential homes. A high proportion of street children have been forcibly thrown out of the family home by uncaring or poverty-stricken family members. The reasons are mostly conflicts with parents or step-parents, broken homes or ill treatment by family members. Some are rural children who have simply become attracted to city life, perhaps through the mass media [*2,3,9,10,22*]. In our study group 12% of the children went out to the streets to earn money, 57% to escape family problems and 11% to escape physical abuse at home.

The present study was designed to define the psychological profile of a sample of 35 street children before and after participation in a behavioural modification intervention in order to establish how effective the programme was in raising their self-esteem and ameliorating their behaviour. The programme was based on training the children to behave in a more appropriate and socially acceptable manner [*20*]. The programme included different units, which contained variable activities that were chosen carefully to be appropriate with the nature and ages of the studied sample. The intervention was applied to help children to change their behaviour, fulfil their needs through activities, discover their abilities and develop and acquire new skills. The results of the intervention showed a significant improvement in some aspects of the children's behaviour after attending the programme compared to before, using statistical analysis of scores for each behavioural item. The programme activities seemed to be successful in modifying the street children's behaviour.

In Egypt, there are currently a number of projects sponsored by the President of the country and other governmental and non-governmental organizations (NGOs) to support street children through the declaration of the second decade for the protection and welfare of the Egyptian child (2000–10). This declaration has signified that childhood issues should occupy a place at the centre of future plans for the community and will focus on guaranteeing health and education in cultural and social areas, backed up by strict legislation to protect mothers and children and to guarantee their safety and stability [*23*]. The National Council of Childhood and Motherhood (NCCM) uses the term "homeless child instead of "street child , which reflects similar concepts, and defines them as children who lack any kind of care and protection, and are vulnerable to physical and psychological danger, and exploitation of their basic rights [*24*]. The NCCM introduce in March 2003 a national strategy to define, characterize, protect, integrate and rehabilitate street children in Egypt [*25*]. The NCCM introduced a protection and caring project for street children involved with drugs in collaboration with NGOs and police stations in Cairo, Giza and Alexandria [*26*]. The project aims to support the health, nutritional, social and cultural care services for street children through reception centres for arrested children to ensure care and safety for them. The NCCM arranged a workshop to discuss and verify the working guidelines for the dealers with street children (part of the project was funded by the NCCM, the United Nations Office on Drugs and Crime and the Danish Embassy in Cairo) in order to raise the performance of those who deal with street children (psychiatrists, sociologists, police officers, caring institutes, NGO staff, etc.) to protect and prevent street children from smoking and substance abuse [*27*].

Egyptian NGOs such as the Hope Village Society in Cairo and El-Horriya Institute in Alexandria provide some services for street children. The Hope Village Society in Egypt is the best model of NGOs that deal with street children. It is a private voluntary association established by a group of businessmen and women and is dedicated to providing attention, care, education and training to children in difficult circumstances, with an emphasis on street children. The Society has successfully expanded from caring for a few boys in one shelter to a number of separate sites around Cairo using a mobile unit, reception day care centres and short-term and long-term shelters [*28*]. The Society provides care and shelter and rehabilitation and training and facilitates government education for street children, runs training projects to sustain continuity

and stability of society, carries out scientific research on the phenomenon of street children, provides small loans to families of street children and re-integrates them with the community. It also provides subdonations and technical help and training to other NGOs that work in the same field and it networks and exchanges experiences with other associations and organizations [*28*]. The Society targets training the children through several vocational programme workshops on handicrafts, and electrical, carpentry or plumbing products. It offers religious, cultural and recreational programmes through monthly trips, fun parties and summer camping. A new programme called the Center for Habilitating and Integrating Young Street Mothers, introduces special care for young mothers who are victims of sexual and physical abuse [*28*].

The current programme for environmental behavioural modification of street children is the first programme to be applied in Egypt and needs to be further applied in different institutions and localities. Also, further studies are required for long-term behavioural modification programme to fulfil the needs of street children. Knowing the risk factors, efforts on a wider scale should be addressed at an earlier level of intervention to the target population to prevent the phenomenon of street children.

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Characteristics and risk factors of tobacco consumption among University of Sharjah students, 2005

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خصائص استهلاك التبغ وعوامل اختطاره بين طلاب جامعة الشارقة، في عام 2005

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الخلاصة: استهدفت هذه الدراسة تقدير معدل انتشار تعاطي التبغ، وأنماطه، وعوامل الاختطار المرتبطة به، بين عينة عشوائية طِباقِيَّة من طلاب جامعة الشارقة، بالإمارات العربية المتحدة، في عام 2005. وكان معدل الانتشار الكلي للتدخين بين عينة الطلاب البالغ عددها 1057 طالباً هو 15.1٪؛ وكانت نسبة مدخني السجائر 9.4٪، ومدخني الشيشة 5.6٪. وفي حين لم تزد نسبة الإناث على 8.9٪ من مدخني السجائر، إلا أنهن يشكِّلن 26.2٪ من مدخني الشيشة. وبيَّن تحليل التحوُّف الخطي المتعدِّد أن أهم العوامل المنبِّئة بالتدخين بين الطلاب هي: الذكورة، ووجود صديق مدخِّن، ووجود فرد مدخِّن في الأسرة (الأب/الأم/كلاهما)، والانتماء لجنسية غير إماراتية، وكبر السن. إن هناك حاجة لتكثيف الجهود من أجل منع انجراف الشباب نحو التدخين، ومساعدة المدخنين الصغار على الإقلاع عنه.

ABSTRACT This study aimed to estimate the prevalence, patterns and risk factors of tobacco consumption among a stratified random sample of students at University of Sharjah, United Arab Emirates (UAE), during 2005. The overall reported smoking prevalence among 1057 sampled students was 15.1%; cigarette smokers were 9.4% and waterpipe smokers 5.6%. While women comprised only 8.9% of cigarette smokers, they were 26.2% of waterpipe smokers. Multiple linear regression analysis showed that the most important predictors for smoking among the students were: male sex, having a smoking friend, having a smoking family member (father/mother/both), non-UAE nationality and older age. There is a need to intensify efforts to prevent young people from starting smoking and to help young smokers to stop.

Caractéristiques et facteurs de risque du tabagisme en 2005 chez les étudiants de l'Université de Sharjah

RÉSUMÉ La présente étude avait pour objectif d'évaluer la prévalence, le profil et les facteurs de risque du tabagisme dans un échantillon aléatoire stratifié d'étudiants de l'Université de Sharjah, aux Émirats arabes unis, au cours de l'année 2005. Sur cet échantillon de 1057 étudiants, la prévalence globale du tabagisme s'élevait à 15,1 %, les fumeurs de cigarette représentant 9,4 % et les fumeurs de pipe à eau 5,6 %. Tandis que seules 8,9 % des femmes fumaient des cigarettes, 26,2 % s'avouaient utilisatrices de pipe à eau (ou narguilé). Selon l'analyse de régression multiple, les principaux indicateurs du tabagisme estudiantin sont l'appartenance au sexe masculin, l'imitation d'un ami ou d'un membre de la famille (père, mère, voire les deux) eux-m mes fumeurs, une nationalité étrangère aux Émirats arabes unis et un âge plus avancé. Il faudrait intensifier les efforts visant à emp cher les jeunes de commencer à fumer et à aider les jeunes fumeurs à arr ter.

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Introduction

Tobacco use is one of the chief preventable risk factors of some 25 noncommunicable diseases, many of which are eventually fatal. The World Health Organization (WHO) attributes some 4 million deaths annually to tobacco consumption, and this is expected to rise to 8.4 million by 2020 [*1–3*]. A report by WHO Regional Office for the Eastern Mediterranean indicates that the prevalence of tobacco consumption among adult males in the countries of the Eastern Mediterranean Region (EMR) ranges from 24% to 70% among adult males and 3% to 22% among adult females, and that these are among the highest in the world, especially for males [*4*].

A few studies have estimated tobacco prevalence among young people aged less than 18 years of age in the United Arab Emirates (UAE). The UAE has recently participated in the Global Youth Tobacco Survey (GYTS) which reported that among 4178 surveyed schoolchildren aged 13–15 years, 14.3% of boys and 2.9% of girls were current smokers, while 25% of students had first tried smoking at under 10 years of age, more than 70% had seen a tobacco advertisement, 20% had been offered free cigarettes from a tobacco company representative and 50% had bought their cigarettes from stores, 80% of whom were not refused purchase because of their age [*5*]. Another study by the UAE University in 1999 found that 30% of surveyed 15–19-year-old schoolboys were smokers [*6*]. A family health survey in 1995, covering 45 830 UAE citizens, revealed that 18.3% of adult males and 0.4% of adult females were current smokers [*7*].

Other studies on tobacco use and its risk factors among secondary-school students were carried out in other Gulf nations, including Bahrain [*8*], Saudi Arabia [*9–12*], Kuwait [*13*] and Yemen [*14*], and can be compared with high-school students in Belfast [*15*], Syria [*16*] and Egypt [*17*].

In spite of the many studies carried out in the EMR on tobacco consumption among secondary/high-school students, only a few have focused on university students, such as studies performed in Saudi Arabia [*18*], Jordan [*19*], Egypt [*20*], Lebanon [*21*] and Bahrain [*22*]. Hence, there was a great need to bridge the gap in the literature for UAE students. This study aimed to estimate the prevalence, patterns and risk factors of tobacco consumption among students attending the University of Sharjah (UoS).

Methods

The study was cross-sectional, conducted during the academic year 2004/05.

Setting

Founded in 1997, the UoS is one of the leading higher education establishments in the UAE, with 4 health-related colleges, namely: health sciences, medicine, pharmacy and dentistry, with an overall student population of about 6000, of whom 66% (3755) are females, and 34% (1949) males, with 9.4% health-related students in 4 colleges (2004/05 data).

Sample

A stratified proportionate random sampling technique was used to select 1290 students for the study, representing the 13 different colleges of the UoS. The sample size estimate was based on an estimated 20% prevalence of smoking. Table 1 shows the distribution of the 1290 students in the survey by college.

Questionnaire

The data collection tool used in the study was a modified version of the standard WHO questionnaire and the GYTS ques-

Table 1 **Distribution by college of the sample of University of Sharjah students**

College	Total no. of students	%	No. selected
Arts and sciences	751	13.2	170
Business and management	897	15.7	200
Communication	588	10.3	130
Health and medical sciences[a]	535	9.4	120
Intensive English programme	701	12.3	160
Engineering	660	11.6	150
Fine arts	49	0.9	20
Law	675	11.9	150
Sharia and Islamic studies	438	7.7	100
Career development	397	7.0	90
Total	5691	100.0	1290

[a]*Health sciences, medicine, pharmacy and dentistry.*

tionnaires, which have previously been validated for use in both their English and Arabic versions [*23,24*]. It was developed as an anonymous self-administered questionnaire by the investigators (all bilingual), revised, piloted and edited several times before it was finally utilized in its English and Arabic versions.

The study proposal and instrument were approved by the College of Health Sciences Institutional Review Board.

The questionnaire enquired about demographic information (age, sex, marital status, nationality, field of study, residence, work status, pocket money, mother's and father's education, years in university) and tobacco consumption (status, type, frequency, duration, age at first attempt, family members' and peers' smoking status, etc.).

Five data collectors (3 women and 2 men), with a social sciences background and experience in supervising student activities in UoS and carrying out surveys among university students were trained by the investigators on how to administer the study tool. To facilitate data collection, the purpose and operation of the study were adequately explained to the deans of students' affairs (men and women) as well as the deans of different UoS colleges in personal letters from the principal investigator. Deans then asked their faculty to cooperate in data collection before/after lectures. The data collectors explained the purpose of the study to the students, asking for their verbal consent, and emphasized the voluntary and anonymous nature of the study.

Statistical analysis

Data were coded, entered, cleaned and analysed using *SPSS*, version 14.0. Analysis included univariate, bivariate as well as multivariate analytical techniques. This included calculation of odds ratios (OR) with 95% confidence intervals (CI) and corresponding *P*-values, while multiple logistic regression was carried out to identify variables most predictive of taking up the habit of smoking among the surveyed

students. $P < 0.05$ was used as the level of significance.

Results

Table 2 shows the characteristics of the study population. The total sample was 1057 students, with a response rate of 82%. The age range was 17–37 years, mean 20.9 [standard deviation (SD) 2.6] years. About two-thirds of participants in the survey were females (60.7%), more than half were UAE nationals (57.2%) and lived with their parents (53.9%). Most students were single (87.9%) and were from colleges other than health and medical sciences (84.0%). About two-thirds of students (63.1%) in the sample were in their junior (3rd) or senior (4th) years. More of the students' fathers had university or higher education (44.5%) than did the mothers (27.3%).

A total of 163 students reported smoking, giving an overall smoking prevalence (cigarettes and waterpipe) of 15.1%; this was 33.0% among males, 3.9% among females (Table 3). The mean age of smokers was 22.3 (SD 2.9) years, slightly older than the whole sample. Smokers in the sample were mostly single (81.0%), males (84.6%), non-UAE nationals (62.7%), non-health majors (89.3%) and living with their parents or relatives (64.5%). Table 3 shows the characteristics of the student smokers, comparing cigarette smokers (prevalence of 9.4%) with waterpipe smokers (5.6%). While most smokers had 1 or more friends who smoked (86.7%), less than one-quarter (24.5%) had fathers who smoked.

Bivariate analyses

The results of bivariate analyses showed that the most important predictors of smoking among UoS students in our sample were: male sex (OR = 12.2; CI: 7.8–19.0), having a smoking friend (OR = 9.8; CI: 6.1–15.8),

Table 2 **Characteristics of the study sample of University of Sharjah students**

Variable	No. of students	%
Sex		
Male	415	39.3
Female	642	60.7
Nationality		
UAE	600	57.2
Non-UAE	449	42.8
Marital status		
Single	927	87.9
Married	128	12.1
Residence		
With parents	579	53.9
With family	124	11.5
Dormitory	343	31.9
Other	29	2.7
Mother's education		
Illiterate/read and write	282	26.5
Elementary/intermediate	254	23.8
Secondary	239	22.4
University/higher	291	27.3
Father's education		
Illiterate/read and write	226	21.4
Elementary/intermediate	174	16.5
Secondary	175	16.6
University/higher	481	44.5
College		
Health and medical sciences	168	16.0
Others	881	84.0
Study level		
IEP	139	13.0
Freshman	56	5.2
Sophomore	199	18.6
Junior	227	21.3
Senior high	447	41.8
	Mean (SD)	
Age (years) (total sample)	20.9 (2.6)	
Years in university	2.4 (1.3)	
Age (years) (total smokers)	22.3 (2.9)	
Years in university	2.9 (1.5)	

The total number of responses may differ for different variables.
UAE = United Arab Emirates; IEP = intensive English programme.
SD = standard deviation.

Table 3 **Characteristics of reported smokers among University of Sharjah students**

Variable	Cigarette smokers		Waterpipe smokers		Total smokers	
	No.	%	No.	%	No.	%
Total sample (prevalence)	102	9.4	61	5.6	163	15.1
Sex						
Male	92	91.1	45	73.8	137	84.6
Female	9	8.9	16	26.2	25	15.4
Nationality						
UAE	37	37.8	22	36.7	59	37.3
Non-UAE	61	62.2	38	63.3	99	62.7
Marital status						
Single	84	84.8	45	73.8	129	80.6
Married	15	15.2	16	26.2	31	19.4
Residence						
With parents	51	50.0	28	45.9	79	48.5
With family	16	15.7	10	16.4	26	16.0
Dormitory	28	27.5	20	32.8	48	29.4
Other	7	6.9	3	4.9	10	6.1
Mother's education						
Illiterate/read and write	25	24.8	4	6.6	29	17.9
Elementary/intermediate	11	10.9	16	26.2	27	16.7
Secondary	23	22.8	14	23.0	37	22.
University/higher	42	41.6	27	44.3	69	42.6
Father's education						
Illiterate/read and write	22	22.0	9	14.8	31	19.3
Elementary/intermediate	8	8.0	5	8.2	13	8.1
Secondary	12	12.0	16	26.2	28	17.4
University/higher	58	58.0	31	50.8	89	55.3
College						
Health and medical sciences	10	10.2	7	11.5	17	10.7
Other	88	89.8	54	88.5	142	89.3
Study level						
IEP	3	3.0	3	5.1	6	3.8
Freshman	5	5.0	3	5.1	8	5.0
Sophomore	23	23.0	9	15.3	32	20.1
Junior	21	21.0	6	10.2	27	17.0
Senior high	48	48.0	38	64.4	86	54.0
Smoking status of parents						
Father only	22	23.2	16	26.7	38	24.5
Mother only	1	1.1	2	3.3	3	1.9
Both parents	3	3.2	5	8.3	8	5.2
None	44	46.3	22	36.7	66	42.6

Table 3 **Characteristics of reported smokers among University of Sharjah students** *(concluded)*

Variable	Cigarette smokers		Waterpipe smokers		Total smokers	
	No.	%	No.	%	No.	%
Smoking status of friends						
None	11	11.1	10	16.9	21	13.3
Some/most of them	77	77.7	40	67.8	117	74.0
All of them	11	11.1	9	15.3	20	12.7

The total number of responses may differ for different variables.
UAE = United Arab Emirates; IEP = intensive English programme.

working (OR = 4.0; CI: 2.6–6.2), non-UAE nationality (OR = 2.6; CI: 1.8–3.7), higher education of father (OR = 2.1; CI: 1.5–3.0), having pocket money of > 500 Arab Emirate dirhams (OR = 2; CI: 1.4–2.9), single status (OR = 1.95; CI: 1.25–3.0), having a smoking family member (father/mother/both) (OR = 1.9; CI: 1.3–2.8), and mother's education (OR = 1.76; CI: 1.2–2.6) (Table 4).

