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Eastern Mediterranean Health Journal

المجلة الصحية لشرق المتوسط

La Revue de Santé de la Méditerranée orientale

The Beirut port explosion resulted in more than 6000 casualties, 180 deaths, 300 000 residents made homeless, and economic losses estimated at US$ 15 billion. With WHO support, an emergency medical team coordinator and a communication consultant were deployed within the first 96 hours of the explosion; trauma and surgical supplies for 2000 patients were deployed within 26 hours; and 24 tons of personal protective equipment were also dispatched within 72 hours of the explosion. WHO and the Lebanese Ministry of Public Health continue to work closely together to rebuild Lebanon's severely affected health system.

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المجلة الصحية لشرق المتوسط

هى المجلة الرسمية التى تصدر عن المكتب الإقليمى لشرق المتوسط بمنظمة الصحة العالمية. وهى منبر لتقديم السياسات والمبادرات الجديدة في الصحة العامة والخدمات الصحية والترويج لها، ولتبادل الآراء والمفاهيم والمعطيات الوبائية ونتائج الأبحاث وغير ذلك من المعلومات، وخاصة ما يتعلق منها بإقليم شرق المتوسط. وهى موجهة إلى كل أعضاء المهن الصحية، والكليات الطبية وسائر المعاهد التعليمية، وكذا المنظمات غير الحكومية المعنية، والمراكز المتعاونة مع منظمة الصحة العالمية والأفراد المهتمين بالصحة فى الإقليم وخارجه.

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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 de la santé publique et 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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From health emergency preparedness to response action: a long journey in Lebanon

Alissar Rady, [1] Iman Shankiti, [2] Richard Brennan [3] and Ahmed Mandil [4]

[1]Senior National Professional Officer, World Health Organization, Beirut, Lebanon. [2] World Health Organization Representative, Beirut, Lebanon. [3]Regional Emergency Director, World Health Organization Regional Office for the Eastern Mediterranean, Cairo, Egypt. [4]Coordinator, Research and Innovation, World Health Organization Regional Office for the Eastern Mediterranean, Cairo, Egypt. (Correspondence to: Alissar Rady: radya@who.int).

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Emergency preparedness is a critical pillar of the International Health Regulations (IHR), a legally binding instrument underlying the global health security regime that came into effect in 2005 (*1*). Lebanon, a small country of 10 452 km2 bordering the eastern Mediterranean (*2*), ratified the IHR in 2007 (*3*) after the devasting effects of a sudden military conflict in 2006 that severely impacted the recovering health system. Moreover, the Lebanese health system infrastructure was only just recovering from 15 years of civil war that ended in 1990 (*4*). Since 2005, the country has also faced a complex refugee crisis potentiating the risk of disease outbreaks since 2011 (*5*), in addition to a severe financial crisis that has degenerated into social unrest since October 2019, and more recently the COVID-19 pandemic since February 2020.

This constant instability, coupled with frequent security breaches, necessitated a rapid reinforcement of the health system to build its resilience and respond in an adequate and timely manner to potential and real health risks, and an almost continuous crisis mode.

Within the framework of the National Health Reform, the government progressively reaffirmed its leadership and stewardship and in the health sector. Accordingly, the Ministry of Public Health's (MoPH) capacity for disease surveillance and early warning and response rapidly increased. The primary health care (PHC) network was expanded to include more than 230 centres in 2020, and the public hospitals system was progressively expanded to reach a total of 27 hospitals by 2019, providing around 12% of total bed capacity in the country (*4*). More importantly, the MoPH developed and reinforced its private public partnership, adopting the Collaborative Governance approach. This approach, coupled with an accelerated IHR implementation, reinforced the health system's resilience, allowing it to withstand repeated public health shocks.

The latest public health shock caused by the Beirut port explosion resulted in more than 6000 casualties, around 180 deaths, more than 30 missing persons, in addition to an estimated 300 000 residents driven out of their demolished homes, and massive economic losses estimated at US$ 15 billion (*6*). The long-standing resilience of the Lebanese people and health system, anchored in the private-public partnership and fostered by the Collaborative Governance approach, allowed a rapid absorption of all casualties, although the area most affected by the blast lost around 500 beds in hospital capacity, since 3 hospitals were rendered completely non-functional, and 3 only partially functional. Nevertheless, the casualties - with support from the Lebanese Red Cross and the community - were rapidly referred to hospitals (private and public) outside the area affected and even outside Beirut, as needed. With WHO support, the severely damaged central warehouse was evacuated within the first 24 hours and medications safely stored in an alternative warehouse; a rapid needs assessment with cost estimation for rehabilitation of the 5 most affected hospitals was completed within 5 days from the blast; an Emergency Medical Team coordinator and a communication consultant were deployed within the first 96 hours of the explosion; and trauma and surgical supplies for 2000 patients were deployed within 26 hours (*7*). Such supplies were immediately distributed to the 10 hospitals that were treating the highest number of casualties. Additionally, 24 tons of personal protective equipment were also dispatched within 72 hours of the explosion. The daily situation report, initially produced for the COVID-19 outbreak, was expanded to include updates on the response to the Beirut blast, and WHO issued US$ 2.2 million from its Central Fund for Emergencies within 72 hours, and outreach to donors was started immediately (*7*).

The support of WHO to the health sector in this unprecedented crisis was prompt. Such actions were greatly facilitated by the good rapport established by the WHO country office with the MoPH team and all health partners. A long and diversified experience of the WHO country team in public health emergencies, coupled with Country Office leadership and intense regional and headquarters teams support, reaffirmed the WHO leadership in health emergencies. Since the military aggression in Lebanon in July 2006 and the current complex crisis, a long journey of institutional capacity building in emergency preparedness and response in Lebanon has been supported by WHO. In fact, lessons

learned from previous response to health emergencies has most likely paid off in the current structured and critical support. As stated by Benjamin Franklin in the 18th century, "By failing to prepare, you are preparing to fail" (*8*); preparedness is the journey to successful response.

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A Systems Thinking approach for responding to the COVID-19 pandemic

Imad Hassan,[1] Fatima Obaid,[1] Roa Ahmed,[1] Lobna Abdelrahman,[1] Sara Adam,[1] Omiema Adam,[1] Mohammed Alfatih Yousif,[1] Khobieb Mohammed[1] and Tayseer Kashif[1]

[1]Al Tababa Knowledge Translation Unit, Al Tababa Advanced Training Center, Khartoum, Sudan. (Correspondence to: Imad Hassan: imadsahassan@yahoo.co.uk).

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Introduction

The human, social and economic costs of the COVID-19 pandemic are enormous. It is paramount that effective control strategies are implemented especially in resource-poor countries to initially mitigate and finally control this novel infection. Systems Thinking is considered a paradigm shift in human thinking. It first appeared in the business and management arena but has spread to all disciplines or 'systems', especially when the human factor is a pivotal element, e.g., in social systems. It was first publicized by a Nobel prize winner, Professor Peter Senge in his book, "The Fifth Discipline" (*1*).

The World Health Organization (WHO) has in a recent landmark publication, as well as among some international experts, strongly advocated the employment of a 'Systems Thinking' approach in formulating plans for resolving complex social and health issues (*2*); this includes the fight against COVID-19 (*3*). Systems thinking is an indispensable tool for quality improvement (*4*) and has shown promise in the fight against Human Immunodeficiency Virus infection and Hepatitis C (*5*).

Understanding the concept

A system is defined as an entity with interrelated and interdependent parts that are working together to achieve a common purpose; health care is considered a system. At its core is the concept of components interdependence at multiple levels. Any change in one part of the system affects the part and the whole system. Areas where system interventions produce higher impacts (using an equivalent input), are termed strong-leverage points.

The COVID-19 pandemic has so vividly brought this systems interconnectedness to the forefront of human thinking. As a health-care issue, the COVID-19 pandemic resulted in unprecedented impacts on all domains of life – economy, entertainment, transport, education etc. Additionally, it highlighted another critical domain in the Systems Thinking mindset – the domain of 'unintended consequences'. The latter will inevitably materialize as 'side-effects' to any intervention used to control the pandemic. Examples are the negative impacts of social distancing, curfew, market closures, etc. on people's livelihoods, mental health, domestic violence and other non-COVID-19 medical ailments (*6–9*).

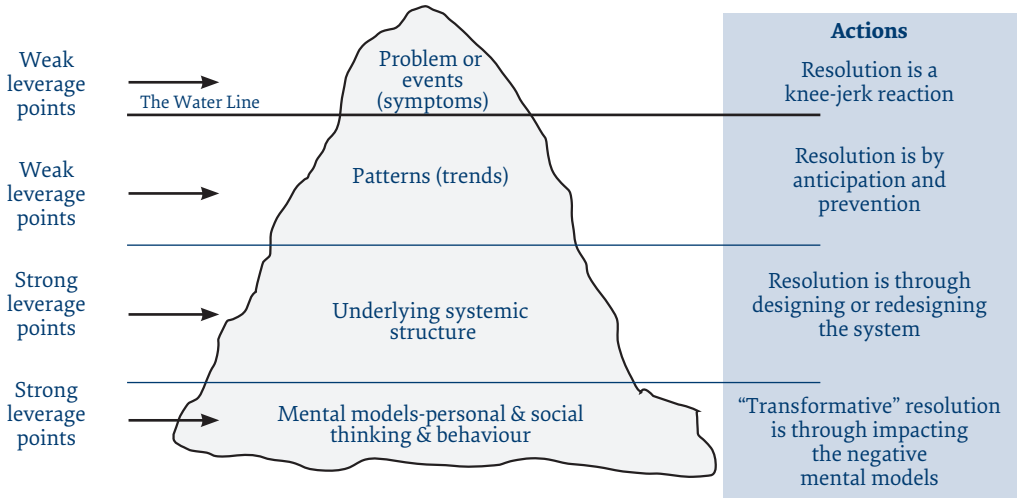
How to practice Systems Thinking?

Systems Thinking is a holistic approach to better understanding of how the system elements interact with each other over time, the root-causes of system defects, and the right approach for a highly effective problem-solving intervention (strong leverage areas). Systems thinking facilitates an in-depth understanding of system dynamics. Its tools enable its users to re-design their systems, thereby radically creating the results they truly desire thanks to a methodology for identifying the root causes and critically selecting and focusing on the right 'strong-leverage areas'. There are 5 pivotal steps in Systems Thinking: 1) root cause analysis, 2) selection of and focusing on strong-leverage areas, 3) system design or redesign coupled with 4) measures to nullify the impact of any unintended consequences resulting from these interventions and 5) continuous learning and improvement from the whole exercise.

One simple tool for identifying and categorizing the root causes, thus pinpointing the leverage areas, is the Iceberg Tool (*10*). The latter stratifies the issue or problem under consideration and its root causes into 4 elements: 1) the event (the problem); 2) the underlying pattern (why it happened); 3) the structures directly responsible for the pattern; and 4) The underlying cultural and mental models that maintain these structures and facilitate the persistence of the problem. Figure 1 portrays the Iceberg Tool and Figure 2 the Populated Tool for the problem of the COVID-19 pandemic in a resource-poor country. Systemic structures and mental models are considered the 'strong-leverage points' that system leaders should focus on when dealing with complex social problems and conflicts. The significance and importance of focusing on interventions in the mental model domain were the motivators for a joint New York University and UNICEF initiative to design a course for a "strategic global behavioural communication intervention" to deal with infectious diseases epidemics (*11*).

Another Systems Thinking tool for depicting these strong-leverage areas, thus facilitating their incorporation as building-blocks for 'a highly effective system', is

Figure 1 The Iceberg Tool: Below the water line, one can notice patterns of behaviour enforced by the structure of the system and sustained by mental models.



the Biomatrix Tool, which emanated from Biomatrix Systems Theory (*12*). Its seven components constitute the building blocks for any effective system. They are the pillars for any transformational project, whether it is a population-based or government intervention, organizational intervention, hospital, department or clinical unit intervention or establishment, etc. Unlike the classic description of a 'system' with only its 3 basic components (structure, process and outcome), the Biomatrix tool smartly incorporates 4 extra indispensable elements for comprehensive and successful system design or redesign. Thus, one may utilize it to build a comprehensive anti-COVID-19 system for fighting the pandemic.

Numerous interventions are recommended to prevent or slow the spread of COVID-19 infection (*13–16*). Table 1 depicts the seven elements, their definition and their relevant practical administrative components or actions for such a system. A major and deterministic 'leverage-point' for establishing this programme is purely administrative and falls squarely on government, professional and community leaders.

The evidence that a System Approach works

A recent Systematic Review (*17*), as well as experience from several countries that managed to mitigate COVID-19 infection employing elements in the System approach above, are worth referring to. Quarantine, especially if started early on and is combined with other system elements above, is very effective in reducing patient numbers and fatalities (*17*). South Korea applied a mitigation strategy thereby avoiding major social disruption actions, i.e., no true lockdown (*18*). Current daily figures for new infections hardly reach 50 to 100 cases.

Figure 2 The Iceberg Tool depicting the root causes of a failed response to a COVID-19 epidemic and the strong leverage points for effective action

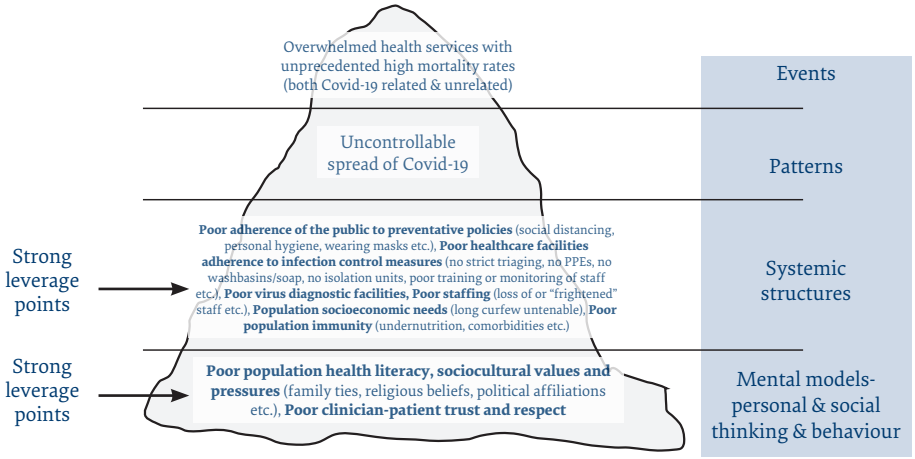


Table 1 A COVID-19 control package using a Systems Thinking Biomatrix Tool and administrative actions

Biomatrix Item	Description	Component or Action	Examples
Aims (Vision)	**The Outcome(s):** the results that the system wants to achieve. Aims create focus.	**A nation without Coronavirus!** (Positive public Communication)	
Ethos	**Organizational Culture:** its unique expectations, and values and is expressed in its self-image: "As you think, so you will become".	**We always win!** (Positive public Communication)	
Structure	**The Organogram:** the anatomy of a system.	• **Strategic Multidisciplinary**, Intergovernmental body with its comprehensive administrative and executive components. • **Strategic Roadmap** for the Health-care sector and the population as a whole. • **Monitoring and Assessment** unit with timely data capture, analysis and action supported by efficient information technology platforms.	Multidisciplinary Team from all ministries, nongovernmental organizations, social support societies, charitable organizations, professional unions, international agencies etc.
Process	**The Activities:** describes the activities of the system: the activities involved in the delivery of services (training) to the customers.	**Health care directed:** • Facility preparedness • Staff education and training • Confirmed and suspected patients' clinical management pathways • Staff support and incentives, etc. • Patient and family education	• Efficient screening of staff and patients • Effective diagnostic capabilities • Reducing in-hospital transmission (personal protective equipment (PPEs), handwashing, triaging, cohorting of patients and of staff, disposal of hazardous material, environmental cleanliness and hygiene, restricting non-urgent clinical services, virtual outpatient and inpatient patient encounters, etc.) • Screening of visitors and restricting hospitalized patients visits by relatives, friends, etc.
		• **Population Directed:** Education and empowerment, Personal hygiene practices e.g. hand washing, sneezing and coughing etiquette etc., Social Distancing, Wearing masks, Restriction of social gathering e.g. at work, schools, sporting events/social events, Robust contact tracing and isolation, Augmenting population innate immunity: e.g. education on healthy foods and herbs rich in immunopotentiators etc.	• Quarantine and isolation centers • Robust contact tracing, isolation and close monitoring during isolation etc.
Resources	**Material and Intellectual Assets:** refer to the resources of the organization, such as its capital equipment, financial resources, intellectual property, staff capabilities etc.	• System Leadership • Diagnostic and treatment facilities • Internists • Infection Control Specialists • Patient Educators • Epidemiologists • Infectious Diseases Specialists • Intensivists • Trainers and Educationalists • Statisticians • Financial Resources • Monitoring teams/IT Specialists • Social Psychologists • Audiovisual Resources • Covid-19 cyberspace resources, Website, Blogs in simple language etc. • Local Social and Religious support teams	

Table 1 A COVID-19 control package using a Systems Thinking Biomatrix Tool and administrative actions *(concluded)*

Biomatrix Item	Description	Component or Action	Examples
Environment	**Local & Surrounding Facilitators & Barriers:** (the latter need to be resolved at the outset).	• Social activists and local support networks in the community. • Incentive Program for all healthcare workers. • Insurance and financial support to healthcare workers who get infected. • Collaboration with Research Centers, Technology and Innovation Centers, Evidence-based Practice Centers, Quality Improvement Organizations, International bodies etc.	
Governance	**Regulation & Monitoring:** The function of governance in an organization is to set aims and to monitor and regulate the movement of the organization towards the attainment of these aims.	• Daily reporting from the monitoring unit and assessment of progress, successes and failures and timely interventions to improve performance and deal with unintended consequences.	

On the other hand, New Zealand and Jordon applied both mitigation and suppression measures with significant population-based lockdown strategies (*19–20*). Their current daily figures are less than 10 cases. All three countries employed thorough screening and diagnostic methods, contact tracing, isolation, and reporting of cases. These were coupled with robust organizational capabilities, electronic tracing, education, monitoring, positive public health communication, and involvement governed and monitored by high-level administrative structures (*18–20*). However, better outcomes in the latter two countries are primarily due to employment of all system elements. A recent review exploring the elements and measures in many countries supports this Systems Thinking approach (*21*).

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Thinking strategically for COVID-19: suppress and lift, to flatten or to crush?

Jade Khalife[1]

[1]Lund University, Malmö, Sweden (Correspondence to: Jade Khalife: jade.khalife@med.lu.se).

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A perfect strategy to tackle COVID-19 does not exist, but it is timely for countries to consider an endgame. This includes moving on from a mindset of immediate response towards a long-term strategy, necessarily updated with the developing evidence. The chaotic response and squandering of time seen in several countries throughout February and March 2020 should not be repeated.

Most countries are currently engaged in phases of containment, mitigation, or a combination of both. 'Flattening the curve' has been widely adopted to help delay the epidemic curve peak and allow health-care systems to cope with demand (*1*). Recent modelling suggests that a strategy of suppression (R_t<1), rather than mitigation (R_t>1), would save the most lives and avoid exceeding healthcare capacity (*2*,*3*). Beyond modelling limitations, this was also demonstrated in Wuhan, China, which witnessed the first successful suppression of widespread COVID-19 (*4*). By the end of February 2020, the suppression measures in Wuhan had driven the COVID-19 reproductive number (R_t) to 0.3 (*4*). Such strong suppression measures result in 'crushing the curve' within a matter of weeks, as the decline would be exponential (*5*).

Whether pursuing curve flattening or crushing, many countries with widespread cases have resorted to lockdowns, alongside physical distancing and other measures. However, lockdowns cannot be maintained indefinitely, and stepwise lifting is underway in several countries. A common mistake has been to assume a second wave similar to the first would occur when lockdowns are lifted (*2*). This ignores the impact of maintained individual and country-level measures, which were largely absent during the first wave (*6*). The question then arises of how this will play in the longer term, at least until a vaccine is available.

A 'suppress and lift' approach is being formally advanced, particularly in Hong Kong and Singapore (*7*). Interestingly, other countries may be drifting to such an approach as well, albeit implicitly. Those lifting from lockdowns and closures, but acknowledging possible resumption or other measures in the event of surges, are following 'suppress and lift'. Typically, this approach involves cyclic implementation of restrictions to suppress transmission, and lifting restrictions once at a desired or acceptable level (*7*). What is an 'acceptable' level will vary across and possibly within countries, in terms of new cases or deaths. Trade-offs are often unavoidable, particularly considering human health and well-being, employment and economy.

A 'crushing the curve' scenario would have suppression drive the disease to low levels (near-zero), thus 'resetting' countries from mitigation to containment, and lifting for several weeks or a few months. This would last until a threshold level is exceeded, prompting the next suppress and lift cycle. By June 2020 several countries had succeeded in crushing the curve, including low and middle-income countries such as Cambodia, Cyprus, Latvia, Slovakia, Slovenia, Thailand, Tunisia and Viet Nam, as well as Australia, Iceland and New Zealand.

A 'flatten the curve' scenario would primarily differ in having a more modest suppression (by intensity or temporally), to maintain new cases to within health-care capacities. This has been underway most notably in the Netherlands, Sweden, the United Kingdom and the United States of America. Which of these two scenarios is desirable deserves greater discussion, particularly considering the large difference in potential lives saved and the 'normalcy' of inter-cyclic periods.

The crisis expectedly places considerable burden on the physical and mental well-being of most individuals, as well as their ability to engage in society for leisure and for work. This is greater for the most vulnerable, including children, the elderly and persons with mental and physical challenges, and lower socioeconomic groups. The expanded capacity of health-care systems for COVID-19 also means decreased access to health care for many 'regular' conditions; this cannot endure and increasing overall health-care capacity would be limited.

A reversal of the chronic under-funding of health systems is one of the major changes that would be sought following this crisis. This goes alongside addressing the unequitable and unsustainable frameworks within which human societies function. Much will be learned from the early experiences of countries currently pioneering suppress and lift, including how to tailor more targeted and effective measures. Beyond vaccination, a combination of factors will remain necessary to keep COVID-19 at bay, including better treatment, enhanced surveillance and monitoring, rapid response mechanisms, and active community participation.

An active surveillance and response system has a crucial role to play in any strategy to counter COVID-19. With increasing recognition of the challenges posed by super-spreading events and asymptomatic/pre-symptomatic infection, developing the approaches and capacities to test, track and trace the disease are an urgent priority. Without such systems in place, even countries with low COVID-19 levels would be unable to long maintain their status.

Many countries owe much of their success in suppressing the outbreak to communities encouraging volunteering and compliance with measures. Communities can also play a central role in identifying gaps and in developing new ideas and solutions. A national strategy would empower community participation and leadership, be responsive to their needs and provide clarity on the rationale, milestones and destination (*8*).

It is timely for populations and governments to engage in thinking strategically towards an endgame for COVID-19. A clear strategy encourages people to think outside of the box and develop new ways to cope and even thrive while countering COVID-19. Unlocking the full potential of humanity to participate in this requires nothing less.

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Migrant health in Saudi Arabia during the COVID-19 pandemic

Mohamed Abdelghafour Ali,[1], Abdullah Murhaf Al-Khani[1] and Laila Awad Sidahmed[2]

[1]College of Medicine, Sulaiman Al Rajhi University, Bukairyah, Saudi Arabia. [2]College of Medicine, Al-Rayan Medical Colleges, Medina, Saudi Arabia. (Correspondence to: Mohamed Abdelghafour Ali: m.ali@sr.edu.sa).

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The world is currently living under the era of COVID-19, marked by its heavy toll on international economies and modern lifestyles due to imposed quarantine and curfew regulations. Measures taken to prevent viral transmission in the population should not undervalue the importance of international migrant workers. This particular group is known to have a high risk of occupational and health hazards, along with health-care givers, patients and other essential workers. Worldwide, there are currently an estimated 258 million migrants, many of whom have to pay for health care out-of-pocket. This raises the possibility of not seeking immediate health care and run the risk of spreading the infection. Furthermore, there is a dearth of information on migrant health during the current COVID-19 pandemic in the literature.

Saudi Arabia attracts many migrant workers from low-income countries. It was estimated that during 2019, legally resident foreign workers made up a little more than two-thirds (67.3%) of the total work force in Saudi Arabia (excluding undocumented workers and those working in the security and military sectors) (*1*). Patients who are international migrant workers are at an increased risk of many health issues, including mental health deterioration, all of which necessitate training of health professionals to care for mental health problems of isolated patients (*2*). Recent studies have shown alarming prevalence of mental issues, namely depression in migrant health workers in Saudi Arabia (*3*), primarily due to the fear of job insecurity (*4*). Within the current situation of COVID-19, it is imperative that governments maintain a clear policy regarding health and job security for their international labour, to ensure psychosocial stability and public health.

Saudi Arabia saw its first COVID-19 case identified in Qatif, Eastern Region, on 2 March 2020. In response, the Saudi government imposed a lockdown of Qatif Region on 5 March 2020, including limitation of domestic travel, closure of schools and universities, a shutdown of non-essential industrial facilities, followed by a suspension of international flights on 21 March (*5*). By 29 June 2020 there was a recorded total of 57 719 active cases in Saudi Arabia alone, 127 118 recoveries and 1599 deaths (*6*).

In the current COVID-19 pandemic, Saudi Arabia took the initiative by offering free screening and health-care services for all its residents, including migrant workers. This included access to treatment, with dedicated teams to deliver supportive treatment to the homes of both migrants and nationals (*7*). The Saudi Ministry of Health (MoH) has had to take into account the religious observations of Hajj and Umrah – two major gatherings in Saudi Arabia where citizens, migrants and international visitors may gather – and the effect on transmission of respiratory infections. In addition, international migrant workers are often housed in relatively small and crowded accommodation, which provides an environment for greater risk of infection transmission (*8*). In response, the MoH has dispensed field units to many neighbourhoods where crowding was evident. This resulted in increased rates of COVID-19 detection in asymptomatic individuals (*9*). As of 29 June 2020, the total number of field screening tests was 1 591 141 (*6*).

The COVID-19 pandemic has exerted its toll on the working population, including migrant workers. Many industrial factories and non-essential workshops have closed, putting monetary strain on migrants who rely on daily or monthly wages for survival. Migrant workers commonly work at petrol stations, grocery shops, fast food restaurants, industrial workshops and hospitals – all areas where there is a potential for acquiring and transmitting COVID-19. Migrant workers are also found in more domestic environments such as maids, cleaners and personal drivers. Moreover, the sight of many foreign workers outside during curfew may propagate fear and discrimination against such vulnerable populations, specifically international migrant workers.

The media's recent reporting of infection incidence among nationals and the foreign workforce should not be interpreted as discriminatory. Many of the workforce facing the outbreak in hospitals, namely nurses and physicians, are non-Saudi citizens, as is the case in many essential occupations, and therefore reporting of infection rates reflects this demographic reality. Since the commencement of active screening, an increasing number of foreign workers have been confirmed positive with COVID-19 (*10*). However, because of the availability of accessible health care, more migrant workers are willing to participate in screening, with a focus of testing in high density residences and workers in essential occupations.

Saudi Arabia has also allocated resources for testing of undocumented migrants, since they are an important group at risk of acquiring and spreading COVID-19 (*11*). Recognizing the many health-care risks facing illegal migrants, mitigating the transmission of disease and provide access to those in desperate need is the priority for the benefit of society as a whole (*12*). In addition to local care, Saudi Arabia has extended its reach towards regional support of the Eastern Mediterranean Region with medical supplies, alongside the United Arab Emirates and Qatar (*13*). This is a step forward beyond national gain and more towards international solidarity in these difficult times.

In conclusion, the ever-evolving COVID-19 pandemic has proved to be an unprecedented challenge to all health-care systems worldwide. Saudi Arabia's approach has been to facilitate access to health care services for all residents, legal and illegal workers. This approach is unprecedented as it is important, since an effective response to the pandemic is only as strong as the weakest link, which here is the vulnerable migrant population.

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Is the health system in the Islamic Republic of Iran ready to deal with the effects of drought?

Reza Dehnavieh,[1] Keyhan Sajadi[1] and Simin Salehinejad[2]

[1]Health Foresight and Innovation Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Islamic Republic of Iran. [2]Medical Informatics Research Center, Institute for Future Studies in Health, Kerman University of Medical Sciences, Kerman, Islamic Republic of Iran. (Correspondence to: Simin Nejad: s__salehi@kmu.ac.ir).

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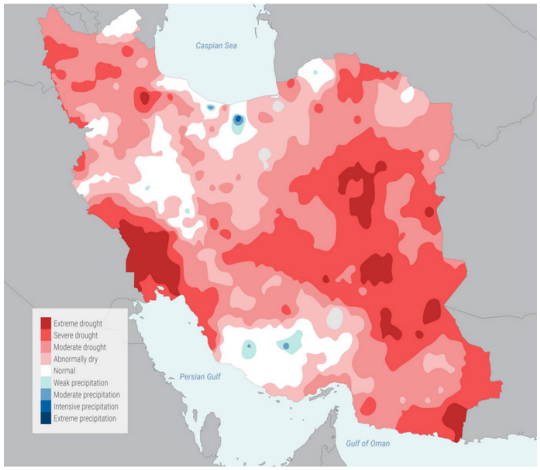
According to the Food and Agriculture Organization of the United Nations, since the year 1900 more than 11 million people have died as a result of drought and more than 2 billion have been affected by drought *(1)*.

The Islamic Republic of Iran is located in arid and semi-arid regions and has experienced several major droughts. For example, over the past 40 years, the country has had more than 27 droughts *(2)*. Figure 1 shows areas of the country affected by drought in 2016–2017.

Studies show that drought conditions will intensify in the coming years: in 2025, 2032, 2034, 2035 and 2039, most parts of the country are likely to face severe or moderate droughts *(4)*. In particular, the drought situation will be much more critical in 2039; it is estimated that most parts of the country will have less than normal rainfall in this year and will face extreme and severe drought. Only small parts of the west, north-west, south-west and south of the country will not be badly affected *(4)*.

Droughts can have a substantial impact on society, the environment and the economy, as well as human health. The main health effects of drought are related to nutrition, waterborne disease, airborne and dust-related disease, vector-borne disease, mental health and other health conditions, and as a consequence of wildfires, migration and damage to infrastructure *(5)*.

Figure 1 Area affected by drought in the Islamic Republic of Iran, 2016–2017 *(3)*



Malnutrition is one of the most obvious consequences of drought. According to the International Human Dimensions Programme on Global Environmental Change in 2015, the estimated annual risk of wheat and rice yield loss as a result of drought is high in the Islamic Republic of Iran *(6)*. This situation can have a negative effect on nutrition and health because rice and wheat are the most popular food and agricultural products in this country *(6)*. In addition, diseases transmitted by contaminated water and food (different types of diarrhoea, gastroenteritis and hepatitis) and by lack of water for personal hygiene (scabies, impetigo and conjunctivitis) are another impact of drought. About 5500 outbreaks of water- and foodborne diseases were recorded in the Islamic Republic of Iran between 2015 and 2016 *(7)*. Drought may not be the only cause of water- and foodborne diseases, but it can intensify them, especially in areas where such diseases are endemic. Furthermore, some vector-borne diseases increase in drought periods, such as malaria, which is endemic in southern and south-eastern parts of the country, and fascioliasis, which is endemic in western parts *(8)*.

As soil becomes increasingly dry during a drought, dust in particular increases in the air. This dust can cause airborne/dust-related disease such as respiratory infection (sinusitis, pneumonia and mycoses), and respiratory and cardiovascular diseases, especially in high-risk groups such as older adults and people who have severe underlying medical conditions (e.g. heart or lung diseases or diabetes). A survey in the Islamic Republic of Iran showed that with a 1% increase in air pollution caused by dust, hospitalized respiratory patients will increase by about 0.5% and hospitalized cardiac patients by about 1%, and cardiac deaths will increase by about 0.3% *(9)*.

Migration and mental health are also affected drought because of the financial effects and the increased economic pressure on people, especially in agriculture-based regions in the Islamic Republic of Iran, where water scarcity affects most of the population. In many provinces, people are facing serious shortages of safe drinking-water and are therefore forced to migrate to

other villages or cities *(10)*. Regardless of the stimulus for migration, recent research provides evidence that mental health and well-being among migrant populations are worse than among native populations *(11,12)*.

All the issues mentioned above can have an impact on the infrastructure and delivery of health services. Droughts can put pressure on health care providers because of an increase in the number of referrals and the workload of the medical staff as a result of the shortage of personnel due to their migration and unequal distribution. On the other hand, lack of a water supply in health services can increase the likelihood of contamination of instruments and hence reduce the ability of health professionals to perform their tasks. Therefore, droughts can increase the risk of disruption to health care and a deterioration in the health of affected people. Disruption of the power supply due to water shortage can also be a problem for the use of medical equipment and cooling systems for drugs and vaccines *(13,14)*. In the Islamic Republic of Iran with its wide population distribution and the poor infrastructure of the health system, these effects can be intensified.

One of the problems that health centres face if there is no pre-disaster planning is the lack of equipment, materials and human resources, and a system for identifying resources and allocating them to prioritized needs *(15)*. For example, the health sector does not play an active role in tackling dust problems, which are one of the consequences of drought in the Islamic Republic of Iran *(16)*.

One of the first field studies on reproductive health management in regions of the Islamic Republic of Iran affected by drought found that several factors affected reproductive health management. These factors were: disregard of cultural issues, lack of training of health care workers and drought-affected people, lack of planning, insufficient data collection, neglect of male reproductive health, and lack of a monitoring system on the planning for and response to the drought *(17)*. On the other hand, health care providers such as nurses and vulnerable people, despite their important role in disaster management and planning, had little awareness about participation in the response phase of the disaster, were less prepared and performed poorly in this phase *(18)*.

These findings should alert the policy-makers that steps need be taken to improve disaster preparedness and response, particularly since drought is a serious climate problem that will worsen in the coming years in the Islamic Republic of Iran.

Given the important role of the health sector in all phases of drought risk management and considering the problems discussed above, we recommend the following key actions.

- Provide proper planning and surveillance.
  - Analyse local and regional health conditions based on a drought scenario.
  - Study epidemiological characteristics of the population, available resources and health needs.
  - Provide a local contingency plan to respond to the public health emergencies caused by drought.
  - Develop a surveillance system to monitoring functions linked with primary health care.
  - Plan for the development of resources and services for disease epidemics and outbreaks, and for surveillance of no communicable diseases in affected communities.
  - Continuously assess current actions in order to plan for future actions.
  - Increase knowledge about the role of the social environment on health during climate migration.
- *Strengthen the data collection system in drought-affected areas.*
- *Strengthen communication and collaboration with relevant health organizations.*
  - Enhance the relationship between the main bodies involved in the drought response (organizational, local and regional).
  - Connect health professionals and disaster managers.
- *Empower human resources.*
  - Develop and train health teams for monitoring and assisting; provide health education for health care workers and vulnerable people.
- Strengthen food-safety measures.
  - Develop monitoring programmes for water and food, and ensure their safety during transportation.
  - Promote food and nutrition interventions that support measures for poverty alleviation, and ensure food accessibility and availability.

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The challenges of HIV self-testing in the Eastern Mediterranean Region

Ismaël Maatouk[1,2] and Moubadda Assi[3]

[1]Department of Dermatology, Clemenceau Medical Center affiliated with Johns Hopkins Beirut, Lebanon [2]Faculty of Health & Life Sciences, De Montfort University, Leicester, United Kingdom. [3]Surveillance Officer, National AIDS Control Program in Lebanon, Beirut, Lebanon. (Correspondence to: I. Maatouk: ismaelmaatouk@gmail.com; ismael.maatouk@cmc.com.lb).

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Introduction

There is a global commitment to end AIDS by 2030. In order to achieve this commitment, and in line with the 3rd Sustainable Development Goal, the Joint United Nations Programme on HIV and AIDS (UNAIDS) set 3 measurable targets[1] to be met by 2020 (*1*). At the core of these targets resides the importance of HIV testing, which is essential to the ultimate success of HIV response. The World Health Organization (WHO) introduced and adopted HIV self-testing (HIVST) in recent years to scale up testing (*2*). The objective of this editorial is to discuss potential benefits, limitations and impact of HIVST in the Eastern Mediterranean Region.

Overview of the HIV epidemic in the Eastern Mediterranean Region

The Eastern Mediterranean Region has recorded the highest regional increase rate in HIV incidence in the past 7 years (*3*). New HIV infections in the Region reached 36 000 in 2017, marking a 28% increase on the 29 000 infections reported in 2010 (*3*). Life-saving antiretroviral therapy (ART) is available in the Region but has not been able to prevent AIDS-related mortality. Around 10 000 people died of an AIDS-related illness in 2017, marking an 11% rise since 2010 (*3*). In the Region, the percentage of HIV infections remained low in the general adult population (< 0.1%) and high among key populations (*4*). For instance, 95% of new HIV infections in the Region are within key populations: people who inject drugs (PWID) and their partners; men who have sex with men (MSM) and their partners; and sex workers (SWs) and their clients (*4*). Key populations affected by HIV differ across the Region. Higher HIV prevalence rates are found among PWID in Pakistan (21%) and the Islamic Republic of Iran (9.3%); among MSM in Lebanon (12.6%) and Morocco (5.7%); and SWs in Djibouti (12.9%) and Somalia (5.2%). With only 34% of people living with HIV (PLHIV) aware of their status, there is clearly a gap at the top of the pyramid with regard to access to HIV testing. In addition to key populations, sexual and injecting partners of PLHIV are at high risk of HIV transmission and should be included in HIV testing to identify PLHIV efficiently. However, a negligible number of partners of PLHIV were tested in 2017 (*1*).