Multiple logistic regression analyses

Results of multiple logistic regression analysis showed that the most important predictors for smoking among students in our sample were: male sex (OR = 6.1; CI: 3.2–11.7), having a smoking friend (OR = 3.3; CI: 1.7–6.4), having a smoking family member (father/mother/both) (OR = 2.1; CI: 1.2–3.5) and older age group (OR = 1.2; CI: 1.0–1.3) (Table 5).

Discussion

The UAE Ministry of Health (MoH) has been implementing important measures to combat smoking, whether through antismoking campaigns with special emphasis on primary prevention of smoking among adolescents, or establishment of antismoking clinics during the past 8 years across the 9 districts of the MoH in the 7 Emirates [*25*].

Nevertheless, smoking still remains prevalent among young people in the UAE. This study showed that 15.1% of surveyed students reported smoking, with a much higher prevalence among males (33.0%) than females (3.9%). Such figures seem to be comparable to other studies in the EMR among university students [*18–22*] or high-school students [*8–17*]. The smoking prevalence ranged from 11.8% among Cairo University students, Egypt [*20*] (22% among males; 1.7% among females) and 28.6% among Jordan University of Science and Technology students [*19*] (50% among males; 6.5% among females). A study of Aga Khan University medical students, Pakistan [*26*], also reported a considerable sex difference (17% among males; 4% among females). Reported figures among high-school males in the EMR ranged from 16% to 22% in different studies [*6,8,11,12,14,16*].

The gender difference is explainable, given the local traditions in the EMR, but it should be noted that figures here are reported ones, and females, despite the anonymity of the questionnaire, are less likely to report a habit which may be seen as a "social stigma . It has also been observed that smoking prevalence is on the rise among women in the EMR in recent years, especially waterpipe consumption [personal

Table 4 **Results of bivariate analysis of risk factors for tobacco consumption among University of Sharjah students**

Variable	Smoker		Non-smoker		Odds ratio	95% CI	*P*-value
	No.	%	No.	%			
Sex							
Male	137	32.8	281	67.2	12.20	7.8–19.0	0.001
Female	25	3.9	623	96.1			
Marital status							
Single	129	13.8	805	86.2	1.95	1.25–3.05	0.006
Married	31	23.8	99	76.2			
Residence							
Dormitory	48	14.0	295	86.0	1.15	0.80–1.65	0.523
Other	115	15.7	617	84.3			
College							
Health and medical sciences	17	10.1	151	89.9	1.71	1.0–2.91	0.046
Other	142	16.1	739	83.9			
Employed							
Yes	41	36.3	72	63.7	4.05	2.63–6.22	0.001
No	115	12.3	817	87.7			
Pocket money (AED)							
< 500	45	10.4	389	89.6	2.02	1.40–2.93	0.001
500+	113	19.0	483	81.0			
A family member smokes							
Yes	49	22.4	170	77.6	1.90	1.3–2.77	0.001
No	106	13.2	697	86.8			
A friend smokes							
Yes	137	28.1	351	71.9	9.78	6.06–15.78	0.001
No	21	3.8	526	96.2			
Study level							
Junior and senior	113	16.8	561	83.2	1.52	1.06–2.20	0.026
Other	46	11.7	348	88.3			
Mother's education							
Secondary or more	106	20.0	424	80.0	2.14	1.51–3.04	
< Secondary	56	10.4	480	89.6			0.001
Father's education							
Secondary or more	117	17.8	539	82.2	1.76	1.21–2.55	0.003
< Secondary	44	11.0	356	89.0			
Nationality							
UAE	59	9.7	547	90.3	2.60	1.83–3.69	0.001
Other	99	21.9	353	78.1			
Age (years)							
< 20	111	21.7	401	78.3	2.69	1.88–3.83	0.001
20+	50	9.3	486	90.7			
Years in university							
≤ 2	67	11.4	519	88.6	1.79	1.27–2.55	0.001
> 2	82	18.8	354	81.2			

The total number of responses may differ for different variables.
CI = confidence interval; UAE = United Arab Emirates; AED = Arab Emirates dirham.

observation]. In our study, it was shown that while only 8.9% of cigarette smokers in our study were females, 26.2% of reported waterpipe smokers were females.

Being a male with a smoking friend or family member was shown by multiple regression analysis in our study to be the most predictive factor for being a smoker. In fact, having a smoking friend (peer pressure) has been shown by this study and many others to be consistently linked with smoking of youngsters. A Bahraini study reported that 43% of smokers reported that their best friend was a smoker, compared with 15.4% among non-smokers [*19*]. Similar results were reported from other Gulf country studies in Saudi Arabia [*9,10*], Kuwait [*13*] and Yemen [*14*].

Conclusion and Recommendations

We conclude, based on the findings in this study, that an intensification of efforts is needed to prevent young people taking up the habit of smoking and to help those who consume tobacco to swiftly quit before serious complications ensue. Both cigarettes and the waterpipe still attract young people, including females, not only in the UAE, but also in many other countries of the EMR. In fact, one-third of the smokers in our study were waterpipe smokers, and it was the most common habit among female smokers. This points to the need for effective outreach health education programmes, targeting young schoolchildren, in primary education, before they take up the habit of smoking. Teachers and parents should be involved, and the mass and mini media all brought into action.

The message emerging from the role of peer pressure in smoking is for role models in the community, for example parents, teachers (in basic and university education), community and religious leaders. The health community is no exception here, and there is no value of preaching the harmful effects of smoking and asking the public to avoid or quit the habit, when many health professionals themselves are smokers. We are a long way from reducing the incidence as well prevalence of tobacco consumption among students, but combined multisectoral efforts are called for without delay.

Table 5 **Results of multiple logistic regression analysis of risk factors for tobacco consumption among University of Sharjah students**

Variable	β coefficient	SE (β)	Odds ratio	95% CI	*P*-value
A friend smokes[a]	1.20	0.34	3.31	1.71–6.42	0.001
A family member smokes[a]	0.73	0.26	2.07	1.24–3.47	0.006
Age[b]	0.14	0.06	1.15	1.03–1.29	0.016
Sex[c]	1.81	0.33	6.13	3.21–11.69	0.001
Constant	–8.02	1.21	–	–	0.001

[a]None is reference; [b]continuous; [c]female is reference.
CI = confidence interval; SE = standard error.

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Workshop on the Framework Convention on Tobacco Control implementation and reporting

The World Health Organization is organizing a workshop on the Framework Convention on Tobacco Control (FCTC) implementation and reporting in Alexandria from 18 to 20 November 2007.

The objectives of the workshop are to:

- discuss the status of the FCTC implementation at the national level;
- start the needed work for reporting;
- take the needed steps to involve other sectors in the reporting mechanism.

Experts from Canada, Djibouti, Egypt, Islamic Republic of Iran, Iraq, Jordan, Lebanon, Libyan Arab Jamahiriya, Oman, Pakistan, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, and Yemen as well as WHO concerned staff will be participating in this workshop.

Report

Women's empowerment and health: the role of institutions of power in Pakistan

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تمكين المرأة وأثره على صحتها: دور المؤسسات ذات السلطة في باكستان

ندرت قريشي، بابر شيخ

الخلاصة: مع أن حق المرأة في الصحة مقولة تتكرَّر على الدوام، إلا أن هناك حواجز اجتماعية وثقافية، تعوق عملية تمكين المرأة في البلدان النامية. ولا يَخفَى أن للمكانة المتدنِّية للمرأة، وحرمانها من التعليم، وفقدانها للتحكُّم في حياتها، بل وفي جسدها، تأثيرات سلبية على الوضع الصحي لها ولعائلتها. وتناقش هذه الورقة البحثية تمكين المرأة وأثره على صحتها، في إطار المؤسسات الأربع ذات السلطة في المجتمع – الأسرة، والجماعة، ونُظُم الرعاية الصحية، والدولة – مع إشارة خاصة للوضع في باكستان. وتخلص هذه الدراسة إلى أنه لكي يمكن تحسين الوضع الصحي للمرأة، فلابُدَّ من أن تتضافر الجهود وتتناغم بين جميع هذه المؤسسات السُّلْطَوِيَّة للعمل على تحقيق المساواة العادلة بين الجنسَيْن، وتمكين المرأة بشكل أكبر.

ABSTRACT Women's right to health has been reiterated many times. However, there are social and cultural barriers in developing countries that hinder their empowerment. Women's low status, deprivation of education and lack of control over their own lives and bodies have a negative impact on their health status and that of their families. This paper discusses women's empowerment and health within the framework of the 4 institutions of power in a society—family, community, health care systems and the state—with special reference to the situation in Pakistan. It concludes that to improve women's health status, concerted efforts are needed by all these institutions of power to work towards gender equality and the greater empowerment of women.

Autonomisation de la femme et santé : le r le des lieux institutionnels de pouvoir au Pakistan

RÉSUMÉ Le droit des femmes à la santé a été affirmé à de nombreuses reprises. Pourtant, il existe dans les pays en développement des barrières sociales et culturelles qui entravent le renforcement de l'autonomie des femmes. La péjorativité du statut des femmes, la spoliation de leurs droits à l'instruction et à la ma trise de leur propre vie et de leur propre corps ont un impact négatif sur leur état de santé et celui de leur famille. Le présent article aborde la double question du renforcement de l'autonomie de la femme et de sa santé dans le contexte des quatre lieux de pouvoir traditionnels d'une société organisée, à savoir la famille, la collectivité, les systèmes de soins de santé et l'État, en accordant une attention particulière à la situation au Pakistan. L'article conclut que l'amélioration de la santé des femmes exige des efforts concertés entre ces différents vecteurs traditionnels de pouvoir, lesquels devront se concentrer sur la promotion de l'égalité des sexes et d'un « affranchissement » plus franc de la femme.

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Empowerment: defining the notion

Researchers and reform activists have always advocated for gender equity and women's empowerment as prerequisites of social reform. These notions have been most strongly stressed by advocates of health reforms. Empowerment by definition is "a process by which the powerless get greater control over circumstances in terms of both ideology and resources [*1*].

It is not so easy to apply this principle in practice, as embedded within communities are strong social and cultural values, norms and beliefs which, if challenged, may become a source of discord within the community. The values of a culture determine the role of women in its society and this phenomenon is global [*2*]. Worldwide, women play a pivotal role in raising children, caring for household members and running the home, in addition to their roles in the world outside the home. Hence, they may suffer an even greater physical, social and mental burden, and are especially deserving of appropriate health care.

Women's right to health has time and again been advocated. However, a multitude of social and cultural barriers have directly or indirectly hindered empowerment, reinforcing the negative impact on their health status [*3*]. Health systems, therefore, must develop an understanding of women's role and status within this complex sociocultural environment. Having acknowledged this, strategic health reforms need to be translated into actions for the enhancement of the lives of women. This is not just for their own sakes: there is evidence that the health systems in a country function more effectively if women are acknowledged as the crucial link between health services and the home [*4*].

This paper highlights the factors that contribute to gender inequities, that create barriers to women's empowerment and that compromise their health status in developing countries. These factors will be discussed within the framework of 4 institutions of power, i.e. family, community, health care systems and the state [*5*]. The impact of women's low status in some developing countries and its repercussions on their health will be discussed, with special reference to Pakistan. Furthermore, the paper highlights the potential for active input by women in promoting the health of their families and the wider community.

A scenario of developing countries

The factors determining women's health status have frequently been analysed for solutions to the problem of poor health, particularly in developing countries. Though much effort has been invested in researching women's health problems, macro-issues pertaining to the society they live in have often been ignored.

The 4 institutions of power—family, community, health care systems and the state [*5*]—play an important role in determining the health status of women. Family traditions and customs govern the lives of women. A lack of formal education and poor nutrition for girls, early marriage and multiparity are some of the determinants of ill-health and discomfort for women, [*6*]. On the part of the community, lack of social support networks, religious barriers and restrictions on women's mobility outside the home affect the process of seeking health and hinder women's health status [*7*]. The health care system is also important in determining women's health, including

factors such as the low availability and poor quality of health care services, particularly obstetric care [*8*]. Finally, the state's lack of responsiveness to women's development is reflected in terms of inadequate provision of female health care providers in primary health care facilities, insufficient allocation of resources for girls' education and lack of awareness of gender issues in all sectors [*9*].

Most developing countries have been unable to devise any health reforms to work towards improving women's economic and social role in society. As the dismal health indicators show, we are faced with the challenges of consistently high rates of fertility, maternal mortality and morbidity and infant mortality [*10,11*]. The reasons are clear, as the World Health Organization definition of health—"a complete state of physical, social, mental and emotional wellbeing —is never reflected in women's life experiences. From the beginning of her life, a girl child is given lower priority than a male child [*12*]. Owing to limited family income, girls have limited opportunities for formal education and are fed the least and the last, with malnourishment leading to a weakly-developed immune system and a greater chance of ill health [*13*].

Compounding the biological vulnerability of girls are many social realities reflecting women's lower social status, such as limited educational opportunities, unequal gender relations, inability to contribute to family decisions, domination of the husband's family and lack of control over their own lives and bodies [*14*].

Women are always considered subordinate to men, therefore they have a minimal say in matters related to marriage, pregnancy and family size [*15*]. Ironically, despite being the primary care providers of the family, women in developing countries are poorly equipped to deal with family ailments because they lack knowledge and awareness of health problems [*16*]. Besides the sociocultural barriers to women's role in health promotion, there is often negligence on the part of the health care providers and government organizations [*17*]. Negligence on the part of health care providers is seen in their attitudes towards female patients, the quality of health care services and affordability of medicines prescribed. On the part of the government, it is seen in the lack of concrete policies, the lack of intersectoral collaboration and unwillingness to empower women.

Women's empowerment and health in Pakistan: the barriers; the constraints

As in other south Asian countries, the situation of women's health is grim in Pakistan. Estimates of the maternal mortality rate (500/10 000 live births), infant mortality rate (86/1000 live births) and total fertility rate (5 children/woman) are still high [*11*]. In terms of the United Nations Development Programme's (UNDP) gender empowerment measurement (GEM), Pakistan lies 100th out of 102 countries [*18*]. As mentioned before, all the 4 key institutions of power in society are accountable.

Traditions in a *famil*□play a fundamental role in developing a girl's physical, social and mental health status. Cultural values are embedded deeply in the family traditions, making her access to health care limited and most of the time dependent on the family's decision [*19*]. In terms of seeking health for herself, a woman has no control over decision-making, difficulty in accessing health centres and discomfort with communicating with male physicians. With a patriarchal system dominating, women are not allowed much liberty in terms of education and

freedom of any kind, including freedom of movement [*20*].

Another factor inhibiting women's empowerment and better health status is lack of support from the husband's family [*21*]. In Pakistani society, the role of women as prescribed in Islam is often cited as a determinant of women's status. However, religious doctrine is often misinterpreted, leading to an unjustified restriction on women's mobility on the grounds that it is a threat to social and religious values and a distraction from household duties [*22*].

Barriers imposed by the *communit* play a primary role in opposing women's empowerment, resulting in poor health indicators. Disregarding girls' education, restricting the decision-making power and the mobility of women and misinterpreting religious teachings are some of the many community-instituted barriers. For example, a woman in labour who suffers from complications may be unable to seek help if a male member of the family is absent. Support from the community is minimal or absent, and social support systems are lacking. Such a situation can lead to the death of the mother or the child or to future morbidity [*23*].

As for *health care pro iders*, the situation is no different. As women do not have any economic autonomy, the cost of health care is definitely a barrier to appropriate and quality health care seeking. Even if care is accessed, there is a communication gap between male physicians and female clients, whose problems are considered to be of lesser importance than males [*24*]. Due to a dearth of female health care providers, only 16% of women seek proper antenatal care and as few as 17% deliver in health facilities [*11*]. Most of the health care in Pakistan is sought from the private sector. Private practitioners thus have a crucial role to play in promoting women's health [*25*]. However, the urban and formal setting of these clinics makes these health services difficult and costly to access for rural women [*26*]. Furthermore, male practitioners are neither gender-sensitized nor well trained to handle women's health problems; this brings a great deal of uneasiness among women clients [*27*].

In the *state*-owned health sector, there are also inadequate numbers of female health care practitioners employed in the government sector, a fact which restricts the female client's access to health care [*28*]. Village elders or community leaders often impede the activities of women practitioners and health professionals for various reasons, which may be political or incorrect interpretations of religious laws—for example, services may be seen as socioculturally inappropriate, there may be mistrust of the health workers and services or there may be myths and misperceptions about the services. In the public sector, primary health care centres are underutilized [*29*].

Another factor is short working hours so that health providers are often unavailable in the facilities. The ability to deliver quality health services also remains a big challenge in the Pakistani health sector because of the dearth of sound policies and poor implementation of public health programmes [*30*].

What needs to be done?

When proposing what needs to be done, we must first look at the role of *famil* Family heads should be sensitized to issues such as malnourishment among girls, the importance of girl's education, the appropriate age for marriage, greater child spacing, safe motherhood, etc. Private sector and nongovernmental organizations (NGOs) can play a key role in bringing this infor-

mation to the communities they work in. A successful example of a community-based project run by civil society organizations with funding from the state is that of Tawana Pakistan, an endeavour to increase girls' school enrolment and provide them with a healthy diet at school. Such programmes need to be carried out with consistency and be sustained so that they lead to improved health status [*20*].

With respect to *communit* issues, especially in rural areas of Pakistan, there is a need to listen to the community's views on social and health-related issues. Holding group discussions with all members of the community in order to highlight their issues would be a practical approach. Then sessions can be held to discuss the myths and taboos held in the community and address misinterpretations of religious teachings with the community leaders and clergymen. Community meetings could be held to encourage mothers-in-law and husbands to take a role in promoting women's health [*31*]. They need to be sensitized to their responsibility to look after a woman's needs and wants, and to give due regard to the rights to which she is entitled on both social and religious grounds.

The *health care pro iders* also need to be sensitized to women's health issues. Issues such as quality of services, long waiting hours, lack of female practitioners and apathy of physicians towards women clients ought to be addressed mutually by the state, NGOs, health care providers and the community. Monitoring of initiatives to support and promote women's health is imperative.

The *state* needs to contribute to the promotion of girls' education and other women's empowerment programmes. An inter-ministerial collaboration involving the Ministries of Health, Population Welfare, Education, Women's Development and Social Development and all others concerned is needed, to invest in developmental programmes that lead to women's empowerment in society.

More schools for formal and non-formal education for girls could be one possible initiative. Better women's education has been associated with success in reducing infant and maternal mortality rates in the past decade [*19,25,32*].

As for health, more female physicians need to be trained and employed in the public sector, and working hours need to be expanded so as to improve accessibility. Better status of women health care workers, better pay and working conditions and better incentives in the form of benefits to the family are essential.

There is a need to invest in skills development of women, for example by enabling them to set up small-scale businesses, thereby supplementing the family income and fostering financial independence. The micro-credit scheme in Kerala and the Grameen Bank's initiative in Bangladesh are some of the lessons to be learned [*19,33*].

Empowering women and improving their health status requires concerted efforts by the state, external donors, NGOs and women's health groups. The gender-based institutional rules need to be changed. The hierarchies of power should be transformed to work towards gender equality and to initiate the process of women's empowerment. The United Nations Millennium Declaration clearly acknowledges women's empowerment and gender equality as pillars of social justice in any society [*34*]. In response to this call and to join the efforts to achieve the Millennium Goals, the process needs to be initiated within communities not only for gender rights but also for the well-being and health of women, family and the entire community.

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Report

Impact of rural health development programme in the Islamic Republic of Iran on rural–urban disparities in health indicators

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أثر برنامج تنمية الصحة الريفية في جمهورية إيران الإسلامية على تقليص الفوارق بين المؤشرات الصحية في الريف والحضر

أكبر آقاجانيان، أمير مهريار، شيرين أحمدنيا، سهلا كاظمي بور

الخلاصة: قبل قيام الثورة الإسلامية في عام 1979، كانت قد مرت خمسون عاماً من الجهود الحكومية غير المتوازنة في مجال التنمية والتحديث، التي تركت المناطق الريفية لجمهورية إيران الإسلامية في وضع صحي واقتصادي يُرثى له. وتستعرض هذه الورقة أثر برنامج تنمية الصحة الريفية المنفَّذ بوصفه طريقة فعَّالة وغير مكلِّفة لتحسين صحة السكان الريفيِّين، ولاسيَّما الأمهات والأطفال. وتتناول هذه الورقة بالوصف نظام مراكز الصحة الريفية، والمنازل الصحية، والعاملين في صحة المجتمع، وتبيِّن فعَّالية البرنامج من حيث تقليص الفوارق في المؤشرات الصحية في الريف والحضر. كما تناقش الورقة تأثير سياسات تنمية الصحة الريفية غير الباهظة التكاليف في بلدان أخرى من بلدان الإقليم، مثل أفغانستان وبلدان وسط آسيا المشابهة في الهيكل الاجتماعي والثقافي.

ABSTRACT By 1979 50 years of uneven development and modernization by governments prior to the Islamic Revolution had left rural parts of the Islamic Republic of Iran with extremely low economic and health status. This paper reports on the impact of the rural health development programme implemented as an effective and inexpensive way to improve the heath of the rural population, especially mothers and children. It describes the system of rural health centres, health houses and community health workers (*behvarz*) and demonstrates the effectiveness of the programme through declining measures of rural–urban disparities in health indicators. The implications of inexpensive rural health policies for other countries in the region such as Afghanistan and Central Asian countries with a similar sociocultural structure are discussed.

Impact du programme de développement de la santé en secteur rural en République islamique d'Iran sur les disparités des indicateurs de santé entre les milieux rural et urbain

RÉSUMÉ En 1979, 50 années d'inégalité en matière de développement et de modernisation héritées des gouvernements antérieurs à la Révolution islamique ont laissé les zones rurales de la République islamique d'Iran dans un état économique et sanitaire déplorable. Cet article concerne l'impact du programme de développement de la santé en secteur rural mis en œuvre afin d'améliorer de manière efficace et peu onéreuse l'état de santé des populations rurales, en particulier des mères et de leurs enfants. Il décrit le système des centres ruraux de santé, des « maisons de santé » et des agents de santé communautaires (*behvarz*) et démontre l'efficacité de ce programme, que confirme la réduction des disparités des indicateurs de santé entre milieux rural et urbain. Les implications de politiques de santé rurale à bas co t pour d'autres pays de la région tels que l'Afghanistan et les pays d'Asie centrale, de structure socio-culturelle comparable, y sont discutées.

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Introduction

Many countries in western and central Asia suffer from rural underdevelopment and poor health indicators among rural populations. Conventionally, greater economic development of a country ultimately leads to improvements in the health status of the population. However, there is a significant lag between initiating development efforts and the time it takes for them to impact on health status. Hence there is an urgent need for implementation of inexpensive and effective programmes to improve the health status of rural populations in the short run. These may in fact also contribute to the success of rural economic development projects.

Even after almost 50 years (1921–77) of modernization and economic development by the oil-rich state of the Islamic Republic of Iran, after the Islamic Revolution in 1979, rural areas were still extremely poor and underdeveloped, with very low health indicators. The modernization and economic development efforts which started in the 1920s and intensified through the 1960s and 1970s were not balanced across social classes, regions and economic sectors, resulting in rural underdevelopment and a decline in agriculture [*1–2*]. Despite the rapid and heavy industrial investment and strong modernization effort of the Iranian state, poverty and underdevelopment remained persistent in rural communities and villages at the dawn of the Revolution in 1978–79. The land reforms by the state had not prevented the rural population falling deeper into poverty and underdevelopment [*3–5*].

Iranian economic development of the 1960s and 1970s was industrial and urban-based, and concentrated mainly in the national capital and a few large provincial capitals. In rural areas, agricultural productivity was declining and poverty and landlessness expanding. When the elements of the Islamic Republic were starting to take shape in 1976, almost 18 million people lived in 66 000 villages and settlements with less than 5000 people [*6*]. About 80% of the rural population aged 10 years and older worked in agriculture. The majority were family farmers working small plots of land. Landless workers were the poorest sector of the population and in some areas 15% of the families were landless and surviving in extreme poverty and debt [*7,8*].

An outcome of persistent rural–urban inequality and extreme rural poverty was the low health status of rural populations. After the success of the revolution, a major issue for the government was improvement of the health and life chances of the rural population. In this paper we describe the fast-paced, low cost, health devlopment programme that the revolutionary government implemented to reduce the deep rural–urban health disparities and attempt to illustrate its impact with data from various sources.

Rural health intervention programme

Faced with the situation of major underdevelopment and low levels for health indicators for over 50% of the population living in rural areas, the Islamic government set about improving the situation with rural development projects which are conventionally considered as the precursor to improved health of the community [*9,10*]. However, it was clear that the existing extremely low health status could not wait for the impact of rural development to take effect and that rapid action was needed to improve the health and wellbeing of the disadvantaged population who ought to be equal benefici-

aries of the revolution. To this end the main innovation of the government was a strong push to establish an inexpensive community-based primary health care (PHC) system in the early 1980s and oversee its wide expansion in the 1990s.

The focus of the programme on primary care and prevention rather than on the capital-intensive tertiary sector made it relatively inexpensive. The main element of the programme was establishing a strong network of rural health centres (RHCs) and smaller centres called "health houses to deliver low-technology PHC through indigenous health care providers at village level. Hence, training and utilization of local personnel was a key part of the system.

Based on the results of a few small-scale experimental studies carried out in the 1970s, the Ministry of Health and Medical Education launched in the early 1980s a large-scale PHC system with a focus on rural areas and small towns [*11*]. The focal point of activity for this programme was the establishment of the health houses (*khane behdasht*). Each health house is designed to cover a target population of about 1500. Since most Iranian villages have fewer than 1500 residents, each health house also serves several "satellite villages. Such villages are carefully grouped according to a realistic consideration of their cultural and social compatibility. The distance between the main and satellite villages is also pragmatically defined to be no more than 1-hour's walk (rather than a certain number of kilometres).

Each health house is staffed by 1 or more female and 1 male community health workers who are known as *behvarz*. The *behvarz* comes from the same village where he/she is to be stationed in the future. Choosing *behvarz* from among the local population has been a key policy decision, closely observed throughout the expansion of the PHC network. As a result, the *behvarz* often knows every mother, child and family who seeks health care at the health house. Such a close relationship between the *behvarz* and his/her community facilitates the accurate collection of health information, among other things. According to the latest available statistics, there were 16 340 rural health houses scattered among the 66 000 villages and settlements, covering about 85% of the rural population [*12*].

The rest of the rural population is covered by mobile teams. Each team is composed of doctor from the RHC, a health technician for basic laboratory tasks and 1 or 2 *behvarz*. The team visits their designated remote villages each month and provides PHC support. If there are any patients that need to be referred to larger health centres in rural or urban areas the team provides support and referrals.

The main function of a health house is to offer PHC services to the community it serves including:

- annual census of the population covered,
- collection, recording and storage of health information and regular reports,
- public health education and promotion of community participation,
- provision of family health care,
- antenatal, prenatal and postnatal care,
- care of children under 5 years,
- care of school-age children,
- family planning services,
- immunizations,
- disease control services,
- environmental health activities.

Each health house is supported by an RHC, which is a village-based facility. It supervises the health house in its own village, and a few more health houses in neighbouring villages. Each RHC covers

about 7500 people on average. Apart from a physician, the RHC includes the at least 1 of each of the following staff specialties: family health, disease control, environmental health, oral health, laboratory technician, nurse-aid(s) and administrative staff. All staff members function under the doctor's leadership. About 3000 RHCs support the network of rural health houses. The chief responsibilities are to support health houses and supervise their activities; accept referred cases; and maintain proper contact with the higher levels of the health system. Other major functions include carrying out basic laboratory tests, participation in human resources training, taking samples of food products, monitoring environmental health in schools and workplaces, carrying out statistical studies and preparation of reports. In the area of reproductive health, providers at RHCs are authorized to insert intrauterine devices (IUDs).

Specifically, the RHCs support the health house by:

- providing outpatient care and case-finding among referred patients,
- advising on monitoring and follow-up of the treatment schedule of established cases,
- supervising family health, disease control and environmental health activities of health houses,
- offering oral health services,
- monitoring basic environmental sanitation (water sampling where required),
- supporting health houses in the procurement of necessary drugs and equipment.

While RHCs provide the infrastructure of support for providers, the soul of the rural health network has been its most outlying facility, the health house, which is run by the *behvar*. There are now almost 26 000 of these male and female community health workers serving their villages and satellite villages. The female *behvar* is generally responsible for the tasks that are performed within a health house. The male *behvar*, on the other hand, is predominantly concerned with activities outside the health house (i.e. follow-up of cases with communicable disease, case-finding, immunization, environmental health activities and routine care in satellite villages). This partial division of duties does not mean that either *behvar* cannot perform all the duties on his/her own if required.

Behvar have strong community ties with their villages. The *behvar* is nearly always chosen from the main village where the health house will be stationed. However, if this is not feasible, a candidate is recruited from one of the satellite villages. The *behvar* are selected from among 16- to 24-year-old female candidates, and 20- to 28-year-old males with direct participation from village authorities, such as the village council, local clergy and other influential figures of the community.

The process of training the *behvar* provides a good example of the use of appropriate technology at the village level. Given the low rural literacy rate, candidates are required to have 8 years of formal schooling (nowadays frequently a high-school diploma). Candidates must successfully complete a written examination and interview before enrolment in the training course.

Their studies, which span 2 years, are a contrast with traditional pedagogy. Memorization of large amounts of written material has been eliminated. Training is effected through group discussion, role-playing exercises and working at the health houses alongside a carefully selected qualified *behvar*. Students receive free training and financial support throughout the 2-year period of the programme. In return, they are formally obliged to remain and serve at

the village health house for a minimum of 4 years after completing their study. Each student's progress is assessed by instructors at monthly intervals. Students who successfully complete all the courses, pass the examination at the end of each block, and pass the final examination, receive the "Certificate for Completion of Behvarz Training . Then they are ready to start providing PHC in a friendly environment to their home villages and nearby villages, where they usually have relatives and family acquaintances.

Data collection

In order to document the impact of the rural health intervention programme on health indicators for Islamic Republic of Iran we compared data from a number of different sources in the period before the intervention (1976) with the period after the intervention had been in place for over 2 decades (2000).

The Iran Statistical Centre compiles official data from various ministries and provincial offices annually and publishes the *Annual statistical abstract of Iran.* Two major sections of this publication are related to population and health. A national census of population and housing has been conducted in the Islamic Republic of Iran since 1956. The published reports from these censuses provide key demographic and housing data by rural and urban residence. The survey of population growth provided reliable mortality data for the period 1975 through 1976 [*13*].

The data for our survey were gathered through dual record systems where both survey methods and a registration system were used to record the changes in the sample households due to birth, death, incoming and outgoing migration and marriage. The rates were then calculated based on person-years of exposure during the 2-year period (averaged to obtain an annual figure). These data represent the preintervention mortality and fertility level for the Islamic Republic of Iran at the peak of pre-Revolution development and modernization in 1976.

The data for the postintervention impact analysis come from the demographic and health survey (DHSI-2000) [*14*]. This is the first effort to apply a locally adapted version of the internationally recognized demographic and health survey instruments to a large sample of households representative of the urban and rural populations in all provinces of the country. The DHSI-2000 is probably unique both for its reliance on national expertise for advice in design and implementation of the survey and for its coverage of a huge sample (close to 114 000 households with a total population of about 475 000), selected so that it is possible to carry out separate analyses for the urban and rural areas of each of the 28 provinces of the Islamic Republic of Iran as well as the Tehran metropolitan area. The financial support of the project by the United Nations Population Fund and Children's Fund (UNFPA and UNICEF) and their participation in the various stages of the survey contributed significantly to the quality of the project implementation.

The DHSI-2000 was developed over a 3-year period. The Population and Family Health Department of the Ministry of Health and Medical Education was assigned overall responsibility for the design and implementation of the survey [*14*]. To ensure the technical quality of the survey and make its results acceptable to academic researchers as well as specialized agencies, a steering committee consisting of academic demographers, staff members from the Statistical Centre of Iran, staff members from the Civil Registration Organization and researchers with long track-records of research and

teaching on population and reproductive health oversaw the implementation of the project at various stages.

The sampling frame for the survey was based on the 1996 census. The availability of data for the provincial level estimation of various indicators was carefully considered in the sampling process. The sample design was to select 400 primary sampling units (200 urban and 200 rural) from each of the 28 provinces of the country. In Tehran province, 400 primary sampling units were selected from urban and rural areas outside the Tehran metropolitan area. Tehran metropolitan area was treated as a separate urban province represented by an independently selected sample of 2000 households. An estimated total sample of 114 000 households (58 000 urban and 56 000 rural households) was expected to be covered by the study. The actual sample size achieved included 113 957 households (57 968 urban and 55 989 rural). The response rate was 97.5% in urban areas and 99.0% in rural areas. In addition to the heads of households (or other adult member of the household) who provided the household level information, a total of 91 604 ever-married women of reproductive age were interviewed (46 916 urban and 44 688 rural). These women provided data on reproductive health and other issues concerning women and young children.

The data collection instrument was a 213-item questionnaire adapted from the standard interview schedules used in demographic and health surveys. The questionnaire consisted of the following major sections:

- General household questionnaire, focusing on household members' data, including economic activity, migration status over the previous 5 years for all ages, loss of parents for those aged under 15 years, accidents, disability, deaths, household access to sanitary facilities and ownership of modern household comforts, communications and transportation.
- Questionnaire for ever-married women aged 10–49 years, focussing on pregnancies, births and family planning knowledge and practices.
- Questionnaire about nutrition and health of children aged under 5 years.