HIVST recommended by WHO and endorsed globally

HIVST is a process through which a person collects his or her own specimen (oral fluid or blood), performs a test, and interprets its results in a private setting, either alone or with a trusted person (*2*). This initiative is expected to reach first-time testers and create demand among people that need frequent retesting, such as high-risk populations and serodiscordant couples. Thus, this scale-up in testing should help increase the rate of PLHIV who are aware of their status. Moreover, HIVST represents another step forward in line with efforts to increase patient autonomy and self-care interventions, decentralize services, and create demand for HIV testing among those not reached by existing services (*5*).

HIVST has 2 major limitations: the inability to track seropositive testers and the confirmatory power of the tool. This method involves a certain level of independence and assumes a basic level of knowledge of HIV to ensure proper interpretation of reactive tests and linkage to further testing and care (*6*). In fact, interpretation of HIVST results needs to be validated by trained professionals and bold national testing strategies (*2,6*). To date, 88 countries have implemented HIVST and included it in their national HIV strategy (*7*).

HIVST implementation in the Eastern Mediterranean Region

Across the Eastern Mediterranean Region, the usage, efficacy and acceptability of HIVST are under-researched. Two qualitative studies conducted in 2016 interviewed MSM from Tunisia, Lebanon and Morocco, and female SWs and PWID from Jordan, Lebanon, Morocco and Tunisia, and introduced the concept of HIVST (*8,9*). In both studies, the potential of this approach to contribute to a

[1] The UNAIDS 90-90-90 strategy calls for 90% of HIV-infected individuals to be diagnosed by 2020; 90% of whom will be on ART and 90% of whom will achieve sustained virological suppression. Reaching these targets by 2020 will reduce the HIV epidemic to a low-level endemic disease by 2030.

sharp scale-up of testing was acknowledged but concerns were expressed with regards to accuracy of the self-test, fear of self-harm, and absence of trained professionals. Access to HIVST via appropriate and safe delivery channels (internet-based distributors, community centres, non-stigmatizing pharmacies, physician clinics, outreach workers, or peers) were acknowledged to reduce many of these barriers for key populations. The directly assisted approach was preferred over the delivery of HIVST by the majority of PWID and female SWs in Jordan, Lebanon, Morocco and Tunisia, and by some of the MSM participants interviewed from Tunisia, Lebanon and Morocco.

A supportive environment should be ensured before implementing HIVST across the Region. First, regulatory authorities should have data about the targeted key population, mapping, stakeholder mapping and clear community engagement. This will allow programmes to identify which populations will benefit most from self-testing using existing routine indicators for HIV testing and linkage to prevention and treatment. After choosing the HIVST products, national authorities should develop or update their laws, policies and regulations, including the age of consent for HIVST. Additionally, HIVST approaches should be clear to facilitate linkage to further testing, prevention and treatment following self-testing (referral, follow-up, treatment initiation and partner services). Thus, HIV testing guidelines and regulations, standard operating procedures and promotional materials should be developed. Moreover, training on guidelines, policies and regulations should be conducted with relevant communities, regulators, national agencies, implementing partners and healthcare workers. Finally, programmes should update their HIV indicators by adding HIVST-specific monitoring and reporting tools.

In conclusion, HIVST has the potential to play a catalytic role in ending the AIDS epidemic by scaling up testing and maximizing the first of the 3 90s. Its implementation gives an indisputable hope for scale-up of HIV testing, especially in an area like the Eastern Mediterranean Region. Among all WHO Regions, the Eastern Mediterranean might be the most in need of HIV testing scale-up approaches, which will be the occasion to improve HIV monitoring systems. Further research needs to be intensified in the Region to keep up with this ever-dynamic landscape to maximize the potential of HIVST.

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Response to:

Seroprevalence of Herpes simplex virus types 1 and 2 in Indian and Filipino migrant populations in Qatar: a cross-sectional survey

Nasrallah G, Dargham S, Harfouche M, Abu-Raddad L. Seroprevalence of herpes simplex virus types 1 and 2 in Indian and Filipino migrant populations in Qatar: a cross-sectional survey. East Mediterr Health J. 2020;26(5):609–615. https://doi.org/10.26719/2020.26.5.609

Comment on article "Seroprevalence of Herpes simplex virus types 1 and 2 in Indian and Filipino migrant populations in Qatar: a cross-sectional survey"

Yixue Sun,[1,2] Min Li,[3] Ting Gong,[4] Yanlong Cong [5] and Jinghui Zhao [2,6]

[1]Jilin Academy of Animal Husbandry and Veterinary Medicine, Changchun, China. [2]Scientific Research Center, Guilin Medical University, Guilin, China. [3]Department of Clinical laboratory, China-Japan Union Hospital of Jilin University, Changchun, China. [4]Huanren County Agricultural Development Service Center, Huanren, Liaoning, China. [5]Laboratory of Infectious Diseases, College of Veterinary Medicine, Key Laboratory of Zoonosis Research, Ministry of Education, Jilin University, Changchun, China. [6]Changchun Sci-Tech University, Changchun, China. (Correspondence to: Jinghui Zhao: zhaojinghui8791@hotmail.com).

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Sir,

In May 2020, Nasrallah et al. published their study titled "Seroprevalence of herpes simplex virus types 1 and 2 in Indian and Filipino migrant populations in Qatar: a cross-sectional survey" (*1*). It is an interesting work that the authors evaluated the seroprevalence rates of herpes simplex virus types 1 and 2 (HSV-1 and HSV-2) in Filipino and Indian migrant populations in Qatar. Despite its strengths, a technical issue should be further considered.

The key of the study was the stability of antibodies to herpes simplex virus types 1 and 2, which were measured by HerpeSelect® 1/2 and Euroline-WB assays (*2*). According to the authors, "The study samples consisted of Filipino and Indian male blood donors who donated blood between June 2013 and June 2016 at Hamad Medical Corporation, the largest provider of health care in Qatar. The blood specimens were collected – originally for other studies – from 120 Filipino and 620 Indian male adults aged ≥ 18 years", the blood specimens were obtained from June 2013 to June 2016 for other studies and some samples were stored for up to five years (*3–6*). The storage conditions and the testing time of serum specimens were not introduced in the 'Methods'. To date, there is no report that the antibodies titers to HSV-1 and HSV-2 were stable during five years. The antibody titers against HSV-1 and HSV-2 may decrease after long-term storage, especially the seropositive sample with cut-off titer. The stability of the antibody titers to HSV-1 and HSV-2 may influence the results of the survey.

Notably, the relationship between storage conditions and antibody titers to herpes simplex virus should be further analyzed. The storage conditions of long-term stored blood specimens should be included in the 'Materials and Methods' during seroprevalence studies of HSV in the future. If the seropositive samples for HSV-1 and HSV-2 were still stored, we strongly advice that HerpeSelect® 1/2 and Euroline-WB assays should be performed and further analyzed the relationship between antibody titers to herpes simplex virus and different storage conditions.

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Response by authors

Sir,

We thank the authors for their comment on our study. We would like to clarify that the plasma was separated from whole blood by centrifugation, aliquoted in 1.5 Eppendorf tubes, and stored at -80° C freezer until time of analysis. All samples were collected between 2013-3016 and the testing on the samples was completed by 2017. The manuscript reporting the results was submitted for publication to the Eastern Mediterranean Health Journal in April of 2018, but was published recently.

As indicated by the authors, we are not aware of existing studies that assessed the effect of storage conditions on the stability of the antibody titers to herpes simplex virus type 1 (HSV-1) and type 2 (HSV-2) infections. However, the duration between sample collection and testing, as indicated above, is not as long as the authors seem to think based on the publication date of this article. The seroprevalence results also agreed with existing evidence (*1-6*), further supporting these results. Of note that in another study on these blood donor specimens, we found HSV-1 seroprevalence levels that were nearly 100% (*3*), supporting the stability of the antibody titers.

In conclusion, we agree with the authors that it is of value to investigate the effect of storage conditions and timing on the stability of the antibody titers to HSV-1 and HSV-2 infections, but this issue is unlikely to affect the results reported in our study.

Gheyath K. Nasrallah,[1,2] Soha R. Dargham,[3,4] Manale Harfouche[3,4] and Laith J. Abu-Raddad[3,4,5]

[1]Department of Biomedical Science, College of Health Sciences, Qatar University, Doha, Qatar. [2]BioMedical Research Center, Qatar University, Doha, Qatar. [3]Infectious Disease Epidemiology Group, Weill Cornell Medicine-Qatar, Cornell University, Doha, Qatar. [4]World Health Organization Collaborating Centre for Disease Epidemiology Analytics on HIV/AIDS, Sexually Transmitted Infections, and Viral Hepatitis, Weill Cornell Medical College – Qatar, Cornell University, Qatar Foundation – Education City, Doha, Qatar. [5]Department of Population Health Sciences, Weill Cornell Medicine, Cornell University, New York, New York, USA. (Correspondence to: Laith J. Abu-Raddad: Lja2002@qatar-med.cornell.edu).

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Using a geographic information system to identify the number and location of new health centres needed in the city of Kermanshah, Islamic Republic of Iran

Sohyla Reshadat,[1] Shahram Saeidi[1] and Alireza Zangeneh[1]

[1]Social Development and Health Promotion Research Center, Health Institute, Kermanshah University of Medical Sciences, Kermanshah, Islamic Republic of Iran. (Correspondence to: Shahram Saeidi: SaediShahram@yahoo.com).

Abstract

Background: Inappropriate distribution of health centres can increase inequities in health care. A geographic information system (GIS) is a useful tool to help plan, monitor and evaluate health systems by analysing and visualizing geospatial data.

Aims: This study aimed to propose an optimal model for establishing new health centres in the city of Kermanshah, Islamic Republic of Iran using GIS.

Methods: In this descriptive analytical study, the number and location of health centres and people's access to them across Kermanshah were evaluated using the GIS system, ArcGIS 10.3, for the years 1997, 2007 and 2012. To determine the best locations for establishing health centres, five principles were considered: access, distance, service delivery radius, proximity to areas of compatible and incompatible land-use, and population density.

Results: In spite of an increase in the number of health centres in Kermanshah between 1997 and 2012, the population without access to such centres also increased, and this varied by age group. Based on the final map of all the land in Kermanshah, 6% of the land was considered unsuitable or very unsuitable, 16% medium suitability, and 78% good or very good for the location of health centres in Kermanshah city.

Conclusion: The spatial distribution of health centres (in terms of the radius of access) and compatibility of the land-use were not properly considered over the 15-year period. To provide health coverage for the current population in the city of Kermanshah, 13 new health centres are needed in suitable locations.

Keywords: health centres, access, geographic information system, Islamic Republic of Iran

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Introduction

Over the past 50 years, urban populations have risen but the services provided have not been expanded enough to meet the needs of the people. This has led to undesirable and spatial inequity in urban health services and a waste of human and material resources *(1)*. Today, preventing inequities in the health sector is a main concern of the health policy-makers, especially in developing countries *(2)*. However, a lack of financial and human resources and the growing complexity of health dimensions (physical, mental, emotional, spiritual, and social) are challenges for health policy-makers *(3)*.

Health care services provide health care, maintain and promote health, and restore health at times of illness *(4)*. One of the factors that can both cause inefficiency in the delivery of health services and increase inequality in health services is the inappropriate distribution of health centres *(2)*. The theory of healthy and ecological cities *(5)* promotes good access to health centres and the placement of urban services at consistent and optimal distances. Factors that can support the proper distribution of health services include good and transparent management, and the required knowledge and tools *(6)*. Managers are important because they are responsible for planning, organizing, directing, innovating, motivating, coordinating and budgeting health services.

Today, the technological developments in the field of health information *(7)* have increased the importance of using new tools in health management, such as the geographic information systems (GIS) *(8,9)*. GIS is a valuable tool to help ensure that vulnerable and deprived populations have access to primary health care services *(10)* and hospitals *(11)*. GIS can also be used to plan, monitor and evaluate health systems by gathering, storing, processing, analysing and visualizing geospatial data *(3,10–16)*. Thus, GIS can help reduce inequalities in the distribution of services and identify inequalities in groups, sectors and urban areas.

As mentioned above, identifying and ranking the criteria of a desirable model for location of health centres are important in health services management. Kermanshah is one of the most deprived *(17)* and underdeveloped *(18)* provinces of the Islamic Republic of Iran in terms of access to health services. Moreover, Kermanshah has faced many health challenges, including

high rates of disease such as gastrointestinal cancer and AIDS *(19,20)* and inequity in access to health centres *(2)*.

The United Nations Sustainable Development Goals aim to ensure healthy lives and promote well-being for all at all ages, reduce inequality, and support sustainable cities and communities *(21)*. In view of these goals and the above-mentioned situation in Kermanshah, allocating resources and health centres in this area is a priority. We therefore aimed to develop an optimal model for establishing new health centres in Kermanshah city using GIS with the aim of supporting our health managers and policy-makers on this issue.

Methods

This descriptive, analytical study was done over a 15-year period (1993–2012). The number of health centres was our target. People's access to these centres and land-use compatibility status across Kermanshah city were evaluated using ArcGIS 10.3, and its index overlay model and network analyzer *(22)*. Land-use compatibility describes an existing or committed land use or activity that can co-exist with neighbouring use(s)/activity(ies), without either creating or experiencing off-site adverse effects. In the first step we used the ArcGIS intersect and symmetrical difference tools. In this study, the effective layers for locating health centres include proximity to green space (C1), proximity to the centre of the neighbourhood (C2), proximity to fire-fighting services (C3), proximity to communication networks (C4), proximity to population density (C5), proximity to residential areas (C6), the slope of the land (C7), distance from existing health centres (C8), distance from industrial workshops (C9), distance from urban facilities (C10), distance from places of education (C11), distance from cultural services (C12), and distance from sports facilities (C13).

In the second step, the proposed map of suitable locations for establishing health centres was extracted using the index overlay model, ArcGIS network analyzer, the fuzzy analytic hierarchy process (AHP) (fuzzy AHP SoLver software, 2015) and GIS. Moreover, to determine the best locations for establishing health centres, five principles were considered *(23)*.

- Access principle: One of the main criteria in locating such critical centres is easy access. In other words, easy access denotes the ability of urban residents to have the access to health centres they wish.
- Distance principle: Use of the distance principle in locating centres is based on the sphere of influence, that is, the standard range covered by each of the health centres.
- Service radius: This is the radius of each of the health centres in terms of delivering services and its distance from the radius of other centres. For example, the standard coverage is a radius of 750 m which may become shorter because of overlap with other centres.

Proximity principle (compatibility and incompatibility): The presence of some land-use, such as industrial centres in the vicinity of and adjacent to health centres, is known as incompatible land-use, which reduces the efficiency of these health centres. In this regard, we classified land-use into two categories, compatible and incompatible land-use. Items C8 to C13 were considered incompatible land-use. This is because this land-use causes problems such as crowding, noise pollution and atmospheric pollution, and avoiding noise and environmental pollution are among the most important considerations when locating health centres. C7 was considered both compatible and incompatible, and the other items (C1 to C6) were considered compatible land-use *(24)*.

Population criterion: This is one of the main factors in the establishment of health centres. In other words, there should be more health centres in areas with higher population densities.

We marked the health centres based on statistical blocks of Kermanshah in the environment of ArcGIS maps, and then the urban roads were created. The urban communication network and health centres in Kermanshah city were extracted using the ArcGIS network analyzer. The topology and spatial relationships between the roads were developed in ArcGIS catalog, and the rules and restrictions were imposed through the ArcGIS network analyzer.

In the third step, given that normal walking speed ranges between 0.75 and 1.25 m/s *(24)* and the standard 750 m catchment radius for health centres *(25)*, a person's speed was set at 1 m/s. In addition, a walking time of 12.5 minutes was set for the distance of each person's house from the nearest health centre. Then, using the ArcGIS network analyzer, some limits were considered for areas with health centres in terms of people's access to these areas in real time through real roads. The above-mentioned items, including the access principle, the distance principle and the service radius, were considered in this step.

In the fourth step (the proximity principle), a minimum distance of 1000 m was considered *(26)*, and the number of people with and without access to health centres was calculated based on age and gender, and also the area of compatible and incompatible land-use within a radius of 1 km. The ArcGIS intersect and symmetrical difference tools were used for these calculations. The information of layers in terms of compatible and incompatible land-use were as follows.

Incompatible layers: These layers include industrial workshops, urban facilities, educational, cultural, sports facilities, and health centres. The appropriate distance from these land-uses should be considered in locating health centres because of challenges such as air and noise pollution for health centres as well as the optimal and equitable access to health centres and their appropriate distribution in cities. Therefore, the further these land-uses are from the health centres, the higher the score (a score of 10 being highest) would be and vice versa. In this model, a distance of 0–100 m from the incompatible

land-use has the lowest score (a score of 1), and a distance of more than 750 m has the highest score (a score of 10). The minimum distance of health centres from the incompatible land-use is 1000 m, and this value was considered as the base analysis of the land-use.

Compatible layers: These include residential areas, green spaces, fire-fighting services, population density, centre of the neighbourhood and communication networks. The shorter the distance of these land-uses from the health centres, the higher the score would be and vice versa. In this regard, quick and timely access to health centres is seen as one of the basic needs of households. Accordingly, the proximity and access to urban streets is one of the best options for the location of health centres. Thus, if the distance from the main streets is reduced, the score will be higher and vice versa. Moreover, proximity to the centre of the neighbourhood is another factor that should be considered for residents, and equitable distribution of health centres is one of the objectives and criteria of locating such land-use. Therefore, the shorter the distance of health centres from the centre of the neighbourhood, the higher the score will be and vice versa.

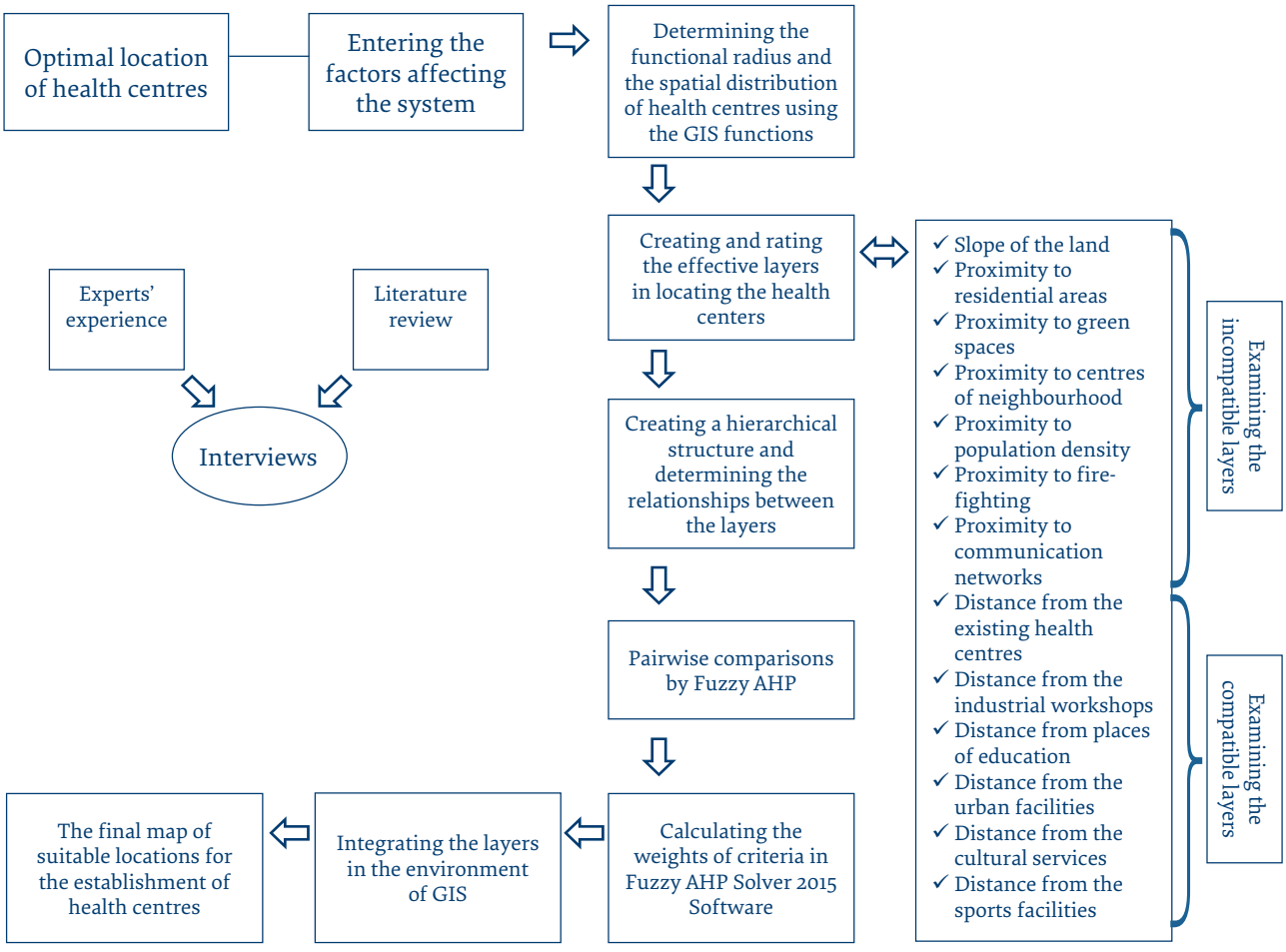
It should be noted that areas with a slope of the land value of 0–5% will have a higher score (the compatible section) and areas with a slope of 20–100% will have a lower score (the incompatible section) *(26–30)*.

In the fifth step, to examine the population criterion, a population density of more than 150 population/km^{2}was considered *(31)*.

Modelling is important in geographical studies and the model of overlapping indexes is one of the most important models *(32)*. In this modelling, units in each information layer are given weights based on their capability, in addition to the weights of the information layers, and the input maps are given weights according to their importance *(33)*. The simplest type of index weighting is when maps are binary (consisting of pixels that can have one of only two colours, usually black and white) *(34)* and each map has a single weighting factor.

We used AHP to assign weights to criteria *(35)*. This method is based on pairwise comparisons and determining the priority of elements over other criteria. It is used to solve multicriteria problems and prioritization of alternatives using the intended criteria *(36)*. In our modelling, the final map was extracted for the decision-making of health managers by reviewing the literature and interviews with experts in connection with the significance of each layer and their combinations using the fuzzy AHP *(23,37)*.

Figure 1 Study processes



The research framework and processes of our study are shown in Figure 1.

Results

The distribution of health centres in Kermanshah city was not uniform. Given the assigned walking time of 12.5 minutes for each person from his/her home to a health centre during the three periods under study (1997, 2007 and 2012), the percentage of the population with access to health centres fell while the percentage of the population without access increased.

The population of Kermanshah city was 693 157 in 1997, 794 863 in 2007 and 851 405 in 2012. The deprived population increased from 47.28% in 1997 to 55.65% in 2007 and 58.39% in 2012, while the number of health centres increased from 29 in 2007 to 33 in 2007 and to 34 in 2012 based on ArcGIS network analyzer (Figure 2). In 1997, 38.57% of those aged 0–14 years did not have access to health centres compared with 22.97% in 2007 and 20.44% in 2012. As regards older ages, 56.62% of those aged 15–65 years did not have access to health centres in 1997 compared with 70.50% in 2007 and 74.76% in 2012. However, 4.81% of the age group 65 years and older did not have access to health centres in 1997 as opposed to 6.53% in 2007 and 4.79% in 2012 (Table 1). In 2012, 354 236 people (41.61%) had access to health centres, of which 114 859 people (32.42%) had access to two or three health centres.

Kermanshah city had eight fire-fighting services in the compatible layers, of which two were out of the range (radius of 1 km). With regard to proximity to the centres of neighbourhoods, we identified 121 centres of neighbourhoods, of which 40 (33%) were out of the range (radius of 1 km). This finding suggests that many areas have been deprived of the services provided by these centres. Moreover, all health centres were constructed along the street. In other words, the layer of proximity to streets had been considered in the establishment of health centres. The slope of the land fit into both groups: compatible (areas with a slope of 0–5% will have a higher score) and incompatible (areas with a slope of 20–100% will have a lower score). According to our findings, most of the central areas of Kermanshah city had a 5% slope and the surrounding areas had slopes ranging between 20% and 100%. Moreover, 92.42% of compatible land-use and 84.79% of incompatible use were within the range covered by health centres (radius of 1 km) (Table 2 and Figure 3).

In Figure 4, the information layers were scored in both compatible and incompatible groups. We created the hierarchical structure, determined the relationships between layers (C1–C13), and made pairwise comparisons by reviewing literature and interviews with experts *(26–28)*. Additionally, the weights of the information layers were determined by fuzzy AHP (fuzzy (AHP SoLver, 2015) (Table 3). The layers and their weights are shown in Table 4.

After ranking and combining layers with overlapping indexes in GIS software, the output layer was developed, whereby suitable lands were identified for establishing health centres. Land with higher scores had better conditions for the establishment of health centres. The final map indicated five belts for new sites for health centre as in Kermanshah city (Figure 5). The outer areas, shown in red, with a total area of 3 015 988 m2 had the lowest value (very unsuitable sites); these areas are located in the northern and southern parts of Kermanshah city. The orange belts with an area of 3 684 334 m2 and the yellow belts with an area of 18 590 936 m2 were ranked

Figure 2 Functional radius and spatial distribution of health centres and areas with and without health centre coverage in 1997, 2007 and 2012

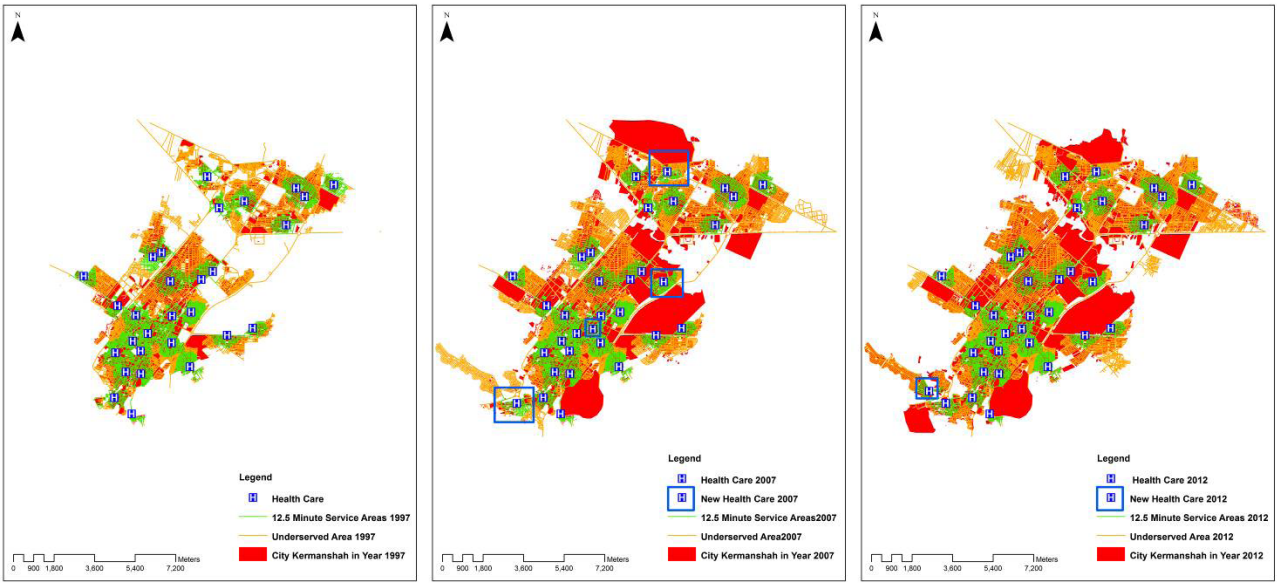


Table 1 **Population without access to health centers based on age and sex over a period of 15 years, Kermanshah, 1993–2012**

Year/Sex	Age groups (years)							
	Total		0–14		15–65		≥ 65	
	No.	%	No.	%	No.	%	N	%
1997								
Female	160 959	49.12	61 580	38.26	92 310	57.35	7 069	4.39
Male	166 753	50.88	64 820	38.87	93 244	55.92	8 689	5.21
Total	327 712	100	126 400	38.57	185 554	56.62	15 758	4.81
2007								
Female	215 101	48.62	50 418	23.44	154 551	71.85	10132	4.71
Male	227 286	51.38	51 201	22.53	157 339	69.23	18 746	8.25
Total	442 387	100	101 619	22.97	311 890	70.50	28 878	6.53
2012								
Female	247 769	49.83	49 038	19.79	186 908	75.44	11 823	4.77
Male	249 400	50.17	52 591	21.09	184 800	74.10	12 009	4.82
Total	497 169	100	101 629	20.44	371 708	74.76	23 832	4.79

unsuitable and medium suitability sites, respectively. The turquoise belts with an area of 35 423 271 m2 and the blue belts with an area of 51 641 924 m2 were ranked good and very good sites, respectively. In general, given the existing conditions and based on our data, we suggest 13 new health centres should be built in Kermanshah city (Figure 5).

Discussion

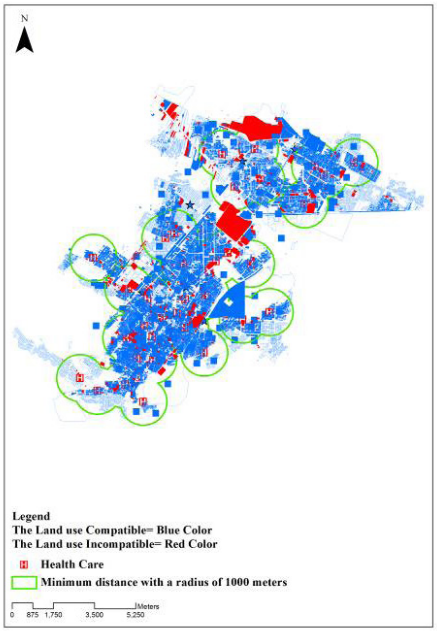
Our study shows that even with an increase in the number of health centres in Kermanshah city, the percentage of the population without access to health centres was on the rise, 47.28% in 1997, 55.65% in 2007 and 58.39% in 2012. Kermanshah city has increased in population from 693 000 in 1997 to 851 000 in 2012. The inappropriate spatial distribution of health centres is another challenge that Kermanshah city has, which is due reduced optimal access to health centres and the irrational accumulation of these centres in certain places. Some of the consequences of this issue are the lack of equal opportunity for people, injustice *(2)*, negative changes in the ecological, human and natural structure of healthy cities, and inefficiency of the urban health management system in using funds *(25)*.

Health centres were not distributed appropriately across Kermanshah city. Over the period 1997–2007, four new health centres were established, three of which were appropriately located. However, one centre was established in a part of the city that was already covered by other centres and there was no need for it. Similarly, from 2007 to 2012, a new health centre was established which overlapped with a neighbouring centre. Based on our data, the interference of the function radius was very

Table 2 **Areas of the land use within and outside the range covered by the health centres (radius of 1 km) in Kermanshah city**

Type of land use	Total area	Land use within the range covered by health centres		Land use outside the range covered by health centres	
		Area	%	Area	%
Compatible					
Residential	17 764 003	15 871 617	89.35	1 892 386	10.65
Green space	4 656 665	3 802 101	81.65	854 564	18.35
Blocks with high population density	21 020 679	20 474 774	97.40	545 905	2.60
Total	43 441 347	40 148 492	92.42	3 292 855	7.58
Incompatible					
Industrial workshops	2 162 608	1 676 362	77.52	486 246	22.48
Educational centres	2 791 985	2 474 194	88.62	317 791	11.38
Urban facilities	559 975	503 979	90.00	55 996	10
Cultural services	124 581	98 133	78.77	26 448	21.23
Sports facilities	365 020	338 175	92.65	26 845	7.35
Total	6 004 169	509 0843	84.79	913 326	15.21

Figure 3 Compatible and incompatible land-use within a radius of 1 km of the health centres



high, so that 32.43% of people had access to two or three health centres, thereby resulting in a waste of resources in terms of the optimal use of facilities in these health centres. Our findings on the lack of appropriate and uniform access to health centres across Kermanshah city are consistent with the results of other studies *(25,26,29,38–40)*. Based on our results, if more detailed need assessments and planning had been done in Kermanshah city over 1997–2007, it would have been possible for the areas in need of health centres to be better covered instead of establishing new centres in areas already covered. This situation would have resulted in higher productivity, better public satisfaction, less duplication of previous programmes and time-saving compared with the current circumstances. The results of studies in other countries have shown that adopting inappropriate management strategies results in the loss of resources *(6)*.

In addition, our results show that the population without access to health centres in the age group 0–14 years had decreased from 38.57% to 20.44%. Population growth has decreased in the Islamic Republic of Iran and this decrease may explain the declining trend in the population of children without access to health centres. In those aged 15–65 years, the percentage of the population without access to health centres was on the rise (from 56.62% in 1997 to 74.76% in 2012). For the group over 65 years, the percentage without access increased from 1997 to 2007 and then decreased from 2007 to 2012 (from 6.53% to 4.79%). Given the reconstruction and renovation plan in recent years in central areas of Kermanshah city, the number of migrants to the peripheral suburbs has risen. Also, because of the accumulation of health centres and the large population of elderly people in Kermanshah (before migration and renovation/renewal policies), these factors may be a reason for the decline in the population without access to health centres in 2012. In general, this lack of responsiveness to the needs of residents without proper access to health centres and the lack of social justice cause damage in community groups, especially vulnerable groups. In cities such as Kermanshah where ethnic segregation exists between residents of different neighbourhoods *(25,41)*, the accumulation of services in particular places across the city is unjustifiable and disturbs the human, natural and ecological structure of cities.

The analysis of the compatibility and incompatibility of land-use across Kermanshah city showed that about 92% of the compatible and 85% of incompatible lands were in the range of 1000 m from the health centres. The large amount of compatible and incompatible land-use around health centres indicates that these centres were established without planning, which is one of the main reasons for the failure of urban health projects in the country *(42)*.

As for compatible land-use, residential area (89%), green spaces (81%), densely populated blocks (97%), fire-fighting services (75%) and centres of the neighbourhoods (67%) were within a radius of 1 km of the health centres. The presence of such compatible land-use in the vicinity of health centres is an advantage. However, the existence of incompatible land-use (e.g. sports facilities (92%), urban facilities (90%), places of education (89%), cultural services (78%) and industrial workshops (77%) within a radius of 1 km of the health centres) is a disadvantage. Our finding on the lack of appropriate planning for the distribution of land-use concur with the results of other studies *(42)*. The lack of planning in the urban land-use has led to the wide distribution of incompatible land-use throughout Kermanshah city.

Given that a large proportion of the population did not have proper access to health centres, and this situation was related to the location and insufficient number of health centres, we conclude that 13 new health centres should be established on suitable land across Kermanshah city. The use of GIS software by health managers in their planning and decision-making is recommended. By doing so, health policies and management decisions in Kermanshah city will be enhanced.

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Competing interests: None declared.