Outcomes

Preintervention: status of health care in 1979

Data on the status of health care in 1979 is limited to the official data reported in the *Statistical abstract of Iran* [*15*]. From these data it is obvious that the numbers of health care providers were minimal in rural areas. Of the 10 000 Iranian general medical practitioners in 1979, 54% were living in Tehran, the capital city and 5 other large cities, leaving 46% for other urban areas and almost none for rural areas. Of almost 6000 medical specialists, 87% practiced in Tehran and 5 other large cities. Out of nearly 2400 dentists, 65% worked in Tehran and 5 other large cities and practically none in rural areas. At the time, some 700 medical doctors graduated from the medical schools every year, half of whom would leave the country sooner or later because they were dissatisfied with their situation and could easily find work in developed countries. About 2.5%–3.5% of the total government budget was allocated to the health sector. Most of these resources were focused on expensive endeavours of building hospitals in big cities, to which access by the rural population was limited by economic, geographic and cultural factors.

Table 1 summarizes data from the population growth survey of 1975–76 [*13*].

The adverse health service infrastructure and strong health disparities between rural and urban populations are reflected in the mortality rates. The crude death rate for rural areas was 72% higher than the rate for urban areas. Overall infant mortality was high. However, the infant mortality rate of rural areas was one of the highest rates in 1976 and was 105% higher than the urban areas. The worst situation was observed for rural female infants whose mortality was 112% higher than the rate for urban female infants.

Similar disparities can be found in the measure of life expectancy. The difference in the life expectancy of rural and urban men was 10 years in favour of urban men. The life expectancy of rural women in 1976 was barely 52 years, which was 10 years less than urban men. These differences were not surprising in view of the prevailing urban–rural disparities in terms of other variables correlated with health status at the macro-level. Among these were access to such basic facilities as safe drinking water, electricity, and bathing facilities. By 1979, for instance, only 19.9% of rural households (compared with 90.1% of urban ones) had access to piped water while only 27.7% of them versus 97.8% of their urban counterparts had access to electricity. Similarly, only 2.8% of rural households, as compared with 45.7% of the urban, had a hot water bath/shower inside their dwellings.

Postintervention: impact of the programme

The PHC network has drastically improved the health status of rural communities over a relatively short period of time. Data from DHSI-2000 reported in Table 2 provides a number of indicators for rural and urban

Table 1 **Health and housing indicators in the Islamic Republic of Iran, 1976**

Indicator	Total	Urban	Rural	Rural:urban ratio
Crude death rate (per 1000 people)	12.0	8.3	14.3	1.72
Infant mortality rate (per 1000 live births)				
Total	105.4	60.4	123.7	2.05
Male	101.4	59.8	118.2	1.98
Female	109.9	61.1	129.5	2.12
Child mortality rate (ages 1–4 years per 1000 live births)				
Male	14.7	8.9	17.3	1.94
Female	18.9	10.4	22.8	2.19
Life expectancy at birth (years)				
Male	–	60.7	50.7	0.84
Female	–	62.2	51.7	0.83
Domestic facilities (%)				
Housing units with sanitary drinking water	–	90.1	19.9	0.22
Housing units with electricity	–	97.8	27.7	0.28
Housing units with hot water bath/ shower	–	45.7	2.8	0.06

areas in the year 2000. In most cases the indicators in rural areas were as good as urban areas or only slightly lower. For example, regarding neonatal mortality, an urban–rural difference of only 3 units was observed in favour of urban areas. The difference between rural and urban areas in mortality of children aged 1 to 4 years was not large.

Table 2 **Health indicators related across rural and urban areas in the Islamic Republic of Iran, 2000**

Indicator	Urban %[a]	Rural %[a]	Rural:urban ratio
Neonatal mortality rate (per 1000 live births)	17.1	20.6	1.20
Infant mortality rate (per 1000 live births)	27.7	30.2	1.09
Child mortality rate (ages 1–4 years per 1000 live births)	6.9	4.6	0.67
Children with one illness during the last 2 weeks	41.6	41.6	1.00
Mothers treating their children's sickness correctly	93.0	92.0	0.99
Children under 5 years having diarrhoea	11.8	13.7	1.16
Children with diarrhoea correctly treated	91.1	91.0	1.00
Children with diarrhoea who used ORT	96.4	94.6	0.98
Children with respiratory infection correctly treated	93.6	91.9	0.98
Women with no prenatal care	5.2	10.1	1.94
Pregnant women who received vaccination	80.7	77.8	0.96
Received postnatal care at least once	63.9	56.6	0.89
Received postnatal care at least twice	30.7	31.6	1.03
Ever-married women who had knowledge about:			
Oral contraceptives	98.7	98.0	0.99
Condoms	93.3	84.5	0.91
IUDs	95.4	89.4	0.94
Injectable contraceptives	86.3	91.0	1.05
Vasectomy	94.6	86.5	0.91
Tubectomy	97.2	95.3	0.98
Safe period	48.7	25.1	0.52
Withdrawal	88.8	72.4	0.82
Ever-married women who used:			
Oral contraceptives	62.6	65.9	1.05
Condoms	33.6	21.3	0.63
IUDs	26.0	13.0	0.50
Injectable contraceptives	7.3	17.8	2.44
Vasectomy	3.7	1.5	0.41
Tubectomy	15.8	18.5	1.17
Safe period	4.3	1.4	0.33
Withdrawal	49.2	28.7	0.58

[a]*Except where otherwise indicated.*
ORT = oral rehydration therapy; IUD = intrauterine device.

Infant mortality for rural and urban communities has declined greatly but the most important observation is the sharp rate of decline in rural areas, which brought the level of infant mortality to almost the same level as in urban areas.

Other indicators of health of children and mothers, reported in Table 2, showed a similar pattern of rural–urban equality. The efficient delivery of family planning services by rural health workers definitely contributed to the effectiveness of the expansion of PHC and prevention.

Conclusions

This report has described and analysed the impact of a rural health programme delivered to communities suffering poverty and underdevelopment. The rural heath programme developed and implemented in the Islamic Republic of Iran was a very effective and inexpensive way to improve the heath of the population, especially children and mothers. By all indications this programme has accelerated the decline of infant mortality, child mortality and maternal mortality. It has improved the level of prenatal and postnatal care and increased the use of contraceptives as a way of reducing the future mortality of mothers and children. It has contributed to the promotion of healthy attitudes and behaviours, universal immunization of children, and correct treatment of children suffering from diarrhoea and acute respiratory infection. The presence of the friendly *behvar* in the village and their constant interaction with the community and proactive interventions has enabled them to ensure that health education messages are effective. For example, according to the DHSI-2000, among the rural women who were pregnant during 1998–2000, 77.5% had visited a rural health house. Moreover, the ability of the PHC system to support the health messages by providing easy access to the tools needed (e.g. vaccines, oral rehydration therapy, essential drugs, etc.) where and when they were required contributed to bridging the traditional gap between knowledge, attitudes and practices.

The health and social returns of the PHC programme in rural areas of the Islamic Republic of Iran has been much higher than the cost of the programme. The Iranian government could not have made such gains in health outcomes by waiting for general economic development efforts to have an effect on population health and could not have continued to rely on investing in an extensive curative health infrastructure.

A number of countries neighbouring the Islamic Republic of Iran such as Afghanistan and central Asian countries such as Tajikistan, could benefit from our experience and success in implementing PHC in rural areas. These countries have a significant portion of their population in rural areas with high levels of poverty and underdevelopment. Using inexpensive programmes to promote PHC can in fact support the rural economic development efforts. The major factor in designing such programmes, however, should be a firm and rational basis for service delivery and the distribution of facilities guided by a master plan and continuous evaluation of the programme at each step in expansion. The plan should allow for assured, easy access to health service facilities, effective and appropriate training, availability and production of relevant statistics, selection of rural health care providers from the community and creation of a respected network, supported through the urban–rural hierarchy.

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Report

Achieving sustainability, quality and access: lessons from the world's largest revolving drug fund in Khartoum

S. Witter[1]

ضمان الاستمرارية والجودة والإتاحة: دروس من أكبر صندوق دوّار للأدوية في العالم بالخرطوم

صوفي ويتر

الخلاصة: يمثِّل توفير إمدادات موثوقة وميسورة التكلفة من الأدوية الأساسية في المرافق الصحية، واحداً من التحدِّيات التي تواجهها البلدان النامية. وتقدِّم هذه الورقة البحثية وصفاً للصندوق الدوَّار للأدوية في الخرطوم، الذي أنشئ عام 1989 من أجل تحسين إتاحة الأدوية العالية الجودة في سائر أنحاء الولاية. وأظهر تقييم أُجريَ عام 2004 أن الصندوق نجح في التعامل مع عدد من الأمور التي هدَّدت استمراره المالي، ووسَّع شبكة مرافقه ومدَّ نطاق منتجاته وموجوداته المالية. ويوفر الصندوق الآن الأدوية الأساسية لثلاثة ملايين من سكان الخرطوم البالغ عددهم خمسة ملايين، كل عام، بأسعار تقل بنسبة تتراوح بين 40٪ و100٪ عن مثيلاتها الموفَّرة من مصادر بديلة. ومع ذلك، فقد أوضحت الدراسة مدى صعوبة تحقيق التوازن بين إيجاد نظام فعَّال لاسترداد التكلفة من جانب، وبين إتاحة الأدوية للأشخاص الأشد فقراً من جانب آخر.

ABSTRACT Ensuring a reliable and affordable supply of essential drugs to health facilities is one of the main challenges facing developing countries. This paper describes the revolving drug fund in Khartoum, which was set up in 1989 to improve access to high quality drugs across the State. An evaluation in 2004 showed that the fund has successfully managed a number of threats to its financial sustainability and has expanded its network of facilities, its range of products and its financial assets. It now supplies essential drugs to 3 million out of the 5 million population of Khartoum each year, at prices between 40% and 100% less than alternative sources. However, results illustrated the tension between achieving an efficient cost-recovery system and access for the poorest.

Garantir viabilité, qualité et accès : l'expérience de Khartoum, le plus grand fonds renouvelable pour les médicaments au monde

RÉSUMÉ Garantir aux centres de santé un approvisionnement fiable et abordable en médicaments essentiels est l'un des principaux défis qu'ont à relever les pays en développement. Le présent article décrit le fonds renouvelable pour les médicaments de Khartoum, créé en 1989 afin d'améliorer l'accès à des médicaments de qualité sur tout le territoire national. Une évaluation réalisée en 2004 a montré que ce fonds a su surmonter avec succès les différentes menaces qui pesaient sur sa viabilité financière, tout en étendant son réseau de distribution, en élargissant sa gamme de produits et en multipliant ses investissements. Aujourd'hui, le fonds assure chaque année l'approvisionnement en médicaments essentiels de 3 millions d'habitants de Khartoum, qui compte une population de 5 millions, à des prix inférieurs de 40 à 100 % à ceux pratiqués par d'autres distributeurs. Toutefois, les résultats mettent en lumière la difficulté qu'il y a à concilier un système de recouvrement des coûts efficace et l'accès des plus pauvres aux médicaments essentiels.

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Background

Drugs are a critical component of any health care system, and since the 1980s there have been a variety of experiments in developing countries with different approaches to cost recovery which aim to increase access to drugs. Some, such as the Bamako Initiative, use the willingness to pay for drugs to increase resources in the health sector generally [*1,2*]. Others operate strict cost recovery, using payments to purchase new drug supplies, but without any leakage of revenue for other purposes. One of the main features of many of these experiments is that they have been small-scale, and often not very long-lasting, due to a variety of managerial problems which lead to depletion of the original capital.

The importance of financing strategies for drug supplies is underlined by the fact that, generally speaking, developing countries spend a much higher proportion of their total health spending on drugs, 24%–66%, compared with 7%–20% for developed countries [*3*]. In addition, the public spending on drugs as a proportion of total drug expenditure is typically much lower in developing countries (5%–50%) compared with developed countries (50%–90%), leaving a heavy financial burden on households. Despite being costly, though, drugs are highly valued; studies in Sudan and elsewhere confirm that the availability of drugs is often seen as the key indicator of quality of health care by households [*4*].

The revolving drug fund (RDF) in Khartoum State, Sudan, is worth studying for 2 reasons: first, it is the largest single revolving drug fund in the world, with an annual turnover of £2 million and currently providing drugs to 3 million patients per year. Secondly, it has been in existence for nearly 2 decades now, and has been growing in scale and scope. The RDF now supplies 102 health centres, 18 hospitals and 18 community pharmacies. To run these it has 74 pharmacists, 202 pharmacy technicians and 297 support staff.

In 2004, an evaluation was commissioned to focus on how the RDF was functioning as an independent organization—whether it was still fulfilling its original mandate to supply quality drugs at below-market prices—and to examine which groups were benefiting from the RDF and how access could be extended to any groups found to be excluded. The team was also asked to draw out lessons for roll-out in other states of Sudan.

This paper presents the findings of the evaluation, in terms of financial sustainability, quality of drug supply and access, and the lessons for drug funds in other developing country contexts.

History of the Khartoum RDF

The RDF was jointly initiated by the Khartoum Ministry of Health (MoH) and Save the Children (UK) in the mid-1980s, though it took until 1989 for the first drugs to be supplied to health centres. It arose in response to the weakness of the primary care system in the state and the increasing number of common childhood illnesses being brought to the Children's Emergency Hospital. The RDF was developed as part of a wider project—the Khartoum Comprehensive Child Care Project (KCCCP)—which aimed to revitalize primary health care services through improved drug supplies, equipment, staff training, refurbishment of health centres, and improving primary health care (PHC) systems.

The aims of the RDF component were to increase access to essential drugs at affordable prices and to encourage the rational use of drugs. The first was to be achieved

by setting up a sustainable drug revolving fund, with full cost recovery (but no subsidy to external activities, as was practised by the Bamako Initiative). The second was to be achieved by investment in infrastructure, training and operational research.

The RDF imports drugs from non-profit suppliers abroad, or from local sources, where these are available. A committee made up of RDF management and PHC representatives selects the drugs from the Sudan Essential Drugs List. These are then sold on at cost, plus a mark-up to cover overall running costs (including reserves against currency devaluation, etc.). Cross-subsidies are operated from the common, cheaper drugs to some of the more expensive ones. Prices for patients are uniform across the State: there is therefore some cross-subsidy from the closer facilities to the more remote ones, which are more expensive to supply and supervise.

Drugs are delivered to RDF-supported pharmacies in the health facilities, based on previous consumption patterns. Funds are collected monthly, against sales records. (For a more detailed description of the operation of the RDF, see [*5*]). An important point is that the RDF does not sell to the health centres to sell on (which would place the financial risk on the health centre), but sells directly to the patients, via pharmacies in health centres and hospitals.

Starting with 13 health centres in 1989, the RDF expanded to 77 outlets (65 health centres and 12 rural hospitals) by 1996. The list of essential drugs also expanded from 70 to 90 items. A total of US$ 1.8 million was invested in capitalizing these outlets. Save the Children (UK) also provided training, refurbished pharmacies and provided transport until the programme was handed over in 1996 to the Khartoum MoH [*6*].

An evaluation of the overall KCCCP carried out in 1996 concluded that the RDF "was able to improve the supply system and avail a range of essential drugs at affordable prices" [*7*]. It also noted improvements in rational prescribing, though "efforts are still needed for further improvements in this area". It found that 8% of patients were unable to pay the prescription cost (this was based on the proportion of prescriptions where the drugs were available, but were not dispensed). It noted that the RDF policy of cost recovery had since become a key government policy in health throughout the country, and recommended that the RDF model be expanded nationwide.

During the next phase, 1996–2002, the RDF became an independent project within the Khartoum MoH. Changes over this period included the following:

- Financial incentives were introduced to retain staff.
- Training programmes were organized for all members of staff.
- A new employment contract was signed with pharmaceutical staff, whereby they would have to pay for stock losses. This reduced the leakage of drugs.
- Management improvements included a system for reconciling cash with the value of sales made, as well as ABC analysis of sales (investigating the proportion of revenue generated by different products).
- A policy of selling through the newly established "people's pharmacies" increased the number of outlets of the RDF, as did the expansion to a number of national hospitals.
- The RDF took responsibility for delivering free drugs for the first 24 hours of emergency treatment in public hospitals.

One study noted an increase in utilization of health facilities during this period that was attributed to the RDF and also to

the new health insurance system introduced in 1997 [*8*].

In 2002, the Wali (Governor) of Khartoum State signed a constitutional decree on the establishment of the RDF as an independent foundation, responsible for the medical supply in Khartoum State. An independent administrative board was established, chaired by the State Minister for Health. At the same time, 7 RDFs were set up in other states, financed by the Central Medical Supplies Public Organization (CMSPO).

Evaluation components

The study was designed and approved by a steering committee, which included representatives of the Federal MoH, the Khartoum MoH, the RDF, World Health Organization (WHO), United Nation's Children's Fund (UNICEF) and Save the Children (UK) [*9*]. Ethical approval for the research design, tools and sites was obtained from the Khartoum MoH and the Humanitarian Aid Commission.

There were 9 different components to this study:

- A literature review, to examine the RDF's history and also to fit the study findings into the context of wider developments in Sudan and internationally.
- Interviews with key informants in Khartoum, to assess the policy context and to identify concerns and suggestions for potential improvements to the RDF.
- A household economy approach study of different areas within the state, focussing on household livelihoods and coping strategies, and ability to afford health care and other basic goods [*10*].
- A household survey of 700 households (5111 individuals) looking at health-seeking behaviour, expenditure on health care, coping strategies and perceptions of health facilities and the RDF [*11*].
- Focus group discussions, which looked at the same questions as the household survey, but using qualitative techniques.
- A health facility survey, which looked at prescribing practices, financial management and pricing structures, and some indicators of quality of care within RDF outlets [*12*].
- A financial analysis of the RDF, to focus on profitability, operating costs, financial management and probity.
- A pharmaceutical study, to look at issues of quality, pricing, procurement, management and the range of drugs which the RDF supplies.
- A management study, focussing on the structure of the RDF, its human resource policies, management issues and legal status.

Analysis

Financial sustainability

Financial sustainability was measured in a number of ways, including by examining:

- the change in profit margins over time and from different revenue streams,
- the proportion of revenue expended on overheads (including staffing),
- various efficiency measures, such as working capital efficiency ratios.
- risks and liabilities to future sustainability.

The evaluation found that the RDF has continued to grow, in terms of its volume of sales and assets, and remains in good financial health. However, concerns were raised that increases in sales value, profit margins and salary costs could indicate that the primary ethos of the RDF was shifting

from a public health to a more commercial one.

In addition, some trends were noted towards less efficient management, such as increasing stocks (which increase the risk of losses), longer turnaround periods for stock, and the lack of some important information in financial reports.

One of the ways in which the RDF has expanded its business beyond the initial network of public health centres and hospitals (which are supplied with essential drugs) is by growing a semi-commercial wing, which supplies essential and non-essential drugs to the people's pharmacies. The high volumes and low overheads associated with this side of the business make it profitable, despite a lower mark-up. The removal of the people's pharmacies side of the business would pose a threat to the core business of the RDF.

There are a number of other threats to the long-term future of the RDF, which are common to funds of this kind. One is defaulting by debtors. The RDF supplies most of the public facilities in Khartoum State, including some tertiary referral centres. Unlike the health centres and hospitals (where the RDF sells direct to patients), the referral hospitals (which are federal institutions, not state) buy drugs themselves and some have not been paying promptly. They have considerable clout and it has taken delicate negotiations to reach a deal on payment of outstanding debts owed to the RDF. These issues, if unresolved, could threaten the RDF's credit rating with its creditors—the European not-for-profit suppliers which provide most of its imported drugs.

Financial independence has been crucial to the survival and success of the RDF. High level political support has helped to ensure that to date its funds have not been diverted to other uses. The RDF has traditionally paid a proportion of its profits to the Khartoum MoH, originally to compensate for the Ministry's investment in the health care and pharmacy infrastructure. The initial agreement between Save the Children (UK) and the MoH stated that 6% of the RDF sales should be transferred to the MoH to finance other PHC investments. The proportion of RDF sales revenue that is being transferred has increased, and the amount of money received by the MoH has doubled, in the light of the growth in RDF business and the addition of the income stream from the people's pharmacies (which did not exist when the original agreement was drawn up). It is also not entirely clear how the money is being used, and whether it is being invested in primary care or one of the tertiary institutions.

The RDF is also subject to a complex array of pharmaceutical regulations and tax concessions, which, if altered in a way that increased operating costs, could diminish its ability to continue to "revolve" successfully.

Quality of drugs supply

Quality of drugs supply was examined in 4 main ways:

- by looking at changes in prescriptions in relation to WHO rational prescribing indicators,
- by comparing drug prices at RDF outlets with market alternatives,
- by checking availability of essential drugs at RDF outlets,
- by investigating whether RDF supervision and quality control systems are still operating effectively.

The evaluation found that many of the systems—for procurement, quality assurance, distribution and stock control—continued to operate effectively. In addition, the market survey confirmed that the RDF continued to offer lower prices to its clients, compared with alternative outlets (it

is 40% cheaper, on average across its list, compared to the CMSPO and 100% cheaper than private sector outlets).

However, there were some areas of concern. One was that the availability of essential drugs, while remaining good, had deteriorated since the last evaluation: the proportion of available stock in the facility had reduced from a reported 100% in health centres in 1996 and 2000 to 95.6% in 2004. Some indicators of rational drugs use had also deteriorated (in particular, there had been an increase in prescription of antibiotics). This suggests that renewed attention to prescriber training and public education is required. Systems for stock-keeping also appeared to be relatively poor in many of the RDF facilities—the number of health facilities stocking expired drugs had risen from 16% in 1996 to 28%. These raised questions about the quality and robustness of the supervision which is being undertaken.

The RDF applies a cross-subsidy from cheaper to more expensive drugs, which increases access to costly items such as insulin. The equity effects of that are unclear, but it does mean that its prices, while lower on average for the full list than all its rivals, are higher compared with the CMSPO for the 15 most common drugs.

Access

Access was measured through 5 questions:

- How many people are being served by the RDF: what are the trends in utilization?
- Geographical access: are RDF services within reach?
- How many households, and what kinds of households, cannot afford to access RDF drugs and health services?
- How much awareness is there in the community of the RDF?
- What is the level of community participation in health services generally?

In terms of overall access, utilization trends were impressive (the RDF reached 3 million patients, some three-fifths of the total population of Khartoum State in 2002) but may have declined slightly in the last few years. Changes in reporting by the RDF and lack of a recent population census made it hard to track some of these issues.

Geographic coverage is good and there was no evidence that distance to facilities was a major barrier (it takes on average 15 minutes to reach a health centre and just over half an hour to reach a public hospital, according to the household survey). Quality indicators examined in the health facility survey suggested that quality did not vary systematically by location or rural/urban status, with the exception of supervision by the Khartoum MoH, which was more frequent in urban areas.

The household survey also reinforced the importance of the public services: the main treatment strategy was to go to a health centre (36% overall), followed by public hospitals (29% overall). Moreover, these facilities are more important for the poor: use of health centres is concentrated in the bottom 3 quintiles, while hospitals are important to the bottom 4 quintiles, but not the richest.

Financial access is the main issue of concern, with the health sector charging for almost the entire range of health services and also, of course, the drugs. The household economy component of the study suggested that 17% of the population of Khartoum State were unable to afford basic health care costs, and 24% could meet basic costs but were unable to meet "emergency" costs, if they arose. These households are mainly composed of internally displaced people (60%–75% of whom were estimated

to be unable to meet their basic health care costs)[1], plus the poorest 5%–10% of the urban and rural households.

The household survey results are broadly consistent with the household economy approach results. It found that 51% of the overall sample were living in absolute poverty, but that the areas with internally displaced people were most affected (66% of whom are under the poverty line), as well as being most disadvantaged in terms of infrastructure, which is also linked to higher rates of communicable disease. It found that 6% of the sick did not have treatment (largely for economic reasons), and that 29% of those who do treat cannot afford to pay for their treatment, resorting largely to borrowing or reduced treatment. For the internally displaced people areas, this was much higher (46%), as it was when results were analysed by income quintile (37% of the bottom quintile could not afford to pay). Moreover, the poorest quintile was 5 times more likely not to treat sick members, compared with the top quintile.

These results related to overall health care costs, not just drug costs; however, drugs form the bulk of health care expenditure, according to the household survey, accounting for 58% of total costs. Overall, household expenditure on health care absorbs 1%–5% of total household income and averages US$ 57 per person per year, much higher than previous estimates. Given that public spending on health averages US$ 4 per person per year, these figures suggest that public sources are contributing a mere 7% of total health expenditure, at least within Khartoum State.

There are various formal mechanisms for protecting households against health care costs, but the survey suggests that they are only playing a small role. Only 1% of the sample had been exempted from paying for health care; 3% had had assistance from the Zakat Fund (an official charitable fund, based on mandatory payroll deductions), while a further 3% had had assistance from Takaful (a voluntary fund set up to assist with hospital costs). In addition, just under 5% had benefited from insurance coverage (though this did not reduce the members' expenditure, rather it increased the proportion able to treat, especially at more expensive facilities). Informal channels appeared to be the most prolific and supportive—57% of those who could not pay relied on borrowing to cover their bills—though these often create debts and future obligations.

Community awareness of the RDF was low: only 10% of household survey respondents had heard of it. Given that the RDF works through regular health service outlets, this low awareness is not surprising. In terms of community participation in those health services, the health facility survey found that 73% of the health centres and 50% of the hospitals reported having a functioning community health committee (CHC), but only 33% and 20% respectively had minutes of the meetings, which suggests that this may be a more realistic figure for active CHCs. For the health centres with active committees, some 70% held monthly meetings, and the other 30% met weekly. These figures on availability of CHCs showed some improvement by comparison with the evaluation of 1996, though the proportion of health centres with an active committee remains less than a third.

Lessons learned

There are a number of general lessons that emerge from the RDF evaluation.

[1] *The situation of the internally displaced people living in Khartoum has been affected by the peace agreement in the south and IDP data may now need to be reviewed.*

One is that there is an inherent tension in revolving drug funds between being business-minded (ensuring financial sustainability) and being philanthropic (ensuring access). The RDF originally managed the tension by coexisting with a project which focused on training and investments in the primary care network. Since 1996, when the project was handed over, and even more since 2002, when it became an independent organization, the temptation is there to focus on the business side, with less emphasis on looking for ways of increasing coverage for excluded groups. There is no trend data for exclusion, as it was not measured accurately in the past, but current data suggest that some 20% overall are either denied treatment or are having to resort to strategies which may threaten their future ability to cope. Although the RDF provides drugs at prices below those of competitors (thus improving relative affordability), it is unable to tackle issues of absolute affordability without endangering its own financial security.

The interaction with the health financing context is all-important. The RDF has been developed in the context of a health system which has increasingly been passing costs on to households. Since the 1990s, Sudan has been following the familiar path of health sector reform, including an increasing role for cost recovery (user fees), decentralization and encouraging the growth of the private sector [*13*]. This increases the willingness to pay for drugs (especially if they are accessible, of high quality and relatively cheap), while at the same time reducing the ability to pay, as households are already absorbing the full range of health care (and other) costs. In Khartoum, this tension has been manageable because of the buoyancy of the economy. In more remote parts of Sudan, evidence from what few reports exist suggests that revolving drug funds, where they were set up, have either ceased to function or have become the private businesses of individual health workers, seeking to supplement meagre salaries [*14*]. The importance of context has been emphasized by other studies which evaluated cost recovery programmes, for example McPake et al. [*15*].

In addition to the economic base in Khartoum, a number of other factors for the success of the RDF have been identified, which are of wider applicability. One is the large-scale and long-term investment which was made in establishing the RDF. The start-up took 7 years, with considerable technical and training inputs from Save the Children (UK), as well as a capital infusion of US$ 1.8 million. Strong systems were established, and local technical competence and leadership built. The commitment of the political leadership of Khartoum to preserving the independence of the RDF, especially after handover, has also been crucial. In addition, the development of the national health insurance system has allowed the RDF to expand beyond what was previously affordable by the local population. A synergy has developed with the Khartoum Health Insurance Corporation, which is now its main purchaser. In 2003 it paid for 52% of the sales through people's pharmacies and 43% of the sales through RDF outlets in health centres and hospitals.

Threats to financial sustainability need continued management, however. In particular, there is a temptation to change the purpose of a successful RDF, by extracting revenue for other purposes (making it more akin to a Bamako Initiative scheme, funding health care through drugs sales). If the funds are used to subsidise primary care and reduce user costs, then the effect could be cost-neutral on the users. However, in the case of the Khartoum RDF, this does not appear to have happened, in which

case it is preferable to channel profits back into price reductions for drugs, or set the "excess profits" aside to fund exemptions for indigents. Other potential threats include political interference, poor leadership and weak management systems which allow overhead costs, losses and fraud to grow.

Conclusion

The RDF provides a useful model for other countries. It has survived for nearly 2 decades now and is continuing to fulfil its original mandate to supply high-quality essential drugs at below-market prices to a state of more than 5 million people. Most revolving drug funds fail due to problems such as under-capitalization, prices set below replacement costs, delays in cash flow, rapid programme expansion without sufficient additional capital, losses due to theft and deterioration, unanticipated price increases due to inflation and changes in parity rates or foreign exchange restrictions [*16*]. The RDF, however, has gone from strength to strength, expanding its network, expanding coverage and range of products, and maintaining its price advantage over alternative sources.

The benefits are most marked in rural areas, which suffered from greater drug supply problems in the past (the private sector was less developed there) and which now benefit from the "one price" policy of the RDF (drugs cost the same throughout the RDF network, no matter how remote the facility). In ensuring a reliable and relatively affordable drug supply, the RDF has contributed to revitalizing the primary care system and has supported the growth since 1997 of a new national insurance scheme.

At the same time, the RDF is based on a strict cost-recovery mechanism, which has no built-in exemptions for those who are unable to pay. It is unable to square the circle of low incomes and high burden of illness, which lead to exclusion and financial hardship for around one fifth of the population. Drug funds, at their best, can improve availability and relative affordability, but in areas with high levels of absolute poverty, they cannot ensure access for all without external support. This is particularly true where cost recovery is applied not just to drugs, but to all health care services, as is the case in Sudan.

In Sudan, where the government provides one of the lowest proportions of total health expenditure in the whole of Africa (19%, according to World Bank estimates), there is a strong case for increased public expenditure targeted at specific deprived regions and groups. This could be channelled through the health budget or through the growing health insurance system. In other countries which have developed revolving drug funds, other methods of reducing exclusion will need to be developed to complement their RDFs.

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Report

Cancer magnitude, challenges and control in the Eastern Mediterranean Region

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حجم مشكلة السرطان، والتحدّيات التي يمثّلها، وسُبُل مكافحته في إقليم شرق المتوسط

شريف عمر، نيلي علي الدين، أسامة محمد نمر الخطيب

الخلاصة: هناك إقرار متزايد بأن السرطان بات يمثّل همّاً صحياً كبيراً ومتعاظماً في إقليم شرق المتوسط. ويوضّح هذا التقرير العبء الذي يمثّله السرطان في الإقليم حالياً، والتحدّيات التي تواجهها البلدان، المتمثّلة، بصفة رئيسية، في غياب أنشطة الترصُّد الوطني لحالات السرطان، وغياب نموذج الرعاية المتكاملة التي تهدف إلى توقّي الأمراض غير السارية، بصفة عامة، والسرطان بصفة خاصة، وعدم كفاية الأنشطة الوطنية لبناء القدرات، وعدم ضمان استمرارية البرامج. ويناقش التقرير استراتيجيات الوقاية من السرطان، ومكافحته، ورعاية مرضاه في هذا الإقليم، مثل: إعداد السياسات المُسْنَدة بالبيِّنات، وحشد الموارد، وتخصيصها على النحو الملائم، والمشاركة الفاعلة لجميع أصحاب الشأن المعنيِّين، والالتزام الحكومي بالتشريع، والتثقيف، والتعاون الدولي.

ABSTRACT Cancer is increasingly recognized as a major and growing health concern in the Eastern Mediterranean Region (EMR). This report outlines the current burden of cancer in the Region and the challenges faced by the countries; these are mainly lack of national cancer surveillance, lack of a model of integrated care for noncommunicable disease prevention in general and cancer in particular, inadequate national capacity-building and lack of programme sustainability. Strategies for cancer prevention, control and care in the Region are discussed, such as: the formulation of evidence-based policies, mobilization and appropriate allocation of resources, active participation of all stakeholders, government commitment to legislation, education and international collaboration.

Dimension, défis et ma trise du cancer dans la Région de la Méditerranée orientale

RÉSUMÉ Dans la Région de la Méditerranée orientale, le cancer s'affirme chaque jour davantage comme un problème de santé majeur de plus en plus pesant. Ce rapport se propose de délimiter l'impact du cancer dans la Région et les défis que doivent relever les pays, à savoir notamment le défaut de surveillance du cancer au niveau national, l'absence d'un modèle de soins intégrés pour la prévention des maladies non transmissibles en général et du cancer en particulier, l'insuffisance des politiques nationales de renforcement des capacités et le peu de viabilité des programmes. Sont ici discutées les stratégies de prévention et de lutte anticancéreuses ainsi que de prise en charge du cancer dans la Région, par exemple la formulation de politiques factuelles, la mobilisation et l'affectation raisonnée des ressources, la participation active de toutes les parties prenantes, l'implication des instances gouvernementales dans la législation, l'éducation et la collaboration internationale.

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Introduction

Cancer is the second most common killer in the world today, after cardiovascular disease [*1*]. According to the World Health Organization (WHO), 13% of all deaths worldwide are currently caused by cancer [*2*]. Cancer is and will become an increasingly important factor in the global burden of disease in the decades to come. The estimated number of new cases each year is expected to rise from 11 million in 2002 to 27 million by 2030 [*1–4*] (Table 1). Approximately 60% (about 6.5 million) of all these new cases are expected to occur in less developed countries.

In the Eastern Mediterranean Region (EMR) of WHO, cancer is the fourth most common killer and is increasingly recognized as a major heath problem (Figure 1, Table 1) [*1–12*]. The main factors contributing to the projected increase are the growing proportion of elderly people and the overall reduction in deaths from communicable diseases. Changes in lifestyle have resulted in more exposure to cancer-promoting substances. This, together with the increased prevalence of tobacco use, changes in social and dietary habits, decreased physical activity, and exposure to other environmental risk factors, contributes to the increased cancer morbidity. The EMR is expected to see the greatest increase in cancer incidence in the next 15 years, with an increase between 100% and 180% according to projection modelling (Figure 2) [*13*].