Figure 4 Scoring the effective layers by distance for compatible and incompatible groups

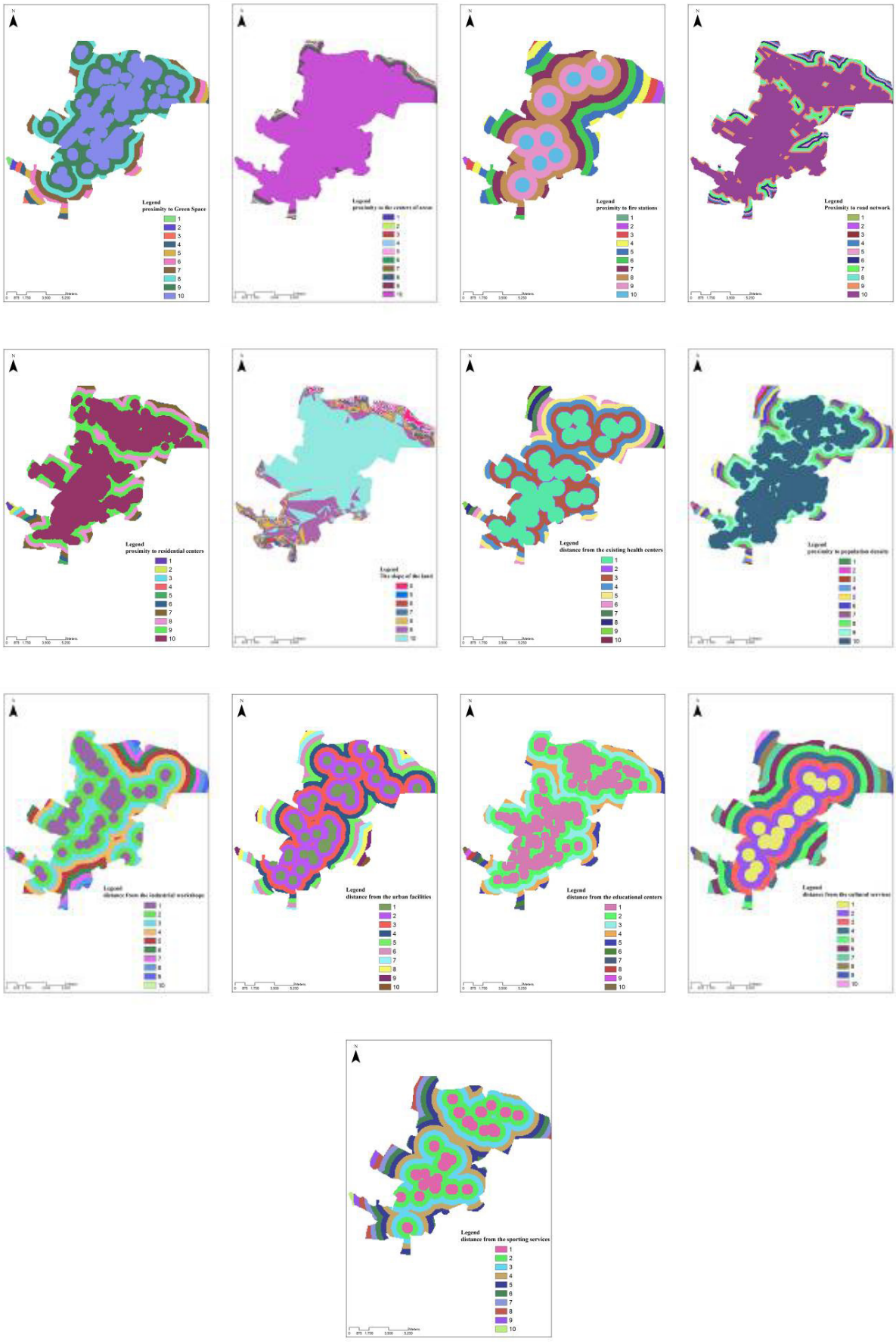


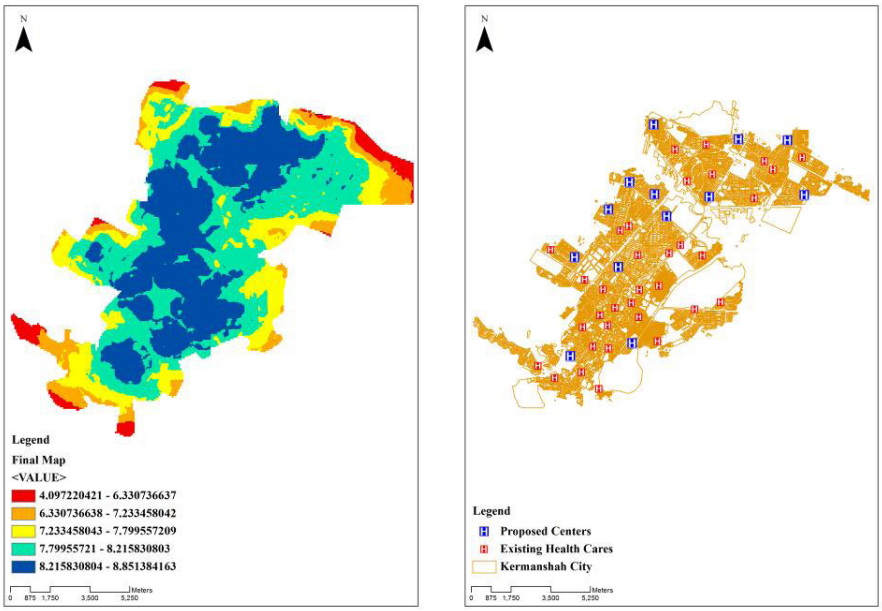
Table 3 Pairwise comparisons of the effective layers in locating health centres: comparisons metrics using fuzzy analytic hierarchy process (fuzzy AHP SoLver software, 2015)

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
C1	1, 1, 1	1, 2, 4	1, 2, 4	1, 2, 4	1, 3, 5	1, 3, 5	1, 3, 5	2, 4, 6	3, 5, 7	4, 6, 8	5, 7, 9	6, 8, 10	7, 9, 11
C2	0.25, 0.5, 1	1, 1, 1	1, 2, 4	1, 2, 4	1, 2, 4	1, 3, 5	1, 3, 5	1, 3, 5	2, 4, 6	3, 5, 7	4, 6, 8	5, 7, 9	6, 8, 10
C3	0.25, 0.5, 1	0.25, 0.5, 1	1, 1, 1	1, 2, 4	1, 2, 4	1, 2, 4	1, 3, 5	1, 3, 5	1, 3, 5	2, 4, 6	3, 5, 7	4, 6, 8	5, 7, 9
C4	0.25, 0.5, 1	0.25, 0.5, 1	0.25, 0.5, 1	1, 1, 1	1, 2, 4	1, 2, 4	1, 2, 4	1, 3, 5	1, 3, 5	1, 3, 5	2, 4, 6	3, 5, 7	4, 6, 8
C5	0.2, 0.33333, 1	0.25, 0.5, 1	0.25, 0.5, 1	0.25, 0.5, 1	1, 1, 1	1, 2, 4	1, 2, 4	1, 2, 4	1, 3, 5	1, 3, 5	1, 3, 5	2, 4, 6	3, 5, 7
C6	0.2, 0.33333, 1	0.2, 0.33333, 1	0.25, 0.5, 1	0.25, 0.5, 1	0.25, 0.5, 1	1, 1, 1	1, 2, 4	1, 2, 4	1, 2, 4	1, 3, 5	1, 3, 5	1, 3, 5	2, 4, 6
C7	0.2, 0.33333, 1	0.2, 0.33333, 1	0.2, 0.33333, 1	0.25, 0.5, 1	0.25, 0.5, 1	0.25, 0.5, 1	1, 1, 1	1, 2, 4	1, 2, 4	1, 2, 4	1, 3, 5	1, 3, 5	1, 3, 5
C8	0.16667, 0.25, 0.5	0.2, 0.33333, 1	0.2, 0.33333, 1	0.2, 0.33333, 1	0.25, 0.5, 1	0.25, 0.5, 1	0.25, 0.5, 1	1, 1, 1	1, 2, 4	1, 2, 4	1, 2, 4	1, 3, 5	1, 3, 5
C9	0.14286, 0.2, 0.33333	0.16667, 0.25, 0.5	0.2, 0.33333, 1	0.2, 0.33333, 1	0.2, 0.33333, 1	0.25, 0.5, 1	0.25, 0.5, 1	0.25, 0.5, 1	1, 1, 1	1, 2, 4	1, 2, 4	1, 2, 4	1, 3, 5
C10	0.125, 0.16667, 0.25	0.14286, 0.2, 0.33333	0.16667, 0.25, 0.5	0.2, 0.33333, 1	0.2, 0.33333, 1	0.2, 0.33333, 1	0.25, 0.5, 1	0.25, 0.5, 1	0.25, 0.5, 1	1, 1, 1	1, 2, 4	1, 2, 4	1, 2, 4
C11	0.11111, 0.14286, 0.2	0.125, 0.16667, 0.25	0.14286, 0.2, 0.33333	0.16667, 0.25, 0.5	0.2, 0.33333, 1	0.2, 0.33333, 1	0.2, 0.33333, 1	0.25, 0.5, 1	0.25, 0.5, 1	0.25, 0.5, 1	1, 1, 1	1, 2, 4	1, 2, 4
C12	0.1, 0.125, 0.16667	0.11111, 0.14286, 0.2	0.125, 0.16667, 0.25	0.14286, 0.2, 0.33333	0.16667, 0.25, 0.5	0.2, 0.33333, 1	0.2, 0.33333, 1	0.2, 0.33333, 1	0.25, 0.5, 1	0.25, 0.5, 1	0.25, 0.5, 1	1, 1, 1	1, 2, 4
C13	0.09091, 0.11111, 0.14286	0.1, 0.125, 0.16667	0.11111, 0.14286, 0.2	0.125, 0.16667, 0.25	0.14286, 0.2, 0.33333	0.16667, 0.25, 0.5	0.2, 0.33333, 1	0.2, 0.33333, 1	0.2, 0.33333, 1	0.25, 0.5, 1	0.25, 0.5, 1	0.25, 0.5, 1	1, 1, 1

Table 4 Weighted layers using fuzzy analytic hierarchy process (fuzzy AHP SoLver software, 2015)

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
0.15001	0.13885	0.1272	0.11523	0.10301	0.09107	0.07988	0.06889	0.05562	0.03956	0.02448	0.00619	0

Figure 5 Final ranking and proposed sites for the establishment of health centres



Utilisation d'un système d'information géographique pour déterminer le nombre de nouveaux centres de santé nécessaires dans la ville de Kermanshah, ainsi que leur emplacement (République islamique d'Iran)

Résumé

Contexte : Une répartition inappropriée des centres de santé peut aggraver les inégalités en matière de soins de santé. Un système d'information géographique (SIG) est un outil intéressant qui permet de planifier, de surveiller et d'évaluer les systèmes de santé en analysant et en visualisant des données géospatiales.

Objectifs : La présente étude visait à proposer un modèle optimal pour la création de nouveaux centres de santé dans la ville de Kermanshah (République islamique d'Iran) au moyen d'un SIG.

Méthodes : Dans cette étude analytique descriptive, le nombre de centres de santé, leur emplacement et l'accès de la population à ces centres dans l'ensemble de la ville de Kermanshah ont été évalués à l'aide du système d'information géographique ArcGIS 10.3, pour les années 1997, 2007 et 2012. Afin de déterminer les meilleurs emplacements pour établir des centres de santé, cinq principes ont été pris en compte : l'accès, la distance, la portée des services fournis, la proximité de zones d'aménagement compatibles et incompatibles et la densité de population.

Résultats : Malgré l'augmentation du nombre de centres de santé à Kermanshah dans la période comprise entre 1997 et 2012, la population n'ayant pas accès à ces centres s'est également accrue, et ce de manière variable selon les groupes d'âge. Sur la version finale du plan de l'ensemble des terrains de Kermanshah, 6 % des terrains ont été jugés inadaptés ou très inadaptés, 16 % moyennement adaptés et 78 % bien adaptés ou très adaptés à l'implantation de centres de santé dans la ville.

Conclusion : La distribution spatiale des centres de santé (vue sous l'angle du rayon d'accès) et la compatibilité des terrains n'ont pas été correctement prises en compte sur cette période de 15 ans. Pour assurer la couverture sanitaire de la population actuelle de la ville de Kermanshah, il faudrait créer 13 nouveaux centres de santé à des emplacements appropriés.

استخدام نظام المعلومات الجغرافية لتحديد عدد المراكز الصحية الجديدة وموقعها في مدينة كرمنشاه، جمهورية إيران الإسلامية

سُهيلا رشادات، شهرام سعيدي، علي رضا زنجنه

الخلاصة

الخلفية: يمكن أن يؤدي توزيع المراكز الصحية بصورة غير ملائمة إلى زيادة أوجه عدم الإنصاف في الرعاية الصحية. ويُعتبر نظام المعلومات الجغرافية من الأدوات المفيدة التي تساعد في تخطيط النُّظم الصحية، ورصدها، وتقييمها من خلال تحليل البيانات الجغرافية والمكانية وتصويرها بيانياً.

الأهداف: هدفت هذه الدراسة إلى اقتراح نموذج أمثل لإنشاء المراكز الصحية الجديدة باستخدام نظام المعلومات الجغرافية في مدينة كرمنشاه، جمهورية إيران الإسلامية.

طرق البحث: في هذه الدراسة التحليلية الوصفية، تم تقييم عدد المراكز الصحية وموقعها وإمكانية وصول الناس إليها في جميع أنحاء كرمنشاه، وذلك باستخدام نظام المعلومات الجغرافية، ArcGIS 10.3، خلال السنوات 1997، و2007، و2012. وقد أُخذ بعين الاعتبار المبادئ الخمسة التالية لتحديد أفضل المواقع التي يمكن إنشاء المراكز الصحية بها، ألا وهي: إمكانية الوصول إليها، والمسافة، ومحيط تقديم الخدمات، ومدى قربها من مواقع الاستخدام المتوافق أو غير المتوافق للأراضي، والكثافة السكانية.

النتائج: على الرغم من زيادة عدد المراكز الصحية في مدينة كرمنشاه في الفترة بين عامي 1997 و2012، إلا أن عدد السكان الذين لا يستطيعون الوصول إلى هذه المراكز قد زاد أيضاً، ولكن بنسب متباينة حسب الفئة العُمرية. واستناداً إلى الخريطة النهائية لجميع الأراضي في كرمنشاه لتحديد المواقع التي تصلح للمراكز الصحية في المدينة، تبين أن 6٪ من الأراضي تُعتبر غير ملائمة أو غير ملائمة على الإطلاق، و16٪ منها ملائمة بدرجة متوسطة، بينما 78٪ ملائمة بدرجة جيدة أو جيدة جداً.

الاستنتاجات: لم يُدرَس جيداً التوزيع المكاني للمراكز الصحية (من حيث محيط الإتاحة، وإمكانية الوصول إليها) ومدى توافق استخدام الأراضي طوال فترة 15 عاماً (فترة الدراسة). ولتوفير التغطية الصحية لسكان مدينة كرمنشاه حالياً، يجب إنشاء 13 مركزاً صحياً جديداً في مواقع ملائمة.

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The Short Form Health Survey (SF-36): translation and validation study in Afghanistan

Nasar Ahmad Shayan [1,a] Umut Ece Arslan,[2,a] Abdul Malik Hooshmand,[3] Mohammad Zobair Arshad[4] and Hilal Ozcebe[5]

[1]Department of Public Health, Faculty of Medicine, University of Herat, Herat, Afghanistan. [2]Institute of Public Health, University of Hacettepe, Ankara, Turkey. [3]Department of Dermatology, Faculty of Medicine, University of Herat, Herat, Afghanistan. [4]Afghanistan Private Hospital Association, Herat, Afghanistan. [5]Department of Public Health, Faculty of Medicine, University of Hacettepe, Ankara (Correspondence to: H. Ozcebe: hilalozcebe@gmail.com). [a] Both authors contributed equally and shared first authorship

Abstract

Background: Quality of life is defined as the subjective perception of one's own well-being within a sociocultural context. SF-36 is commonly used to check the health status of the general population in many countries.

Aims: To validate the Persian (Dari) version of the Short Form Health Survey (SF-36) in Herat.

Methods: The Persian (Dari) version of SF-36 was culturally adapted. A total of 1259 healthy individuals aged ≥ 18 years participated in the study between November 2016 and April 2017. Construct validity of SF-36 was evaluated through exploratory factor analysis. The extraction was performed by principal component analysis from the polychoric correlation matrix estimated by a 2-step method with varimax rotation. Internal consistency and test–retest reliability were assessed by Cronbach's α SPSS version 23.0 and R version 3.1.3 were used in the analysis.

Results: The last version of SF-36 including 27 items in 8 factors explained 86.48% of the variance. The Kaiser–Meyer–Olkin value was 0.391 and Bartlett's test showed statistical significance ($P < 0.001$). Confirmatory factor analysis revealed that the final model demonstrated good fit statistics ($P < 0.001$), root mean square error of approximation=0.056, goodness-of-fit index=0.963, and adjusted goodness-of-fit index=0.953). Cronbach's α for the 8 subscales was 0.753–0.933. All subscales of SF-36 had good internal consistency reliability and good test–retest reliability.

Conclusions: We showed that our Dari version of SF-36 is suitable to evaluate quality of life in adults in Herat City. This scale will be useful for health researchers in the future.

Keywords: Afghanistan, Dari, quality of life, SF-36, validity

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Introduction

Quality of life (QOL) is either defined as the subjective perception of one's own well-being within a sociocultural context, or as the satisfaction of a person's desires and achieving an ideal level of well-being. Health-related QOL (HRQOL) refers to functioning and wellbeing in physical, mental and social dimensions of life (*1–3*).

Measuring the health status of individuals or a population is an important first step in the assessment of healthcare needs and evaluation of the impact of health interventions. The indicators of QOL are used to measure the effects of symptoms and treatment on people's health status (*4–8*). Measuring QOL in the community is also helpful in health planning (*9*). Reliable population-wide statistics on health status are scarce, especially in developing countries such as Afghanistan.

The 36-item Short Form Health Survey (SF-36) is a renowned generic health-related QOL questionnaire that was developed by Boston Health Research Institute. The SF-36 instrument provides a concise method that is mainly used to check the health status of members of the general population as well as that of patients aged ≥ 14 years (*1*). As it is easy to administer, it has become one of the most widely used QOL evaluation tools in the world (*6,8–12*). SF-36 is also widely used among different age groups in Middle Eastern countries (*13*). Psychometric analyses of the translated versions provided evidence that SF-36 is a reliable and valid measure in different populations (*14–19*), and a few studies have translated and culturally adapted SF-36 into different Asian languages (*20–23*).

There is increasing demand by healthcare professionals and researchers to have and include an authenticated QOL questionnaire in their research or clinical investigations in Afghanistan. This study reported the development and validation of a Persian (Dari)/Afghan version of SF-36 and the results of its testing in the general population in Herat; a province in Southwest Afghanistan where most of the population communicates in Persian.

Methods

SF-36

SF-36 measures 8 health-related subscales: Physical functioning (PF, 10 items); role limitation due to physical

health (RLPH, 4 items); bodily pain (BP, 2 items); general health perception (GH, 5 items); vitality (VT, 4 items); social functioning (SF, 2 items); role limitation due to emotional problems (RLEP, 3 items); and perceived mental health (MH, 5 items). A single item that provides an indication of perceived change in general health status over a 1-year period (health transition) is also included. SF-36 is also evaluated by physical health component (PHC) and mental health component (MHC). While PF, RLPH, BP and GH are considered under the dimension of PHC, VT, SF, RLEP and MH are under the dimension of MHC (*1*).

Translation of SF-36

Translation of the Persian (Dari) version of SF-36 involved 3 steps. The standard forward–backward translation method was followed to translate the SF-36 questionnaire. The SF-36 questionnaire was translated into Persian (Dari) by 2 independent health professionals. Persian literature lecturers reviewed the translated questionnaire to assess Afghan culture and language appropriateness. This questionnaire was back-translated into English by 2 professional translators to check for differences between the Persian and original English versions. A few changes were made and the provisional version of the questionnaire was provided on the basis of the results of the cultural adaptation. There were no difficulties with translation of questions and response categories. Changes were only made in a few items regarding activities, namely: playing golf had been changed to light sporting activities such as snooker and billiards; and measurements like mile was changed to kilometre, and block to approximately 1 or a few hundred meters, which are more familiar in Persian language and Afghan society. The provisional forward-translated questionnaire was pilot tested and administered to 50 healthy individuals, and almost all stated that did not have any difficulties completing the questionnaire. The results of pilot testing were analysed by the research team and after review, only a few changes were made, and the final version was used in this study.

Data collection

This study was conducted in Herat City, Afghanistan from November 2016 to April 2017. The Persian version of SF-36 was administered to a random sample of healthy individuals aged ≥ 18 years living in Herat City from November 2016 to April 2017. Our final questionnaire contained 2 main parts: the first included questions about sociodemographic characteristics, economic status, and cultural and daily activities; and the second had only questions in SF-36. Since SF-36 had 36 questions, we considered a minimum 15 individuals were needed for each question, so our minimum sample size was 540 for the test and ~200 for the retest. The inclusion criteria were: age ≥ 18 years; residents of Herat City; knowledge of Persian (Dari) language; and no psychological disorder that could affect the answers.

The field coordinator and 15 interviewers were trained in the aim of the research, the questionnaire and data collection methods by an Afghan researcher. Herat City has 15 districts, and 1 hospital in each district was selected for the study. The selected hospitals were the most used by people in the district. The interviews were done face to face with the patients and their relatives at 15 general hospitals in 15 different districts of Herat City.

In order to evaluate the validity of SF-36, which is a Likert-type scale, we needed 15 participants for each question with a target total of 540 participants who attended the selected district hospitals. Data collection was continued until at least 90 people were reached in each age group from November 2016 to April 2017. There were 1259 interviewees (54% female and 46% male) and 259 (52.1% male and 47.9% female) were contacted for the retest study.

Statistical analysis

SPSS version 23.0 (SPSS, Chicago, IL, USA) was used to calculate the descriptive analyses such as frequencies, percentage distributions, means, and standard deviation. $P < 0.05$ was considered statistical significance.

Exploratory factor analysis was used to assess the construct validity by using free software R version 3.1.3 (packages: psych, polycor, GPArotation, nFactors, corpcor, ICS, R.utils) and SPSS. Polychoric correlation coefficients were used for explanatory factor analysis because SF-36 is a Likert-type scale and the individual items are not interval scaled (*26*).

Principal component analysis (PCA) from the polychoric correlation matrix estimated by a 2-step method with a varimax rotation was applied for data extraction. It was accepted that factor loading > 0.32 was considered statistically significant (*1*). Six items were dropped from SF-36 because factor loading of these items was < 0.32. After deletion of items 1, 2, 8, 12, 26, 29, 30, 31 and 35, the data were reanalysed. The Kaiser–Meyer–Olkin (KMO) statistic and Bartlett's test were carried out to check for sampling suitability. Confirmatory factor analysis (CFA) was used to determine the goodness of fit of the 8-subscale model after explanatory factor analysis. The following parameters were used to evaluate model fit: c^2 to df ratio (CMIN/df), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), adjusted GFI (AGFI). The following criteria were used to assess model fit: CMIN/df < 5, RMSEA < 0.08, GFI > 0.90 and AGFI >0.90 (*27,28*).

PCA was used to reduce the two dimensions of the scale (PHC and MHC) . The summary scores of PHC and MCH were obtained by PCA. Spearman's rho correlation coefficient was used for correlation between the 8 subscales (PF, RLPH, BP, GH, VT, SF, RLEP and MH) and the 2 rotated components (PHC and MCH). Reliability was estimated using the test-retest correlation coefficient and the internal consistency (Cronbach's α). To assess test–retest reliability, 259 people completed the questionnaire twice at 3-week intervals. Spearman's rho correlation coefficient (> 0.6 as reliable) was used for the test–retest reliability (*23*). Internal consistency was calculated by using

Cronbach's α, which was considered acceptable at ≥ 0.70 (*27,28*). Spearman's rho correlation coefficient was also used to evaluate the relationship between 2 subscales of SF-36.

Ethical approval

All procedures involving human participants were performed in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments, or comparable ethical standards. Permission from the RAND Corporation was obtained via email for using SF-36 for this research. We obtained the approval of the Ethics Committee and Research and Development Committee of Herat University Faculty of Medicine. Informed consent was obtained from all individual participants included in the study.

Results

In this study 56% of participants were from urban area, 62.4% of the participants were Tajik, 46% of the participants were male, 65.5% were married, and 39.6% were illiterate (Table 1). More than half of the participants (59.2%) did not have any income and 23.6% of them received a regular income under US$100. Almost 80% of participants were probably living under or just above the poverty line.

Factor analysis with the polychoric correlation and varimax rotation was performed to construct 8 subscales (Table 2). Items 1, 2, 26, 29, 30, 31 and 35 (in MH, GH and VT) were loaded on the different subscales. Two items (8 and 12) had low standardized estimates. Therefore, the 9 items were dropped from the original scale. After that, explanatory and confirmatory factor analysis were reanalysed with the remaining 27 items. Total 8 subscales were obtained according to explanatory factor analysis factors and these subscales explained 86.48% of the variance. KMO value was 0.391 and Bartlett test was statistically significant ($P < 0.001$). The factor structure of the final model obtained from explanatory factor analysis (8 subdimension model with 27 items) was tested by CFA. The CFA revealed that the final model demonstrated good fit statistics ($c^2/df = 4.96$, $P < 0.001$, RMSEA = 0.056, GFI = 0.963, AGFI = 0.953) (Figure 1).

Reliability of the scale was evaluated using the test–retest and internal consistency reliability methods (Table 3). Test–retest reliability coefficients ranged from 0.682 to 0.905. All subscales of SF-36 had good internal consistency and test–retest reliability. There were positive correlation coefficients between each of the 8 subscales of the SF-36 ($P < 0.01$).

Table 4 shows the PCA with varimax rotation, correlation between the 8 scales and the 2 rotated components. KMO was 0.88 and Bartlett's spherical check was $\chi^2 = 6494.45$ and p< 0.001. Taken together, these results indicated that the study samples were suitable for factor analysis. The analysis identified 2 principal components (PCS and MCS) that could be used to explain 70.95% of the total variance. However, the correlations did not exactly confirm the hypothesized association between the 8 scales with PCS and MCS scores obtained from the first and second components. The VT and GH were strongly correlated with PCS. MH moderately correlated with PCS. The RLEP and RLPH scales were found to have a higher correlation with the MCS than PCS.

Table 1 Sociodemographic characteristics of the participants

	Percentage	Frequency
Age group, years		
18–29	318	25.3
30–39	249	19.8
40–49	253	20.1
50–59	179	14.2
60–69	170	13.5
≥ 70	90	7.1
Sex		
Male	579	46.0
Female	680	54.0
Nationality		
Tajik	785	62.4
Poshton	317	25.2
Other(Ozbik, Hazara)	157	12.4
Marital status		
Married	825	65.5
Single	316	25.1
Widowed	116	9.2
Unknown	2	0.2
Education status		
Illiterate	499	39.6
Can read and write[a]	197	15.6
Primary school	105	8.3
Secondary school	118	9.4
High school	224	17.8
University	115	9.1
Unknown	1	0.1
Economic status, US$		
No income	745	59.2
< 100	297	23.6
100-200	165	13.1
200-300	33	2.6
300-400	12	1.0
> 400	6	0.5
Total	1259	100.0

[a]*Literate, but no official schooling; only home schooling at the level of reading and writing.*

Discussion

Our findings suggest that the SF-36 has acceptable reliability, test–retest correlations and factor validity (polychoric correlation). The aim of this research was to study

Table 2 Rotated loading matrix: polychoric correlation, principle component extraction, varimax rotation after dropping items 1, 2, 8, 12, 26, 29, 30, 31 and 35

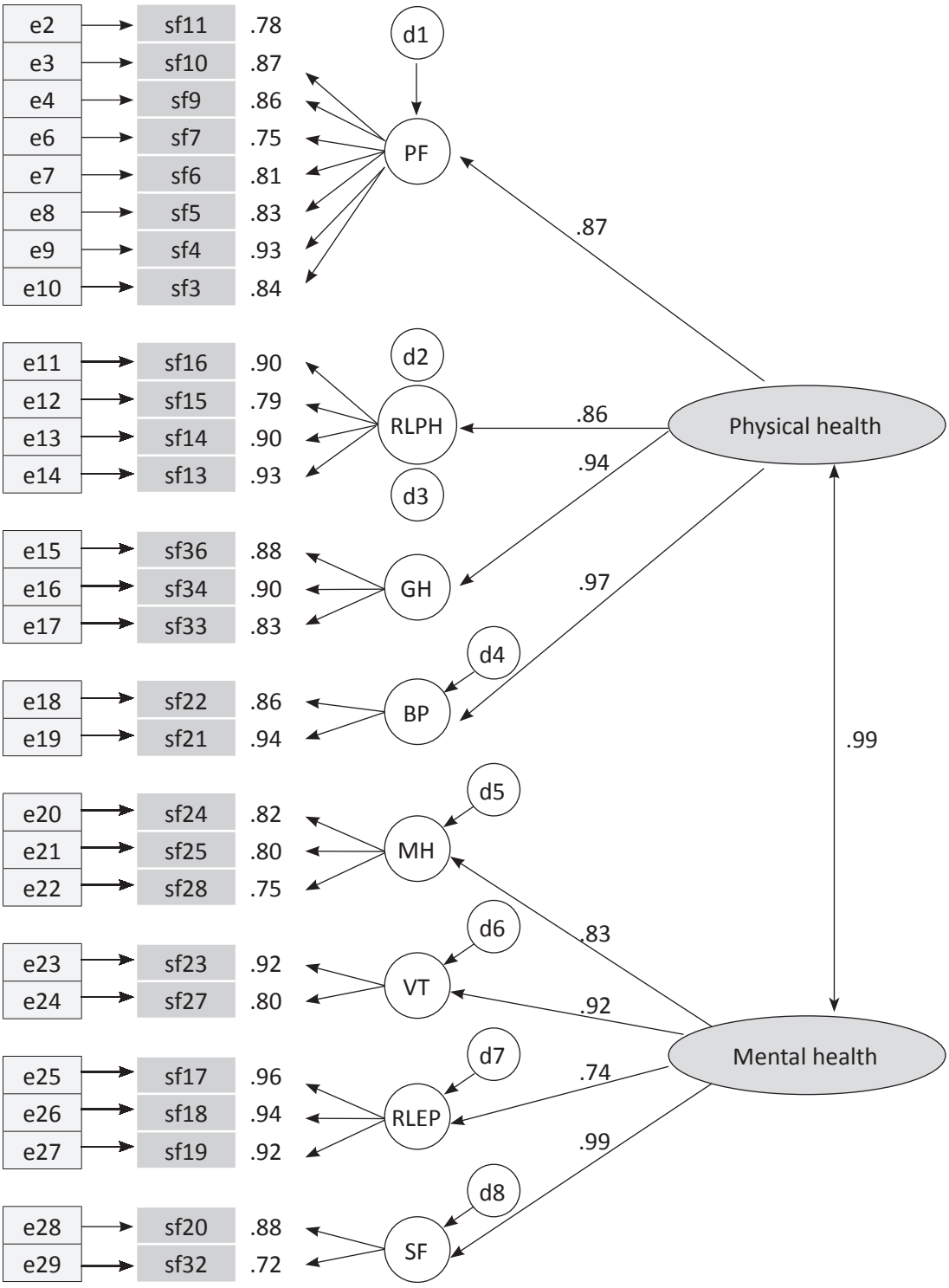
	Sorted rotated factor loadings							
	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8
Physical functioning (PF)								
(SF-10) Walking medium	0.847	0.148	0.211	-0.145	0.178	0.211	0.024	0.077
(SF- 4) Vigorous activity	0.844	0.140	0.144	-0.217	0.229	0.146	-0.169	0.101
(SF-5) Lifting or carrying	0.835	0.149	0.124	-0.269	0.136	0.179	-0.006	0.171
(SF-9) Walking short	0.829	0.127	0.205	-0.115	0.269	0.165	-0.178	0.126
(SF-3) Moderate activity	0.801	0.104	0.151	-0.105	0.302	0.135	-0.323	0.119
(SF-11) Walk along distance	0.785	0.167	0.171	-0.291	0.131	0.236	0.240	0.033
(SF-6) Climb flight stairs	0.783	0.130	0.089	-0.328	0.010	0.269	0.100	0.183
(SF-7) Climb several flights	0.774	0.159	0.145	-0.312	0.029	0.247	0.288	0.145
Role limitation due to emotional problems (RLEP)								
(SF-18) Less done like	0.168	0.840	0.219	-0.264	0.071	0.237	-0.139	0.176
(SF-19) Not carefully	0.209	0.817	0.158	-0.081	0.254	0.286	0.257	0.028
(SF-17) Cut down work	0.227	0.802	0.258	-0.293	0.028	0.262	-0.112	0.064
Mental health (MH)								
(SF-28) Down hearted	0.164	0.124	0.786	-0.119	0.127	0.145	0.016	0.053
(SF-25) Unhappy	0.220	0.148	0.762	-0.157	0.144	0.100	0.119	0.218
(SF-24) Nervous	0.167	0.234	0.711	-0.248	0.172	0.011	-0.173	0.055
Social functioning (SF)								
(SF 20) Interfere social	0.281	0.221	0.200	-0.761	0.232	0.183	0.014	0.052
(SF 32) Time limit	0.188	0.216	0.178	-0.703	0.222	0.077	-0.058	0.216
Bodily pain (BP)								
(SF-22) Interfere	0.330	0.126	0.166	-0.793	0.178	0.230	0.048	0.045
(SF-21) Body pain	0.350	0.149	0.181	-0.742	0.245	0.266	-0.051	0.094
General health (GH)								
(SF-36) Excellent health	0.343	0.123	0.261	-0.325	0.711	0.168	-0.047	0.123
(SF-34) Healthy as others	0.329	0.141	0.242	-0.314	0.688	0.179	-0.076	0.255
(SF-33) Get sick easier	0.230	0.128	0.197	-0.382	0.662	0.230	0.098	0.164
Role limitation due to physical health (RLPH)								
(SF-15) Limited in activity	0.244	0.213	0.098	-0.148	0.218	0.815	0.167	0.084
(SF-16) Difficulty performing	0.375	0.255	0.100	-0.172	0.210	0.776	0.082	0.035
(SF-14) Accomplished less	0.314	0.316	0.112	-0.301	0.089	0.689	-0.347	0.197
(SF-13) Cut down on time	0.356	0.299	0.168	-0.386	0.037	0.676	-0.263	0.107
Vitality (VT)								
(SF-23) Full of life	0.355	0.285	0.369	-0.260	0.250	0.127	-0.065	0.541
(SF-27) Loss of energy	0.352	0.107	0.222	-0.179	0.297	0.169	0.007	0.753

the validity and reliability of the SF-36 Persian-Dari version in Herat City, Afghanistan. This was the first study to assess the SF-36 in an Afghani sample.

Regarding validity, polychoric correlation and varimax rotation were performed to construct 8 subscales. All items in the PF, RLPH, SF, RLEP and BP were loaded on their own subscales. The several items in the MH, GH and VT subscales were loaded on the different subscales. The items that measure people's feelings and energy can vary by understanding of social and psychological health in the different cultural communities. Two items in the PF dimension, bending/kneeling and bathing/dressing, were dropped because of their low value of standardized estimates in CFA. The last version of SF 36 which had 27 items was analysed again for explanatory factor analysis. The reason for deleting the items was cultural differences, as in other studies (*16*,*18*,*20*,*22*,*23*).

Regarding the internal consistency and test–retest results, Cronbach's α in our study was 0.753–0.933, which is higher than 0.70 as an admitted level for internal consistency, and test–retest results showed a good level of 0.68–0.90. Our results were similar to those of previous studies.

Figure 1 Confirmatory factor analyses for SF-36 scale



PF: Physical functioning, RLPH: Role limitation due to physical health, GH: General health perception, BP: Bodily pain, MH: Perceived mental health, VT: Vitality, RLEP: Role limitation due to emotional problems, SF: Social functioning
ei: Measurement error of observed variable
Arrows (←): Standardized regression weights
Arrow (↔): Covariance between physical and mental health

Emotional well-being should be under the mental health dimension of SF, but it was correlated with the physical dimension in our study. However, the other subscales generally fitted into the original hypothesized association. Li et al. showed that VT and RLEP were loaded to the physical health subscale instead of emotional scales in the explanatory factor analyses (*23*). Fukuhara et al. (*22*) found that VT and RLEP were obtained under the physical health dimension and Montazari et al. (*21*) also found VT under physical health. Thumboo

Table 3 Internal-consistency reliability and test–retest reliability and interscale correlations

Scale	Correlation of between test and retest (n = 259)	PF	RLPH	RLEP	VT	MH	SF	BP	GH	Cronbach's α
PF	0.905*	1.0								0.933
RLPH	0.714*	0.58*	1.0							0.849
RLEP	0.682*	0.41*	0.55*	1.0						0.854
VT	0.815*	0.61*	0.51*	0.46*	1.0					0.758
MH	0.783*	0.48*	0.38*	0.44*	0.61*	1.0				0.767
SF	0.753*	0.51*	0.51*	0.48*	0.57*	0.50*	1.0			0.753
BP	0.762*	0.58*	0.58*	0.45*	0.55*	0.46*	0.78*	1.0		0.864
GH	0.864*	0.59*	0.52*	0.43*	0.66*	0.56*	0.65*	0.66*	1.0	0.871

Dropped items: 1, 2, 8, 12, 26, 29, 30, 31 and 35.
**P < 0.001.*
BP = bodily pain; GH = general health; MH = perceived mental health; PF = physical functioning; RLEP = role limitation due to emotional problems; RLPH = role limitation due to physical health; SF = social functioning; VT = vitality.

et al. studied English and Chinese versions of SF-36 in a multiethnic urban population in Singapore and found small differences between the 2 versions (24). This result supports the suggestion that emotional dimensions may be affected by the perception of people from different cultural backgrounds.

The strength of the study was that the provisional version of the questionnaire was provided after careful review and cultural adaptation. In general, there were no difficulties in translating response categories, except that bowling and playing golf were changed to light sporting activities, mile was been changed to kilometre, and walking or several blocks was changed to walking one or several alleys to refer to a similar distance in the Persian language. The provisional forward translated questionnaire was pilot tested and administered to a sample of 50 healthy individuals in all age groups within the inclusion criteria.-

The study had some limitations. The Persian version of SF-36 was administered to a random sample of healthy individuals aged ≥ 18 years living in Herat City; therefore, this study only represented people living in Herat and speaking Dari, not for all regions in Afghanistan. SF-36 needs to be translated into Pashto and the other languages spoken in the country, and validity and reliability studies need to be conducted in different regions of the country. There is not any other QOL scale in Persian in the country; therefore, the validity test could not be conducted using direct statistical comparison, such as invariance analysis and differential item functioning. After developing new scales to measure QOL in Afghanistan, the validity test can be repeated to conduct comparisons in the different regions of the country.

In conclusion, the study has shown that SF-36 in Dari language is suitable to evaluate QOL of adults in Herat Province, Afghanistan.

Table 4 Correlations between 8 scales in SF-36 and rotated principal components

Scale	Hypothesised association		Rotated principal components (Varimax)	
	Physical	Mental	Physical	Mental
Physical functioning	*	*	0.647	0.364
Role limitation due to physical health	*	+	0.416	0.717
Role limitation due to emotional problems	-	+	0.208	0.871
Vitality	+	-	0.863	0.170
Mental health	*	*	0.593	0.335
Social functioning	+	*	0.733	0.358
Bodily pain	+	*	0.740	0.370
General health	+	-	0.888	0.192

*+ strong association (r ≥ 0.70); *moderate association (0.30<r<0.70); - weak association (r≤0.30).*
Dropped items: 1, 2, 8,12, 26, 29, 30, 31 and 35.

Table 5 Results of reliability and validity studies of SF-36

Author	Country	Publication year	Population	Cronbach's α	Other analysis	Refs
Failde and Ramos	Spain	2000	185 patients hospitalized with suspected ischemic cardiopathy	0,72-0,94		11
Wagner et al.	Tanzania	1999	3802 adults	Overall 0.81, 0.70-0.92		14
Apolone and Mosconi	Italy	1998	2031 adults	0.77-0.93	Test-retest reliability >0.70	15
Frempong-Ainguah and Hill	Ghana	2014	2814 women, aged ≥ 20 years in urban Ghana	Overall 0.82, 0.69-0.94		16
Jenkinson et al.	United Kingdom	1999	8889 adults	0.80-0.92		17
Scott et al.	New Zealand	1999	11 921 households and 7862 adults, aged ≥ 15 years	0.78-0.93		18
Koçyigit et al.	Turkey	1999	50 healthy individuals and 50 patients with back pain	0.7324-0.7612		19
Zhang Y et al.	China	2012	1358 3rd and 4th medical school students	Overall 0.791 Social functions (0.631)	Test-retest reliability 0.59-0.86	20
Montazeri et al.	Iran	2005	4163 healthy individuals, aged ≥ 15 years	0.77-0.90 except VT (0.65)	Convergent validity 0.58-0.95	21
Fukuhara et al.	Japan	1998	588 adults	0.71-0.86	Test-retest 0.78-0.93	22
Li et al.	China	2003	1000 households in 18 communities	0.72-0.88 except SF (0.39) and VT scale (0.39)	Test-retest reliability coefficients 0.66-0.94	23
Thumboo et al.	Singapore	2013	4917 participants Aged ≥ 21 years 4115 participants for English version 802 participants for Chinese version	Exceeded 0.70 for all English and Chinese versions (except social functioning (0.68) in Chinese version		24
Sabbah et al.	Lebanon	2000	347 households, aged 14–86 years	Exceeded 0.70	Comparable to the scales in the USA and France	25

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Enquête de santé abrégée (SF-36) : traduction et étude de validation en Afghanistan

Résumé

Contexte : La qualité de vie est définie comme la perception subjective du propre bien-être d'une personne dans un contexte socioculturel. Le questionnaire SF-36 (Enquête de santé abrégée) est couramment utilisé pour vérifier l'état de santé de la population générale dans de nombreux pays

Objectifs : Valider la version en langue persane (dari) du SF-36 à Herat.

Méthodes : La version en langue persane (dari) du SF-36 a été adaptée en tenant compte de la culture. Au total, 1259 personnes en bonne santé âgées de 18 ans ou plus ont participé à l'étude entre novembre 2016 et avril 2017. La validité structurelle du SF-36 a été évaluée à l'aide de l'analyse factorielle exploratoire. L'extraction a été effectuée par analyse en composantes principales à partir de la matrice de corrélation polychorique estimée par une méthode en deux étapes avec rotation varimax. La cohérence interne et la fidélité test-retest ont été évaluées par la méthode de l'alpha de Cronbach. Les logiciels SPSS (version 23.0) et R (version 3.1.3) ont été utilisés pour l'analyse.

Résultats : La dernière version du SF-36 comprenant 27 items assortis à huit facteurs expliquait 86,48 % des variations. La valeur de Kaiser-Meyer-Olkin était de 0,391 et le test de Bartlett a montré une signification statistique ($p < 0,001$). L'analyse factorielle confirmatoire a révélé que le modèle final présentait de bonnes statistiques d'ajustement ($p < 0,001$), une erreur quadratique moyenne d'approximation de 0,056, un indice de qualité de l'ajustement de 0,963 et un indice ajusté de la qualité de l'ajustement de 0,953. Le coefficient alpha de Cronbach pour les huit sous-échelles était de 0,753-0,933. Toutes les sous-échelles du SF-36 présentaient une bonne fidélité de cohérence interne et une bonne fidélité test-retest.

Conclusions : Nous avons démontré que notre version en langue dari du SF-36 est adaptée pour évaluer la qualité de vie des adultes dans la ville de Herat. Cette échelle sera utile aux chercheurs en santé à l'avenir.

المسح الصحي القصير المُكوَّن من ٣٦ بنداً: دراسة حول ترجمة المسح والتحقق من دقة النسخة المُترجَمة في أفغانستان

نثار احمد شایان، أوموت آرسلان، عبدالملک هوشمند، محمد زبیر ارشد، هلال اوزجیبی

الخلاصة

الخلفية: إن قياس جودة الحياة مهم لتقييم احتياجات الرعاية الصحية وتأثير الخدمات الصحية. هناك حاجة لقياس جودة الحياة في أفغانستان.

الأهداف: هدفت هذه الدراسة إلى التحقق من دقة النسخة الفارسية (لغة الداري) من المسح الصحي القصير المُكوَّن من 36 بنداً في مدينة هيرات.

طرق البحث: كُيِّفَت النسخة الفارسية (لغة الداري) من المسح الصحي القصير المُكوَّن من 36 بنداً من الناحية الثقافية. وبلغ مجموع الأصحاء الذين شاركوا في الدراسة 1259 فرداً وكانت أعمارهم 18 عاماً فما فوق، وذلك في الفترة بين نوفمبر/ تشرين الثاني 2016 وأبريل/ نيسان 2017. وقُيمت صلاحية الإنشاء في النسخة الفارسية من المسح الصحي القصير المُكوَّن من 36 بنداً من خلال التحليل العاملي الاستكشافي. وتمت عملية الاستخراج بتحليل المكونات الرئيسية من مصفوفة الترابط المتعددة التي قُدِّرت باستخدام طريقة تدوير فاريماكس المكوَّنة من خطوتين. كما قُيم الاتساق الداخلي وموثوقية طريقة الاختبار وإعادة الاختبار باستخدام معامل كرونباخ ألفا. واستُخدم في هذا التحليل الإصدار 23.0 من برنامج SPSS، والإصدار 3.1.3 من برنامج R.

النتائج: بلغ إجمالي نسبة الأميين من المشاركين 46٪ من الذكور، و39.6٪ من الإناث. وأوضحت النسخة الأخيرة من المسح الصحي القصير المُكوَّن من 36 بنداً، ومنها 27 بنداً في 8 عوامل، نسبة التباين التي بلغت 86.48٪. وبلغت قيمة اختبار كايزر–ماير–أولكن 0.391، وأظهر اختبار بارتليت الأهمية الإحصائية ($P < 0.001$). وبيّن التحليل العاملي التوكيدي أن النموذج الأخير كان يمثل إحصاءات موائمة جيدة ($P < 0.001$)، وكان متوسط الجذر التربيعي للخطأ بالتقريب = 0.056، وبلغ مؤشر جودة الملاءمة = 0.963، ومؤشر جودة الملاءمة المُصحَح = 0.953.

وبلغ معامل كرونباخ ألفا للأبعاد الفرعية الثمانية 0.753–0.933. وأظهرت جميع المقاييس الفرعية للمسح الصحي القصير المُكوَّن من 36 بنداً موثوقية الاتساق الداخلي الجيد وموثوقية طريقة الاختبار وإعادة الاختبار الجيدة.

الاستنتاجات: لقد بيَّنّا أن نسخة لغة الداري من المسح الصحي القصير المُكوَّن من 36 بنداً ملائمة لتقييم جودة الحياة في مدينة هرات. وسيكون المقياس مفيداً للباحثين في مجال الصحة في المستقبل.

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Pattern of infants' feeding and weaning in Suez Governorate, Egypt: an exploratory study

Laila Kamel,[1] Hend Sabry,[1] Marwa Ismail[1] and Ghada Nasr[1]

[1]Department of Public Health and Community Medicine, Faculty of Medicine, Cairo University, Cairo, Egypt (Correspondence to: Laila Mahmoud Kamel; hendalysabry@yahoo.com).

Abstract

Background: Breastfeeding and proper weaning contribute to achievement of the Sustainable Development Goals. In Egypt, by age 4–5 months, only 13% of infants are exclusively breastfed. A survey conducted in Egyptian hospitals concluded that many of the 10 steps to support successful breastfeeding were not executed correctly and other steps were not executed at all.

Aims: To explore the patterns of feeding and weaning among infants in Egypt, and identify their determinants, to improve practice and promote children's nutritional status.

Methods: A cross-sectional analytical study of 333 mother–infant pairs attending two primary healthcare (PHC) centres for vaccination sessions between April 2017 and June 2018. Mothers were interviewed using a structured questionnaire.

Results: Almost all infants were born in hospitals. Exclusive breastfeeding was not widely practiced. Prelacteal feeding was a common malpractice. The majority of mothers initiated artificial feeding during the first month of life. Rural mothers tended to introduce different foods earlier than urban mothers did. Minimum dietary diversity was achieved by 50.9% of urban infants aged ≥ 6 months (≥ 4 food groups), compared with 25.9% of rural infants. Minimum recommended meal frequency for age was fulfilled for 51.9% of urban and 29.6% of rural infants. More than 85% of mothers expressed their need for additional knowledge, and more than half identified the PHC centre as the appropriate source for information.

Conclusions: Our study reflects deficiency in maternal practice regarding breastfeeding and weaning, despite being regular visitors to the PHC centre.

Keywords: breast feeding, complementary feeding, exclusive breastfeeding, Egypt, weaning

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Introduction

Early childhood health and nutrition form the foundation for the well-being of the future generation. Breastfeeding and proper weaning contribute to the achievement of the Sustainable Development Goals (SDGs); they improve nutrition (SDG2), decrease child mortality (SDG3), support cognitive development and education (SDG4), and decrease the future risk of development of noncommunicable diseases (SDG3). Breastfeeding also provides an economic benefit to the family and country, thus contributing to SDG1. It also lowers healthcare costs, improves education and increases productivity (*1*).

Despite knowing the benefits of breastfeeding, only 40% of children younger than 6 months are exclusively breastfed (*2*). The Global Breastfeeding Scorecard found that only 23 countries have > 60% exclusive breastfeeding for 6 months (*3*). Globally, only 45% of newborn infants initiate breastfeeding within the first hour of birth and about 75% of children continue breastfeeding till 12–15 months (*4*). The Egyptian Demographic Health Survey (EDHS), 2014 showed that 96% of infants are ever breastfed; however, exclusive breastfeeding is little practiced. By age 4–5 months, only 13% of infants are exclusively breastfed (*5*). A 2015 survey conducted in 33 Egyptian hospitals concluded that many of the 10 steps for promotion of breastfeeding in baby-friendly hospitals were not executed correctly and other steps were not executed at all (*6*).

Introducing nutritionally adequate complementary (solid) foods at age 6 months, together with continued breastfeeding is essential for optimal child growth (*7*). The World Health Organization (WHO) recommends that, for healthy growth, infants must receive at least 4 food groups each day from 7 essential food groups (*8*).

The objectives of this study were to explore the patterns of feeding and weaning among infants in Egypt, and to identify their determinants, to improve practice and promote children's nutritional status.

Methods

This was a cross-sectional analytical study conducted over a period of 15 months, from April 2017 to June 2018. The study included 333 mother–infant pairs attending vaccination sessions at 2 primary healthcare (PHC) centres in Suez Governorate, Egypt [El-Tawffikia PHC (urban centre) and Qariat-Amer PHC (rural centre)].

The sample size was calculated using Epi-info version 7.2.2.6 software with under 5 stunting prevalence of 21% (5) and a margin of error/precision (d) no more than 0.05. The total required sample size was calculated to be 256 from both PHC centres, and each cluster size equalled 128. Finally, the study was actually conducted on a sample of 333 mother–infant pairs.

Eligible mothers were interviewed using a structured questionnaire (attached as Supplementary Material) that included sociodemographic data for mothers and children, which was adapted from the Fahmi and El-Sherbini Sociodemographic Score (*9*). Feeding practices included: breastfeeding (child receiving breast milk); artificial feeding (child feeding on a breast-milk substitute); complementary feeding (child receiving both breast milk and solid/semisolid or soft foods); weaning (introduction of complementary feeding) pattern; and 24-hour dietary recall; which were adapted from the WHO/United Nations Children's Fund (UNICEF) tool (*8*). Answers were coded prior to data collection to facilitate data entry. Validation was through use of pretested questionnaires and by experts' opinions. Pilot testing was done on 20 infants (not included in the worked upon sample) to check clarity of the used questions, and to estimate the average time needed for each mother to answer the questions.

Precoded data were entered into SPSS version 24 to be cleaned and analysed. Quantitative variables were summarized using mean, median and standard deviation. Qualitative variables were summarized using frequency and percentage. Comparison between groups was performed using the c^2 test for qualitative variables and independent sample *t* test and Mann–Whitney test for quantitative variables. A z test for 2 proportions was used for indicators. $P < 0.05$ was considered statistically significant.

Mothers were informed about the nature of the study and asked to participate. The data collection was anonymous and all responses were confidential. Oral consent was sought from the participants before the study. Participation in the study was optional and not required for accessing other services. The study was approved by the Research Ethics Committee of the Department of Public Health, Faculty of Medicine, Cairo University (s-4-2017).

Results

The study included infants aged 2–23 months attending for vaccination. Age and sex distribution did not differ significantly between the PHC centres.

All parents were literate in urban areas. In rural areas, 12 (6.6%) of fathers and 17 (9.4%) of mothers were illiterate. All fathers were working, except 2 in rural areas. More of the urban mothers were working: 26 (17.2%) urban versus 12 (6.6%) rural. Family size tended to be smaller in urban areas; 82 (45.1%) families had ≥ 5 members in rural areas compared with 51 (33.8%) in urban areas. In general, urban families had a higher socioeconomic level. All these differences were significant.

Sixty-nine (20%) infants were within a short birth spacing period after the last pregnancy (< 2 years) in both urban and rural areas. Child loss was significantly more frequently reported in rural than in urban areas (9.3% vs 2.6%). All infants were born in hospitals except for 5 infants in rural areas who were born at home.

Table 1 describes breastfeeding practices among urban and rural mothers. Most infants were ever breastfed. Exclusive breastfeeding was not widely practiced. Among 92 infants aged < 6 months, only 17 (18.5%) were exclusively breastfed: 11 (24.4%) in urban areas and 6 (12.8%) in rural areas. Prelacteal feeding was a common malpractice, with a higher frequency among mothers

Table 1 Breastfeeding pattern among studied infants attending urban and rural primary health care centres in Suez

Breastfeeding pattern	Urban (151)		Rural (182)		Total (333)	
	No.	(%)	No.	(%)	No.	(%)
Ever breast feeding	146	96.7	182	100	324	97.3
Initiation of breast feeding:	146	100	178	100	324	100
Within 1 hour	71	48.6	84	47.2	155	47.8
2–24 hours	62	42.5	70	39.2	132	40.7
From day 2	13	7.9	24	13.6	37	11.5
Prelacteal feeding	92	63.0	129	72.5	221	68.2
Duration of exclusive breastfeeding:						
< 1 month	59	40.4	72	40.5	131	40.4
≥ 1 month	87	59.6	106	59.5	193	59.6
Exclusive breastfeeding among infants aged < 6 months	45	100	47	100	92	100
Infants 0–5 months of age who are receiving breast milk only	11	24.4	6	12.8	17	18.5

in rural areas. The commonest cause of never receiving breast milk was maternal illness in rural areas (50%), compared with breast problems (40%) and infant illness (40%) in urban areas. In general, there were no significant differences in breastfeeding practices between mothers in urban and rural areas, although urban residents were slightly better.

Artificial milk was fed to more than 40% of infants in urban and rural areas (Table 2). The majority of mothers (72.5%) initiated artificial feeding during the first month of life. There were no significant differences between urban and rural mothers in artificial feeding practices. The most important reasons for introducing artificial feeding were: infant not gaining weight (23.5%), twin baby (23.5%), insufficient breast milk (22.1%) and infant illness (17.4%). Out of the 149 infants receiving artificial feeding, 31 obtained it from the PHC centre only, 94 from the pharmacy, and the remainder from either source. A bottle was used for artificial feeding or other fluids of 89 (58.9%) urban and 120 (65.9%) rural infants, with no significant difference.

The first foods to be introduced to infants were milk products, vegetables, fruit, potatoes and bread at a median age of 6 months (Table 3). In general, rural mothers tended to introduce different foods earlier than urban mothers. Except for milk, milk products and beans there was no significant difference between urban and rural areas. For fish and potatoes, the difference was marginally significant between urban and rural areas.

Based on 24-hour recall, 54 (50.9%) urban infants aged ≥ 6 months achieved minimum dietary diversity (≥ 4 food groups), compared with 35 (25.9%) rural infants; the difference was significant. Among non-breastfed infants, 21 (71.9%) urban and 20 (62.9%) rural infants received ≥ 2 milk feeds on the previous day but the difference was not significant. Minimum recommended meal frequency for infants aged ≥ 6 months was fulfilled for 55 (51.9%) urban and 40 (29.6%) rural infants, and the difference was significant.

More than 85% of mothers (285 in both centres) expressed their need for additional knowledge, and > 50% (178 in both centres) identified the PHC centre as the appropriate source for information. Social media and the Internet were the preferred sources of information for 48 (31.8%) urban mothers and 26 (14.3%) rural mothers. Only 107 (32.1%) mothers knew the right meaning of exclusive breastfeeding, and 161 (48.3%) defined weaning correctly. Infant age 6 months was mentioned as appropriate for introducing food by 292 (87.7%) mothers: 152 (92.7%) urban and 152 (83.5%) rural ($P \leq 0.05$). Almost 90% (298 mothers) said that infant age 2 years was suitable for termination of breastfeeding. Three quarters of mothers (n = 247) would not stop breastfeeding during their infant's illness. In general, urban mothers' knowledge was slightly better. More urban than rural mothers knew the correct meaning of exclusive breastfeeding [57 (37.7%) urban vs 50 (27.5%) rural] and weaning [76 (50.3%) urban vs 85 (46.7%) rural]; suitable age to introduce food [140 (92.7%) urban vs 152 (83.5%) rural]; not to introduce cow's milk before the first year [125 (82.8%) urban vs 141 (77.5%) rural]; and not to stop breastfeeding in illness [115 (76.2%) urban vs 132 (72.6%) rural].

Table 2 Artificial milk feeding among studied infants attending urban and rural primary health care centres in Suez

Artificial feeding pattern	Urban (151)		Rural (182)		Total (333)	
	No.	(%)	No.	(%)	No.	(%)
Ever artificial feeding	68	45.1	81	44.5	149	44.7
Age of starting:	68	100	81	100	149	100
< 1 month	50	73.4	58	71.6	108	72.5
1–2 months	6	8.8	12	14.8	18	12.1
≥ 2 months	12	17.8	11	27.2	23	15.4
Reasons for artificial feeding:						
Infant not gaining weight	15	22.1	20	24.7	35	23.5
Twin baby	15	22.1	20	24.7	35	23.5
Insufficient maternal milk	15	22.1	18	22.2	33	22.1
Infant illness	13	19.1	13	16.1	26	17.4
Mother's illness	4	5.8	5	6.2	9	6.0
Baby refused to breastfeed	4	5.8	4	4.9	8	5.4
Mother going work	2	3.0	1	1.2	3	2.1
Source for artificial feeding:						
Primary health centre	13	19.1	18	22.2	31	20.8
Pharmacy	48	70.6	46	56.8	94	63.1
Primary health centre and pharmacy	7	10.3	17	21.0	24	16.1

Table 3 **Age of introduction of different foods to studied infants attending urban and rural primary health care centres in Suez**

Food introduced	Urban n = 151				Rural n = 182				P*
	Received No	%	Median	Range Min–Max	Received No	%	Median	Range Min-Max	
Milk & milk products									
Milk	64	42.4	12.0	4–21	71	39.0	9.0	3–16	0.019
Milk products	97	64.2	6.0	2–18	132	72.5	6.0	2–12	0.001
Animal food:									
Meat	80	53.0	9.0	5–15	98	53.4	9.0	6–15	0.122
Fish	80	53.0	9.0	5–17	89	48.9	9.0	6–12	0.055
Liver	74	49.0	8.5	3–16	74	49.0	8.0	5–15	0.262
Eggs	91	60.3	8.0	4- 14	91	60.2	7.0	3–12	0.064
Beans	75	49.7	8.0	4–15	110	60.4	7.0	4–12	0.026
Vegetables &Fruits	102	67.5	6.0	3–12	131	72.0	6.0	3–12	0.533
Potato	101	66.9	6.0	4–13	129	70.9	9.0	2–10	0.055
Bread	106	70.2	6.0	2–13	137	75.3	6.0	2–10	0.848

* *Mann–Whitney test.*

Discussion

Early feeding pattern forms the foundation of health throughout the lifespan of the individual, and breastfeeding is the cornerstone. In our study, ever breastfeeding was practiced by 97.3% of mothers; slightly more in rural areas. Nearly the same pattern was reported by EDHS 2014 (5), where ever breastfeeding was practiced by 95.7% of mothers. The difference may be related to sampling differences.

Early initiation greatly affects the whole period of breastfeeding (10). It is associated with improved newborn survival and lowers hospital-acquired infection through colostrum (11). With > 1 hour delay in initiation of breastfeeding, mothers are more likely to stop breastfeeding early (12). In our study, early initiation was practiced by 47.8% of mothers, and was slightly better in urban areas (48.6% vs 47.2% in rural areas). In Minya District, a community-based study was conducted on 307 rural mothers whose youngest child was aged ≤ 2 years, and 83.7% initiated breastfeeding within the first hour (13). This may have been due to the better communication and health education given in the Maternal and Child Health Centre under study. EDHS 2008 (14) reported 55.9% and EDHS 2014 (5) reported a much lower figure of 27.1%. All urban deliveries and all except 5 rural deliveries were in hospital, which imposes a great responsibility on the hospital to support early initiation of breastfeeding as one of the 10 steps of baby-friendly hospitals (15).

Prelacteal feeding shortens the duration of any breastfeeding and exclusive breastfeeding, as well as carrying a risk of infection (4). Prelacteal feeding seems to be on the rise. EDHS 2008 (14) reported 46.6%, EDHS 2014 (5) reported 61.2%, and in the present study it was 68.2% (63.0% in urban and 72.5% in rural areas). In Minya, the situation was better; the prevalence of prelacteal feeding among the rural population was 42.7% (13). The Population and Family Health Survey conducted in Jordan in 2012 reported a similar prevalence as in our study (16). High rates of prelacteal feeding are usually due to the traditional misconception that the colostrum volume is small. Unfortunately, some of the healthcare providers in our study had the same misconcept; all urban and all except 5 rural mothers had hospital deliveries, and their infants received prelacteal feeding. Some misconceptions about colostrum are related to its colour; some people think it is dirty, or the milk has "gone bad" after being in the breast too long. In fact colostrum perfectly matches newborn's stomach capacity and is rich in antibodies and nutrients (4).

Breast milk is the only requirement in the first 6 months of life. It supplies the infant with necessary nutrients and protects against infection. Despite its importance, exclusive breastfeeding is decreasing over time. EDHS 2008 (14) reported 53.2% of infants aged 0–5 months were exclusively breastfed but the prevalence decreased to 39.7% in EDHS 2014 (5). In the Minya study, the prevalence was 32.2% (13). In a study done among attendees of outpatient paediatric clinics in Cairo the prevalence was 49.7% (17). The present study revealed that, among infants aged 0–5 months, only 18.5% were exclusively breastfed (24.4% among urban and 12.8% among rural infants). Our findings are disappointing; contrary to the studies done in the community or outpatient clinics, mother–infant pairs were recruited from attendees of PHC centres that should have provided them with health education about proper breastfeeding. In the present study, more than 85% of mothers expressed their need for additional knowledge, and only a third knew the right meaning of exclusive breastfeeding.

Ever use of artificial feeding was reported in 44.7% of mothers; almost three quarters of them started in the first month, and 85% within the first 2 months. EDHS 2014 (5) reported that 12.5% of infants aged 0–5 months received artificial milk. In Jordan, the prevalence of artificial feeding was almost the same as in our study (45%) (16). The Egyptian Ministry of Health dispenses artificial

milk free of charge to infants in the first 6 months who really need it; however, 63.1% buy it from the pharmacy. The availability of low-price milk substitutes encourages mothers toward inappropriate introduction of artificial milk. The widespread introduction of artificial milk was greatly affected by the Egyptian national code for the marketing of breastmilk substitutes, which was released in 1994 but was never enforced (*18*).

A bottle was used for artificial feeding or other fluids by 58.9% of urban and 65.9% of rural mothers, with no significant difference between the groups. EDHS 2014 (*5*) reported around 3 in 10 children aged < 6 months were being bottle fed.

The first foods to be introduced to infants were vegetables, fruits, potatoes, milk products and bread at a median age of 6 months. Six months as the appropriate age of introducing food was mentioned by 87.7% of mothers (92.7% urban and 83.5% rural). However, in practice, rural mothers tended to introduce different foods earlier than urban mothers did. Except for milk and milk products, there was no significant difference between urban and rural areas. Almost all infants (94.1%) in our study received solid, semisolid or soft foods at age 6–8 months, which is higher than the national figure of 71% reported in EDHS 2014 (*5*). This can be explained by the higher socioeconomic level of the studied community where mothers do not rely on the prolonged duration of exclusive breastfeeding without adding complementary foods as an additional source of nutrients (*19–21*). A similar result was reported in Jordan in 2012 (91%) (*16*).

Four food groups are considered as the minimum acceptable diversity in feeding for infants and young children (*8*). In our study, 37% of infants were given foods of appropriate diversity, which is higher than in a study conducted in Nigeria 2016 that concluded that 31% of infants had achieved the minimum diversity score (*22*), but is still lower than the EDHS 2014 report of 43% (*5*).

We found that 39.4% of infants achieved minimum meal frequency per day. This is close to the results reported by the study in Nigeria that concluded that 36% of infants had achieved the minimum recommended meal frequency (*22*) but is still lower than the EDHS 2014 report of 60% (*5*).

Mothers' knowledge is expected to reflect practice. More than 85% of mothers expressed their need for additional knowledge, and more than half identified the PHC centre as the appropriate source for information.

Conclusion

Our study reflects deficiency in maternal practice despite being regular visitors to the PHC centre for vaccination, and their identification of the centre as the appropriate source for them to receive health education. Both this and lack of early initiation of breast feeding in hospitals represent lost opportunities for maternal health education and support. This imposes a great responsibility on PHC centres to improve their role in health promotion and education through the critical 1000 days of life extending from pregnancy to the first 2 years of life.

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Profil de l'alimentation et du sevrage des nourrissons dans le gouvernorat de Suez (Égypte) : une étude exploratoire

Résumé

Contexte : L'allaitement au sein et un sevrage approprié contribuent à la réalisation des Objectifs de développement durable. En Égypte, à l'âge de 4 à 5 mois, seuls 13 % des nourrissons sont exclusivement allaités au sein. Selon les résultats d'une enquête menée dans des hôpitaux égyptiens, les dix mesures visant à favoriser un allaitement au sein réussi n'étaient pas suivies correctement, voire pas appliquées du tout.

Objectifs : Étudier le profil de l'alimentation et du sevrage des nourrissons en Égypte et identifier ses déterminants afin de faire progresser les pratiques et de promouvoir l'état nutritionnel des enfants.

Méthodes : Une étude transversale analytique portant sur 333 couples mère-enfant fréquentant deux centres de soins de santé primaires (SSP) pour des séances de vaccination a été menée entre avril 2017 et juin 2018. Les mères ont été interrogées au moyen d'un questionnaire structuré.

Résultats : Presque tous les nourrissons étaient nés dans des hôpitaux. L'allaitement exclusif au sein n'était pas largement pratiqué. L'introduction d'aliments avant l'allaitement au sein était une faute courante. La majorité des mères avaient commencé l'alimentation artificielle au cours du premier mois de vie. Les mères vivant en zone rurale avaient tendance à introduire différents aliments plus tôt que les mères vivant en zone urbaine. Le niveau minimal de diversité alimentaire avait été atteint par 50,9 % des nourrissons vivant en zone urbaine âgés de six mois ou plus (quatre groupes d'aliments ou plus), contre 25,9 % des nourrissons vivant en zone rurale. La fréquence minimale recommandée des repas en fonction de l'âge était respectée pour 51,9 % des nourrissons vivant en zone urbaine et 29,6 % des nourrissons vivant en zone rurale. Plus de 85 % des mères ont exprimé le besoin d'acquérir davantage de connaissances et plus de la moitié ont reconnu que le centre de soins de santé primaires était la source d'information appropriée.

Conclusions : Notre étude reflète les carences des pratiques adoptées par les mères en matière d'allaitement au sein et de sevrage, malgré la fréquentation régulière d'un centre de soins de santé primaires.

نمط تغذية الرضَّع وفِطامهم في محافظة السويس، مصر: دراسة استكشافية

ليلى كامل، هند صبري، مروة إسماعيل، غادة نصر

الخلاصة

الخلفية: تساهم الرضاعة الطبيعية وفِطام الرضَّع في الوقت المناسب في تحقيق أهداف التنمية المستدامة. وفي مصر، تبلغ نسبة الرضع الذين تتراوح أعمارهم بين 4–5 أشهر وتقتصر تغذيتهم على الرضاعة الطبيعية 13٪ فقط. وخلُص مسحٌ أجري في المستشفيات المصرية إلى أن الكثير من الخطوات العشرة اللازمة لدعم الرضاعة الطبيعية الناجحة لم تُنفَّذ على نحو صحيح، وخطوات أخرى لم تُنفذ على الإطلاق.

الأهداف: هدفت هذه الدراسة إلى استكشاف أنماط التغذية والفطام بين الرضع في مصر، والوقوف على مُحدِّدات ذلك لتحسين الممارسة، وتعزيز الوضع التغذوي للأطفال.

طرق البحث: أُجريت دراسة تحليلية مقطعية شملت 333 زوجاً من الأمهات – الرضع الذين يأتون إلى اثنين من مراكز الرعاية الصحية الأولية من أجل دورات التطعيم في الفترة بين أبريل/ نيسان 2017 حتى يونيو/ حزيران 2018. وأُجريت مقابلات مع الأمهات باستخدام استبيان مُنسَّق.

النتائج: وُلد جميع الرضع تقريباً في مستشفيات. ولم يكن الاقتصار على الرضاعة الطبيعية مُطبَّقاً على نطاق واسع. كما كانت التغذية السابقة لظهور الأسنان اللبنية من ضمن الممارسات الخاطئة الشائعة، حيث بدأت غالبية الأمهات في التغذية الصناعية خلال الشهر الأول من عمر أطفالهن. وتميل الأمهات إلى تقديم أغذية مختلفة إلى أطفالهن قبل الأوان في المناطق الريفية بنسبة أعلى من الأمهات في المناطق الحضرية. وقد تحقق الحد الأدنى من التنوع الغذائي لدى 50.9٪ من الرضع بالمناطق الحضرية الذين كانت أعمارهم 6 أشهر أو أكثر (> 4 مجموعات غذائية) مقارنة بحوالي 25.9٪ في الرضع بالمناطق الريفية. وتحقق الحد الأدنى الموصَى به لوتيرة تقديم الوجبات حسب العمر في 51.9٪ من الرضع بالمناطق الحضرية مقارنةً بحوالي 29.6٪ من الرضع بالمناطق الريفية. وقد عبرت أكثر من 85٪ من الأمهات عن حاجتهن إلى اكتساب مزيدٍ من المعارف في هذا الشأن. ووَفقاً لأكثر من نصف الأمهات، فإن مركز الرعاية الصحية الأولية يُعتبر المصدر المناسب للحصول على المعلومات.

الاستنتاجات: تعكس هذه الدراسة قصوراً في ممارسات الأمهات في ما يتعلق بالرضاعة الطبيعية والفطام، وذلك على الرغم من زيارتهن لمركز الرعاية الصحية الأولية بانتظام.

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Prevalence of ABO and Rh blood groups and their association with demographic and anthropometric factors in an Iranian population: Mashad study

Mohammad Andalibi,[1,2] Zahra Dehnavi,[1*] Asma Afshari,[1*] Maryam Tayefi,[3] Habibolah Esmaeili,[4] Mahmoud Azarpazhooh,[5] Mohsen Mouhebati,[2] Mohsen Nematy,[1] Alireza Heidari-Bakavoli,[2] Maryam Shokri,[1] Gordon Ferns,[6] Majid Ghayour-Mobarhan[2,3] and Mohammad Tayyebi[2]

[1]Department of Nutrition; [2]Cardiovascular Research Center, Student Research Committee; [3]Department of Modern Sciences and Technologies; [4]Department of Biostatistics and Epidemiology, School of Health, Management and Social Determinants of Health Research Center, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Islamic Republic of Iran (Correspondence to: Majid Ghayour-Mobarhan; Mohammad Tayyebi: Andalibims891@mums.ac.ir). [5]Department of Clinical Neurological Science, University Hospital, London Health Science Center, University of Western Ontario, London, Canada. [6]Brighton and Sussex Medical School, Division of Medical Education, Falmer, Brighton, United Kingdom.

Abstract

Background: Blood groups appear to be markers for various human diseases and their distribution among different communities, ethnic groups and geographical boundaries varies over time.

Aims: We aimed to investigate the frequency of ABO and Rh blood groups and their relationship with demographic and anthropometric characteristics among Iranian residents in Mashad

Methods: ABO and Rh blood groups were determined among 7268 participants from the MASHAD cohort study and their relationships with demographic and anthropometric parameters were evaluated. This part of the study was done in January 2017. Student *t*-test, ANOVA, Bonferroni' and Chi-squared were used for comparison of quantitative and qualitative variables.

Results: The most common blood group was O (33.8%); AB was the least common (8.3%). The prevalence of Rh-positive and Rh-negative was 88.2% and 11.8% respectively. There were statistically significant associations between ABO blood groups and demi-span ($P = 0.03$), even after correction for multiple comparisons.

Conclusion: Our findings showed there was no relationship between ABO blood groups and demographic characteristics although there was an association with anthropometric measurements such as demi-span.

Keywords: ABO blood group, Rh blood group, anthropometric parameters, Iran

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Introduction

The ABO and Rhesus (Rh) blood group systems are the most important among the 36 identified systems (*1,2*). In the early 20th century, 3 types of blood groups A, B and C (later re-named O) were known and later the fourth group, AB, was discovered (*3*). The ABO blood group antigens (A, B, and H) are determined by carbohydrate molecules that are ordinarily considered as red blood cell antigens. They are also expressed on other human tissues such as vascular endothelium and epithelium, sensory neurons and platelets (*4*). The second most important blood group system is Rh, which was discovered in 1941 and includes only 2 phenotypes, Rh-positive and Rh-negative (*5,6*).

Many studies have investigated the prevalence of ABO and Rh blood groups in different populations and ethnic groups. These studies have been undertaken for several reasons: their importance in blood transfusion and organ transplantation, their application in genetic research, forensic pathology and anthropology and studying the ancestral relationships of human (*6,7*). Blood group prevalence studies are also important in the management of blood product resources in the community as well as the assessment of different disorders related to blood groups, such as the risk of venous thromboembolism syndrome, blood coagulation and coronary artery disease (*8*).

Although the ABO blood group antigens are constant throughout life, the distribution of blood groups among different communities, ethnic groups and geographical boundaries do vary over time (*5,9*), even within the same region (*10*). The ABO blood groups appear to be markers for various human diseases, including cardiovascular, neoplastic and infectious conditions (*11*). It has also been suggested that they are associated with certain personality characteristics (*12,13*).

Hence, knowing the distribution of ABO and Rh blood groups within communities is important and helpful for safe blood transfusion and health care programmes (*14*). Several studies have reported the frequency of blood groups among Iranian people but till now only one has

been carried out among people living in the north-eastern region of the Islamic Republic of Iran (*15*).

We aimed to determine the prevalence of blood groups and whether there was any relationship with demographic, socioeconomic and anthropometric characteristics among a representative sample population living in Mashhad, the capital of Khorasan-e Razavi province in the northeast of the country.