The considerable magnitude of the cancer burden in the EMR was recognized at the 43rd Session of the WHO Regional Committee for the Eastern Mediterranean in 1996, at which a resolution for cancer control and prevention was adopted. In the last 15 years, the WHO Cancer Control Programme has fostered the development of national cancer control programmes as a primary intervention strategy for a comprehensive and cost-effective approach at the country level.

This paper presents an overview of the current cancer situation in the Region and the actions needed to tackle the growing burden. Data for this report were obtained from the following sources. National population-based registries [*7,14–17*], regional population-based registries [*18,19,20–24*], GLOBOCAN – 2002 IARC for countries with hospital-based registries (Morocco, Sudan and Yemen) or those lacking any form of cancer registry (Somalia, Djibouti and Afghanistan) [*25*].

Table 1 **Incidence, mortality and prevalence of cancer globally and in the Eastern Mediterranean Region (EMR) (in 2002 and projection for 2030) [*1,2,12,13,25,27*]**

	World 2002	World 2030	EMR 2002	EMR 2030
Population census	6 229 629 168	8 206 457 382	492 721 000	649 074 572[a]
Absolute incidence	11 000 000	27 000 000	529 000	1 953 714[b]
Deaths	7 000 000	17 000 000	272 000	1 003 145
Prevalence	25 000 000	75 000 000	1 017 441	3 758 142

[a]*Assuming an average annual population growth rate of 0.98% of the world population.*
[b]*Crude incidence rate of cancer will increase from 1.07/1000 population in 2002 to 3.01/1000 population in 2030 in EMR (assuming a 181% increase). Assuming the same rate of increase, the crude death rate will increase from 0.55/1000 population in 2002 to 1.545/1000 population in 2030. Also the prevalence of cancer increased from 2.06/1000 to 5.79/1000 population in 2030.*

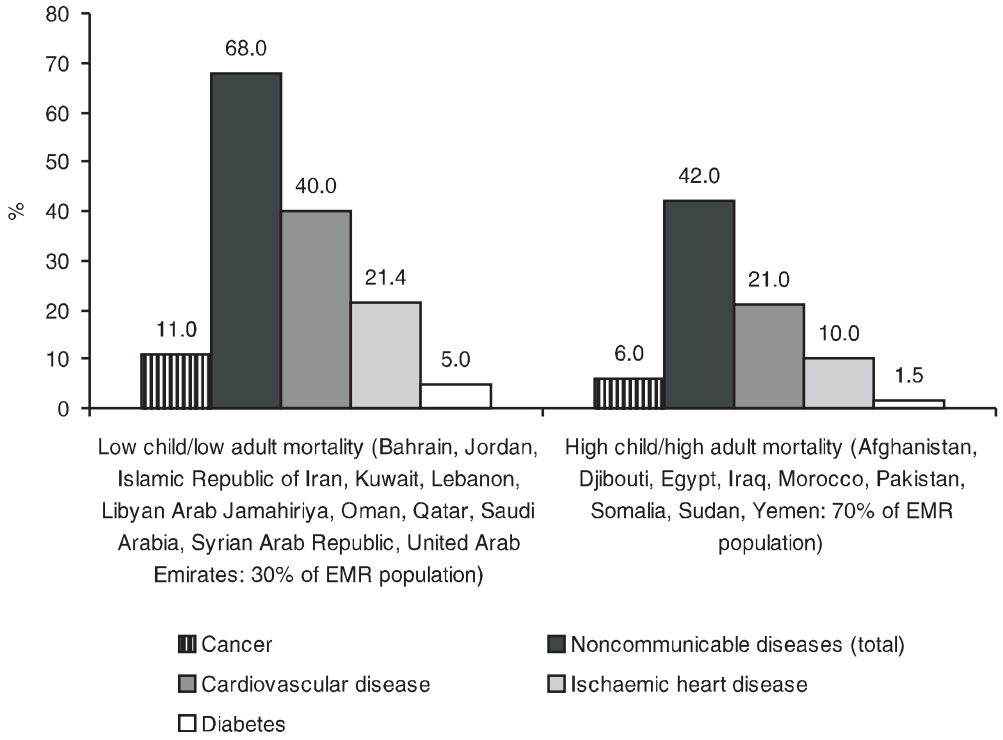

Figure 1 **Deaths by cause, Eastern Mediterranean Region (EMR), 2002 [*12,26,30,31*]**

Burden of cancer in EMR countries

The burden of cancer can be described with respect to incidence (newly diagnosed cases), prevalence (new and old cases), mortality, or survival estimates. In the EMR, the absolute incidence of cancer was more than half a million new cases/year (528 729 new cases) identified through national/local cancer registries or estimated from other sources (Table 1) [*1,2,6–8,14,18–23,26–28*]. The crude incidence of cancers in males was found to range from 35.1/10^5 population/year in Saudi Arabia to 140/10^5 population/year in Lebanon with a weighted average of 97.7/10^5 population. In females it ranged from 33.3 to 147.7/10^5 population with a weighted average of 95.83/10^5 population in the same 2 countries. The male to female ratio was 1.02. Lung cancer and breast cancer are responsible for the greatest number of deaths in the Region (Figure 3). In males, lung cancer was the foremost in one-third of EMR countries and 2nd to 4th in 8 countries (38%). In nearly all EMR countries, breast cancer constituted a public health problem. In women breast cancer was the leading cancer in all countries, except Somalia and Djibouti [*1–4,8–10,20–29*]. Tables 2 and 3 show the 5 commonest cancers in males and females in EMR countries.

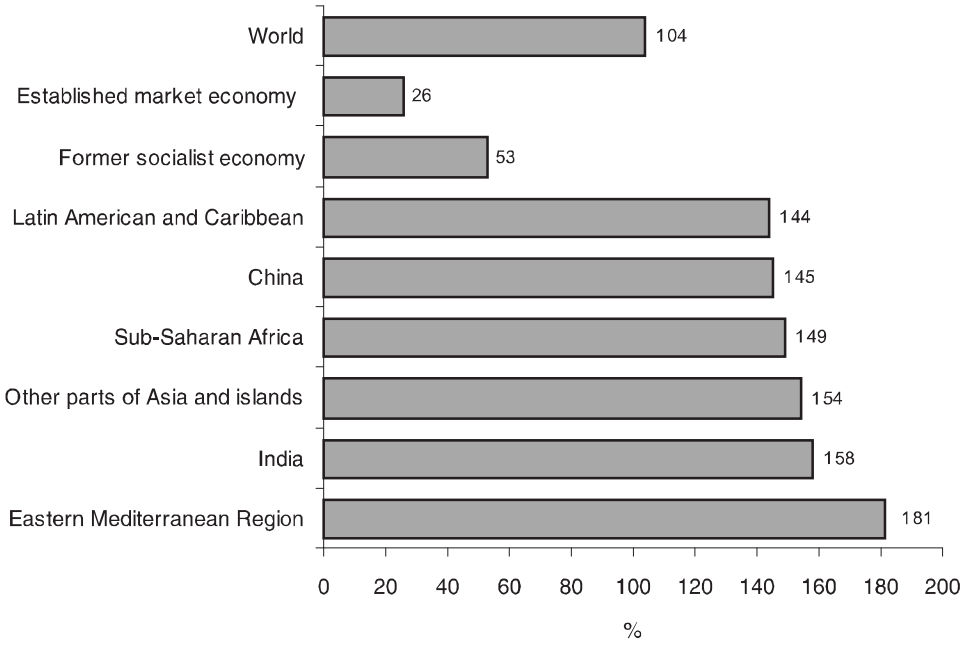

Figure 2 **Increase in deaths from cancer (%) [*13*]**

Cancer data and evidence

Throughout the Region, reliable data on cancer mortality are lacking. Few registries posses published incidence data and amongst those available, source and citation vary greatly (Figure 4). After extensive and systematic review, data on incidence were reported via national registries in 8 of 21 of EMR countries, and via local or regional cancer registries in 7 countries. Although local cancer data are important in order to develop and evaluate control measures against cancer, up to the end of 2006, 6 countries in the Region had no local or national cancer registries. In addition, many lacked financial or technical resources to collect good quality, complete and timely data.

Cancer control

Although some progress in cancer control has been made, many EMR countries face constraints which must be overcome to improve cancer control. Indeed, despite rapid wealth and transformation of many countries in the Middle East chronic disease risk and mortality profiles have increased, especially in cancer [*24*]. Lack of national cancer control plans in most countries is a serious public health problem. Nearly all health systems in the Region are centralized, mainly curative and hospital-based. Primary care is not well developed and public health initiatives are very limited. While there are effective strategies for the

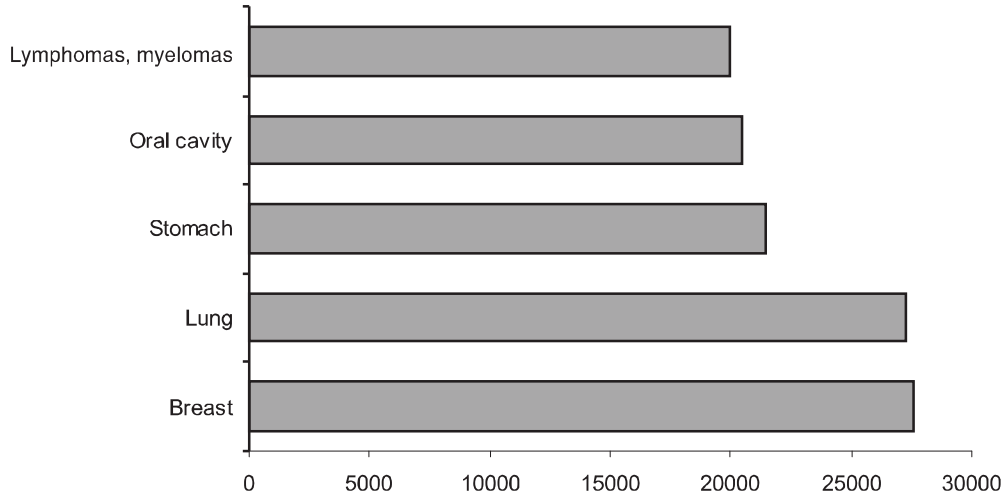

Figure 3 **Top 5 cancer causes of deaths in the Eastern Mediterranean Region, 2002 [*25*]**

pain relief and the provision of palliative care in most EMR countries, even in low-income ones, there is little evidence of prevention both at the population level and among high-risk groups. For example, none of the countries has a call and recall system for the early detection of cervical and breast cancer. Despite some efforts to re-orient the health systems from primarily "curative" to more "preventive", progress has not been significant in most of the countries.

Challenges for the Region

The political obsession with creating a surplus of hospitals coupled with a lack of leadership within the health services has undermined the ability of governments to predict the impending cancer epidemic. Various WHO studies on cancer services in the EMR have identified common barriers to developing effective cancer control and prevention plans [*32*]. The principal barriers for cancer prevention and control in EMR include:

- Lack of a clear and well-documented public health policy for all noncommunicable diseases (NCDs), including cancer, in most of EMR countries.
- Lack of political support to develop legislations and regulations to:
  - Build up and enhance cancer registries;
  - Control tobacco, which alone could prevent one-third of cancers in many of EMR countries;
  - Endorse WHO's global strategy on diet, physical activity and health (DPAS).

WHO cancer control strategy

As a response to the cancer epidemic and following the adoption of the resolution on cancer prevention and control (WHA58.22)

Table 2 **The 5 most common cancer sites in males by country in the Eastern Mediterranean Region [*1,2,6 8,14,18 23,25 29*]**

Country	First	Second	Third	Fourth	Fifth
Afghanistan[a]	Stomach	Lung	Oesophagus	Oral cavity	Colorectal
Bahrain	Lung	Prostate	Bladder	Colorectal	Stomach
Djibouti [a]	Liver	Oesophagus	Prostate	Kaposi sarcoma	NHL
Egypt	Bladder	Liver	NHL	Lung	Leukaemia
Iran (Islamic Republic of)	Stomach	Oesophagus	Colorectal	Skin	Prostate
Iraq	Lung	Bladder	Larynx	NHL	Prostate
Jordan	Lung	Bladder	Colorectal	NHL	Prostate
Kuwait	Colorectal	Prostate	Lung	Liver	NHL
Lebanon	Lung	Bladder	Larynx	Leukaemia	Prostate
Libyan Arab Jamahiriya	Bladder	Lung	Prostate	Colorectal	Liver
Morocco[a]	Lung	Bladder	Prostate	Stomach	Colorectal
Oman	NHL	Stomach	Prostate	Lung	Colorectal
Pakistan	Lung	Oral cavity	Larynx	Bladder	Prostate
Qatar	Bladder	Liver	Colorectal	NHL	Prostate
Saudi Arabia	Liver	Colorectal	NHL	Lung	Prostate
Somalia[a]	Liver	Oesophagus	Prostate	NHL	Stomach
Sudan[a]	Oral cavity	Prostate	Oesophagus	NHL	Liver
Syrian Arab Republic	Bladder	Leukaemia	Lung	NHL	Colorectal
Tunisia	Lung	Skin	Bladder	Prostate	Colorectal
United Arab Emirates	Colorectal	Lung	Stomach	Prostate	NHL
Yemen[a]	Liver	NHL	Colorectal	Oesophagus	Stomach

Ranking was done according to age standardized rate/10^5 and, when equal, by relative frequency.
[a]In these countries, cancer site ranking was based on estimated rates.
NHL = non-Hodgkin lymphoma.

[*33*] at the 58th World Health Assembly in May 2005, the Director-General has recently approved the development of various activities for cancer prevention and control.

The aim of the WHO cancer control strategy is to "strengthen and accelerate the translation of cancer control knowledge into public health action. The focus is placed on countries to ensure the reduction of cancer cases and the improvement of the quality of life of patients and their families" [*34*].

WHO stepwise approach for cancer prevention and care

WHO has outlined a stepwise framework that ministries of health can use to create a policy and regulatory environment in which other sectors can operate successfully [*1,2,27*]. The guidance and recommendations provided may be used by policy-makers and planners at the national and sub-national levels. This approach includes the following elements.

Table 3 **The 5 most common cancer sites in females by country in the Eastern Mediterranean Region [*1,2,6 8,14,18 23,25 29*]**

Country	First	Second	Third	Fourth	Fifth
Afghanistan[a]	Breast	Stomach	Oesophagus	Cervix	Ovary and uterus
Bahrain	Breast	Thyroid	Ovary and uterus	Lung	Stomach
Djibouti[a]	Cervix	Breast	Liver	Oesophagus	Ovary and uterus
Egypt	Breast	NHL	Liver	Leukaemia	Bladder
Iran (Islamic Republic of)	Breast	Ovary and uterus	Stomach	Colorectal	Oesophagus
Iraq	Breast	Bladder	Lung	NHL	HL
Jordan	Breast	Colorectal	Ovary	Lymphoma	Leukaemia
Kuwait	Breast	Colorectal	Cervix	Thyroid	NHL
Lebanon	Breast	Cervix	Uterus	Leukaemia	Brain and CNS
Libyan Arab Jamahiriya	Breast	Uterus	Bladder	Colorectal	Leukaemia
Morocco[a]	Breast	Cervix	Colorectal	NHL	Ovary and uterus
Oman	Breast	Leukaemia	Cervix	Thyroid	NHL
Pakistan	Breast	Oral cavity	Cervix	Oesophagus	Lymphoma
Qatar	Breast	Uterus	Thyroid	NHL	Cervix
Saudi Arabia	Breast	Thyroid	Colorectal	NHL	Skin
Somalia[a]	Cervix	Breast	Liver	Oesophagus	Ovary and uterus
Sudan[a]	Breast	Cervix	Oral cavity	Oesophagus	Ovary and uterus
Syrian Arab Republic	Breast	Cervix	Leukaemia	Colorectal	Thyroid
Tunisia	Breast	Colorectal	Bladder	Uterus	Leukaemia
United Arab Emirates	Breast	Thyroid	Ovary	Cervix	Skin
Yemen[a]	Breast	Cervix	Oesophagus	Oral cavity	NHL

Ranking was done according to age standardized rate/10^5 and, when equal, by relative frequency.
[a]In these countries, cancer site ranking was based on estimated rates.
NHL = non-Hodgkin lymphoma.
HL = Hodgkin lymphoma.
CNS = central nervous system.

- Provision of a unifying framework for cancer prevention and control by governments that will ensure that actions at all levels and by all sectors are mutually supportive.
- Development of integrated prevention and control strategies – focusing on the common risk factors and cutting across specific diseases. Such strategies have been found to be the most effective.
- Institution of a comprehensive public health action that combines interventions for the whole population and for individuals.
- Implementation of those activities that are most feasible first, given that most countries will not have the immediate resources to do everything that would ideally be done.

- Promotion of intersectoral interaction at all stages of policy formulation and implementation because major determinants of the cancer burden lie outside the health sector.
- Establishment of locally relevant and explicit milestones for each step and at each level of intervention, with particular focus on reducing health inequalities.

Strategies for EMR countries

More than 30% of cancers can be prevented and controlled by using available knowledge. However, without national strategic action, deaths from cancer are expected to increase globally by 17% between 2005 and 2015 [*1,2,26,27*].

There are several problems facing countries of the Region which include: lack of national cancer surveillance and harmonization of monitoring and surveillance methodologies; absence of linkage of cancer mortality data with NCD prevention and control, and lack of availability of an integrated care model for NCD prevention in general and cancer in particular; inadequate national capacity-building; and a lack of programme sustainability.

EMR states thus need to develop and adopt the following strategies and activities to tackle effectively and efficiently cancer prevention and care in their countries.

Estimate population need and advocate for action

Many countries of the Region do not have a surveillance system for cancer. Knowledge of cancer risk factors is important for predicting the burden of cancer in populations and for identifying potential interventions to reduce such burdens. The World Health Report 2002 [*9*] identified 8 risk factors that contribute the most to mortality and morbidity that can be changed through primary intervention and that can be easily measured in populations. These are tobacco, alcohol use, physical inactivity, low fruit/vegetable intake, obesity, raised blood pressure, raised cholesterol and diabetes.

Develop national public health policies, strategies and plans for cancer prevention and care and capacity-building

As 30% of cancer can be prevented and controlled using available knowledge, a comprehensive and integrated approach is required at the country level, led by the government, and with the full participation of the community. The population-wide approach aims to reduce the risks in the entire population. Cancer can be reduced by small reductions in the average population levels of several known risk factors, such as tobacco consumption and unhealthy diet. Population-wide and individual approaches are complementary and together provide a continuum of interventions. Countries of the Region need to set strategies for developing a model of integrated care for cancer prevention and national capacity-building.

Seventy per cent of EMR countries are low-resource countries and they need to focus on areas where the needs are greatest and there is potential for success. National strategies need to consider priority status for cancer prevention strategies and direct special attention to combat infections that may promote cancer development, such as schistosomiasis and hepatitis B. In areas of endemicity for liver cancer, hepatitis B vaccination should be integrated with other vaccination programmes.

Promote and implement community participation in prevention and care of cancer

The community approach in cancer prevention can be generalized and is cost-effective, can diffuse information well, and can influence environmental and institutional policies that relate to the health status of the population. Close collaboration between those implementing the community approach and the national health authorities is important to sustain the programme and for influencing policy development in regard to health.

For the cost-effective approach, all efforts to facilitate the role of the community should enable the individuals and communities to be actively involved to control the factors affecting their health. Education, public health policy and environmental support are complementary approaches to health promotion.

Implement priority actions for palliative care

WHO recommends implementing comprehensive palliative care programmes to improve the quality of life of patients with cancer and their families [*1,2,27*]. Awareness among public health professionals that cancer pain should be properly controlled needs to be promoted and the WHO essential palliative care medications should be made available. In low resource settings, it is important to ensure that minimum standards for pain relief and palliative care are progressively adopted at all levels of care. Home-based care is generally the best way to achieve good quality care and coverage in countries with strong family support and poor health infrastructure.

Implement national cancer control programmes

Implementation of national cancer control programmes, tailored to the socioeconomic and cultural context, should allow countries to translate current knowledge into action. The overall aims of a national cancer control programme are to reduce the incidence and mortality of cancer, and improve overall survival and quality of life of cancer patients and their families. National cancer control programmes should aim to: prevent future cancers; diagnose cancers early; provide curative therapy; ensure freedom from suffering; and reach all members of the population.

Conclusion

Cancer control and care in the EMR are a challenging task, nationally and regionally. Advocacy is needed to raise awareness and create a climate for resource mobilization. Two key messages for advocacy are: a) NCDs are a major disease burden in the Region and b) 30% of cancers are preventable by using available knowledge, and the solutions are effective and highly cost-effective. The establishment of a national cancer control programme, tailored to the socioeconomic and cultural context, should allow countries to translate the present knowledge into action. Implementation of the necessary measures for cancer prevention and care requires the formulation of evidence-based policies, the mobilization and appropriate allocation of resources, the active participation of all stakeholders and government commitment to legislation, education, and international collaboration in support of cancer control and prevention.

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Short communication

Study on child labour in automobile workshops of Peshawar, Pakistan

H. Khan,[1] A. Hameed[2] and A.K. Afridi[3]

دراسة عن تشغيل الأطفال في ورَش السيارات في بيشاور، باكستان

حمز الله خان، عبد الحميد، أكبر خان آفريدي

الخلاصة: بُغْيَةَ تحديد خصائص الأطفال العاملين في ورَش السيارات في بيشاور، أُجري مسح وصفي في الفترة من حزيران/يونيو إلى تشرين الثاني/نوفمبر 2005 على 200 فتى تراوحت أعمارهم بين 6 و15 عاماً، أُختيروا عشوائياً من 32 ورشة. واستُخدم في هذه الدراسة استبيان لجمع بيانات عن المستوى الاجتماعي والاقتصادي وأخرى تتعلّق بالعمل. وتبيَّن أن غالبية هؤلاء الفتيان إما أنها تلقّت تعليماً بسيطاً أو لم تتلق تعليماً على الإطلاق، وأنها بدأت العمل قبل سن العاشرة، وتكسب أقل من 700 روبية في الشهر. وأغلب آباء هؤلاء الفتيان قد تلقّوا تعليماً بسيطاً، ويعملون في وظائف شحيحة الأجر، أو أنهم عاطلون، أو متوفون. وكان نحو 40٪ من هؤلاء الفتيان يزاولون أعمالاً ميكانيكية. وتمثَّلت أكثر الأعراض المرضية شيوعاً، التي اشتكى منها هؤلاء الفتيان، في إدماع العين المستمر (31٪)، والسعال المزمن (29٪)، والإسهال (22٪)، كما تعرَّض 38٪ منهم إلى إصابة بالغة.

ABSTRACT To determine the characteristics of children working in car workshops in Peshawar, a descriptive survey was conducted from June to November 2005 of 200 boys (6–15 years) randomly selected from 32 workshops. A questionnaire was used to collect socioeconomic and work-related data. The majority of the boys had no or little education, had started work before the age of 10 years and earned < 700 rupees/month. Most of their fathers had little education and were in poorly paid jobs, unemployed or deceased. About 40% of the boys were engaged in mechanical work. Watery eyes (31%), chronic cough (29%) and diarrhoea (22%) were the commonest symptoms reported by the boys and 38% had had a major injury.

Étude du travail des enfants dans les ateliers de réparation automobile de Peshawar au Pakistan

RÉSUMÉ Afin de déterminer les caractéristiques des enfants travaillant dans les ateliers de réparation automobile de Peschawar, une étude descriptive a été menée de juin à novembre 2005 auprès de 200 garçons, âgés de 6 à 15 ans, sélectionnés au hasard dans 32 ateliers. Les données socio-économiques et d'ordre professionnel ont été collectées par le biais d'un questionnaire. Dans leur majorité, les garçons enquêtés n'avaient qu'une instruction très limitée, voire nulle, avaient commencé à travailler avant l'âge de 10 ans et gagnaient moins de 700 roupies par mois. Pour la plupart, les pères de ces enfants n'avaient qu'un très faible niveau d'instruction et étaient soit très mal payés, soit chômeurs ou décédés. L'activité d'environ 40 % de ces garçons était en rapport avec la mécanique. Larmoiement (31 %), toux chronique (29 %) et diarrhée (22 %) étaient les symptômes les plus fréquemment rapportés par ces garçons et 38 % présentaient une lésion majeure.

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Introduction

Pakistan's exports have suffered heavy losses due to its denunciation for use of children in industry on the premise that it destroys their childhood and desire for betterment. The children in this area are deprived and are trapped between working for the family and the desire to live the life of a child with hopes, dreams and aspiration for a better future. However, it has been argued that making them jobless may only aggravate their health and financial problems and will not improve their social and economic status [*1*].

According to unofficial estimates, during 2004–05, 8–10 million children in Pakistan were employed in various sectors. Officially, 3.5 million children were acknowledged to be a part of the labour force. It has been reported that child labour among 10–14-years-olds increased to 2.0 million during 1992–93 from 1.8 million during 1990–91 [*2*]. The growth in the number of girl workers is higher than that in boys. In urban areas, the services sector employs 52% of all children, followed by the manufacturing sector, which employs 38%. Moreover, it has been reported that about 70% of the children work longer than normal working hours (35 hours/week) [*2*].

Child labour and corporal punishment are believed to be the major causes of a Sindh school drop-out rate of over 50%, while similar reasons are also responsible for children leaving school in other provinces [*3*].

In the city of Peshawar, there are hundreds of motor vehicle repair workshops, where huge numbers of children work without any safety measures. A considerable number of children work in these workshops out of financial necessity because of the low socioeconomic status of their families [*4*].

This study aimed to determine the characteristics of children working in automobile workshops in Peshawar, Pakistan, their reasons for working and the adverse health effects experienced, in order to add to the voice against the child labour.

Methods

This study was conducted in automobile workshops located on the university road, ring road, hajj camp and bazaar area in Peshawar from June to November 2005. The sample comprised only boys, which reflects the Pashtun culture that requires men to work and earn for the whole family without any or very little contribution from women.

A total of 200 boys with ages ranging from 6 to15 years were randomly selected from 32 randomly selected automobile workshops of Peshawar. The inclusion criteria were that the individuals: were 5–15 years old, could be identified unambiguously as being within that age range, and were working only in the automobile workshop rather than any other type of labour.

Respondents were interviewed during their work time after prior permission from the head of the workshop. They were interviewed using a predesigned questionnaire prepared in accordance with the objectives of the study. Our medical interviewers visited the workshops with stethoscope and sphygmomanometer and carried out some clinical examinations of the children to confirm the systems involved in a particular disease the boys were complaining of.

The questionnaire sought information about age, nature of work (assigned to them in the workshop), monthly wage, exposure to dangerous environment at work and chronic symptoms that children were suffering from. It also included information about the father's profession, family size and income. Major accident/injury was defined as any permanent loss to an organ, or loss of hearing, or fracture of bones, or

a permanent physical disability and injury that caused anatomical distortion.

Results

Table 1 shows selected characteristics of the boys working in automobile workshops. A large proportion (34%) had never been to school while 41.5% had dropped out before class five (age 10 years). For 66% of the respondents, the average monthly income was ≤ 700 rupees. The age of starting work was < 10 years for 76.5% of the children.

The reasons for starting work and leaving school were: to help the family financially, either going on own accord (40%) and being sent by parents (26.5%) (Table 2). The largest proportion was involved in mechanical work (42.5%).

Table 3 shows the family background of the boys. Just over half of the fathers of the boys had had no schooling and were illiterate; only 11% had high school or higher education. As regards profession, 20% of the fathers were farmers, 16.5% were unskilled labourers, 15.0% were unemployed and 10% were dead. About 85% of the boys came from large families (5 or more children). Father's monthly income was less than 3000 rupees/month for 33.3% of cases.

The symptoms recorded in the 200 boys were: watery eyes (31.0%), chronic cough (29.0%), diarrhoea (22.0%), runny nose (18.0%), skin lesions and fatigue (each 17.5%), chronic backache (16.5%), breathlessness (13.5%) and no symptoms in 23.0% cases. Some suffered from more than 1 symptom. Of the 200 boys, 76 (38%) had

Table 1 **Characteristics of the boys working in automobile workshops in Peshawar**

Characteristic	No. of boys (*n* = 200)	%
Age group (years)		
6–9	36	18.0
10–12	73	36.5
13–15	91	45.5
Education		
Never went to school	68	34.0
Dropped out before class five (age 10 years)	83	41.5
Completed primary school	34	17.0
Completed middle school or higher	15	7.5
Average monthly wage (rupees)[a]		
< 500	78	39.0
500–700	53	26.5
701–1000	40	20.0
> 1000	29	14.5
Age at starting work (years)		
< 8	83	41.5
9–10	70	35.0
11–12	22	11.0
13–15	25	12.5

[a]*US$ 1 = 60.8 Pakistani rupees at the time of the study.*

Table 2 **Reason for starting work and nature of the job**

Variable	No. of boys (*n* = 200)	%
Reason for starting work		
Went on own accord to help family financially	80	40.0
Sent by parents to help family financially	53	26.5
Own desire to work	17	8.5
Dropped out of school	13	6.5
Other	37	18.5
Nature of job		
Mechanical work	85	42.5
Painting	26	13.0
Welding	21	10.5
Dent repair	12	6.0
Electrical	9	4.5
Other	47	23.5

Table 3 **Family background of the boys working in automobile workshops in Peshawar**

Variable	No. of boys (*n* = 200)	%
Family size (no. of children)		
1–4	31	15.5
5–7	128	64.0
> 7	41	20.5
Father's profession		
Farmer	41	20.5
Shopkeeper	10	5.0
Civil servant	3	1.5
Skilled worker	27	13.5
Unskilled labourer	33	16.5
Unemployed	30	15.0
Private sector worker	12	6.0
Dead	20	10.0
Other	24	12.0
*Father's education (*n = *180)*		
No schooling	92	51.1
Primary school	46	15.6
Middle school	23	12.8
High school and above	19	10.6

Table 4 **History of major injuries recorded in the boys working in automobile workshops in Peshawar**

History of injury	No. of boys	%
History of major injury recorded (*n* = 200)		
Yes	76	38.0
No	124	62.0
If yes, nature of injury (*n* = 76)		
Severe cut wounds	44	57.9
Blunt injury	6	7.9
Burn	16	21.1
Fracture	8	10.5
Other	2	2.6

had a major accident, the commonest being severe cuts (60%) (Table 4).

Discussion

In Pakistan it is estimated that 10%–19% of children are working. The estimate for Egypt was 6.5% of children 6–14 years in 1980 [*2,4*]. The present study aimed to raise awareness of the problem of child labour in our city, and to explore some of the characteristics of the boys related to their working. Although the number of boys included was small, the study still provides useful information regarding child labour in the area.

Children ranging in age from 6 to 15 years were selected. This is the age that children need to be in school but many factors force them to drop out and join the labour force, usually earning only low wages. Helping to support the family is a main reason for this. Indeed, 13% of the population of Pakistan earn less than US$ 1 per day so there is tremendous pressure to supplement income however possible [*3*]. The father's profession can directly affect the life of a child and a father's inability to support his family can lead to children being forced to go out to work. In the present study, the fathers of the boys working in the automobile workshops were mainly in low level jobs that did not pay adequate salaries; for about a third of the boys their father's monthly income was less than 3000 rupees/month. Furthermore, 15% of the fathers were unemployed and 10% were dead, situations that can further put pressure on children to work in order to help provide for the family. The low level of jobs of the fathers may be a result of the low level of education that they had. The majority of the fathers were illiterate. Our study correlates with other studies showing

that the parents of children working in factories had low educational levels and were either unemployed or employed in unskilled occupations [*5*].

Symptoms recorded in the boys were: watery eyes, chronic cough, diarrhoea, runny nose, skin lesions, fatigue and chronic backache. These are indicative of possible exposure to polluted, hazardous environments and hard labour. Ravikumara and Sandhu reported that bowel diseases were common in working children and accounted for nearly 30% of total cases [*6*]. Another study showed an increased prevalence of childhood dermatosis especially in working children [*7*]. Diarrhoeal diseases are a leading cause of mortality and morbidity, especially among children in developing countries. Many of the infectious agents associated with diarrhoeal disease are waterborne [*8*]. Regarding asthma/dyspnoea in working children, a study from Puerto Rico revealed that 25% of child workers were affected by this chronic condition [*9*]. In our study, 29% of the boys had a chronic cough and 13% reported breathlessness, both of which could be indicative of asthma and clearly show a considerable proportion of boys suffered from respiratory problems. Major injuries were recorded in 38% of the boys in our study and clearly show the real risks children face when working in unsafe environments, such as car repair workshops. Other studies also show that mild traumatic brain injury is frequently encountered in working children [*10*].

The children in our study are trapped and deprived of their childhood and the chance to aspire for a better future. Such children are caught in a vicious cycle; they need to work to help provide for their families and as a result are unable to attend school and get an education which could provide them with the skills to better themselves and break out of the poverty trap. Not only are they deprived of the means (education) to achieve a better life, but by working, particularly in unsafe environments, their health is being endangered, and they may also be subject to abuse and exploitation [*11*]. This may further limit their ability to escape the poverty trap. Poverty is clearly a key factor and is the issue that must be addressed to try and eliminate child labour.

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The state of the world's children 2007: women and children, the double dividend of gender equality

This UNICEF report, which can be downloaded at: http://www.unicef.org.uk/publications/pub_detail.asp?pub_id=111, intends to provide a road map to accelerate progress towards gender equality and empowering women. It describes the lives of women around the world. Gender equality and the well-being of children go hand in hand: when women are empowered to live full and productive lives, children prosper; when women are denied equal opportunity within a society, children suffer.

Despite substantial gains in women's empowerment since the Convention on the Elimination of All Forms of Discrimination against Women was adopted by the UN General Assembly in 1979, gender discrimination remains pervasive in every region of the world. It appears in the preference for sons over daughters, limited opportunities in education and work, and gender-based physical and sexual violence.