Methods

Participants

The study population comprised participants in the Mashad Cohort Study who were Iranian residents of Mashhad. This cohort was originally recruited in 2010 and will continue to be followed up until 2020 (*16*). Participants were selected using a stratified cluster random sampling technique. There were 3 strata from 3 regions in Mashhad including Mashhad health centres No. 1, 2 and 3. Each stratum was divided into 9 areas centred on Mashhad health care centre divisions (clusters). Families with members aged 35–65 years were identified. We excluded those with a history of stroke or peripheral and cardiovascular disease. Of the participants recruited into this cohort study, blood group was determined for 7268 of them.

All participants gave written informed consent prior to participation in this study, which was approved by the ethics committee of Mashhad University of Medical Sciences.

Data collection

This part of the study was carried out in January 2017Demographic and lifestyle characteristics, including age, sex, number of family members residing at the same location, educational attainment, job status and smoking habit, were collected via a questionnaire. Anthropometric parameters such as body mass index (BMI), demi-span (half the distance between their hands outstretched to either side in cm), and waist and hip circumference were measured and recorded by a certified health care professional and a skilled nurse. Body weight was measured using a clinical scale to the nearest 0.5 kg. Height was also measured without shoes to the nearest cm and BMI was calculated as weight (kg)/height^2 (m).

Waist circumference was measured halfway between the lower border of the ribs and the iliac crest in a horizontal plane. Hip circumference was measured at the widest point over the buttocks with a flexible tape (*17*). Demi-span was also measured in triplicate, using a flexible tape. For quality control and reliability, we used preset tolerance limits, 0.2 kg for weight, and 0.5 cm for arm circumference.

Fasting blood samples were taken from the antecubital vein and transferred immediately to a tube containing EDTA (*6*).

Determination of blood group

The ABO and Rh blood groups were determined using the antigen-antibody agglutination test. The antisera were obtained from the plasma of each blood sample; 3 drops were taken, designated A, B and Rh, then the relevant antiserum (A, B and D) was added. The ABO blood groups were assessed based on agglutination using ABO monoclonal reagents (Lorne, UK) and for determination of Rh blood group Lo-Du1 and Lo-Du2 monoclonal reagents (Lorne, UK) (*18*).

Statistical analysis

All statistical analyses were performed using *SPSS*, version 16. Descriptive statistics were used to define baseline characteristics. Independent sample *t*-test, analysis of variance (ANOVA) and post hoc tests (Bonferroni) were used for comparison of quantitative variables in Rh and blood groups and the chi-squared test was used for comparing the distribution of qualitative variables in Rh and blood groups. A *P*-value of < 0.05 was considered statistically significant.

Results

This study included 2882 males (39.6%) and 4386 females (60.3%) with a mean age of 48.1 [standard deviation (SD) 8.2] years. Among the 7268 participants, the most common blood group was O (n = 2457, 33.7%) and the least common was AB (n = 599, 8.2%) (Table 1). The frequencies for Rh-positive and Rh-negative were 88.2% and 11.8% respectively.

A statistically significant difference was observed in the distribution of blood groups between the sexes (P = 0.02) (Table 2). There was no statistically significant relationship between ABO blood groups and number of family members (P = 0.59) or educational attainment among individuals with different blood groups (P = 0.07) (Table 2).

Among our participants, 64.8% were unemployed or retired, 35.0% were employed and 0.1% were students; there was no statistically significant association between ABO blood group and job status (P = 0.23) (Table 2). We also observed no significant association between ABO blood group and smoking habit (P = 0.52).

Table 1 Distribution of blood groups, Mashad, 2017

Blood group	Males, n = 2882		Females, n = 4386		Total, n = 7268	
	No.	%	No.	%	No.	%
A	869	30.2	1327	30.3	2196	30.2
B	822	28.6	1194	27.2	2016	27.7
AB	204	7.1	395	9.0	599	8.3
O	987	34.2	1470	33.5	2457	33.8
Rh+	2543	88.2	3870	88.2	6413	88.2
Rh–	339	11.8	516	11.8	855	11.8

Table 2 Association between ABO blood groups and demographic and socioeconomic characteristics, Mashad, 2017

Characteristic	Blood group							*P*-value[a]	*P*-value[b]
	A	B	AB	O	Total	Rh+	Rh−		
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)		
Sex									
Male	869 (39.6)	822 (40.8)	204 (34.1)	987 (40.2)	2882 (39.7)	2543 (39.6)	339 (39.6)	0.02	0.99
Female	1327 (60.4)	1194 (59.2)	395 (65.9)	1470 (59.8)	4386 (60.3)	3870 (60.4)	516 (60.4)		
Education									
Illiterate	326 (14.9)	280 (13.9)	81 (13.7)	326 (13.3)	1013 (14.0)	897 (14.0)	116 (13.7)	0.07	0.73
Elementary	910 (41.7)	796 (39.6)	250 (42.2)	1043 (42.6)	2999 (41.5)	2667 (41.8)	333 (39.3)		
Diploma	738 (33.8)	703 (35.1)	204 (34.4)	790 (32.2)	2435 (33.7)	2128 (36.1)	306 (33.3)		
Bachelor degree	184 (8.4)	205 (10.2)	53 (8.9)	254 (10.3)	696 (9.6)	373 (5.8)	53 (6.2)		
Masters/PhD	20 (0.9)	22 (1.1)	5 (0.9)	34 (1.3)	81 (1.1)	72 (1.1)	9 (1.0)		
Religious education	4 (0.2)	2 (0.1)	0 (0.0)	3 (0.1)	9 (0.1)	9 (0.1)	0 (0.0)		
Job status									
Student	4 (0.2)	2 (0.1)	0 (0.0)	0 (0.0)	6 (0.1)	4 (0.1)	2 (0.2)	0.23	0.15
Employed	770 (35.1)	725 (36.0)	206 (34.4)	860 (35.1)	2561 (35.3)	2257 (35.2)	303 (35.5)		
Unemployed	1208 (55.1)	1072 (53.2)	344 (57.5)	1364 (55.6)	3988 (55.0)	3535 (55.2)	454 (53.2)		
Retired	210 (9.6)	215 (10.7)	48 (6.8)	229 (9.3)	702 (9.7)	607 (9.5)	95 (11.1)		
Be current smoker	500 (22.8)	446 (22.1)	132 (22.1)	516 (21.0)	702 (9.7)	1409 (22.0)	186 (21.8)	0.52	0.87
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**		
No. of family members	4.5 (1.5)	4.4 (1.5)	4.5 (1.5)	4.5 (2.5)	4.5 (1.9)	4.5 (1.9)	4.4 (1.5)	0.59	0.12

Independent samples t-test and ANOVA were used for comparing demographic characteristics between Rh groups and ABO blood groups, respectively.
SD = standard deviation.
P-value[a]: difference in anthropometric parameters between ABO blood groups; P-value[b]: difference in anthropometric parameters between Rh groups.

Table 3 **Association between ABO blood groups and anthropometric parameters, Mashad, 2017**

Parameter	A Mean (SD)	B Mean (SD)	AB Mean (SD)	O Mean (SD)	Total Mean (SD)	Rh+ Mean (SD)	Rh– Mean (SD)	P-value[a]	P-value[b]
BMI*	27.9 (4.8)	27.7 (4.6)	28.0 (4.9)	27.8 (4.7)	27.8 (4.7)	27.8 (4.7)	28.0 (4.6)	0.29	0.17
Demi-span (cm)	76.4 (5.3)	76.8 (5.7)	76.2 (5.3)	76.4 (5.5)	76.5 (5.5)	76.5 (5.5)	76.6 (5.3)	0.03	0.42
WC (cm)	95.9 (12.1)	95.2 (12.1)	95.4 (12.2)	95.4 (12.0)	95.5 (12.1)	95.5 (12.1)	95.6 (11.8)	0.26	0.98
HC (cm)	103.9 (9.3)	103.5 (9.2)	103.9 (9.4)	103.5 (9.1)	103.7 (9.2)	103.6 (9.2)	104.1 (9.3)	0.37	0.20

BMI = body mass index; SD = standard deviation; WC = waist circumference; HC = hip circumference.
SD = standard deviation.
P-value[a]: difference in anthropometric parameters between ABO blood groups.
P-value[b]: difference in anthropometric parameters between Rh groups.
**Significant association with B blood group (Bonferroni's test).*

The mean demi-span was significantly higher among participants with blood group B (mean 76.7, SD 5.6) compared with the other participants (P = 0.03). The difference was greatest between blood groups B and O (76.7, SD 5.6 vs 76.3, SD 5.5) (P = 0.014), followed by AB (P = 0.025) and A (P = 0.032). There was no statistically significant difference between ABO blood groups and BMI (P = 0.3), waist circumference (P = 0.3) or hip circumference (P = 0.4) (Table 3).

Discussion

The ABO system comprises 4 groups, A, B, AB and O, determined genetically by 3 allelic genes located on chromosome 9 (*19*). The distribution of blood groups varies regionally and ethnically and there have been a number of studies on the distribution of ABO and Rh blood groups in different geographical, ethnic and socioeconomic groups (*18*,*20*).

Our findings in a population sample from Mashhad showed that blood group O had the highest frequency (33.7%) and the frequency of A, B, and AB blood groups was 30.2%, 27.7%, and 8.2% respectively. In 2 studies carried out in Pakistan and India, the most common blood group was B, followed by O, A, and AB (*6*,*18*). In a study conducted in Saudi Arabia, the most prevalent blood group was O, followed by A, B, and AB (*7*), comparable with our findings. In a population-based study from China, the most prevalent blood group was A, followed by O, B and AB, and the frequency of ABO and Rh blood groups was significantly different among the ethnic groups in that study (*21*). In contrast, O was the most frequent blood group among our population. Data from British and American populations indicate that blood group O is the most common, followed by A, B, and AB, which is in agreement with our study (*22*). Although these studies observed similar results to our own, other surveys carried out among the Iranian population from different regions and ethnicities showed some variations: the most common blood group was B in a study conducted in Yazd in 2007, and in a study conducted among the Azari population, the most common blood groups were A and O (*1*,*23*). These differences may reflect a difference in population genetics or migration at different times from different areas of the country.

In our study, the frequency of A and AB in females was greater than in males, while, the prevalence of B and O was higher in males, indicating a possible difference of ethnic mix in the surveyed population. It should be noted that all of our study population were Iranian as self-declared, and this may be considered a limitation of this study; the ethnicity of the population should be more precisely determined.

In a 2004 study conducted among the population of Mashhad, the frequencies of O, A, B and AB blood groups in 867 individuals were recorded as 34.7%, 33.1%, 23.3% and 8.9%, respectively, similar to our findings, however in that study there were no important differences in the frequency of ABO blood groups based on sex (*15*). The

smaller sample size (867 against 7268 in the current study) might have led to this difference.

The results of this and previous studies also showed that AB was the least prevalent blood group, indicating that the gene segregation for the ABO system follows a similar a distribution pattern in various ethnic groups, with certain exceptions (*10*). In accordance with the different distribution of ABO blood groups, transfusion centres should consider different strategies for providing and storing blood products for the ongoing needs in the population. Moreover, different distributions of disorders which are associated with blood group would be expected in the community.

For the Rh system, the distribution pattern in different regions of the world and in the Islamic Republic of Iran is similar (*20*). In 1982, Porfathollah et al. reported that the Rh-positive and Rh-negative distribution was 89.62% and 10.38% respectively among the Iranian population (*24*). The frequency of Rh-positive in other parts of the world was also higher than the Rh-negative blood group as observed in the current study (*6,7,20*). The Rh blood system distribution has remained constant over time.

Our findings showed no significant associations between demographic and socioeconomic factors and blood group; we also observed no significant relationship between the ABO blood groups and anthropometric parameters such as BMI, waist circumference and hip circumference. An exception was the significant association between demi-span and blood group ($P = 0.03$): the prevalence was higher for group B in comparison with the other blood groups. Sirajuddin et al. observed a significant correlation between anthropometric factors and certain genetic factors such as ABO blood groups and the Rhesus antigen in an Indian population; however, they did not mention the anthropometric factors precisely (*25*). The results of a 2012 Iranian study showed that mean weight and BMI were significantly higher in those with blood group A compared with other blood groups, but mean height was not significantly different (*26*). In comparison, in our study, blood group AB individuals had slightly higher BMI values; a 1985 American study reported that B individuals were taller than non-B individuals (*27*).

Conclusion

In addition to the various distributions of the blood groups in different regions, blood group appears to be associated with anthropometric measures. Further longitudinal and multicentre studies are required to investigate the exact pattern and related factors of blood groups.

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Competing interests: None declared.

Prévalence des groupes sanguins ABO et Rh et leur association avec des facteurs démographiques et anthropométriques dans une tranche de la population iranienne : l'étude de MASHAD

Résumé

Contexte : Les groupes sanguins semblent être des marqueurs de diverses maladies humaines. Leur répartition entre les différents groupes ethniques, communautés et frontières géographiques varie avec le temps.

Objectifs : Notre objectif était d'étudier la fréquence des groupes sanguins ABO et Rh et leur relation avec les caractéristiques démographiques et anthropométriques chez les habitants iraniens de Mashad

Méthodes : Les groupes sanguins ABO et Rh ont été déterminés chez les 7268 participants de l'étude de cohorte de MASHAD et leurs relations avec les paramètres démographiques et anthropométriques ont été évaluées. Cette partie de l'étude a été réalisée en janvier 2017. Le *t*-test de Student, l'analyse de la variance, l'ajustement de Bonferroni et le Chi carré ont été utilisés pour comparer les variables quantitatives et qualitatives.

Résultats : Le groupe sanguin le plus répandu était O (33,8 %) ; AB était le moins répandu (8,3 %). La prévalence du rhésus positif et du rhésus négatif était de 88,2 % et 11,8 % respectivement. Il existe des associations statistiquement significatives entre les groupes sanguins ABO et la demi-envergure des bras (p = 0,03), même après correction pour les comparaisons multiples.

Conclusion : Les résultats de notre étude ont montré qu'il n'y avait pas de lien entre les groupes sanguins ABO et les caractéristiques démographiques; par contre, il existe une association avec des mesures anthropométriques telles que la demi-envergure des bras.

انتشار فصائل الدم ABO و Rh وارتباطها بالعوامل السكانية والقياسات الأنثروبومترية لدى الإيرانيين: دراسة مشهد

محمد الأندلبي، زهرة دهنوي، أسماء أفشاري، مريم طيفي، حبيب الله إسماعيلي، محمود ازاربازوح، محسن محباتي، محسن نماتي، علي رضا حيدري باكافولي، مريم شكري، جوردن فيرنس، ماجد غيور مبارهان، محمد طيبي

الخلاصة

الخلفية: يبدو أن فصائل الدم علامات لأمراض بشرية مختلفة، ويختلف توزيعها بين المجتمعات المختلفة والمجموعات العرقية والحدود الجغرافية بمرور الوقت.

الأهداف: هدفت هذه الدراسة إلى استقصاء تواتر فصائل الدم ABO و Rh وعلاقتها بالخصائص السكانية والقياسات الأنثروبومترية بين السكان الإيرانيين في مدينة مشهد.

طرق البحث: حددت فصائل الدم ABO و Rh بين 7268 مشاركًا في الدراسة الأترابية (مشهد) وجرى تقييم لعلاقة فصائل الدم بالمتثابتات السكانية والقياسات الأنثروبومترية. وقد أجري هذا الجزء من الدراسة في يناير/ كانون الثاني 2017. واستخدمت الاختبار الإحصائي t– للطالب، واختبار أنوفا، واختبار بونفيروني، واختبار مربع كاي لمقارنة المتغيرات الكمية والنوعية.

النتائج: أكثر فصائل الدم شيوعًا كانت فصيلة O بنسبة 33.8٪. وكانت فصيلة AB هي الأقل شيوعًا (8.3٪). بلغ انتشار فصيلة Rh الإيجابية والسلبية 88.2٪ و 11.8٪ على التوالي. وكانت هناك ارتباطات ذات دلالة إحصائية بين فصائل الدم ABO وقياس الباع النصفي (P= 0.03) بعد التصويب لمقارنات متعددة.

الاستنتاج: أظهرت النتائج التي توصلنا إليها أنه لا توجد علاقة بين فصائل الدم ABO والخصائص السكانية على الرغم من وجود ارتباط مع القياسات الأنثروبومترية مثل قياس الباع النصفي.

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Prevalence, awareness, treatment and control of hypertension among adults in Kenya: cross-sectional national population-based survey

Supa Pengpid[1,2] and Karl Peltzer[3,4]

[1]ASEAN Institute for Health Development, Mahidol University, Salaya, Phutthamonthon, Nakhonpathom, Thailand. [2]Department of Research and Innovation, University of Limpopo, Turfloop, South Africa. [3]Department for Management of Science and Technology Development, Ton Duc Thang University, Ho Chi Minh City, Vietnam. [4]Faculty of Pharmacy, Ton Duc Thang University, Ho Chi Minh City, Vietnam (Correspondence to: K. Peltzer: karl.peltzer@tdt.edu.vn).

Abstract

Background: Hypertension is a major and fast-growing public health problem in Africa.

Aims: To determine the prevalence of hypertension and assess the levels of awareness, treatment and control in Kenya.

Methods: A national cross-sectional study based on stratified cluster random sampling was conducted in 2015. The total sample included 4500 individuals aged 18–69 years, (60.0% female; median age 38.0 years, interquartile range 29–52 years) from Kenya. We used the World Health Organization STEPS method: Step 1, questionnaire interview; Step 2, anthropometric and blood pressure (BP) measurements; and Step 3, biochemical tests. Logistic regression was used to investigate the determinants of hypertension (systolic/diastolic) BP ≥ 140/90 mm Hg or use of antihypertensive medication), and awareness, treatment and control.

Results: Overall, 28.6% of the population had hypertension, 29.2% among men and 27.9% among women, 17.7% among individuals 18–29 years and 58.3% among those aged 60–69 years. Among hypertensives, 29.4% were aware, 6.5% were currently using antihypertensive medication, and 12.5% had controlled their BP (< 140/90 mmHg). In the fully adjusted model, older age, higher education, overweight and obesity, past month binge drinking, and type 2 diabetes were positively associated with hypertension. In addition, underweight was negatively associated with hypertension.

Conclusions: There was a high prevalence of hypertension among adults in Kenya, with low awareness, treatment and control rates. Public health response is needed in the form of integrated and comprehensive action targeting major noncommunicable diseases in the country.

Keywords: hypertension, awareness, treatment, control, Kenya

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Introduction

Globally, hypertension is a major cause of morbidity and mortality, with a prevalence of hypertension of 31.1% in 2010 (1). There has been an increase in the prevalence of hypertension in Africa, from 19.7% in 1990 to 30.8% in 2010 (2). In sub-Saharan Africa, between 2000 and 2013, the predicted prevalence of hypertension at mean ages of 30, 40, 50 and 60 years was 16%, 26%, 35% and 44% (3).

Previous studies have shown that awareness and control of hypertension are low. From 2000 to 2010, awareness (58.2% vs 67.0%), treatment (44.5% vs 55.6%) and control (17.9% vs 28.4%) increased substantially in high-income countries, whereas awareness (32.3% vs 37.9%) and treatment (24.9% vs 29.0%) increased less, and control (8.4% vs 7.7%) even decreased in low- and middle-income countries (1). In 2010, the pooled awareness rate (expressed as percentage of hypertensive cases) was 33.7% in Africa (2), while another review in sub-Saharan Africa found a pooled awareness rate of 27% (3). In the same review, 18% of individuals with hypertension were receiving treatment, and only 7% had controlled blood pressure (BP) (3).

In Kibera, a slum area in Nairobi, Kenya, the age-standardized prevalence of hypertension was 22.8%, and 20% were aware of their hypertensive status (4). In adults aged ≥ 35 years (mean age 46.7 years), the age-standardized prevalence of hypertension was 29.4 %, and 39.0% were unaware they had hypertension (5). Kenya is experiencing an epidemiological transition that has contributed to an increase in prevalence of risk factors for hypertension, such as change in dietary pattern and sedentary lifestyle (4,5). There is a lack of national data on the prevalence and risk factors for hypertension in Kenya, and such data is needed for control strategies.

Hypertension is a preventable condition and is associated with unhealthy lifestyle, including tobacco smoking, lack of physical activity, and alcohol consumption (6). Various risk factors have been found to be linked with hypertension, including sociodemographics (older age, female or male gender, lower education level, and lower household income)

(7–14), urban residence (9,13) and other risk factors, including body weight status, health risk behaviour, and psychosocial stress and support. Higher body mass index (BMI) is positively (7,9–11,15) and underweight negatively (15) associated with hypertension. Other metabolic risk factors for hypertension include diabetes (10,16). Various dietary behaviours, including insufficient fruit and vegetable intake (17), consumption of fatty foods (18), and salt intake (19), increase the odds of developing hypertension. Several studies have found an association between physical inactivity (15), smoking (20), problem or habitual drinking (7), and hypertension. The aim of this study was to assess the prevalence of hypertension and the levels of awareness, treatment and control in Kenya.

Methods

Data, study design and participants

A multistage cluster sampling method was used to select adults aged 18–69 years for the Kenya STEPS Survey (April–June 2015) (21). A 3-stage cluster sample design was adopted for the survey, involving selection of clusters, households and eligible individuals. In the first stage, 200 clusters (100 urban and 100 rural) were selected from 1 subsample of National Sample Surveys and Evaluation Programme master sample frame. A uniform sample of 30 households from the listed households in each cluster was selected in the second stage of sampling. The last stage of sampling was done using personal digital assistants (PDAs) at the time of survey, where one individual was randomly selected from all eligible listed household members using a programmed Kish method of sampling (26). The total sample included 4500 individuals aged 18–69 years, (60.0% female; median age 38.0 years, interquartile range 29–52 years) from Kenya. The response rate for Step 1 (questionnaire) was 95%, Step 2 (physical measurements) 99% and Step 3 (biochemical measurements) 93% (21). The Kenya Ministry of Health Ethics Committee approved the study protocol and participants provided written informed consent prior to the study.

Measures

The World Health Organization (WHO) STEPS method included 3 steps: Step 1, questionnaire interview; Step 2, anthropometric and BP measurements; and Step 3, biochemical tests (22). Physical activity level was calculated from the duration of moderate and vigorous physical activities (at work, transport and recreation) in a typical day and week. Physical activity levels were classified into low, moderate and high, as per WHO Global Physical Activity Questionnaire (GPAQ) (23). The GPAQ has been validated for crosscultural use (24). Current tobacco use was measured with 2 questions: "Do you currently smoke any tobacco products, such as cigarettes, hand-rolled, cigars, water pipes/shisha or pipes/kiko?" and "Do you currently use any smokeless tobacco products such as snuff, chewing tobacco, kuber pan?" (Yes, No) (25). Past month binge drinking was assessed by asking participants how many times they had ³ 6 standard alcoholic drinks in a single drinking session during the past 30 days (21). Dietary behaviour was assessed with the following questions. (1) "Consumption of soft drinks (like Fanta, coca cola, 7-up, Aya, Softa, Vimto or other sugary drinks?" Responses: number of days in a week and number of servings in 1 day; classified into consumption of soft drinks 6 or 7 days a week or < 6 days a week. (2) "Consumption of processed food high in sugar (biscuits, wafers, cakes, candy, sweets and chocolate?" Responses ranged from 1, always (every meal) to 5, never, and were classified into consumption daily or with every meal, and less than daily or never. (3) "Adding sugar to your beverages?" Responses ranged from 1, always (every drink) to 5, never, and were classified into every day or every drink, and less than every day or every drink. (4) "How often do you add salt or a salty sauce such as soya sauce to your food?" Responses ranged from 1, always (every meal) to 5, never, and were classified into every or most meals and sometimes, rarely or never. (5) "Use spices other than salt when cooking?"(Yes or No). (6) Daily fruit and vegetables intake was calculated from the number of servings of FAV consumed per day in a typical week. Inadequate fruit and vegetable consumption was defined as < 5 servings per day.

BMI was classified as underweight (< 18.5 kg/m²), normal weight (18.5–24.9 kg/m²), overweight (25.0–29.9 kg/m²) and obesity (≥ 30 kg/m²) (35). BP was measured 3 times using automated BP measurement (OMRON) (21). For the 3 measurements of systolic BP (SBP) and diastolic BP (DBP), average BP was calculated. Raised BP was defined as SBP ≥ 140 mmHg and/or DBP ≥ 90 mmHg, a self-reported diagnosis of hypertension, or current use of antihypertensive medication (26). Awareness of hypertension included "ever been told by a doctor or other health worker that you have raised blood pressure or hypertension" (21) among the population classified as having hypertension. Treatment of hypertension included "having taken any drugs (medication) for raised blood pressure prescribed by a doctor or other health worker in the past two weeks" (21). Control of hypertension was classified as an average SBP < 140 mmHg and DBP < 90 mmHg among hypertensives. A point-of-care instrument (CardiocheckPA analyser; PTS Diagnostics) was used for blood glucose measurement (21). Diabetes was defined as fasting plasma glucose ³ 7.0 mmol/l (126 mg/dl); using insulin or oral hypoglycaemic drugs; or having a history of diagnosis of diabetes (27). The highest educational level was grouped into low education (no schooling or incomplete primary school) and high education (completed primary school or higher) (21). Household wealth index quintiles, created from a list of household variables, were used to determine the economic status of the households surveyed (21).

Data analysis

Post-stratification adjustments were done to align with the population projections according to age–sex categories (21). Descriptive statistics on frequency, weighted prevalence and 95% confidence intervals (CIs) was performed for sociodemographic, health and hypertension

variables. c^2 statistics were used for comparison of proportions across groups. Analysis of variance was used for comparison of means across groups and Wilcoxon rank-sum (Mann–Whitney) tests for comparing medians between groups. Logistic regression was conducted to assess associations between sociodemographic factors, health variables and hypertension. Variables from bivariate analysis with a significance level of $P < 0.20$ were included in the multivariable model. Multivariable logistic regression was performed to estimate associations between sociodemographic factors, health variables, and awareness, treatment and control of hypertension. Global P values were calculated for categorical variables with Wald tests (using the testparm command in Stata). Multicollinearity among variables was checked by calculating their variance inflation factor and none exceeded 2. $P < 0.05$ was considered significant. Missing values (for all variables below 2.5%, except for BMI 4.6% and type 2 diabetes 7.1%) were excluded from the analysis. All analyses were adjusted for the multistage sample design and conducted with Stata software version 13.0 (Stata Corporation, College Station, TX, USA).

Results

Sample characteristics

Overall, 28.6% of the population had hypertension, 29.2% among men and 27.9% among women, 17.7% among individuals aged 18–29 years and 58.3% among those aged 60–69 years (Table 1). Among hypertensives, 29.6% were aware that they had hypertension, which was higher in women (41.2%) than in men (18.2%) ($P < 0.001$). Of the population with hypertension, 6.5% were currently using antihypertensive medication, and 12.5% had controlled their blood pressure (< 140/90 mm Hg). Mean SBP was 4.9 mmHg higher for men than for women ($P < 0.001$), while mean DBP was 0.5 mmHg higher for women than for men ($P = 0.789$). The prevalence of BMI overweight and obesity was higher in women (24.7% and 13.8%, respectively) than in men (13.2% and 4.4%, respectively)

Table 1 Sample characteristics of 4500 adults in the Kenya STEPS Survey, 2015

Variable name (no. of missing data)	Variable specification	Total	Male	Female	*P*
Sample	***n* (%)**	**4500**	**1799 (40.0)**	**2701 (60.0)**	
Median age, yr (0)	Range 18–64, median (IQR)	38.0 (29–52)	39.0 (30–-52)	38.0 (28–52)	0.214
Systolic blood pressure (67)	mmHg, mean (SD)	125.8 (18.1)	128.3 (17.0)	123.4 (18.8)	< 0.001
Diastolic blood pressure (63)	mmHg, mean (SD)	81.4 (11.7)	81.1 (11.8)	81.6 (11.5)	0.789
		***n* (%)**	***n* (%)**	***n* (%)**	
Hypertension (67)		1428 (28.6)	563 (29.2)	865 (27.9)	0.529
Of hypertensives	Aware	475 (29.6)	114 (18.2)	361 (41.2)	< 0.001
Of hypertensives	Treated	115 (6.5)	24 (3.3)	91 (9.6)	< 0.001
Of hypertensives	Controlled	187 (12.5)	38 (5.7)	149 (19.3)	< 0.001
Education (0)	None/less than primary Primary or more	1855 (35.8) 2645 (64.2)	580 (29.8) 1219 (70.2)	1275 (41.5) 1426 (58.5)	< 0.001
Wealth status (0)	Poorest/Second Middle Fourth/Richest	1800 (39.8) 900 (18.4) 1800 (41.9)	663 (36.5) 345 (17.9) 791 (45.6)	1137 (42.9) 555 (18.8) 1009 (38.3)	0.009
Residence (0)	Rural Urban	2306 (51.2) 2194 (48.8)	853 (47.4) 946 (52.6)	1453 (53.8) 1248 (46.2)	0.022
Body weight status and health behaviour					
Body mass index (208)	Normal Underweight Overweight Obese	2432 (60.1) 518 (11.9) 886 (18.9) 447 (9.1)	1165 (68.0) 254 (14.3) 254 (13.2) 87 (4.4)	1267 (52.0) 264 (9.5) 632 (24.7) 360 (13.8)	< 0.001
Add salt or a salty sauce to food (10)	Every/most meals	1084 (23.2)	500 (26.3)	584 (20.3)	0.070
Use spices other than salt when cooking (3)	Yes	886 (25.6)	371 (26.0)	515 (25.3)	0.733
Add sugar to beverages (8)	Always or often	1681 (35.8)	710 (37.9)	971 (33.9)	0.114
Soft drinks (21)	6–7 d/wk	158 (4.0)	80 (4.4)	78 (3.7)	0.466
Fruit and vegetable consumption (21)	<5 servings/d	4147 (80.1)	1651 (78.6)	2496 (81.5)	0.089
Physical activity (107)	Low Moderate High	530 (10.9) 668 (14.4) 3194 (74.7)	147 (9.9) 209 (12.0) 1409 (78.1)	383 (11.8) 459 (16.7) 1786 (71.4)	0.032
Tobacco use (4)	Current	551 (13.4)	433 (23.2)	118 (4.0)	< 0.001
Alcohol use (1)	Past month binge drinking	463 (13.6)	392 (24.9)	71 (2.7)	< 0.001
Type 2 diabetes (319)	Yes	149 (2.7)	48 (2.3)	101 (3.1)	0.149

IQR = interquartile range; SD = standard deviation.

Table 2 **Predictors of hypertension among adults in the Kenya STEPS Survey, 2015 (unweighted *n*=4035)**

Variable	COR (95% CI)[a]	*P*	AOR (95% CI)[b]	*P*
Sociodemographic factors				
Age, yr				
18–29	1 (reference)	< 0.001	1 (reference)	< 0.001
30–44	1.91 (1.40–2.62)		1.61 (1.16–2.24)	
45–59	4.49 (3.33–6.05)		3.77 (2.86–4.98)	
60–69	6.50 (4.81–8.80)		6.45 (4.50–9.23)	
Sex				
Female	1 (reference)			
Male	1.05 (0.85–1.39)	0.635		
Education				
Primary school complete or more	1 (reference)		1 (reference)	
No schooling/primary school incomplete	0.65 (0.56–0.79)	<0.001	0.76 (0.61–0.95)	0.018
Wealth quintile				
Poorest/Second	1 (reference)	0.004	1 (reference)	0.187
Middle	1.43 (1.11–1.85)		1.22 (0.94–1.60)	
Fourth/Richest	1.47 (1.16–1.86)		0.95 (0.72–1.26)	
Residence				
Urban	1 (reference)			
Rural	1.11 (0.88–1.39)	0.370	—	
Body weight status and health behaviour				
Body mass index				
Normal	1 (reference)	< 0.001	1 (reference)	<0.001
Underweight	0.51 (0.37–0.71)		0.52 (0.37–0.72)	
Overweight	1,73 (1.31–2.29)		1.72 (1.28–2.29)	
Obese	2.60 (1.96–3.45)		2.60 (1.95–3.48)	
Salt or salty sauce (every/most meals) (base=sometimes (every week) or rarely or never)	0.96 (0.70–1.30)	0.782	—	
Spices instead of salt when cooking (Yes) (base = no)	0.83 (0.58–1.19)	0.315	—	
Add sugar to beverages (every day/drink) (base = <every day/drink)	0.94 (0.78–1.13)	0.495	—	
Soft drinks (6–7 d/wk) (base= <6–7 d/wk)	0.96 (0.44–2.10)	0.912	—	
Processed food high in sugar (daily, every meal) (base=<daily or never)	1.23 (0.77–1.95)	0.386	—	
Fruit and vegetable consumption (< 5 servings) (base = 5 or more)	0.83 (0.68–1.02)	0.071	0.87 (0.70–1.08)	0.198
Physical activity				
Low	1 (reference)	0.918	—	
Moderate	0.97 (0.63–1.48)			
High	0.86 (0.58–1.34)			
Current tobacco use (base = no)	0.86 (0.65–1.15)		—	
Past month binge drinking (base = no)	1.53 (1,12–2.08)	0.008	1.82 (1.31–2.51)	<0.001
Type 2 diabetes (base = no)	3.57 (2.18–5.83)	<0.001	3.48 (2.10–5.76)	<0.001

[a]*Adjusted for age;* [b]*adjusted for all covariates.*
AOR = adjusted odds ratio; CI = confidence interval; COR = crude odds ratio.

(*P* < 0.001). Current tobacco use and past month binge drinking prevalence were significantly higher in men (23.2% and 24.9%, respectively) than in women (4.0% and 2.7%, respectively) (*P* < 0.001).

Associations between risk factors and hypertension

Table 2 shows associations (odds ratios) between independent variables and the prevalence of hypertension. In the fully adjusted model, older age, higher education, overweight and obesity, past month binge drinking, and type 2 diabetes were positively associated with hypertension. In contrast, being underweight was negatively associated with hypertension.

Factors affecting awareness, treatment and control of hypertension

Only 44.1% of the population sample indicated that they had ever their BP measured by a healthcare worker; this increased from 38.3% among those aged 18–29 years to 54.0% among those aged 60–69 years (*P* < 0.001) (Table 3). Of individuals aware of their hypertension status, only 22.1% indicated that they were currently taking antihypertensive medication; this was 4.4% among those aged 18–29 years and 46.7% among those aged 60–69 years. A few of the participants (2.7%) who were aware of their hypertension status had ever consulted a traditional healer for their hypertension problem, and 1.1% were currently

Table 3 Awareness and treatment pattern for hypertension by age group among 4500 adults in the Kenya STEPS Survey–2015

Total sample	Age groups in years					
	Total	18–29	30–44	45–59	60–69	*P*
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	
Ever blood pressure measured by healthcare worker	2218 (44.1)	658 (38.3)	846 (45.6)	477 (54.9)	237 (54.0)	< 0.001
Ever previously diagnosed with raised blood pressure or hypertension	484 (19.3)	89 (11.9)	143 (16.8)	160 (32.6)	92 (37.0)	< 0.001
Hypertension measured	1241 (25.0)	225 (14.5)	405 (25.6)	378 (45.3)	233 (52.3)	< 0.001
Hypertension measured, diagnosed and/or treated	1428 (28.6)	285 (17.7)	475 (29.2)	413 (49.1)	255 (58.3)	< 0.001
Of hypertensives						
Aware	475 (29.6)	88 (25.8)	139 (25.8)	156 (36.4)	92 (34.4)	0.042
Treated (drugs, medication)	115 (6.5)	7 (1.1)	20 (5.5)	48 (10.1)	40 (14.4)	< 0.001
Controlled	187 (12.5)	60 (18.0)	70 (12.4)	35 (7.6)	22 (10.2)	0.027
Aware of hypertension						
Treated (drugs, medication)	118 (22.1)	7 (4.4)	22 (22.5)	49 (27.6)	40 (46.7)	0.002
Ever traditional healer	18 (2.7)	1 (1.3)	5 (2.4)	8 (2.6)	4 (7.0)	0.228
Currently taking herbal or traditional remedy	12 (1.1)	1 (0.1)	2 (1.2)	6 (0.8)	3 (3.9)	0.033
Of treated						
Controlled	38 (39.2)	5 (34.6)	5 (45.6)	15 (36.1)	13 (38.1)	0.919

taking a herbal or traditional remedy for their hypertension. Among participants who were using antihypertensive medication, overall, 39.2% were controlled; this was the highest among those aged 30–44 years (45.6%).

Associations between risk factors and awareness, treatment and control of hypertension

In logistic regression analysis adjustment for age, sex, education, wealth quintile, residence status and BMI, being obese and having type 2 diabetes were associated with greater awareness and being male with poorer awareness of hypertension (Table 4). The odds for treatment of hypertension were higher among participants who were aged ³ 45 years, women, or underweight or obese. The odds of controlled hypertension decreased with age and were lower among men, while individuals with type 2 diabetes were more likely to have controlled hypertension.

Discussion

In this first nationally representative population-based survey on hypertension in Kenya, we found a high prevalence of hypertension (28.6%), with low awareness, treatment and control of hypertension in adults aged 18–69 years. The prevalence of hypertension is similar to the pooled prevalence of hypertension in Africa (*2*) and the global prevalence (*1*), but higher than the prevalence in individuals in sub-Saharan Africa aged 50–60 years (*3*), and in previous surveys in slum areas in Nairobi, Kenya (*4,5*).

We found that older age was associated with hypertension, which agrees with previous studies (*7–15*). Higher education level and, in bivariate analysis, greater wealth increased the risk of hypertension, whereas, in a previous meta-analysis, lower socioeconomic status (income, education and occupation) was associated with hypertension (*28*). There are, however, studies in Africa showing a positive association between education and hypertension, for example, in Ghana (*29*). It is possible that in some low-income countries, such as Kenya, the epidemiological transition is affecting the better-educated segments of society first before reaching the lower-educated population. Previous studies have found an association between urban residence and hypertension (*9,13,15*), while we did not find such an association. The absence of an urban–rural difference in the prevalence of hypertension in the current study may indicate equalization of the urban–rural divide in noncommunicable diseases and their risk factors, compared to older studies (*30*).

Overweight and obesity increased the odds of having hypertension, which agrees with previous studies (*7–11,15*). Obesity may be correlated independently with hypertension but it is also possible that obesity is mediated through an unhealthy diet and insufficient physical activity (*12*). Other metabolic risk factors for hypertension include diabetes (*9,16*), which was confirmed in the present study.

Consistent with previous studies (*6,7,31*), we found that binge drinking was associated with hypertension. Heavy drinking, especially binge drinking, is linked to higher mortality from cerebral thrombosis, cerebral haemorrhage and coronary artery disease, although the role of alcohol-related hypertension is not well established (*32*). While a number of previous studies (*13,15*) have found an association between low physical activity and hypertension, we did not find such an

Table 4 Adjusted odds ratios for hypertension awareness, treatment and control among hypertensives in the Kenya STEPS Survey, 2015 (unadjusted *n*=1324)

Variable	Hypertension					
	Aware		treated		Controlled (*n* = 1324)	
	AOR (95% CI)1	*P*	AOR (95% CI)a	*P*	AOR (95% CI)a	
Age, yr						
18–29	1 (reference)	< 0.001	1 (reference)	< 0.001	1 (reference)	< 0.001
30–44	0.85 (0.52–1.40)		4.58 (1.00–20.96)		0.57 (0.31–1.05)	
45–59	1.16 (0.74–1.81)		6.52 (1.52–28.01)		0.22 (0.10–0.48)	
60–69	1.28 (0.69–2.35)		13.73 (3.06–61.61)		0.31 (0.15–0.63)	
Sex						
Female	1 (reference)		1 (reference)		1 (reference)	
Male	0.35 (0.23–0.52)	< 0.001	0.37 (0.16. 0.83)	0.017	0.22 (0.12–0.42)	< 0.001
Education						
Primary school complete or more	1 (reference)		1 (reference)		1 (reference)	
No schooling/primary school incomplete	0.98 (0.62–1.54)	0.928	0.82 (0.39–1.72)	0.601	1.41 (0.85–2.35)	0.181
Wealth quintile						
Poorest/Second	1 (reference)	0.180	1 (reference)	0.302	1 (reference)	0.290
Middle	1.17 (0.77–1.80)		1.55 (0.69–3.51)		1.05 (0.59–1.89)	
Fourth/Richest	1.63 (0.97–2.71)		1.46 (0.53–4.03)		1.38 (0.74–2.58)	
Residence						
Urban	1 (reference)		1 (reference)		1 (reference)	
Rural	1.12 (0.71–1.76)	0.635	1.73 (0.92–3.24)	0.089	1.27 (0.70–2.33)	0.428
Body mass index						
Normal	1 (reference)	< 0.016	1 (reference)	0.072	1 (reference)	0.275
Underweight	1.08 (0.53–2.21)		3.76 (1.14–12.41)		2.06 (0.78–5.45)	
Overweight	1.38 (0.91–2.10)		2.00 (0.86–4.65)		1.16 (0.67–2.02)	
Obese	1.94 (1.23–3.05)		2.64 (1.15–6.04)		0.67 (0.31–1.43)	
Type 2 diabetes (base = no)	3.50 (1.41–8.67)	0.007	1.90 (0.80–4.51)	0.146	3.19 (1.51–6.72)	0.002

[a]*Adjusted for all covariates. AOR = adjusted odds ratio.*

association. Unlike previous studies (*17–19*), we did not find an association between hypertension and intake of fruit and vegetables, saturated fat, fast food and salt. It is possible that participants with diagnosed hypertension adopted better lifestyle practices (diet and physical activity) to control BP (*33*). Current tobacco use is a significant risk factor for hypertension (*20*). However, we found no association. It is possible that the impact of current tobacco use on hypertension is delayed, and thus, current tobacco use may not be closely correlated with hypertension (*34*). Gao et al. (*34*) found that number of cigarettes smoked per day was negatively associated with risk of hypertension; however, the increase in life-course-adjusted number of cigarettes smoked per day was associated with higher risk of hypertension.

Of those who had hypertension, only 29.6% were aware, 6.5% were using antihypertensive medication and 12.5% had controlled their BP. Similar low hypertension awareness rates have been found across Africa (*2,3*), in slum areas in Kenya (*4,5*), and in low- and middle-income countries (*1*). The rate of using antihypertensive medication was lower in this study than in some of the previous studies (*1,3*) and the proportion of individuals who had controlled their BP was higher in the present study. The low levels of awareness, treatment and control of hypertension may be have been due to insufficient public health interventions, which have focused on infectious rather than noncommunicable diseases and their risk factors (*7*). The large number of hypertension cases left untreated and uncontrolled increases the risk for comorbidity, such as cardiovascular disorders, stroke and cardiac failure (*35*). Therefore, early identification, early and improved management, and regular follow-up of hypertension are urgently needed (*35*).

The awareness and treatment of hypertension in this study was greater among women than men, as found previously (*13,26*). This is probably related to better health-seeking behaviour among women than men (*34*). We also found that older age or being underweight or obese increased the odds for treatment of hypertension and decreased the odds of control of hypertension. Similar results were found in previous studies (*13,14*). These findings seem to suggest awareness and treatment of hypertension needs to be improved, especially among men and younger population groups. Contrary to a previous study (*34*), we found an association between type 2 diabetes and controlled hypertension, which may have been related to better management of comorbid hypertension and type 2 diabetes.

A strength of the present survey was that it used a sampling design that permitted nationally representative estimates by sex (male and female) and residence (urban and rural areas). Apart from blood chemistry, anthropometric and BP measurements, 1 study limitation was that all the other information assessed in this analysis was based on self-reporting. It is possible that

certain behaviours were over- or under-reported. It is possible that the over-reporting of physical activity led to a nonsignificant association with hypertension. Furthermore, it was a cross-sectional study and causal relationships between risk factors and the development of hypertension could not be established.

Conclusion

We found a high prevalence of hypertension in a representative sample of the general adult population in Kenya. Less than one third of individuals with hypertension were aware of their condition and a minority were treated and controlled. Several risk factors, including sociodemographic variables (older age and completion of primary school), body weight status (obesity), health behaviour (binge drinking), and type 2 diabetes were identified, which can help in guiding intervention programmes. Interventions programmes operating at multiple levels are urgently needed that can increase awareness of hypertension, and access to BP treatment and community-wide health behaviour interventions that have been identified and are known to be effective in reducing high BP. Conducting targeted screening of high-risk groups, such as those with overweight or obesity and with type 2 diabetes, and treatment of all persons (where indicated) attending healthcare facilities is recommended. Interventions aimed at reducing binge drinking, especially among high-risk groups, should be integrated into health services.

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Prévalence, connaissance, traitement et maîtrise de l'hypertension chez les adultes au Kenya : enquête transversale nationale en population

Résumé

Contexte : L'hypertension constitue un problème de santé publique majeur qui connaît une forte expansion en Afrique.

Objectifs : Déterminer la prévalence de l'hypertension et évaluer le degré de sensibilisation à cette pathologie, ainsi que le niveau de traitement et de maîtrise de l'hypertension au Kenya.

Méthodes : Une étude transversale nationale fondée sur un échantillonnage aléatoire en grappes stratifiées a été réalisée en 2015. L'échantillon total comprenait 4500 individus kényans âgés de 18 à 69 ans (60,0 % de femmes ; âge médian de 38,0 ans, intervalle interquartile 29-52 ans). Nous avons utilisé l'approche STEPS de l'Organisation mondiale de la Santé : étape 1, entretien par questionnaire ; étape 2, mesures anthropométriques et mesure de la tension artérielle ; et étape 3, examens biochimiques. L'analyse de régression logistique a été utilisée pour étudier les déterminants de l'hypertension (tension artérielle systolique/diastolique à 140/90 mm Hg ou recours aux médicaments antihypertenseurs), ainsi que la sensibilisation, le traitement et la maîtrise.

Résultats : Dans l'ensemble, 28,6 % de la population souffrait d'hypertension, dont 29,2 % des hommes et 27,9 % des femmes, 17,7 % des 18-29 ans et 58,3 % des 60-69 ans. Parmi les hypertendus, 29,4 % étaient conscients de leur état, 6,5 % prenaient des médicaments antihypertenseurs et 12,5 % avaient maîtrisé leur tension artérielle (< 140/90 mmHg). Dans le modèle entièrement ajusté, l'âge avancé, l'éducation supérieure, le surpoids et l'obésité, la consommation excessive d'alcool au cours du mois qui précède la réalisation de l'étude et le diabète de type 2 étaient positivement associés à l'hypertension. En outre, il existe une association négative entre le déficit pondéral et cette pathologie.

Conclusions : On a constaté une forte prévalence de l'hypertension chez les adultes au Kenya, avec de faibles taux de connaissance, de traitement et de maîtrise de cette affection. Une intervention de santé publique devrait être menée sous la forme d'une action intégrée et globale ciblant les principales maladies non transmissibles dans le pays.

انتشار ارتفاع ضغط الدم بين البالغين في كينيا، والتوعية بشأنه وعلاجه ومكافحته: مسح وطني مقطعي قائم على السكان

سوبا بنجبيد، كارل بيلتزر

الخلاصة

الخلفية: يُعتبر ارتفاع ضغط الدم مشكلة رئيسية ومتنامية في مجال الصحة العامة في أفريقيا.

الأهداف: هدفت الدراسة إلى تحديد مدى انتشار ارتفاع ضغط الدم وتقييم مستويات الوعي به، وعلاجه، ومكافحته في كينيا.

طرق البحث: في عام 2015، أُجريت دراسة مقطعية على المستوى الوطني استناداً إلى أخذ عينة عشوائية طبقية. وبلغ مجموع الأفراد الذين شملتهم العينة 4500 شخصاً أعمار تتراوح بين 18–69 عاماً من كينيا، (60.0٪ منهم من الإناث؛ بمتوسط عمر 38.0 عاماً، وتراوح المدى الربعي بين 29–52 عاماً). وقد استخدمنا نهج منظمة الصحة العالمية التدريجي للترصد، كالتالي: الخطوة 1: مقابلة عن طريق الاستبيان، الخطوة 2: القياسات الأنثروبومترية وقياسات ضغط الدم، الخطوة 3: الاختبارات البيوكيميائية. واستُخدم الانحدار اللوجستي للوقوف على مُحدِّدات ارتفاع ضغط الدم: ضغط الدم (الانقباضي/ الانبساطي) 140/ 90 ملم زئبق أو استخدام الأدوية المضادة لارتفاع ضغط الدم المفرط، والتوعية بشأنه، وعلاجه ومكافحته.

النتائج: بلغ إجمالي نسبة السكان المصابين بارتفاع ضغط الدم 28.6٪، منهم 29.2٪ من الرجال، و27.9٪ من النساء، ووصلت نسبة السكان المُصابين بارتفاع ضغط الدم الذين تتراوح أعمارهم بين 18–29 عاماً، وبين 60–69 عاماً إلى 17.7٪، و58.3٪ على التوالي. ومن بين المصابين بارتفاع ضغط الدم، كان 29.4٪ منهم على علم بإصابتهم، و6.5٪ كانوا يستخدمون حالياً أدوية مضادة لارتفاع ضغط الدم المرتفع، و12.5٪ استطاعوا التحكم في ضغط الدّم لديهم (أقل من 140/ 90 ملم زئبق). وفي النموذج المُصحح بالكامل، ارتبط بارتفاع ضغط الدم السن الأكبر، والمستوى التعليمي الأعلى، وزيادة الوزن، والسمنة، وتعاطي الكحول بصورة متكررة على مدار الشهر السابق للدراسة، والنمط 2 من داء السُّكري. بالإضافة إلى ذلك، كان هناك ارتباط سلبي بين نقص الوزن وارتفاع ضغط الدم.

الاستنتاجات: تبين انتشار ارتفاع ضغط الدم بمعدَّلات مرتفعة بين البالغين في كينيا، مع انخفاض الوعي بشأنه، وضعف معدلات علاجه ومكافحته. ولابد من استجابة الصحة العامة في شكل إجراء متكامل وشامل لاستهداف الأمراض غير السارية الأساسية في البلد.

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Patient reluctance to accept Do Not Resuscitate order: impact on clinical care

Amal Al Farhan,[1] Manal Al Harthi,[2] Manerh Bin Mosa,[3] Afaf Moukaddem,[4] Hamdan Al Jahdali,[5] Jinan Shamou,[6] Abdulla Al Sayyari[7] and Salim Baharoon[8]

[1]Department of Anaesthesia, King Abdulaziz Medical City, National Guard Health Affairs, Riyadh, Saudi Arabia. [2]Department of Obstetrics and Genecology, King Abdulaziz Medical City, National Guard Health Affairs, Riyadh, Saudi Arabia. [3]Department of Urology, King Abdulaziz Medical City, National Guard Health Affairs, Riyadh, Saudi Arabia. [4]Department of Medical Education, College of Medicine, King Saud Bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia. [5]Department of Medicine, Pulmonary Division, King Abdulaziz Medical City, National Guard Health Affairs, Riyadh, Saudi Arabia. [6]Xi'an Jiaotong University, China. [7]Department of Medicine, Nephrology & Renal Transplantation Division, King Abdulaziz Medical City, Riyadh, Saudi Arabia. [8]Department of Critical Care, King Abdulaziz Medical City, National Guard Health Affairs, Riyadh, Saudi Arabia (Correspondence to: S. Baharoon: baharoon@hotmail.com).

Abstract

Background: A Do Not Resuscitate (DNR) order should only impede the performance of cardiopulmonary resuscitation in case of cardiac or respiratory arrest; it should not interfere with any other treatment decisions.

Aims: To study the impact of DNR order placement on daily clinical care of patients.

Methods: This was a retrospective cohort study of 72 patients in a tertiary care centre in Saudi Arabia. Daily clinical care measures were collected for 2 weeks prior and 2 weeks after DNR order placement and included vital signs, nursing care, comfort measures, documentation, visits by senior and junior physicians, and tests completed.

Results: Malignancy was the most common diagnostic category (43.1%). There was a significant reduction in vital signs documentation, tests completed, documentation, and visits by physicians after DNR orders, with no change in nursing care and comfort measures. No differences were seen for place of DNR order (intensive care unit vs medical ward), category of disease, or sex, but there were differences for documentation (more in females) and vital signs (more in males). More vital signs were documented and more tests were done in patients who survived compared to those who died. Regression analysis showed that the frequency of post-DNR order vital signs measurements and investigations done was not related to sex, age, diagnosis, time from admission to DNR order, or location of patients. Time to death was only related to sex and post-DNR order summary documentation.

Conclusions: Placement of DNR orders significantly reduced vital signs measurements, investigations done, documentation and visits by physicians but not nursing care and comfort measures.

Keywords: clinical care, Do Not Resuscitate order, patient reluctance, Saudi Arabia

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Introduction

According to the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, a Do Not Resuscitate (DNR) order should only impede the performance of cardiopulmonary resuscitation in case of cardiac or respiratory arrest; it should not interfere with any other treatment decisions. Placing a patient on a DNR order, however, may have significant implications for various aspects of clinical care and mortality (1).

Patients hospitalized with acute heart failure who have a DNR order placed are less likely to have their left ventricular function evaluated or be given beta blockers or anticoagulants (2). DNR orders in hospitalized patients are significantly associated with patients' age, social dependence and diagnosis of malignancy or acute stroke (3).

A study in the United Kingdom of Great Britain and Northern Ireland compared the level of care provided to stroke patients with and without a DNR order and concluded that the former received a lower level of care as they were less likely to be admitted to a specialized stroke unit (4). Their mortality rate was higher than that of patients with no DNR orders (10% vs 67%).

It is also reported that patients with DNR orders receive different treatments in different hospitals, which affects their outcome. The hospitals with the highest early DNR order rate (adjusted for case mix) had fewer interventions and lower costs per patient. The author concluded that "early care limitation leads to an overall milieu of nihilism that, perhaps unexpectedly, may influence attitudes of care for patients beyond those with the DNR orders themselves".

The impact of DNR orders on care provision has not been adequately investigated worldwide, and to the best of our knowledge it has not been measured in Saudi Arabia. Due to the unique cultural aspects of Saudi Arabia, we cannot assume that the results of international studies are representative of Saudi hospitals. In addition,

some Saudi hospitals lack regulations to guide the use of DNR orders and their effect on quality of care (5).

This study evaluated the impact of DNR orders on some aspects of care provided for patients at a tertiary care university hospital in Riyadh, Saudi Arabia by comparing the level of care before and after DNR orders.

Methods

This was a retrospective cohort study on the impact of DNR orders placed by the most responsible physician (MRP). The MRP was not part of the study or aware of it, and his decision was independent of the study. MRP is a term used in our hospital to indicate the consultant physician who has the most responsibility on patient management. The study was conducted in King Abdul-Aziz Medical City (KAMC), Riyadh from March 2016 to June 2017. KAMC is an institution with 260 beds in medical wards. An estimated of 15–20 patients are admitted daily from the emergency room to these wards.

All adult patients placed on a DNR order by the MRP within the data collection period and who had complete files were included, provided that the DNR order was written for at least 1 week. The following patients were excluded: those with DNR orders referred to palliative care; those who died within 48 hours of writing the DNR order; those for whom a DNR order was placed < 1 week after admission; and those with DNR orders before their current hospitalization.

The medical wards were visited by one of the investigators 3 times a week. On each visit, the charge nurse was asked about new DNR orders on patients. Patients' records were reviewed for the week before and the week after placement of the DNR order.

The variables documented were demographics (age, sex, admission date, DNR date, date of death, and admission diagnosis category) and frequency of daily clinical care measures. The scores were summated into the following categories: (1) frequency of vital signs recording (blood pressure, respiratory rate, and O_2 saturation); (2) nursing practice (pain assessment recording, mouth care frequency, and frequency of position changes); (3) comfort measures (pain relief); (4) documentation; (5) frequency of visits by senior physicians; (6) frequency of visits by junior physicians; and (7) recording of tests completed (number of daily blood tests, number of blood product units transfused, number of radiological tests, and number of blood cultures).

The summative "vital signs" mean score was calculated as the mean of the measurement of blood pressure, respiratory rate and O_2 saturation pooled together throughout each of the observation periods (pre- or post-DNR orders). Each of these variables carried the same weight. The summative "comfort and nursing care" mean score was calculated as the mean of the numbers of pain assessments, mouth care, position changes and pain relief measures pooled together throughout each of the observation periods (pre- or post-DNR orders). Each of these variables carried the same weight. The summative "tests completed" mean score was calculated as the mean of the numbers of daily blood tests, blood product units transfused, radiological tests completed, and blood cultures pooled together throughout each of the observation periods (pre- or post-DNR orders). Each of these variables carried the same weight. The summative "senior physicians" mean score was calculated as the mean number of visits by consultants, associate consultants and medical fellows pooled together throughout each of the observation periods (pre- or post-DNR orders). Each of these variables carried the same weight. The summative "junior physicians" mean score was calculated as the mean number of visits by assistant consultants, residents and staff physicians pooled together throughout each of the observation periods (pre- or post-DNR orders). Each of these variables carried the same weight. The scores of pain relief drugs refers to the mean number of times an analgesic drug was given, pooled together throughout each of the observation periods (pre- or post-DNR orders). Each of the drugs given carried the same weight.

Data were analysed using SPSS version 21 and descriptive statistics were generated (mean and standard deviation for continuous variables). Percentages and proportions were calculated for categorical data. Paired samples *t* test was used to compare the means before and after DNR orders. Independent sample *t* test was used for the post-DNR order results according to median age, sex and disease category. Regression analysis was performed to assess the independent effect of demographics and underlying diagnosis on patient care and time to death post-DNR order. $P < 0.05$ was considered statistically significant.

Results

Seventy-two patients were included in the study with an average age of 74.4 years and 41 (56.9%) were male. Time from admission to DNR order was 43.5 days. DNR orders were placed at the intensive care unit (ICU) in 20 (27.8%) cases and at the medical wards in 52 (72.2%) cases. The overall mortality rate was 29.2% (21 patients) with a mean time from DNR order to death of 43.2 days.

The commonest comorbid conditions were organ failure and bedridden status (both $n = 21$; 29.2%) and dementia ($n = 9$; 12.5%). A total of 33 (45.9%) patients were bedridden (Table 1).

When comparing the whole group for pre- and post-DNR order frequency of care measures, we found a highly significant drop in the frequency of measuring vital signs, doing tests, documentation and visits by physicians (Table 2). However, nursing care or comfort measures did not differ and there was more pain relief medication given after DNR order placement.

When comparing post-DNR summative scores in patients below and above the median age, we found no significant differences, except in the comfort measures, which were higher in the older group (Table 3).

When comparing post-DNR summative scores according to sex, we found significant differences in

Table 1 Sample participants' characteristics

Number	72
Age (SD)	74.4 (14.4) years
Males	41 (56.9%)
Time from admission to DNR order (SD)	43.5 (72.6) days
Location of DNR order ICU Medical ward	20 (27.8%) 52 (72.2%)
Pre-DNR order follow up duration (SD)	12.8 (2.4) days
Post-DNR order follow up duration (SD)	13.2 (1.9) days
Time from DNR order death (SD)	43.2 (43.0) days
Overall mortality in DNR patients during study follow-up	21 (29.2%)
Diagnosis category	
Dementia	9 (12.5%)
Malignancy	5 (6.9%)
Organ failure	21 (29.2%)
Bedridden	21 (29.2%)
Others	4 (5.5%)
Dementia and bedridden	9 (12.5%)
Malignancy and bedridden	3 (4.2%)

DNR = Do Not Resuscitate; SD = standard deviation.

only 2 parameters: men had more vital signs measured than women had, and women had more documentation than men had (Table 4). When comparing post-DNR summative scores according to patient survival during the observation period, we found significant differences in only 2 parameters: patients who died had more vital signs measured than those who survived, and those who died had more tests done. Patient sex and disease category did not differ between those who died and those who survived.

Regression analysis showed that the frequency of post-DNR vital sign measurements and investigations done was not related to sex, age, diagnosis, time from admission to DNR order placement, or location of patients. However, age affected post-DNR order comfort measures given (P = 0.0044), sex affected post-DNR order frequency of visits by junior staff and frequency of documentation. Time to death was not related to age, diagnosis (except dementia), time from admission to DNR order, location of patients, or post-DNR care given. However, time to death was related to sex and post-DNR documentation.

Discussion

DNR orders only mean that there should be no attempt at cardiopulmonary resuscitation and should not mean abandoning other forms of therapy, unless clearly specified. A DNR order does not prevent blood tests, vital sign measurement, nursing care and other services, including ICU admission and ventilation, unless clarified and communicated to patients or their families. All other clinical care measures should be adhered to. In some terminal care patients, however, the DNR order may be a part of a palliative care plan that allows only comfort care measures.

As others have found, when we compared pre- and post-DNR order frequency of care measures, we found a highly significant drop in the frequency of measuring vital signs, investigations, documentation and visits by physicians. However, nursing care or comfort did not

Table 2 Summative score pre- and post-DNR in the areas studied

	Pre-DNR summative score[a]	Post-DNR summative score[a]	Mean difference (95% CI)	*P*
Vital signs	10.84 (5.4)	7.18 (2.6)	-3.66 (-4.77 to -2.56)	0.0001
Comfort and nursing care	2.08 (0.58)	2.26 (1.06)	0.18 (-0.06 to 0.41)	0.13
Pain relief drugs given	0.1 (0.4)	0.4 (0.8)	0.3(-0.5 to -0.1)	0.003
Laboratory tests	3.00 (1.58)	1.97 (0.89)	1.03 (1.41 to 0.65)	0.0001
Documentation	3.27 (2.34)	2.33 (1.19)	0.94 (1.32 to 0.56)	0.0001
Visits from senior physicians	0.76 (0.25)	0.52 (0.22)	-0.24 (-0.31 to -0.17)	0.0001
Visits from junior physicians	0.37 (0.13)	0.30 (0.12)	-0.064 (-0.10 to -0.03)	0.0007

[a]*Values in parentheses are standard deviation. CI = confidence interval; DNR = Do Not Resuscitate; SD = standard deviation.*

Table 3 Comparing post-DNR summative scores in patients below and above median age of the whole group (76.0 years)

Variables assessed post-DNR	Below median age[a]	Above median age[a]	*P*
Vital signs	6.67 (2.28)	7.72 (2.92)	0.15
Comfort	2.03 (0.53)	2.50 (1.39)	0.001
Tests completed	2.08 (0.87)	1.85 (0.90)	0.84
Documentation	2.32 (1.17)	2.35 (1.22)	0.80
Visits from senior physicians	0.52 (0.24)	0.52 (0.21)	0.45
Visits from junior physicians	0.28 (0.2)	0.33 (0.11)	0.06

[a]*Values in parentheses are standard deviation. DNR = Do Not Resuscitate.*

differ and there was more pain relief given after DNR order placement compared to before the order (*6*,*7*).

When we compared the mean summative scores of patients who died and those who did not during the observation period, we found no differences, except that more vital signs were documented and more tests were done in the group that died. This indicates that the physicians paid more attention only when the patients became seriously ill. However, the sex of the patients and their disease category did not differ according to whether the patients died or not.

These findings are consistent with other international studies reporting a significant change in practice for patients with DNR orders placed early after admission. A study from California, United States of America reported that among 5212 patients admitted after an out-of-hospital cardiac arrest, about one third had a DNR order within the first 24 hours. Compared to those who did not have a DNR order, this group of patients had fewer cardiac catheterizations, less blood transfusion, fewer interventions and higher mortality. The authors concluded that DNR orders within 24 hours may have been premature as they were associated with reduced interventions that could have improved outcome. The authors also noted significant differences in the practice between the hospitals studied (*8*). Patients with DNR orders fare less well in terms of prognosis than those without DNR orders, even after full adjustment for risk factors. Mortality rates are higher in patients with DNR orders compared to patients with similar severity of illness and comorbidity but without DNR orders in place (*9*, *10*). A study of > 15 000 trauma patients found that DNR status and not age affected the post-injury outcome (*11*). However, Chu et al., in a review of the influence of DNR orders on patient care in adult ICUs, could not identify a direct impact of DNR orders on patient care (*12*).

In our patient population the drop in care after DNR was seen only among physicians rather than nurses. This may be because nursing care is usually more protocolled or that nursing assessment is more closely monitored by charge nurses in the unit and fellow nurses on the next shifts. It also may be down to cultural factors as most nurses are expatriates and are more committed due to fear for their jobs. Physicians, however, especially junior physicians may mistake the concept of DNR with comfort care only. The increase in analgesic prescription could reflect their notion of DNR meaning only to comfort patients and not to address their actual complaints.

There are only sparse data addressing nursing care after DNR order placement. The role of nursing in DNR orders and care planning and nursing workloads after DNR order placement have been addressed, but only a few studies have investigated the actual level of nursing care delivered (*13*,*14*). Henneman et al. reported that nurses stated that they would be significantly less likely to perform a variety of physiological monitoring procedures and interventions for patients with a DNR order than for patients without such an order (*15*).

This drop in post-DNR order care with resultant unintended harmful consequences has caused many hospitals to adopt an alternative approach to DNR orders. The Universal Form of Treatment Options (UFTO) is one of these alternatives. UFTO has resulted in a significant reduction in harmful events in patients with DNR orders, indicating that it has improved care for this group of patients (*16*). Others have replaced the DNR order with care plans of comfort and supportive care to eliminate misunderstanding attached to the order (*17*).

Table 4 Comparing post-DNR summative scores by sex and whether patients died or survived

Variables assessed post-DNR	By sex		
	Males	Females	*P*
Vital signs	7.7 (3.1)	6.4 (16)	0.033
Documentation	1.8 (3.0)	3.0 (1.0)	0.0001
	By survival		***P***
	Died	**Survived**	
Vital signs	8.4 (3.3)	6.7 (2.0)	0.017
Tests completed	2.3 (1.1)	1.8 (0.7)	0.045

Only significantly different scores are shown. Values in parentheses are standard deviation. DNR = Do Not Resuscitate.

Our study was limited by its small sample size and being a single centre study. However, our results should inspire more research to validate our findings and observe any variation in hospital practices.

Conclusion

DNR orders are associated with a significant reduction in physicians providing clinical care, which may lead to more refusals of family members to allow DNR orders. Physicians need more insight into the true goals of DNR orders and should not equate them with withholding other therapeutic interventions. DNR orders should not be the first step in a continuum of limitations on care, unless clear goals are established with patients and their families.

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Réticence du patient à accepter l'ordre de ne pas réanimer : conséquences sur les soins cliniques

Résumé

Contexte : Un ordre de ne pas réanimer doit seulement empêcher l'exécution de la réanimation cardio-respiratoire en cas d'arrêt cardiaque ou respiratoire ; il ne doit pas interférer avec d'autres décisions thérapeutiques.

Objectifs : Étudier les conséquences de l'ordre de ne pas réanimer sur les soins cliniques quotidiens des patients.

Méthodes : Il s'agissait d'une étude de cohorte rétrospective portant sur 72 patients d'un centre de soins tertiaires en Arabie saoudite. Des mesures des soins cliniques quotidiens ont été recueillies pendant deux semaines avant et deux semaines suite à l'émission de l'ordre de ne pas réanimer. Elles ont notamment pris en considération les signes vitaux, les soins infirmiers, les mesures de confort, la documentation, les visites des médecins principaux ou assistants et les examens effectués.

Résultats : La malignité était la catégorie de diagnostic la plus courante (43,1 %). On a constaté une réduction significative des mesures des signes vitaux, des examens effectués, de la documentation et des visites des médecins suite à l'émission des ordres de ne pas réanimer, sans aucun changement au niveau des soins infirmiers et des mesures de confort. Aucune différence n'a été constatée en ce qui concerne le lieu associé à l'ordre de ne pas réanimer (unité de soins intensifs ou service d'hospitalisation), la catégorie de la maladie ou le sexe, mais des différences ont été observées pour la documentation (plus détaillée chez les femmes) et la mesure des signes vitaux (plus fréquente chez les hommes). Les signes vitaux avaient davantage été documentés et plus d'examens avaient été effectués chez les patients qui ont survécu que chez ceux qui sont décédés. L'analyse de régression a montré que la fréquence de la mesure des signes vitaux et des examens effectués suite à l'émission de l'ordre de ne pas réanimer n'était pas liée au sexe, à l'âge, au diagnostic, au temps écoulé entre l'admission et l'émission de l'ordre de ne pas réanimer, ni au lieu de prise en charge du patient. Le délai avant le décès n'était lié qu'au sexe et à la documentation sommaire établie à la suite de l'émission de l'ordre.

Conclusions : L'émission d'un ordre de ne pas réanimer réduisait de manière significative la mesure des signes vitaux, les examens effectués, la documentation et les visites des médecins, mais pas les soins infirmiers ni lesmesures de confort.

تردد المرضى في قبول أمر "عدم الإنعاش": الآثار المترتبة على الرعاية السريرية

أمل الفرحان، منال الحارثي، منيرة بن موسى، عفاف مُقدم، حمدان جحدلي، جنان شامو، عبد الله السياري، سليم باهارون

الخلاصة

الخلفية: يجب أن يمنع أمر "عدم الإنعاش" أداءَ الإنعاش القلبي الرئوي فقط في حالة تَوَقُّف القَلْب أو التنفس؛ ولا يجب أن يتداخل مع أي قرارات أخرى للعلاج.

الأهداف: دراسة أثر تنفيذ أمر "عدم الإنعاش" على الرعاية السريرية اليومية للمرضى.

طرق البحث: أُجريت دراسة أترابية استرجاعية شملت 72 مريضاً في أحد مراكز الرعاية الثالثية في المملكة العربية السعودية. وقد حُصرت تدابير الرعاية السريرية اليومية لمدة أسبوعين قبل أمر "عدم الإنعاش" وأسبوعين آخرين بعده، وشملت العلامات الحيوية، والرعاية التمريضية، وتدابير تحقيق الراحة، والتوثيق، وزيارات كبار وشباب الأطباء، وإتمام الفحوص.

النتائج: كان التشخيص بالإصابة بورم خبيث أكثر الفئات التشخيصية الشائعة (43.1٪). وقد حدث انخفاض ملحوظ في توثيق العلامات الحيوية، وإتمام الفحوص، والتوثيق، وزيارات الأطباء عقب إصدار أوامر "عدم الإنعاش"، مع عدم وجود أي تغيير في الرعاية التمريضية وتدابير تحقيق الراحة. ولم يُلاحَظ أي تغيير في تنفيذ أمر "عدم الإنعاش" (وحدة الرعاية المركزة مقابل الجناح الطبي)، أو فئة المرض، أو نوع الجنس، ولكن

لوحظ بعض التباين من حيث التوثيق (أكثر في الإناث) والعلامات الحيوية (أكثر في الذكور). وكان معدل توثيق العلامات الحيوية وإجراء مزيد من الفحوص أعلى في المرضى الذين نجوا وظلوا على قيد الحياة عنه في الذين تُوفُّوا. وقد بيّن تحليل الانحدار أن وتيرة أخذ قياسات العلامات الحيوية والاستقصاءات عقب أمر "عدم الإنعاش" غير مرتبطة بنوع الجنس، أو العمر، أو التشخيص، أو المدة الزمنية من وقت دخول المستشفى وحتى صدور الأمر، أو مكان المرضى. وارتبطت الفترة الزمنية حتى الوفاة فقط بنوع الجنس وتوثيق ملخص ما بعد أمر "عدم الإنعاش".

الاستنتاجات: أدى تنفيذ أمر "عدم الإنعاش" بصورة كبيرة إلى خفض قياسات العلامات الحيوية، وإتمام الاستقصاءات، والتوثيق، وزيارات الأطباء، ولكن الأمر كان مختلفاً بالنسبة للرعاية التمريضية وتدابير تحقيق الراحة.

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Hypoglycaemia assessment tool (HAT) study: subanalysis of the Lebanese cohort

Mireille Amm,[1] Mohamad Rawas,[2] Zelia Francis,[3] Maya Chehabeddine,[2] Amal Chalfoun,[4] Mazen El Akel[4] and Marie Merheb[5]

[1]Faculty of Medicine, Holy Spirit University, Kaslik, Lebanon (Correspondence to: M. Amm: mireille_amm@hotmail.com). [2]Department of Endocrinology, Rafik Hariri University Hospital, Beirut, Lebanon. [3]Lebanese American University Rizk Hospital Medical Centre, Achrafieh, Lebanon. [4]Medical Affairs, Novo Nordisk, Beirut, Lebanon. [5]Department of Endocrinology, Mount Lebanon Hospital, Hazmieh, Lebanon.

Abstract

Background: Diabetic hypoglycaemia affects medication adherence, patients' productivity and quality of life. It is also associated with an increased risk of cardiovascular complications.

Aims: To examine the impact of hypoglycaemia in insulin-treated patients in the Lebanese cohort of the Hypoglycaemia Assessment Tool (HAT) study.

Methods: The HAT study was an observational study covering a 6-month retrospective and a 4-week prospective period in 24 countries including Lebanon. Data were collected using self-assessment questionnaires and patient diaries from 1158 invited lebanese patients, aged ≥ 18 years, with type 1 or type 2 diabetes mellitus (T1DM/T2DM) treated with insulin for > 12 months. The primary endpoint was the proportion of patients experiencing ≥ 1 hypoglycaemic event during the 4-week follow-up period.

Results: After 4 weeks of follow-up, 177/225 [78.7%; 95% confidence interval (CI): 72.7–83.8] of patients with T1DM and 291/630 (46.2%; 95% CI: 42.2–50.2) patients with T2D experienced at least 1 hypoglycaemic event. Rates of nocturnal and severe hypoglycaemia were 10.7 (95% CI: 9.1–12.3) and 13.2 (95% CI: 11.5–14.9) events/patient-year for T1DM, and 3.3 (95% CI: 2.8–3.8) and 4.2 events/patient-year (95% CI: 3.6–4.8) for T2DM, respectively. Fear of hypoglycaemia was significantly associated with nocturnal and severe hypoglycaemia in both diabetes types ($P < 0.001$).

Conclusion: The results suggest that the less-advanced healthcare systems in Lebanon are implicated in lower levels of patient knowledge about hypoglycaemia and related preventive measures. Treatment strategies and glycaemia goals should be individualized according to patient preference, medical benefits, and risk of hypoglycaemia.