Other, less obvious, forms of gender discrimination can be equally destructive. Institutional discrimination is hard to identify and rectify. Cultural traditions can perpetuate discrimination as gender stereotypes remain widely accepted and go unchallenged.

Eliminating gender discrimination requires enhancing women's influence in the decisions that shape their lives and those of children in three distinct arenas: the household, the workplace and the political sphere. A change for the better in any one of these influences women's equality in the others and has a positive impact on children everywhere.

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8. Papers reporting original research findings should follow the IMRAD format: Introduction; Materials (subjects) and methods; Results; Analysis; and Discussion. An abstract of no more than 100 words should be supplied, clearly and briefly stating the objectives, context, results and conclusions.

9. Authors should verify where appropriate that all persons on whom research has been carried out have given their informed consent, and where participants (living or dead) were unable to give such consent, that surrogate consent was obtained.

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Journal article: Jones A et al. One day in Tibet. *Journal of tautology*, 1993, 13(5):23–7.

Document: Al-Itneen M, ed. *The principles of uncertainty*. Geneva, World Health Organization, 1985 (document WHO/DOC/537).

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المجلة الصحية لشرق المتوسط

دلائل إرشادية للمؤلفين

١. ينبغي أن لا تكون الورقات المقدَّمة للنشر، قد نشرت أو قبلت للنشر في أي مكان آخر. ويحتفظ المكتب الإقليمي لمنظمة الصحة العالمية لشرق المتوسط بجميع حقوق استنساخ أو إعادة نشر المواد التي تنشر في *المجلة الصحية لشرق المتوسط*.

٢. يمكن أن ترسل الورقات الأصلية، المكتوبة بالعربية، أو الإنكليزية، أو الفرنسية، للنظر فيها من قِبَل رئيس تحرير *المجلة الصحية لشرق المتوسط*، بالمكتب الإقليمي لمنظمة الصحة العالمية لشرق المتوسط، ص. ب. (٧٦٠٨)، بمدينة نصر (١١٣٧١)، بالقاهرة، في مصر. ويتم تقديم خلاصات للورقات، باللغات الثلاث.

٣. ينبغي أن يكون موضوع الورقات منتمياً لمجال الصحة العمومية، أو أي ميدان تقني وعلمي آخر، له صلة بالمجالات ذات الأهمية لمنظمة الصحة العالمية، مع الإشارة بشكل خاص إلى إقليم شرق المتوسط.

٤. ينبغي تقديم ثلاث نسخ من كل مخطوطة أو مطبوعة. كما ينبغي أن لا يتعدى النص، مع الجداول، والرسومات المرافقة، ١٥ صفحة مطبوعة على الآلة الكاتبة مع ترك فاصلين بين كل سطر، من القطع A4 (٤٥٠٠ كلمة)، وأن تكون الطباعة على وجه واحد فقط من الصفحة. وعندما يتم إعلان المؤلف بأن المطبوعة التي قدَّمها قد تم قبولها من دون شرط، أو قبولها بشروط، ينبغي أن يقدِّم قرص حاسوبي (٣,٥ بوصة)، يتضمن النص، والجداول، والرسوم البيانية والتوضيحية. وبالنسبة للورقات المقدَّمة باللغتين الإنكليزية والفرنسية، يرجى، بناءً على طلب رئيس التحرير، أن يتم تقديم النص، في كلٍّ من، صيغة معالجة الكلمات (وحبَّذا لو أمكن استخدام برنامج الكلمات اللينة الدقيقة Microsoft Word، بالنسبة للحاسوب الشخصي، غير أننا يمكن أن نترجم غالبية الصيغ الأخرى)، وفي شكل محفوظ كنص/ملف الكود الأمريكي القياسي لتبادل المعلومات ASCII (أسكي). وينبغي اتباع نفس الإرشادات في ما يتعلق بالورقات المقدمة باللغة العربية. وإذا كانت الورقة المقدمة، هي ترجمة كلية أو جزئية لعمل آخر لم ينشر، فينبغي تقديم نسخة من هذا العمل، في لغته الأصلية. وحيثما أمكن، يفضل أن تكون الرسوم البيانية في شكل رسوم هارفارد البيانية، مع استخدام برنامج النوافذ Windows أو إكسل Excel، وتقديم الرسوم التوضيحية والصور الفوتوغرافية في صيغة EPS أو TIFF. كما أنه من الضروري تقديم ثلاث مجموعات من الصور الفوتوغرافية والرسومات الأصلية، مع المعطيات الأساسية. وفي حالة وجود أي نص أو حروف مكتوبة على الصور، فينبغي تقديم نسخة إضافية خالية من أي نص مطبوع أوأي حروف مكتوبة .

٥. يتم مراجعة جميع الورقات المقدَّمة مراجعة دقيقة من قِبَل الزملاء، وفي ضوء هذه المراجعة، تحتفظ هيئة التحرير بحق قبول أو رفض أي ورقة. ومن المتفق عليه أن جميع الورقات التي يتم قبولها، تخضع للمراجعة الإحصائية والتحريرية، بحسب ما يلزم، بما في ذلك اختصار النص، أو حذف بعض الجداول أو الرسوم البيانية.

٦. ينبغي أن يكون عنوان الورقة مختصراً على قدر المستطاع، وحبَّذا لو كان حوالي ١٠ كلمات، وأن يكتب على ورقة منفصلة، مع تحديد اسم المؤلف (أو أسماء المؤلفين)، وعضويتهم في المؤسسات المختلفة، وأعلى الدرجات العلمية التي حصلوا عليها. كذلك، ينبغي ذكر العنوان البريدي، والمعلومات الأخرى اللازمة للاتصال بالمؤلف (بريد إلكتروني، فاكس، هاتف). ويجب أن لا يزيد عدد المؤلفين على خمسة. ولابد أن يكونوا قد ساهموا جميعاً في تصميم البحث أو تحليل نتائجه أو كتابته، وأن يكونوا قد وافقوا، جميعاً على النسخة النهائية المقدَّمة. وقد يطلب من المؤلفين إثبات الإسهام الذي قدَّموه. ويمكن إدراج أسماء أخرى إلى عبارات الشكر التي تكون في مقدِّمة الورقة.

٧. ومن أجل تيسير ترجمة الخلاصات وأسماء المؤلفين، على المؤلفين الذين تكون لغتهم الأم تكتب بحروف عربية، ويكتبون مؤلفاتهم بالإنكليزية أو الفرنسية، أن يزودوا رئيسي التحرير بأسمائهم كاملة، مكتوبة بالحروف العربية، ثم بالحروف اللاتينية.

٨. الورقات التي تمثّل تقارير حول نتائج البحوث الجديدة، ينبغي أن تكتب بالترتيب التالي: المقدمة؛ المواد (المواضيع) والطرق؛ النتائج؛ التحليل؛ والمناقشة. وينبغي أن تشفع هذه الورقات بخلاصة لكل منها، لا تزيد على ١٠٠ كلمة، تبيّن بوضوح، وبإيجاز، الأهداف، والسياق، والنتائج، والاستنتاجات.

٩. ينبغي أن يثبت المؤلفون، بحسب ما يلزم، أن جميع الأشخاص الذين أجري عليهم البحث، قد وافقوا موافقة واعية على ذلك، وفي حالة تعذر الحصول على موافقة المشاركين (أحياء أو أموات)، ينبغي أن يثبت المؤلفون أنه قد تم الحصول على موافقة وكلائهم أو ورثتهم.

١٠. ينبغي أن تتناول مقالات الاستعراض والمراجعة الماضية، النقاط التالية: الأهداف، المصادر، طرق الانتقاء، تجميع المعطيات وتفسيرها والاستنتاجات.

١١. ينبغي أن يقتصر الاستشهاد من أي أعمال منشورة، في النص، على المراجع الحديثة الأساسية. ولا ينصح بزيادة المراجع على ٢٥ مرجعاً على الأكثر، باستثناء المقالات النقدية. ويلزم ترقيم المراجع، كلما ظهرت في النص، وأن يليها أعداد عربية بين أقواس [أقواس مربعة]. كما ينبغي تدوين هذه المراجع في قائمة مرقمة، في صفحة منفصلة، في نهاية الورقة، وأن تتضمن المعلومات التالية، إن أمكن: اسم المؤلف أو أسماء المؤلفين، والحروف الأولى من أسمائهم، وعنوان الورقة أو الكتاب في اللغة الأصلية، إضافة إلى ترجمته؛ واسم المجلة بالكامل، مع رقم المجلد، وعدد الصفحات؛ واسم الناشر (التجاري أو المؤسسي)؛ ومكان النشر (المدينة والبلد)؛ وتاريخ النشر. وسوف يتم إعادة الورقات التي تكون فيها المراجع غير كاملة، أو غير مرتبة بحسب هذه المبادئ، إلى المؤلف، لتصحيحها. وفي ما يلي أمثلة للأسلوب الذي تفضل المجلة الصحية لشرق المتوسط أن يتبع:

كتاب:

Al Hamza B, Smith A. *The fifth sign of identity*. Cairo, American University Press, 1990.

مقالة في مجلة:

Jones A et al. One day in Tibet. *Journal Of tautology*, 1993,13(5): 23-7.

وثيقة:

Al-Itneen M, ed. *The principles of uncertainty*. Geneva, World Health Organization, 1985 (document WHO/DOC/537).

١٢. وفي ما يتعلق بالرسومات والجداول، المشفوعة بالشروح الملائمة، فإنه ينبغي أن ترد كل منها في صفحة منفصلة، ومرقمة على التوالي بالأعداد العربية، وملحقة في نهاية الورقة. كما ينبغي الإشارة إلى كل رسم وكل جدول يشار إليه في النص، وتحديد مكانه بوضوح، بحسب ما يلزم، وحبّذا لو أمكن تحديد مصدر كل رسم وكل جدول. وفي حالة نقل أي رسومات أو جداول من مواد أخرى، فإنه تقع على عاتق المؤلف، أو المؤلفين، المسؤولية الكاملة عن الحصول على الأذون اللازمة. وبُغْيَةَ تجنُّب أي مشكلات في طريقة تنسيق المنتج النهائي، فإنه ينبغي الاقتصار على قدر الإمكان في إدراج الجداول والرسومات. وحبّذا لو أمكن الاقتصار على جدول واحد أو رسم واحد لكل ١٠٠٠ كلمة. علماً بأن الرسومات المتعلقة ببعض المعطيات، ينبغي أن تصاحب هذه المعطيات، وأن يتسنّى إعادة رسمها، إذا تطلّب الأمر.

١٣. لا ترد الورقات والقريصات الأصلية، إلا بناءً على طلب من المؤلف الرئيسي.

١٤. بعد النشر، يحصل المؤلفون على نسخة من العدد الذي ترد فيه المقالة، بينما يحصل المؤلف الرئيسي على ٥٠ نسخة من البحث المنشور. وتقدَّم الطلبات للحصول على المزيد من النسخ، أو على معلومات حول الأسعار، إلى رئيس التحرير.

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2. Les articles originaux en anglais, arabe ou en français peuvent être soumis pour considération au Rédacteur en chef de *La Revue de Santé de la Méditerranée orientale*, Bureau régional de l'OMS pour la Méditerranée orientale, BP 7608, Cité Nasr (11371), Le Caire (Égypte). Les articles peuvent également être envoyés par courriel à l'adresse suivante : EMHJ@emro.who.int. Ils seront résumés dans les trois langues.

3. Le sujet de l'article doit concerner la santé publique ou d'autres domaines techniques et scientifiques connexes dans le champ d'intérêt de l'Organisation mondiale de la Santé, se rapportant plus particulièrement à la Région de la Méditerranée orientale.

4. Chaque manuscrit doit être fourni en trois exemplaires. Le texte, avec les tableaux et les figures qui l'accompagnent, ne devrait pas dépasser 15 pages, format A4, dactylographiées ou imprimées en double interligne (4500 mots) et devrait être imprimé sur le recto seulement. Lorsque le manuscrit est accepté, avec ou sans conditions, l'auteur doit soumettre une disquette informatique de 3,5 pouces, contenant le texte, les tableaux, les graphiques et les illustrations. Pour les articles en anglais et en français, à la demande de l'éditeur, le texte devra être fourni en format traitement de texte (de préférence Microsoft Word pour PC, mais la plupart des autres formats peuvent être convertis) et sauvegardé également dans un fichier texte ASCII. Les articles soumis en arabe devraient suivre les mêmes directives que les articles rédigés en anglais ou en français. Si l'article est une traduction, dans son intégralité ou en partie, d'un autre document non publié, une copie de ce document dans la langue d'origine devrait également être soumise. Si possible, les graphiques devraient être fournis en format Harvard Graphics pour Windows ou Excel, et les illustrations et photographies devraient être en format EPS ou TIFF. Toutefois, il est nécessaire de fournir trois jeux des photographies et figures d'origine avec les données de base. Si les photographies comportent un texte ou lettrage, un jeu supplémentaire doit être fourni sans ce texte/lettrage.

5. Tous les articles seront revus par des pairs, et sur la base des commentaires du réviseur, le Comité de rédaction se réserve le droit d'accepter ou de rejeter tout article. Les articles sont acceptés sous réserve de la révision dont ils feront l'objet au plan statistique et rédactionnel, comme jugé nécessaire, ce qui peut amener à abréger le texte et supprimer certaines données présentées sous forme de tableaux ou de graphiques.

6. Le titre de l'article devrait être aussi concis que possible, de préférence 10 mots environ, et devrait être mis sur une page séparée, avec le nom complet de l'auteur (ou des auteurs), l'organisme (ou les organismes) d'appartenance et le diplôme scientifique le plus élevé obtenu. L'adresse pour la cor-respondance, ainsi que toute autre information nécessaire (adresse courriel, télécopie, téléphone) pour contacter l'auteur correspondant devraient être fournies. Le nombre des auteurs ne devrait pas dépasser cinq. Tous les auteurs devraient avoir apporté une contribution matérielle à la conception, à l'analyse ou à la rédaction de l'étude et avoir approuvé la version finale soumise. Une vérification de cette contribution peut être demandée aux auteurs. Les noms d'autres personnes peuvent être inclus dans les remerciements.

7. Afin de faciliter la traduction des résumés et du nom des auteurs, les auteurs dont la langue maternelle s'écrit en caractères arabes et qui rédigent en anglais ou en français doivent fournir leur nom complet en écriture arabe ainsi qu'une transcription.

8. Les articles présentant des résultats de recherche originale devront suivre le format IMRAD : introduction, matériel (sujets) et méthodes ; résultats ; analyse ; et discussion. Un résumé de 100 mots maximum sera fourni, mentionnant clairement les objectifs, le contexte, les résultats et les conclusions.

9. Les auteurs devront vérifier, le cas échéant, que toutes les personnes sur lesquelles la recherche porte ont donné leur consentement éclairé, et lorsque des participants (vivants ou décédés) n'ont pas pu donner ce consentement, qu'un consentement de substitution a été obtenu.

10. Les articles d'analyse devront comporter des sections portant sur les objectifs, les sources, les méthodes de sélection, la compilation et l'interprétation des données et des conclusions.

11. Les citations dans le texte de travaux publiés devraient être limitées aux références essentielles récentes. Hormis les articles d'analyse, il est conseillé de ne pas dépasser 25 références. Elles devraient être numérotées en chiffres arabes placés entre parenthèses [crochets] selon l'ordre dans lequel elles apparaissent dans le texte. Ces références devraient figurer sous forme de liste numérotée sur une page séparée à la fin de l'article. Elles devraient contenir les éléments d'information suivants, selon le cas : nom(s) et initiale(s) de l'auteur/des auteurs ; titre de l'article ou de l'ouvrage dans sa langue originale ainsi que la traduction ; nom complet de la revue ainsi que le numéro du volume et les pages concernées ; nom de la maison d'édition (commerciale ou institutionnelle) et lieu de publication (ville et pays) ; et date de la publication. Les articles comportant des références inadéquates ou dont les références ne sont pas organisées conformément à ces principes seront renvoyés aux auteurs pour correction. Exemples du style préféré de *La Revue* :

Livre : Al Hamza B, Smith A. *The fifth sign of identity*. Cairo, American University Press, 1990.

Article de Revue : Jones A et al. One day in Tibet. *Journal of tautology*, 1993, 13(5):23–7.

Document : Al-Itneen M, ed. *The principles of uncertainty*. Geneva, World Health Organization, 1985 (document WHO/DOC/537).

12. Les figures et les tableaux avec les légendes appropriées devraient être placés chacun(e) sur une feuille séparée, numérotés en chiffres arabes selon l'ordre et joints à la fin du document. Chaque figure et chaque tableau devraient avoir une référence dans le texte et son emplacement dans le texte devrait être indiqué clairement le cas échéant. Au besoin, les sources devraient être mentionnées pour chaque figure ou tableau. Si des figures, tableaux ou d'autres matériels ont été copiés d'autres sources, les auteurs portent l'entière responsabilité d'obtenir l'autorisation nécessaire. Afin d'éviter les problèmes de mise en page lors de la production finale, le nombre de tableaux et figures devrait être limité autant que possible. Il est préférable de ne pas avoir plus d'un tableau ou d'une figure pour 1000 mots. Les figures établies à partir de données doivent être accompagnées de ces données pour permettre une recomposition, le cas échéant.

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