Keywords: diabetes, hypoglycaemia, insulin, nocturnal hypoglycaemia, severe hypoglycaemia.

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Introduction

Diabetes is a worldwide health problem associated with serious morbidity, mortality, and considerable economic burdens (*1*). The prevalence of type 2 diabetes mellitus (T2DM) in Lebanon was reported to be high (8.5%) between 2008 and 2009 (*2*), including many Lebanese patients who were not adequately controlled or followed up according to the International Diabetes Management Practices Study (*3*). As reported in that study, 22.6% of the Lebanese patients were treated with insulin; most commonly basal insulin alone followed by premix insulin alone.

Insulin is the cornerstone of therapy for patients with type 1 diabetes mellitus (T1DM) and it is among the major therapeutic classes recommended for treating type 2 DM (T2DM). However, different studies have shown an association between insulin therapy and increased risk of hypoglycaemia (*4,5*), in which 25–30% of insulin-treated patients with diabetes had 1 or more severe hypoglycaemic episodes every year (*6*). The Diabetes Complications and Controls Trial found that intensive therapy in patients with T1DM caused a 3-fold increase in the number of hypoglycaemic events, compared with those treated less aggressively (*7*). Hypoglycaemia is a common adverse effect of insulin (*8*), and is a hindrance to achieving treatment goals in T1DM and T2DM (*4, 9*). This has driven the American Diabetes Association (ADA) Standards of Medical Care in Diabetes – 2017 to recommend a less-stringent, glycated haemoglobin (HbA1c) goal of < 8% in patients with a history of severe hypoglycaemia (*10*).

Hypoglycaemia affects medication adherence, patients' productivity (*11*), and quality of life at the mental, physical and social functioning levels (*12*). It also places a heavy burden on healthcare systems (*12*). Pai-Feng Hsu et al. showed that clinically severe or mild hypoglycaemia is associated with an increased risk of cardiovascular events, all-cause hospitalization, and all-cause mortality (*13*). Various studies have reported that hypoglycaemia is associated with higher risks of cardiovascular complications (*14–16*).

Data available from clinical trials are not enough to address the problem of hypoglycaemia. Also, lack of real-

world data on hypoglycaemia in Lebanon necessitates the conduct of a large-scale study to assess the problem of hypoglycaemia in terms of rates, risk factors, and at-risk patients, and utilizing these data in clinical practice. The aim of the Hypoglycaemia Assessment Tool (HAT) study was to examine the impact of hypoglycaemia in an insulin-using global patient population (which includes the Lebanese cohort) in an epidemiological observational study covering a 6-month retrospective and 4-week prospective time periods.

Methods

Study design and ethical considerations

This study was a noninterventional, multicentre, 4-week cohort survey of hypoglycaemic events conducted across 2004 sites in 24 countries (Argentina, Austria, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Finland, Germany, Hungary, India, Israel, Lebanon, Malaysia, Mexico, Netherlands, Poland, Romania, Russian Federation, Saudi Arabia, Serbia, Slovakia, Slovenia, and Sweden) from 2012 to 2013 in a staggered fashion (start time varied by country). The same protocol was followed across all participating countries. The study used self-assessment questionnaires (SAQs) and patient diaries where all study materials were translated into local languages and collected data were translated into English for analysis. The study protocol and assessments were conducted in accordance with the Declaration of Helsinki (2004) and the International Conference on Harmonisation Guidelines for Good Clinical Practice (1996), and approved by country-specific regulatory agencies and ethics committees. Informed consent was obtained from all individual participants included in the study.

Study population

Inclusion criteria consisted of patients with T1DM or T2DM, aged ≥ 18 years, being treated with insulin for > 12 months, and who had given informed consent to participate in the study. Nonambulatory patients, illiterate patients and patients unable to complete a written survey were excluded. Eligible patients were enrolled consecutively during a routinely scheduled clinical consultation with their healthcare provider.

Ethical approval and consent to participate

The study protocol and assessments were conducted in accordance with the Declaration of Helsinki (2004) and the International Conference on Harmonisation Guidelines for Good Clinical Practice (1996), and approved by country-specific regulatory agencies and ethics committees. Informed consent was obtained from all individual participants included in the study.

Study endpoints

The primary endpoint was to determine the proportion of patients experiencing at least 1 hypoglycaemic event during the 4-week follow-up period. Secondary endpoints included: hypoglycaemia rates, HbA1c level at baseline, relationship between HbA1c and hypoglycaemia, including proportion of patients with HbA1c < 7.0% (53 mmol/l) and >9 .0% (75 mmol/l) with or without hypoglycaemia, and relationship between hypoglycaemia and factors such as age, fear of hypoglycaemia, disease duration and duration of insulin use.

Assessments

This study was based on a 2-part SAQ. Part 1 was introduced upon patient entry and it recorded baseline demographics, treatment information, as well as history of severe hypoglycaemia over the last 6 months and nonsevere hypoglycaemia over the previous 4 weeks. Part 2 was completed 4 weeks after baseline visit and recorded the occurrence of both severe and nonsevere hypoglycaemia during these 4 weeks. In order to improve patients' recall, they were provided with a diary, which was also used to record hypoglycaemic events. If a patient recorded more hypoglycaemic events using the patient diary than the SAQ Part 2, the patient diary value was used to calculate prevalence of hypoglycaemia in the 4 weeks after baseline.

Hypoglycaemia classification

Nonsevere hypoglycaemia was defined as an event managed by patients alone; severe hypoglycaemia was defined based on the ADA definition, as any hypoglycaemic event requiring assistance of another person to administer carbohydrate, glucagon or other resuscitative actions (17); and nocturnal hypoglycaemia was defined as any event occurring between midnight and 06:00 hours. These 3 categories of hypoglycaemia were included in the SAQ and the patient diary. Combined measures of hypoglycaemia refer to the sum of all individual hypoglycaemic events, and were calculated based on data collected from the patient diary and questionnaire.

Sample size and statistical analyses

To calculate the percentage of patients experiencing a hypoglycaemic event with a 95% confidence interval (CI) precision, a sample size of approximately 12 000 patients was selected. Taking into consideration a 37% response rate in SAQ Part 2, the total number of patients was estimated to be around 32 000. In Lebanon, 1158 patients were invited to participate in the study based on convenience sampling, accounting thus for 3.6% of the overall study cohort.

For the primary endpoint, the percentage of patients experiencing any hypoglycaemia during the 4-week follow-up period was calculated along with its 95% CI. For the secondary endpoints of severe or nocturnal hypoglycaemic events, the number and proportion of patients having an event, number of events, follow-up time (patient-years), estimated hypoglycaemia rate with corresponding 95% CI, and number of patients missing were reported for the 4 weeks after baseline.

Univariate negative binomial regression models were used to examine the relationship between hypoglycaemia and the following factors: age; sex; HbA1c in Mmol/mol

and percentage; duration of diabetes in years; duration of insulin therapy in years; type of insulin therapy; frequency of blood glucose testing in average number of checks per day; knowledge of hypoglycaemia (i.e., knowing what hypoglycaemia is before reading the definition in the SAQ introduction); fear of hypoglycaemia; study period (prospective/retrospective); and diabetes type. These models were based on the complete analysis set (patients who completed SAQ Part 2) and were stratified by country, specifying a log-transformed exposure time offset term and adjusted for all variables in the model. The statistical significance was two-sided and set at $P < 0.05$.

All other variables are presented descriptively only, with the mean and 95% CI being presented. No imputation of missing data was performed.

Results

Population characteristics

Out of 1158 patients invited to participate in the study, 905 (78.2%) (250 with T1DM and 655 with T2DM) were recruited and completed SAQ Part 1. Out of those recruited, 851 patients (94%) (222 with T1DM and 629 with T2DM) completed SAQ Part 2 and 837 patients (92.5%) (224 with T1DM and 613 with T2DM) completed the patient diary. All patients were followed up by endocrinologists.

Both types of diabetes were almost equally distributed among the sexes (male/female: 54.2/45.8% with T1DM vs 48/52% with T2DM). Patients with T2DM were older (60.5 ± 11.0 years) than those with T1DM (35.2 ± 15.9 years) and had a longer disease duration (14.6 ± 8.0 years vs 12.8 ±8.8 years, respectively). As expected, T1DM patients were using insulin for a longer period than T2DM patients were (11.8 ± 8.7 years vs 5 ± 4.1 years). Mean HbA1c levels and percentage were almost similar in T1DM and T2DM patients [63.8 ± 17.6 Mmol/mol (8%) vs 68.4 ± 17.2 mmol/mol (8.4%), respectively]. Most patients checked blood sugar levels [T1DM, 97.6% (n = 241); T2DM, 90.5% (n = 588)] and reported experiencing at least 1 hypoglycaemic event [T1DM, 91% (n = 223); T2DM, 80.3% (n = 521)].

Reporting of hypoglycaemia

After 4 weeks of follow-up, among 225 T1DM patients, 177 experienced at least 1 hypoglycaemic event (78.7%; 95% CI: 72.7–83.8%); 70 experienced severe hypoglycaemia (31.1%; 95% CI: 25.1–37.6%); 167 experienced nonsevere hypoglycaemia (74.2%, 95% CI: 68.0–79.8%); and 90 experienced nocturnal hypoglycaemia (41.5%; 95% CI: 34.8–48.3%). Among 630 T2DM patients, 291 experienced at least 1 hypoglycaemic event (46.2%; 95% CI: 42.2–50.2%); 92 experienced severe hypoglycaemia (14.6%, 95% CI: 11.9–17.6%); 269 experienced nonsevere hypoglycaemia (42.8%, 95% CI: 38.9–46.7%); and 101 experienced nocturnal hypoglycaemia (16.3%; 95% CI: 13.5–19.5%). The estimated annual incidence rate of hypoglycaemic events requiring hospital admission at 4 weeks after baseline was 5.5% (95% CI: 2.9–9.4%) for patients with T1DM and 2.4% (95% CI: 1.3–3.9%) for patients with T2DM.

The estimated annual rate of any hypoglycaemic event was 73.7 (95% CI: 69.6–77.8) and 18.1 (95% CI: 16.9–19.3) events/patient-years for patients with T1DM and T2DM, respectively. For nonsevere hypoglycaemia, the estimated annual rate was 60.5 (95% CI: 56.9–64.3) and 13.9 (95% CI: 12.8–15.0) events/patient-years for patients with T1DM and T2DM, respectively. For nocturnal hypoglycaemia, the estimated annual rate was 10.7 (95% CI: 9.1–12.3) and 3.3 events/patient-years (95% CI: 2.8–3.8) for patients with T1DM and T2DM, respectively. For severe hypoglycaemia, the estimated annual rate was 13.2 (95% CI: 11.5–14.9) and 4.2 events/patient-years (95% CI: 3.6–4.8) for patients with T1DM and T2DM, respectively. The estimated annual incidence rate of hypoglycaemic events requiring hospital admission at 4 weeks after baseline was 0.8 (95% CI: 0.4–1.3) for patients with T1DM and 0.3 (95% CI: 0.2–0.5) for patients with T2DM.

Factor associated with hypoglycaemia

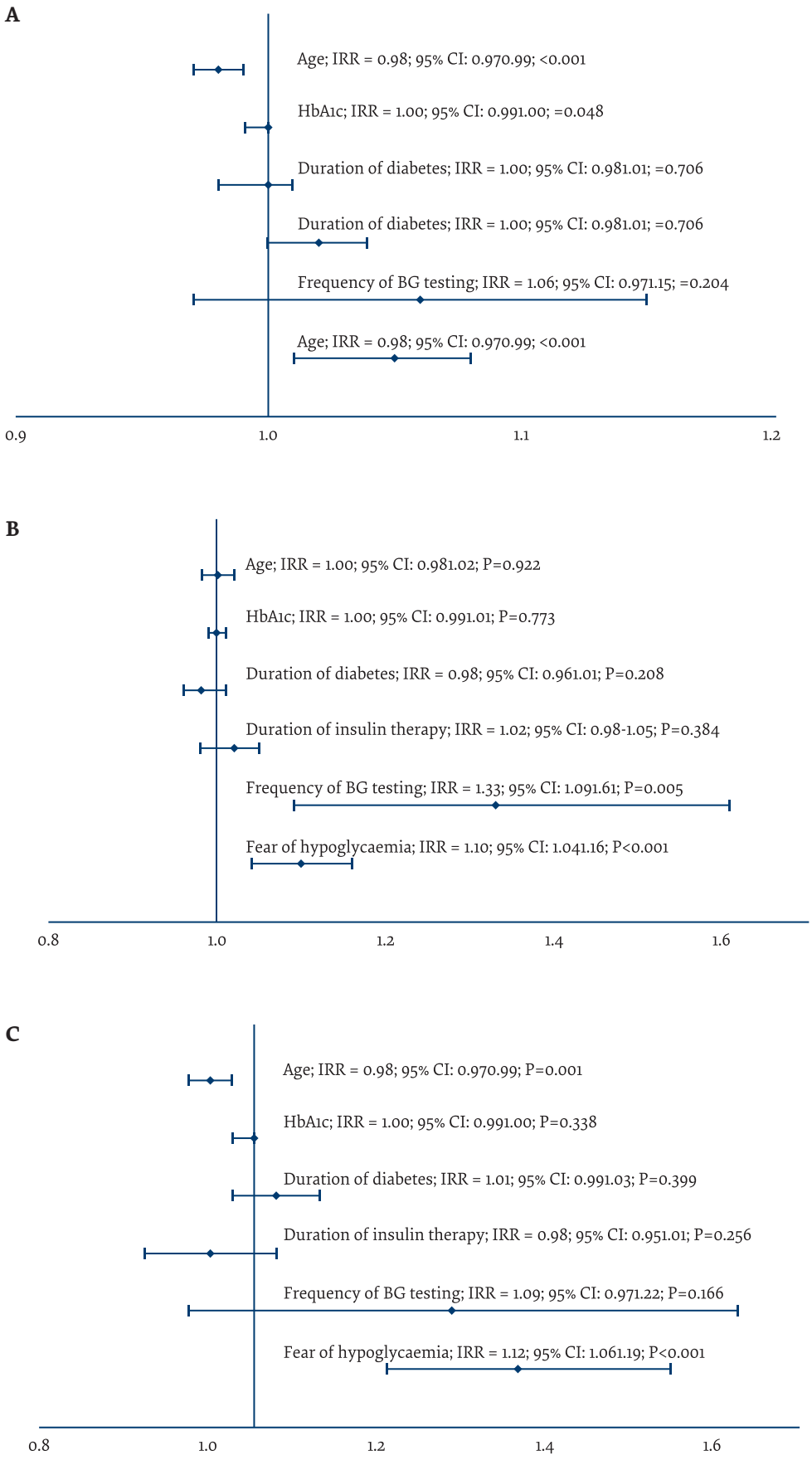
The relationship between any, nocturnal or severe hypoglycaemia and age, HbA1c, duration of diabetes, duration of insulin use, and fear of hypoglycaemia (as indicated on a 10-point scale) was studied using fully adjusted negative binomial modelling. Older age of patients with either type of DM was significantly associated with a reduced risk of any hypoglycaemia ($P < 0.001$) and nocturnal hypoglycaemia ($P = 0.001$) (Figure 1). As fear of hypoglycaemia increased, the risk of any hypoglycaemia ($P = 0.014$) and nocturnal hypoglycaemia ($P < 0.001$) increased significantly. Similarly, fear of hypoglycaemia was significantly associated with severe hypoglycaemia in both T1DM and T2DM patients ($P < 0.001$). Among 52 T1DM patients and 75 T2DM patients with HbA1c <7% at baseline, 44 (84.6%) and 35 (46.7%) had any hypoglycaemia in the 4 weeks after baseline, respectively. The association between different baseline levels of HbA1c and proportion of patients with any hypoglycaemia is shown in Figure 2.

Discussion

The aim of our study was to determine the percentage of insulin-treated patients with T1DM or T2DM experiencing at least 1 hypoglycaemic event during a 4-week observational period, and to study the relationship between hypoglycaemia and other factors. Among T1DM patients, the prevalence of any, severe and nocturnal hypoglycaemia was 78%, 31% and 41%, respectively. In the Diabetes Complications and Controls Trial, the annual prevalence of severe hypoglycaemia was 36% (*18*,*19*). In our study, the reported prevalence of severe hypoglycaemia among T1DM patients was within the range of 30–40% reported in other studies (*20*–*23*).

Among T1DM patients, the estimated annual rates were 73.7, 13.2 and 10.7 events/patient-year for any, severe and nocturnal hypoglycaemia, respectively. The estimated annual rate of severe hypoglycaemia was considerably greater than in other studies (0.7–1.59 episodes/patient-year) (*24*,*25*). Two studies done in the United Kingdom of Great Britain and Northern Ireland (UK) reported a severe hypoglycaemia rate of 1.15–3.2

Figure 1 Fully adjusted negative binomial modelling of the associations between patient characteristics and incidence rate ratios for (A) any, (B) severe or (C) nocturnal hypoglycaemia (*n* = 680).



BG = blood glucose; CI = confidence interval; HbA1c = glycated haemoglobin; IRR = incidence rate ratio.

events/patient-year (*23,26*). A recent study involving 7 European countries (*25*) reported a rate of nocturnal hypoglycaemia among T1DM patients almost double (20 events/patient-year) that reported in our study.

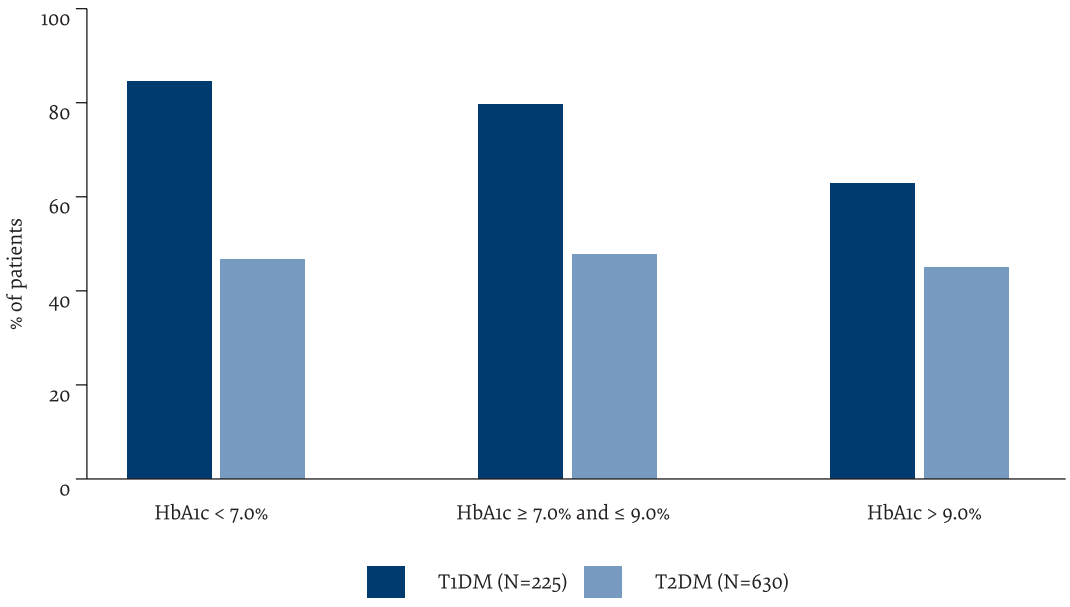
Among T2DM patients, the prevalence of any, severe and nocturnal hypoglycaemia was 46%, 14.6% and 16.3%, respectively. The estimated annual rates were 18.1, 4.2 and 3.3 events/patient-year for any, severe and nocturnal hypoglycaemia, respectively. A recent meta-analysis of population-based studies reported that the prevalence of severe hypoglycaemia was 21% among insulin-using patients (*27*). The UK Hypoglycaemia Study reported mild hypoglycaemia rates of 10.2 events/patient-year and severe hypoglycaemia rates of 0.7 events/patient-year in patients with T2DM using insulin for > 5 years (*23*). Systematic reviews considering hypoglycaemia prevalence in randomized controlled trials involving patients with T2DM (*28–31*) reported that severe hypoglycaemia prevalence was < 1%, which is substantially lower than our findings. In the Veterans Affairs Diabetes Trial involving T2DM patients, rates of any symptomatic hypoglycaemic episode were 383–1333 per 100 patient-years, whereas rates of severe hypoglycaemia were 3–9 per 100 patient-years (*5*). However, these differences should be carefully interpreted taking into consideration the aspects of randomized controlled trials as they do not often reflect real-life situations. The estimated annual rate of nocturnal hypoglycaemia in T2DM patients falls within the range (0.2–13.4 events/patient-year) reported in a study by Elliott et al. (*32*).

The rate of hypoglycaemia was expected to be higher in T1DM than in T2DM. This can be explained in the context of different treatment strategies for both types of diabetes and different pathophysiology. In parallel, the counter-regulatory physiological defences against hypoglycaemia (decreases in insulin and increases in glucagon) are impaired in patients with diabetes with beta-cell failure. This failure is absolute in T1DM and more gradual in T2DM.

The higher rates of hypoglycaemia in both types of diabetes reported by our study can be explained differently. First, endocrinologists in Lebanon have low awareness on hypoglycaemia. Indeed, these specialists do not educate their patients about the risk of hypoglycaemia with insulin use, leading to lower levels of patients' knowledge about hypoglycaemia and related preventive measures. These observations reflect a less-advanced Lebanese healthcare system. Second, poor medical follow-up can result in higher rates of hypoglycaemia. A study done by Costanian et al. on the prevalence, correlates and management of T2DM in Lebanon found that adherence to management and self-care measures was suboptimal, resulting in high complication rates (*2*). Additionally, although the rate of glucose self-monitoring in the study was high (97.6% in T1DM and 90.5% in T2DM), the level of self-care was not adequate. Indeed, the patients were not aware of the risk of hypoglycaemia but were aware of hyperglycaemia, and frequent self-care is done to monitor hyperglycaemia rather than hypoglycaemia.

Although the results of the present study were lower or comparable to other findings, the impact of nocturnal hypoglycaemia should not be underestimated. Episodes of nocturnal hypoglycaemia may have been under-reported and undetected as patients may be unaware of such an event (*32*), because symptoms are

Figure 2 Percentage of patients reporting hypoglycaemia during the prospective period stratified by baseline glycated haemoglobin level for patients with T1DM and T2DM.



HbA1c = glycated haemoglobin; T1DM = type 1 diabetes mellitus; T2DM = type 2 diabetes mellitus.

absent during sleeping and glucose monitoring is rarely done at night (*33*). In T1DM patients, around 50% of all sever hypoglycaemic events occur during sleeping (*18*, *34*). Additionally, nocturnal hypoglycaemia affects patient's well-being and sleep duration and quality (*35*). Furthermore, sudden nocturnal death, also known as death-in-the-bed syndrome, is associated with nocturnal hypoglycaemia and contributes to 5–6% of all deaths among young patients with T1DM (*36*, *37*).

The rate of severe hypoglycaemia among patients with both types of DM was significantly high. Different studies have demonstrated that impaired awareness of hypoglycaemia is associated with higher rate of severe hypoglycaemia in T1DM (*25*) and T2DM (*38*). A recent large observational study reported an increased risk of mortality in the 12 months after a severe hypoglycaemic event (*39*). Moreover, neuroimaging has demonstrated transient cerebral deficits associated with neurological signs in patients who experience episodes of severe hypoglycaemia (*40*, *41*). The Edinburgh Type 2 Diabetes study concluded that severe hypoglycaemia is associated with both poor initial cognitive ability and accelerated cognitive decline (*42*).

It has been shown that older patients are more vulnerable than younger patients to hypoglycaemia (*43–45*). This may be due to different comorbidity, polypharmacy, cognitive impairment, impairment in counter-regulatory hormone responses, and malnutrition (*43*, *46*). In contrast to these previous studies, we found that older patients experienced lower rates of any and nocturnal hypoglycaemia. However, this may not reflect the reality as rates of hypoglycaemia are mainly under-reported in older patients. This is because such patients may be unfamiliar with the signs and symptoms of hypoglycaemia; loss of warning symptoms of hypoglycaemia (in older patients the threshold of autonomic symptoms of hypoglycaemia occurs at a lower blood glucose level); and cognitive impairment. In parallel, fear of hypoglycaemia was significantly associated with higher rates of any, severe and nocturnal hypoglycaemia. This is in line with the findings of a literature review that showed that patients' fear of future episodes causes them to suffer from anxiety and panic attacks that further increase the number of hypoglycaemic episodes (*47*). However, fear of hypoglycaemia may eventually lead to suboptimum insulin therapy and poor glycaemic control (*47*).

To our knowledge, this is the first observational study that addresses the impact of hypoglycaemia among Lebanese patients with DM. Our study involved both types of DM, allowing the comparison between these subgroups. In contrast to clinical trials and physicians' case reports, observational studies allow collection of a wide variety of related data that more or less reflect real-world practice. Thus, more accurate estimations are made. The simplicity of the questionnaires may have contributed to the high completion rate.

Several limitations to our study should be considered. First, data collected through questionnaires and self-reporting are usually subjected to recall bias. Although patient diaries were used in addition to the questionnaire to minimize recall bias, this step introduced some sort of overestimation of hypoglycaemia rates. Second, the short prospective duration may not reflect the fluctuations in hypoglycaemia rates throughout a whole year. Third, willingness to participate and local literacy rates were likely to have affected patients' participation. Furthermore, the observational nature of the study does not allow us to draw a causal relationship between hypoglycaemia and most of the included variables.

Conclusion

Further studies and analyses are required including a larger sample size for a longer prospective duration to detect the long-term impacts and associated complications of hypoglycaemia. Treatment strategies and glycaemia goals should be individualized according to patient preference, medical benefits, and risk of hypoglycaemia. Multidisciplinary integration among all healthcare providers is essential in educating patients about the definition of hypoglycaemia, associated substantial risks, treatment and preventive measures.

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Étude de l'outil d'évaluation de l'hypoglycémie : sous-analyse de la cohorte libanaise

Résumé

Contexte : L'hypoglycémie chez les patients diabétiques affecte leur observance thérapeutique, leur productivité et leur qualité de vie. Elle est également associée à un risque accru de complications cardio-vasculaires.

Objectifs : Examiner l'impact de l'hypoglycémie chez les patients traités par insuline dans la cohorte libanaise faisant partie de l'étude de l'outil d'évaluation de l'hypoglycémie.

Méthodes : L'étude de l'outil d'évaluation de l'hypoglycémie était une étude d'observation couvrant une période rétrospective de six mois et une période prospective de quatre semaines dans 24 pays, y compris le Liban. Les données ont été recueillies à l'aide de questionnaires d'auto-évaluation et des journaux de bord de 1158 patients libanais, âgés de 18 ans et plus, atteints de diabète sucré de type 1 ou 2 traités par insuline depuis plus de 12 mois, qui avaient été invités à participer à l'étude. Le principal critère d'évaluation était la proportion de patients ayant connu un épisode d'hypoglycémie ou plus pendant la période de suivi de quatre semaines.

Résultats : Après quatre semaines de suivi, 177 des 225 patients atteints de diabète sucré de type 1 [78,7 % ; intervalle de confiance (IC) à 95 % : 72,7-83,8] et 291 des 630 patients atteints de diabète sucré de type 2 (46,2 % ; IC à 95 % : 42.2-50.2) ont connu au moins un épisode d'hypoglycémie. Les taux d'hypoglycémie nocturne et sévère étaient respectivement de 10,7 (IC à 95 % : 9,1-12,3) et 13,2 (IC à 95 % : 11,5-14,9) épisodes/patient-année pour le diabète sucré de type 1, et de 3,3 (IC à 95 % : 2,8-3,8) et 4,2 épisodes/patient-année (IC à 95 % : 3,6-4,8) pour le diabète sucré de type 2. La peur de l'hypoglycémie était associée de manière significative à une hypoglycémie nocturne et sévère dans les deux types de diabète (p< 0,001).

Conclusion : Les résultats indiquent que les systèmes de soins de santé moins avancés au Liban contribuent à la faible connaissance des patients en matière d'hypoglycémie ainsi que les mesures préventives qui y sont liées. Les stratégies de traitement et les objectifs en matière de glycémie doivent être individualisés en fonction des préférences du patient, des avantages médicaux et du risque d'hypoglycémie.

دراسة معنية بأداة تقييم نقص سكر الدم: تحليل فرعي لمجموعة أترابية من سكان لبنان

ميراي عمّ، محمّد روّاس، زيليا فرنسيس، مايا شهاب الدين، أمل شلفون، مازن العاقل، ماري مرعب

الخلاصة

الخلفية: يؤثر نقص السكر في الدم بسبب داء السُّكَّري على مدى الامتثال للعلاج، وإنتاجية المريض، وجودة الحياة. كما يقترن أيضاً بزيادة مخاطر مضاعفات أمراض القلب والأوعية الدموية.

الأهداف: هدفت الدراسة إلى دراسة أثر نقص السكر في الدم في مجموعة أترابية من المرضى في لبنان من الذين يُعالَجون بالأنسولين، وشملتهم الدراسة المعنية بأداة تقييم نقص السكر في الدم.

طرق البحث: شملت الدراسة المعْنية بأداة تقييم نقص السكر في الدم دراسة رَصْدية استرجاعية غطَّت فترة 6 أشهر، وأخرى استباقية غطَّت فترة 4 أسابيع في 24 بلداً، منها لبنان. وقد جُمعت البيانات باستخدام استبيانات التقييم الذاتي ويوميات المرضى من 1158 مريضاً لبنانياً تتراوح أعمارهم بين 18 عاماً وأكثر، من المصابين بالنمط 1 أو 2 من داء السُّكَّري الذين ظلوا يُعالَجون بالأنسولين لمدة تزيد عن 12 شهراً. وكانت نقطة النهاية المبدئية هي نسبة المرضى الذين يحدث لهم نقص السكر في الدم مرةً واحدةً أو أكثر خلال فترة المتابعة التي تبلغ 4 أسابيع.

النتائج: تبيَّن من المتابعة التي استمرت 4 أسابيع أن: 177/ 225 [78.7 ٪؛ بفاصل ثقة 95٪: 72.7–83.8] من المرضى المصابين بالنمط 1 من داء السُّكَّري، و291/ 630 (46.2 ٪؛ بفاصل ثقة 95٪: 42.2–50.2) من المرضى المصابين بالنمط 2 من داء السُّكَّري حدث لهم نقص السكر في الدم مرة واحدة على الأقل. وقد بلغت معدلات النقص الليلي الحاد لسكر الدم 10.7 (بفاصل ثقة 95٪: 9.1–12.3) و13.2 (بفاصل ثقة 95٪: 11.5–14.9) من الأحداث/ المرضى – السنة بالنسبة للنمط 1 من داء السُّكَّري، و3.3 (بفاصل ثقة 95٪: 2.8–3.8) و4.2 من الأحداث/ المرضى – السنة (بفاصل ثقة 95٪: 3.6–4.8) بالنسبة للنمط 2 من داء السُّكَّري، على التوالي. وقد ارتبط نقص السكر في الدم ارتباطاً وثيقاً بحدوث نقص ليلي حاد لسكر الدم في كلا النمطين من داء السُّكَّري ($P < 0.001$).

الاستنتاجات: تُشير النتائج إلى ارتباط نُظم الرعاية الصحية الأقل تقدماً في لبنان بالمستويات الأدنى من معرفة المريض بنقص السكر في الدم والتدابير الوقائية ذات الصلة. ويجب أن تُعدّ استراتيجيات العلاج والمعدلات المستهدفة لمستوى السكر في الدم حسب احتياجات كل فرد وَفقاً لتفضيل المريض، والمنافع الطبية، ومخاطر نقص السكر في الدم.

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Prevalence of child abuse and its association with depression among first year students of Kuwait University: a cross-sectional study

Hind Almazeedi,[1] Shaikha Alkandari,[2] Hanan Alrazzuqi,[3] Jude Ohaeri[4] and Ghenaim Alfayez[4]

[1]Abdullah Al-Mubarak Health Center, Ministry of Health, Kuwait (Correspondence to: Hind Almazeedi: hindalmazeedi@gmail.com).

[2]Al-Osaimi Health Center; [3]Mubarak Al-Kabir Hospital, Ministry of Health, Kuwait. [4]Department of Psychiatry, Faculty of Medicine, Kuwait University, Kuwait.

Abstract

Background: Child maltreatment occurs across all cultures and societies. Research in Kuwait is necessary to document its prevalence and related factors.

Aims: To determine the prevalence of childhood abuse reported by first year students of Kuwait University in 2010 and its association with depression.

Methods: A random sample of first year undergraduates completed the Arabic version of the ISPCAN Child Abuse Screening Tools for young adults and were assessed for depression using the Patient Health Questionnaire (PHQ-9).

Results: Among 2508 respondents (70.9% female), 35.6%, 53.5% and 19.8% experienced at least one form of physical, emotional and sexual abuse, respectively. Physical abuse was more prevalent among boys ($P < 0.001$). For emotional and sexual abuse, sex differences were not statistically significant. Physical abuse was associated with living with the father, emotional abuse with living with the mother and sexual abuse with living with non-parents ($P < 0.001$). Most perpetrators were non-parents. Abuse was more prevalent among students whose parents were separated/divorced, whose fathers were polygamous and where monthly family income was < US$ 1800. Depression was significantly associated with all types of abuse and in multiple regression indicated it was one of the most important predictors of physical and sexual abuse.

Conclusion: Kuwaiti first year undergraduates commonly reported experiencing abuse. There is a strong need for child protection policies, improved legislation and prevention strategies.

Keywords: child abuse, maltreatment, depression, students, Kuwait

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Introduction

Background

Child maltreatment affects children worldwide and costs countries up to US$ 94 billion annually (*1,2*). In developed countries, overall prevalence is 2.3–16.0% (*3,4*). In a study involving 4 European countries, the prevalence of physical, emotional and sexual abuse was 5%, 25% and 4%, respectively (*5*). In the United States of America (USA), 28.4% and 4.5% of a national cohort of young adults reported having been physically or sexually abused, respectively (*3*). Rates among young adults in the United Kingdom were 25%, 6% and 16% for physical, emotional and sexual abuse, respectively (*4*). In Arab countries, overall prevaa lence is largely unknown as population-based studies are lacking (*6*). One national study done in Saudi Arabia in 2010–2011 found that prevalence among adolescents was 57.5%, 74.9% and 14.0% for physical, emotional and sexual abuse, respectively (*7*). Child abuse is strongly associated with depression, suggesting it may also contribute to a country's mental health burden (*1,2,8*).

Around one-third of Kuwait's inhabitants are children (*9*). Kuwait signed the United Nations Convention on the Rights of the Child in 1990 and passed a children's rights law in 2015 (*10*). However, few studies on child abuse in Kuwait exist. One national study found a prevalence of 15.0–18.0% for emotional, 3.4–5.8% for physical and 8.6–17.4% for sexual abuse (*6*). This is compounded by cultural acceptance of using physical punishment to discipline children (*11*).

Objectives

This research aims to determine the prevalence of physical, emotional and sexual abuse among first year university students in Kuwait; the association of abuse with sex, age, demographic characteristics, smoking, violent behaviour and criminal record; the co-occurrence of abuse types; the association between child abuse and depression; and the most important predictors of abuse.

It is hypothesized that physical, emotional and sexual abuse are present in Kuwait; that abuse is more common in households where parents are uneducated, unemployed, separated/divorced or polygamous; that physical abuse is more common in boys and emotional and sexual abuse are more common in girls; that exposure to one kind of abuse is associated with co-occurrence of other

types; and that exposure to child abuse is associated with depression. It is also hypothesized that perpetrators are mainly parents and that the most important predictors of abuse are a discordant parental marital relationship and low family income.

Methods

Participants and setting

Among Kuwait University's students (89.4% Kuwaiti), first year students were selected because their age made them better able to remember childhood incidents of abuse and allowed them to consent to our survey without parental permission. According to the schedules from the Dean of Admissions and Registration, the only common mandatory class required for all freshmen was English Language. This was selected in each faculty as the setting for questionnaire distribution. Participants were freshmen attending these classes.

The estimated sample size was calculated using prevalence from previous research in Kuwait (*6*). Based on a prevalence rate of 3.4% for physical abuse, 95% power, alpha error of 0.05, and precision, d, of 0.02 [as recommended when prevalence is < 10% (*12*)], the minimum sample size estimate was 2320.

Procedure

The research protocol was approved by the ethics committee of the Faculty of Medicine in Kuwait University and permission was granted from the head of each faculty. Volunteers who helped with survey distribution were instructed on the content of the questionnaire, consent forms, and how to aid participants seeking help for a previous abusive experience. Questionnaires were distributed over one week in December 2010 at the beginning of class, with prior permission from class instructors, and participants were given sufficient time to complete the self-reported survey. Written informed consent was obtained from all students.

Instruments

The survey included Arabic versions of the ISPCAN Child Abuse Screening Tools Retrospective (ICAST-R) and Patient Health Questionnaire (PHQ-9), 2 validated tools that detect child abuse and severity of depression (*1,13,14*). Soo ciodemographic information that was collected included sex, age, marital and smoking status, living conditions, family income and parental marital status, education and occupation. Students were asked about any recent involvement in physical fights and police arrests to evaluate violent and criminal behaviour.

The ICAST-R and PHQ-9 were translated into Arabic, back-translated to English, and compared with the available Arabic versions to ensure equivalence of meaning (*15*). Test–retest reliability for the ICAST-R was assessed by asking 55 second year students at the Faculty of Medicine to complete the questionnaire and repeating it one week later. Kappa statistics were used to measure intra-observer variation. For physical abuse items, apart from Question 22 (hit or punched at age 10–13), where the kappa value was 0.299, the kappa values for other items indicated moderate to substantial agreement (0.41–0.80) (*16*). The same agreement level was found for most emotional abuse items. For most sexual abuse items, the agreement was substantial (0.61–0.80).

Pilot testing and modification of the questionnaire

A pilot study done one month before the study included 29 students from the Faculty of Medicine (not included in the main study). The average time to complete the questionnaire was 9 minutes. Based on students' feedback about the survey, a few changes were made to the ICAST-R. "Faculty" was added in the demographic section. "Governorate" (as the administrative unit) replaced "City" as the latter is not applicable to a small country like Kuwait. The list of abuse perpetrators was regarded as too lengthy and was summarized into 3 categories (mother, father, others). Most students preferred yes/no answers, which led to the addition of "Yes", "No" and "Not applicable" responses to the questions.

Data analysis

We used *SPSS*, version 22 for Windows, to analyse the data. Frequency counts were used to clean the data, examine the normality of data distribution and calculate prevalence rates. Univariate analysis was used to test significant differences between groups. Multivariate analysis was used to assess independent predictors of dependent variables and the variance contributed by the predictors in the multivariate context, after adjusting for covariates. On examination of the frequency tables, we found that missing data were random events. For univariate analyses, missing data were handled by eliminating the subject from the respective analysis. For multivariate analyses, missing data were handled by list-wise deletion. The level of significance was set a $P < 0.05$, however, where there was multiple testing, a Bonferroni correction of $P < 0.01$ was used to avoid Type I errors.

Results

Demographics

Out of 2523 students who were sampled, 2508 participated and 15 refused, giving a response rate of 99.4%. Most students were female (70.9%) and 97.9% were aged 16–24 years. Kuwaiti students comprised 92.8%. Most students were single (93.5%) and 87.3% came from families where the parents were married. The sample included students from the Capital (22.4%), Hawalli (17.6%), Farwaniya (19.6%), Ahmadi (14.2%), Mubarak Al-Kabir (14.8%) and Jahra (11.3%) governorates.

Physical abuse

Among the participants, 35.6% (n = 818) were exposed to at least one form of physical abuse before age 18 years. Of these, 61.4% were hit/punched, 29.8% were kicked, 41.8% were beaten with an object (stick, whip, belt), 23.2% were

shaken and 22.5% were stabbed/cut with a knife or sharp object. Regarding perpetrators, 26.8% said it was someone other than the parents, 8.9% said it was the mother and 10.5% said it was the father.

Table 1 shows the significant associations of physical abuse, beyond the Bonferroni correction level of $P < 0.01$. Physically abused students were significantly more likely to be male (49.8% males vs 29.8% females), be between 25–34 years, study at the faculty of allied health, have divorced parents, live with their father, have an uneducated father, have a polygamous father, have a family monthly income < US$ 1800, smoke cigarettes, believe the abuse was frequent and unjustified, and be involved in violent behaviour and altercation with the police. They were also more likely to report multiple forms of physical abuse.

Emotional abuse

Prevalence of at least one form of emotional abuse before age 18 years was 53.5% (n = 1244). Of these, 84.2% were insulted or criticized to the point of feeling bad, stupid or worthless; 30.5% were told they were unloved; 27.6% wished they were dead or never born; 30.5% were threatened with being hurt/killed; and 13.6% were threatened with being abandoned. Regarding the perpetrators, 45.5% said it was someone other than the parents, 19.7% accused the mother and 15.4% accused the father.

There were no statistically significant age or sex differences in the prevalence of emotional abuse (Table 2), but exposure to multiple forms of abuse was slightly greater in males. Emotional abuse was significantly associated with parental divorce, living with the mother, having a polygamous family, studying

Table 1 Association of indices of physical abuse with sociodemographic and psychosocial variables

Sociodemographic variable	Significantly different groups	Total with abuse No. (%)[a]	χ^2	df
Sex (ever abused)	Male > female	318 (49.8 male)	79.5***	1
Sex multiple abuses[b]	Male > female	167 (26.1 male)	96.9***	5
Age group (ever abused)	25–34 years > others	19 (65.5)	12.2**	2
Age group multiple abuses[b]	25–34 years > others	16 (55.1)	58.4***	10
Faculty (ever abused)	Allied health > others	47 (43.9)	38.4***	10
Parent's marital status (ever abused)	Divorced/separated > others	78 (53.1)	22.7***	2
Parents' marital status multiple abuses[b]	Divorced/separated > others	50 (34.0)	57.9***	10
Living with who (ever abused)	With father > others	15 (51.7)	17.5***	3
Living with who multiple abuses[b]	With father > others > both parents	11 (37.9)	50.0***	15
Father's education (ever abused)	Primary education > others	28 (45.2)	17.5**	5
Polygamy (ever abused)	Polygamous > Monogamous	74 (40.7)	14.5***	2
Polygamy multiple abuses[b]	Polygamous > Monogamous	42 (23.0)	29.0***	10
Household multiple abuses[b]	Multiple wives in same household > others	112 (32.2)	37.6***	10
Monthly income (ever abused)	Income less than US$ 1800 > others	80 (53.7)	42.8***	4
Monthly income multiple abuses[b]	Income less than US$ 1800 > others	47 (31.6)	67.9***	20
Smoking status (ever abused)	Ex-smoker > others	22 (66.7)	67.9***	3
Smoking status multiple abuses[b]	Daily smoker > Non-smoker	45 (44.2)	138.5***	15
Violent behaviour multiple abuses[b]	Physical fight last year > No physical fight	127 (50.4)	316.0***	5
Police arrest multiple abuses[b]	Arrested by police > not arrested	63 (34.5)	88.2***	5
Physical abuse justified (ever abused)	Not for discipline/not reasonable or justified > others	62 (88.6)	324.2***	3
Physical abuse justified multiple abuses[b]	Not for discipline/not reasonable or justified > others	43 (61.4)	467.2***	15
Physically hurt compared with other children (ever abused)	Much more than other children > others	40 (83.3)	283.6***	4
Physically hurt compared with other children multiple abuses[b]	Much more than other children > others	33 (68.9)	462.3***	20

[a] *% of significant group. Because of missing responses, the overall total as denominator is less than the original total number.*
[b] *Multiple abuses: ≥ 2 forms of abuse.*
***P < 0.01, ***P< 0.001.*
df = degrees of freedom.

Table 2 Association of indices of emotional abuse with sociodemographic and psychosocial variables

Sociodemographic characteristic	Significantly different groups	Total with abuse No. (%)[a]	χ^2	df
Sex multiple abuses[b]	Male > female	179 (28.0 male)	15.8**	5
Faculty (ever abused)	Allied health > others	77 (70.6)	31.3***	10
Parents' marital status (ever abused)	Separated/divorced > others	106 (67.1)	13.5***	2
Parents' marital status multiple abuses[b]	Separated/divorced > others	74 (46.9)	88.5***	10
Living with (ever abused)	With mother > others	142 (68.6)	22.9***	3
Living with multiple abuses[b]	With mother > others	96 (46.4)	87.4***	15
Polygamy (ever abused)	Polygamous > monogamous	111 (59.0)	19.7***	2
Polygamy multiple abuses multiple abuses[b]	Polygamous > monogamous	60 (31.9)	58.8***	10
Household multiple abuses[b]	Multiple wives not in same household > others	78 (33.2)	33.2***	10
Monthly income (ever abused)	Income less than US$ 1800 > others	103 (66.5)	37.5***	4
Monthly income multiple abuses[b]	Income less than US$ 1800 > others	67 (43.2)	87.7***	20
Smoking status (ever abused)	Daily smoker > others	71 (67.0)	15.4***	3
Smoking status multiple abuses[b]	Daily smoker > nonsmoker	96 (39.7)	32.3**	15
Physical fights multiple abuses[b]	Physical fight last year > no physical fight	125 (49.0)	128.1***	5
Emotional abuse experience (ever abused)	Not for discipline/not reasonable or justified > others	116 (97.5)	456.1***	3
Emotional abuse justified multiple abuses[b]	Not for discipline/not reasonable or justified > others	95 (79.9)	840.1***	15
Emotionally abused compared with other children (ever abused)	Much more than other children > others	64 (97.0)	271.7***	4
Emotionally hurt compared with other children multiple abuses[b]	Much more than other children > others	56 (84.9)	662.6***	20

[a] *% of significant group. Because of missing responses, the overall total as denominator is less than the original total number.*
[b] *Multiple abuses (≥ 2 forms of abuse).*
***P < 0.01, ***P < 0.001.*
df = degrees of freedom.

at the faculty of allied health, having a family income < US$ 1800, smoking cigarettes, believing the abuse was unjustified, feeling more emotionally abused than other children and exhibiting violent behaviour.

Sexual abuse

Prevalence of at least one form of sexual abuse before age 18 years was 19.8% (n = 457). Of these students, 61.7% were exposed to someone's genitals, 14.2% were made to pose naked in front of a camera/video/webcam, 68.9% had someone forcibly touch their genitals, 37.2% were forced to touch someone else's genitals and 14.7% were forced to have sex. Only 36.8% of those abused notified someone, with 16.0% telling their mother, 3.4% telling their father and 28.0% telling a non-parent other. However, 18.8% waited at least one year before doing so. Upon revelation, 20.9% were believed and helped while 15.2% were not believed, were blamed, or not supported. Regarding the perpetrators, 17.7% accused someone other than the parents, 1.1% accused the mother and 1.1% accused the father.

There were no significant age or sex differences for sexual abuse (Table 3). Sexual abuse was significantly associated with parental divorce, polygamy, family income < US$ 1800, studying at the Women's College, living with non-parents, cigarette smoking, involvement in physical fights and police arrest.

Multiple types of abuse

Subjects exposed to more than one form of physical abuse were statistically significantly more likely to experience 2 or more forms of emotional abuse compared with those who were not physically abused (Table 4). They were also more likely to experience 2 or more sexual abuse forms compared with those who were never physically abused. Students who experienced more than one form of emotional abuse were significantly more likely to experience 2 or more forms of sexual abuse. In addition, those who experienced 2 or more forms of physical abuse by their mother were significantly more likely to experience multiple abuses by their fathers compared with those who were not physically abused by their mother.

Association of abuse with depressive symptoms

All 3 types of abuse were associated with depression. Depression scores increased with increased exposure to multiple forms of abuse. A significant correlation was evident between total physical abuse scores and PHQ-9 scores (r = 0.301, P < 0.001). Positive correlations were also found between total emotional abuse and PHQ-9 scores (r = 0.448, P < 0.001) and between total sexual abuse and PHQ-9 scores (r = 0.264, P < 0.001). Prevalence of depression in our sample was 76.6%, with 55.6% of students reporting mild or moderate depression.

Table 3 Association of indices of sexual abuse with sociodemographic and psychosocial variables

Sociodemographic variable	Significant different groups	Total with abuse No. (%)[a]	χ^2	df
Faculty[b]	Women's college > others	7 (20.5)	78.1**	50
Parents' marital status (ever abused)	Separated/divorced > others	53 (33.1)	20.9***	2
Parents' marital status[b]	Separated/divorced > others	68 (20.0)	31.7***	10
Living with who (ever abused)	Living with non-parent other > others > both parents	32 (34.8)	25.5***	3
Living with who[b]	Living with non-parent other > others > both parents	15 (16.3)	41.3***	15
Mother's education (ever abused)	Secondary education > others	77 (24.8)	17.3**	5
Polygamy (ever abused)	Polygamous > monogamous	38 (20.2)	12.6**	2
Polygamy[b]	Polygamous > monogamous	19 (10.1)	23.7**	10
Monthly income (ever abused)	Income less than US$ 1800 > others	52 (34.0)	29.5***	4
Monthly income[b]	Income less than US$ 1800 > others	27 (17.6)	49.4***	20
Smoking statusv	Daily smoker > non-smoker	11 (11.0)	59.2***	15
Physical fights[b]	Physical fight last year > no physical fight	43 (17.4)	32.6***	5
Police arrest[b]	Arrested by police > not arrested	28 (16.1)	27.1***	5

[a]*% of significant group. Because of missing responses, the overall total as denominator is less than the original total number.*
[b]*Multiple abuses (≥ 2 forms of abuse).*
***P < 0.01, *** P < 0.001.*
df = degrees of freedom.

Multiple regression analyses: predictors of abuse

Considering the significant univariate associations of child abuse as highlighted above, multiple regression analysis was used to determine the contribution of each factor in a multivariate context (Table 5). Of the factors that were significantly associated with physical abuse in the univariate analyses, the most important predictor of total physical abuse was recent involvement in a physical fight, accounting for 14.4% of total variance, followed by the depression (PHQ-9 total) score (6.0% of total variance), while the least important predictor was smoking status. For emotional abuse, the most important predictor was recent involvement in a physical fight, accounting for 5.2% of total variance, followed by living with the mother (2.7% of total variance), while the least important predictor was sex. It is important to note that depression score was not included in multivariate analysis for emotional abuse to avoid the problem of multicollinearity. The most important predictor for sexual abuse was depression score (7.1% of total variance), the second most important was recent police arrest (0.6%) and the least important was parental marital status.

Discussion

Overview

The prevalence of childhood physical, emotional and sexual abuse was determined in a sample of first year students of Kuwait University using validated questionnaires. Our findings were compared with our hypotheses, results from other countries and previous studies done in Kuwait. Most students in our sample were female (70.9%), which was expected since the registry of the Deanship of Admission and Registration showed 67.0% of freshmen enrolled that semester were female. Therefore, the proportion reflects the university's admission structure in regard to sex.

Physical, emotional and sexual abuse

The prevalence revealed by our study (35.6% physical, 53.5% emotional and 19.8% sexual abuse), while being in line with our hypothesis, surpassed the rates reported by the only national study done in Kuwait (*16*). This may be because our study defined abuse as any positive response. However, our definition of sexual abuse was deemed justifiable given the similar risk of developing negative outcomes after single versus multiple exposures to sexual abuse (*17*).

The higher rates of physical and psychological abuse in Saudi Arabia compared with Kuwait may be related to the popularity of larger-sized families in the former, which is positively associated with abuse (*7,18*). However, sexual abuse was slightly higher in Kuwait. A school-based survey of adolescents in 2007 in the United Arab

Table 4 Association between types of child abuse and association of perpetrators

Child abuse type	χ^2	df
Physical vs emotional	261.7***	15
Physical vs sexual	164.2***	14
Emotional vs sexual	632.9***	15
Association of perpetrators: mother vs father	11.2***	10

****P < 0.001.*
df = degrees of freedom.

Table 5 **Predictors of child abuse: multiple (stepwise) regression analyses: final regression models**

Dependent variable predicted	Significant predictors: independent variable	Variance (%)	Total variance (%)	Standard beta	*t*-value
Physical abuse	Physical fight during past year	14.4	26.6	0.29***	13.8
	Depression (PHQ-9 total score)	6.0		0.26***	12.2
	Sex (male)	2.7		0.15***	7.0
	Age (25–34 years)	1.5		0.10***	5.0
	Parents' marital status (divorced/ separated)	1.2		0.10***	4.9
	Household (live with other wives)	0.4		0.06**	3.03
	Smoking status (ex-smoker)	0.4		0.06**	0.0
Emotional abuse	Physical fight during past year	5.2	9.4	0.23***	10.4
	Living with mother	2.7		0.15***	6.8
	Family income < 600 KD	0.5		0.07***	3.2
	Faculty (Allied health)	0.4		0.06**	2.9
	Father's education (primary)	0.2		0.05*	2.2
	Smoking status (daily)	0.2		0.06**	2.7
	Sex (male)	0.2		-0.05*	-2.3
Sexual abuse	Depression (PHQ-9 total score)	7.1	8.4	0.26***	11.7
	Police arrest during past year	0.6		0.08***	3.7
	Living with non-parent/other	0.4		0.06**	2.8
	Parents' marital status (divorced/ separated)	0.3		0.06*	2.5

*$P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Emirates revealed rates of physical and emotional abuse similar to Kuwait, but lower sexual abuse (*19*). Kuwait's higher reporting of sexual abuse compared with other Gulf countries may be a result of more social openness concerning sensitive topics (*20*). Although sexual abuse among adolescents in Lebanon in 2006 was higher than Kuwait, this may be related to Lebanon's political unrest (*21*). Child abuse rates among young adults in national studies done in the USA (2001–2002), United Kingdom (1998–1999) and Europe (2002–2010) are lower than those found in Arab countries (*3–5*). This may be because many Arab countries lack child protection legislation and those with recent policies may face challenges with implementation. However, variations in rates are expected when using different methods and instruments so comparisons may be misleading. Differences in cultural backgrounds may also affect one's perception, and hence reporting, of abuse (*22*).

Co-occurrence of abuse

Exposure to one type of abuse was associated with increased likelihood of being exposed to other types, as hypothesized, and this is consistent with other studies (*23*).

Perpetrators

Perpetrators being mainly non-parents was unexpected. Studies in Kuwait have conflicting findings regarding perpetrators (*6,24*). In contrast, physical abuse in the USA was mostly perpetrated by parents and sexual abuse by others (*25,26*). Our finding may be attributed to the popp ularity of employing housemaids to care for children in Kuwait (*20*).

Sociodemographics

More physical abuse among males was as predicted, and matches the literature (*27*). However, prevalence of emotional abuse was slightly higher among males and no significant difference between the sexes was found for sexual abuse, which contradicts other findings (*27*). Prevalence of abuse was higher among students whose parents were divorced/separated, which agrees with our hypothesis and previous research (*6*). Fathers' educationn al level was inversely related to physical abuse, but this applied only to mothers in other countries (*28*). Students with polygamous fathers were exposed to more physical, emotional and sexual abuse than those with monogamous fathers. Research on polygamy is scarce, but there is evidence of its association with intimate partner violence (*29*).

Psychological distress

The significant association between all 3 types of child abuse and depression scores was in line with our hypothesis and replicated previous findings (*8*). Research shows depression can begin in early adulthood, as our study also showed (*30*). The linear association between exposure to child abuse and depression scores matches the literature (*31*). Students reporting that the abuse was not reasonable or justified is in line with distress levels revealed by the depression scores.

Child abuse predictors

The results of the multivariate analyses point to violent behaviour as the most important predictor of physical and emotional abuse, which was unanticipated. This, however, is consistent with research showing that abuse during childhood is related to later violent delinquency (*32*). The minor contribution of family income may be explained by conditions in Kuwait that narrow the gap between socioeconomic classes, such as free health care and education. Depression score was the most important predictor of sexual abuse, as the literature shows (*33*). Paa rental divorce and single parenting are known predictors of abuse, and this was found in our study and matched our hypothesis (*34*). Sex was not as important a predictor of emotional and sexual abuse as in other studies (*35*).

Limitations and strengths

The cultural sensitivity surrounding some questions, especially those related to sexual abuse, suggests prevalence may be underreported. Also, there is a likelihood of recall bias with self-reported questionnaires. University students typically belong to a higher socioeconomic class and this may have led to underestimation of the prevalence of abuse. Since most students were Kuwaiti, our results may not accurately reflect child abuse among non-nationals.

The strengths of the study include: the large and representative random sample of first year students who were more likely to remember childhood abuse experiences; the use of internationally validated instruments with adequate reliability indices; and the availability of the researchers to assist participating students.

If these rates are an underestimation, it is alarming to consider how much higher the population rates are. Findings relating child abuse to polygamy and violent behaviour are also concerning and call for further research. Finally, the high rate of depression among Kuwaiti adolescents is an unexpected finding that requires attention.

Conclusion

Our findings are in line with previous reports of relatively high prevalence of child abuse in Kuwait. With a clearer understanding of the risk factors of abuse, it becomes easier to identify children at risk and prevent maltreatment. The association of abuse with depression points to the importance of childhood experiences and widens the approach to managing mental illnesses. Further research on child abuse in Arab countries is necessary to study aspects that are specific to this region.

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Prévalence des mauvais traitements infligés aux enfants et association avec la dépression chez les étudiants de première année de l'Université du Koweït : une étude transversale

Résumé

Contexte : La maltraitance des enfants est présente dans toutes les cultures et sociétés. Des recherches doivent être menées au Koweït pour documenter sa prévalence et les facteurs qui y sont associés.

Objectifs : Déterminer la prévalence des mauvais traitements infligés aux enfants signalés par les étudiants de première année de l'Université du Koweït en 2010 et mesurer leur association avec la dépression.

Méthodes : Un échantillon aléatoire d'étudiants de première année a répondu à la version en langue arabe des formulaires de dépistage des mauvais traitements infligés aux enfants de l'ISPCAN destinés aux jeunes adultes, puis a été évalué dans une optique de dépistage de la dépression à l'aide du questionnaire sur la santé des patients (PHQ-9).

Résultats : Parmi les 2508 répondants (70,9 % de femmes), 35,6 %, 53,5 % et 19,8 % avaient subi au moins une forme de violence physique, psychologique ou sexuelle, respectivement. La violence physique était plus fréquente chez les garçons ($p < 0,001$). En ce qui concerne la violence psychologique et sexuelle, les différences entre les sexes n'étaient pas statistiquement significatives. La violence physique était associée au fait de vivre avec le père, la violence psychologique au fait de vivre avec la mère et la violence sexuelle au fait de vivre avec d'autres personnes que les parents ($p < 0,001$). Dans la majorité des cas, les auteurs de mauvais traitements n'étaient pas les parents. Les mauvais traitements étaient plus fréquents chez les étudiants dont les parents étaient séparés/divorcés, pour lesquels les pères étaient polygames et le revenu familial mensuel était inférieur à 1800 dollars US. La dépression était associée de manière significative à tous les types de mauvais traitements, et à l'analyse de régression multiple, elle était l'un des principaux facteurs prédictifs de violence physique et sexuelle.

Conclusion : Les étudiants koweïtiens de première année ont été nombreux à déclarer avoir été victimes de mauvais traitements. Il serait fortement souhaitable de mettre en place des politiques de protection de l'enfance, d'améliorer la législation et d'appliquer des stratégies de prévention.

انتشار إساءة معاملة الأطفال، واقتران ذلك بالإصابة بالاكتئاب بين طلاب السنة الأولى بجامعة الكويت: دراسة مقطعية

هند المزيدي، شيخة الكندري، حنان الرزوقي، جود أوزوما أوهيري، غنيم الفايز

الخلاصة

الخلفية: قد تحدث إساءة معاملة الأطفال في مختلف الثقافات والمجتمعات. وكان من الضروري إجراء بحث في الكويت لتوثيق مدى انتشار إساءة معاملة الأطفال والعوامل المرتبطة بذلك.

الأهداف: هدفت الدراسة إلى تحديد مدى انتشار حالات إساءة معاملة الأطفال التي أبلغ عنها طلاب السنة الأولى بجامعة الكويت في عام 2010، وارتباطها بالاكتئاب.

طرق البحث: اُختيرت عينة عشوائية من طلاب الجامعة للإجابة عن النسخة العربية من أدوات فحص إساءة معاملة الطفل الخاصة بالجمعية الدولية لمنع إساءة معاملة الأطفال وإهمالهم والموجهة للبالغين من الشباب، وقُدرت إصابتهم بالاكتئاب باستخدام استبيان صحة المرضى (PHQ-9).

النتائج: من بين 2508 مستجيبين للبحث (70.9 ٪ منهم من الإناث)، تبين تعرض 35.6٪، و53.5٪، و19.8٪ مرةً واحدةً على الأقل لشكل من أشكال الإساءة البدنية أو المعنوية أو الجنسية، على التوالي. وكانت الإساءة البدنية هي الشكل السائد للإساءة بين الفتيان ($P < 0.001$). وبالنسبة للإساءة المعنوية والجنسية، فلم يكن هناك فرقٌ يُذكر بين الجنسين. واقترنت الإساءة البدنية بالعيش مع الأب، بينما اقترنت الإساءة المعنوية بالعيش مع الأم، واقترنت الإساءة الجنسية بالعيش مع غير الآباء ($P < 0.001$). وكان معظم المعتدين من غير الآباء. وانتشرت حالات الإساءة أكثر بين الطلاب لأبوين منفصلين/ مُطلَقين، والذين كان آباؤهم متعددي الزوجات، والذين كان يقل دخل أسرتهم الشهري عن 1800 دولار أمريكي. واقترن الاكتئاب بصورةٍ كبيرة بجميع أشكال الإساءة، وتبين في الانحدار المتعدد أنه كان واحداً من أهم العوامل المُنبئة للإساءة البدنية والجنسية.

الاستنتاجات: كان من الشائع قيام الطلاب الكويتيين بالإبلاغ عن التعرض إلى إساءة المعاملة. وتوجد حاجةٌ مُلحةٌ إلى وضع سياسات لحماية الأطفال، وتحسين التشريعات ذات الصلة، واستراتيجيات الوقاية.

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Leveraging Global Fund investments for health systems strengthening: a qualitative case study on Morocco's Concept Note development

Nancy Bolan,[1] Abdellatif Azzouzi,[2] Kamal Alami,[3] Abdelali Alaoui,[2] Hafid Hachri,[4] Amina Latifi,[2] Erin Ferenchick,[1] Viviana Mangiaterra,[1] Sylwia Murray,[1] George Shakarishvili [1] and Yves Souteyrand [5]

[1]The Global Fund, Geneva, Switzerland (Correspondence to: Nancy Bolan: nbolan@umaryland.edu) [2]Ministère de la Santé, Rabat, Morocco. [3]UNAIDS, Rabat, Morocco. [4]Organisation mondiale de la Santé, Rabat, Morocco. [5]Organisation mondiale de la Santé, Tunis, Tunisia.

Abstract

Background: In 2014, the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) introduced a new funding model. Following notice of their 2014–2016 allocation, Morocco took the bold decision to reallocate its entire allocated investment (US$ 8 029 632) for health systems strengthening (HSS) and submitted a comprehensive request for funding solely for interventions to strengthen the health system.

Aims: To explore the specific barriers and facilitators to Morocco's novel development and submission of a cross-cutting HSS funding request to the Global Fund and to document lessons learned and recommendations for policy and programme leaders interested in leveraging Global Fund investments for health systems.

Methods: A thorough desk review of key documents and 15 in-depth qualitative interviews were conducted with key stakeholders in Morocco in 2017.

Results: In preparation for the funding request, Morocco carried out a comprehensive assessment of the health system, which included extensive dialogue with stakeholders and partners. This action was critical to developing a shared understanding and support for adopting a cross-cutting HSS approach. Despite concerns about potential negative effects of diverting funding from disease-specific programmes, visionary leadership advocated effectively for investing in HSS, and this paved the way for the development of a clear Concept Note requesting Global Fund financial support for the health system more broadly.

Conclusion: Morocco was the first country in the Global Fund's Middle/East North Africa region to invest its entire Global Fund allocation in strengthening the health system. Many important lessons have been learned from this novel experience and these are presented for shared learning. This opportunity for learning is timely as countries begin preparations for the upcoming funding cycle.

Keywords: Global Fund, Morocco, investment, health systems strengthening

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Background

In March 2014, The Global Fund to Fight AIDS, TB and Malaria (Global Fund) introduced a new funding model, which helped to foster the integration of disease control programmes into broader health systems with the aim of increasing overall efficiency of investments, addressing system-wide bottlenecks and maximizing health outcomes for the target diseases, HIV, tuberculosis (TB) and malaria (1). The new funding model introduced 2 strategic shifts in the Global Fund's business model. First, each country received a 3-year funding envelope with the amount based on disease burden, income level and other parameters, and had the flexibility to split the total allocation among HIV, TB and malaria programmes based on self-determined country-specific needs. Second, based on a differentiation approach, countries were given different levels of flexibility to also invest in health systems strengthening (HSS) with the aim of addressing system-wide bottlenecks benefitting the 3 disease programmes and beyond. The new funding model also required a country dialogue process to bring key partners together to explore how the available financial resources could be strategically leveraged for maximum impact.

The Global Fund announced this new funding model to Morocco's Country Coordinating Mechanism (CCM) in a letter dated 12 March 2014 [from the Global Fund to the CCM Chair], detailing funding amounts available for Morocco and proposing cross-cutting HSS funding by either including one or more cross-cutting HSS modules in one or more eligible disease concept notes or by submitting a separate HSS Concept Note for a stand-alone grant. In the letter it is also stated that the Global Fund would

consider HSS investment by a Band 4 country (higher income, lower disease burden) on an exceptional basis, together with Morocco's funding allocation in the amount of US$ 8 029 632 for 2014–2016. The figure was based on Morocco's disease burden and income level. For Band 4 categorization, higher income is defined as above US$ 2000 gross national income per capita; lower and higher disease burden is based on whether a composite measure of disease burden is below or above a Board-designated level. The letter suggested that the funds be used for TB programming, but noted that Morocco was invited to propose a revised "programme split" which would enable the country to reallocate the funding among the disease components and cross-cutting HSS in the manner that best met the country's identified needs. Any proposed reallocation was to be accompanied by documentation of the decision-making process, endorsement by the CCM and a clear articulation of the rationale for the proposed split.

In response, Morocco submitted a comprehensive Concept Note requesting that the entire proposed amount be reallocated exclusively to HSS support for the 3-year funding cycle. The Concept Note proposed interventions aimed at improving the health system to deliver priority programmes in response to the country's national public health issues (*2,3*). It was anticipated that the interventions would create a long-term impact by using a systems-based approach to reach those most in need, based primarily on demographics (i.e. underserved populations) and geography (i.e. areas with high disease prevalence).

On review of the initial Concept Note, the Global Fund Technical Review Panel expressed support for the novel request, noting it to be technically sound and strategically focused, identifying strategic gaps in the health system and interventions to contribute to greater efficiencies and improved health outcomes in HIV, TB and reproductive, maternal, newborn and child health (*4*). However, the Technical Review Panel also noted weaknesses in the initial HSS Concept Note, notably a lack of measurable indicators, benchmarks and timelines to achieve project goals. The Technical Review Panel required that these weaknesses be addressed prior to grant making.

In September 2016, subsequent to submitting acceptable revisions, Morocco was approved for €6 143 816 euros for HSS activities, with a grant implementation period of 3 years. The Secretary General's office at the Ministry of Health, having administrative responsibility for the 8 central departments, was proposed and accepted as Principal Recipient of the HSS grant. A management unit was created and placed under the authority of the Secretary General for the implementation of the grant.

While the Global Fund has subsequently articulated it's approach to health systems, such clear policy and technical guidance were not in place at the time and, thus, Morocco's decision was visionary. Morocco was the first country in the Middle East/North Africa (MENA) region to obtain a stand-alone HSS grant prior to the release of the Global Fund's 2017–2022 Strategy, which has placed building "resilient and sustainable systems for health" as a core strategic objective (*5,6*). At the time of Morocco's application, the Global Fund's strategy included support to HSS. However, with the adoption of the new strategy in 2017, the Global Fund shifted its support from HSS to building resilient and sustainable systems for health to emphasize strong support to community systems. In this study both terms are used. HSS will be used to refer to the Concept Note, and "resilient and sustainable systems for health" (RSSH) will be primarily used throughout this paper to represent the Global Fund's current work on health systems as the term more accurately represents the new approach and terminology.

This case study explores the unique context, process, content and actors, which enabled Morocco to successfully submit a cross-cutting funding request. Key lessons learned and recommendations for policy and programme leaders interested in leveraging Global Fund investments for health systems are also extrapolated here.

Methods

We employed a 2-stage qualitative methodology to explore the facilitators and barriers of Morocco's development of a cross-cutting HSS funding request to the Global Fund in order to develop a case study that aimed to posit lessons learned for other countries requesting Global Fund investments in the health system. The hypothesis was that the country dialogue process required by the New Funding Model, as well as strong national leadership, were key factors that enabled Morocco to overcome significant barriers which favoured disease-specific priorities over cross-cutting investments.

We applied Walt and Gilson's analytical model for health policy analysis as the operational framework for the case study with analytical attention to 4 interrelated aspects of health policy (actors, content, context and process) (*7*) in order to better understand the dynamics of the country's decision and subsequent actions. The specific characteristics of a qualitative approach leant themselves to the proposed methodology: a belief in multiple realities; a commitment to identifying an approach to in-depth understanding of the phenomena; a commitment to participants' viewpoints; conducting inquiries with the minimum disruption to the natural context of the phenomenon; and reporting findings in a literary style rich in participant commentaries (*8*).

First, we undertook an initial desk review of key documents for background information on the contextual drivers, content and process of Concept Note development. The Ministry of Health of Morocco, the Global Fund and technical and financial partners provided 28 documents for review; additional searching identified 5 documents for inclusion in the review. Following this review, we conducted 15 in-depth interviews with key stakeholders in Morocco to better understand the dynamics of the process and the complementary

roles played by different actors leading to Concept Note development. We developed and utilized a semi-structured interview guide, based on Walt and Gibson's analytical model, to gather interview data. Interviews were audio-recorded and data were coded deductively using the model as the framework for content analysis to interpret themes from the data (*9*). Key stakeholders included Ministry of Health personnel, CCM members, representatives of key populations and representatives of the technical and financial partners involved in the development of the Concept Note and the early execution of the HSS project. In addition, an initial background meeting was held with 3 key staff at the Global Fund Secretariat in Geneva, Switzerland.

The Moroccan Ministry of Health gave permission for qualitative interviews to be conducted to complete this non-medical case study in accordance with the principles of the Declaration of Helsinki. All study participants provided verbal consent after they were informed about the purposes of the study and were assured of the confidentiality of their responses.

Results

Overview

A review of key documents allowed for an understanding of the context, content and processes involved in Concept Note development. In-depth interviews provided complementary information on the context and processes, as well as additional rich detail on the facilitators and barriers, with a focus on the role of actors.

Key document review

The desk review provided an initial window into the health agenda of incremental health system reform in Morocco. The Health Sectoral Strategy 2012–2016 affirmed Morocco's commitment to the principle of primary health care reform as the means to achieve universal health coverage and to strengthen the performance of the health system broadly (*3*). It reflected the principles articulated in Morocco's new constitution of 2011, which captured the political and social changes sweeping Morocco and the Arab world and enshrined the right to health, the "democratization" of the health sector and gender equity as constitutional rights, in order to assure equal access to health care by all Moroccan citizens. Health system reform, underpinned by the Strategy, aimed to decentralize health administration to the regional level and strengthen health system governance through measures including the promotion of closer collaboration with civil society and the private sector. The primary objective of the reform was to ensure universal coverage/access to a consistent, high quality package of primary care services, based on locally provided family practice, for underserved peripheral areas (*2*). The Second National Health Conference was held in July 2013 to encourage the participation of all stakeholders and citizens in the health system reform process (*8*).

Against this promising landscape, the desk review also revealed that Morocco's health system was characterized by numerous gaps and bottlenecks to the provision of quality health services. Despite the improvements in health secured in Morocco over the preceding 20 years, significant challenges remained with regard to inequalities in the provision and use of health services among population groups and regions, and between urban and rural areas. Potential risks existed with emerging and re-emerging diseases and the environmental risks and social problems encountered by vulnerable populations. Disparities disproportionally affected underserved populations and/or marginalized groups (primarily sex workers and clients, men who have sex with men, people who inject drugs, people living with HIV, prisoners, migrant populations and seasonal workers). Approximately one-third of Morocco's population did not have health insurance. The health system was characterized by insufficient systematic organization of care provision at different levels and was unable to assure access to a minimum set of services for target diseases and priority health issues at all levels of the system, including referral mechanisms between levels of care and types of facilities (*2*). Health system gaps were documented in numerous field-based assessments carried out in preparation for articulating the 2017–2021 Moroccan Health Sector Strategy and developing a funding request to the Global Fund. Assessments were commissioned to examine critical facets of the health system; these included reviews of the national HIV and TB programmes, referral and procurement systems, national laboratory functionality, and partnership with civil society, etc. The WHO and UNAIDS country offices provided support for a number of these consultations (*9–14*) (in 2014, WHO and the Global Fund signed a Memorandum of Understanding whereby the Global Fund allocates specific funding to WHO to financially and technically support Concept Note development processes). **Key gaps in the provision of quality health services were identified in 2015 and are detailed below:**

- **Service availability:**
  - disparities in standardized service availability for people with the priority diseases;
  - difficulties in access for vulnerable groups due to geographical, institutional and financial barriers;
  - non-functional referral and counter-referral systems resulting in loss to follow-up;
  - lack of comprehensive case management for key populations;
  - lack of access to quality, standardized care for prisoners, migrants and asylum seekers.
- **Human resources for health (HRH):**
  - insufficient numbers and uneven distribution of HRH between regions, provinces, urban/rural areas;

  - challenges to full implementation of planned health decentralization related to HRH;
  - insufficient quality of care provision;
  - absence of a structured plan for strategic management of HRH;
  - inadequacy of HRH capacity-building programmes;
  - lack of adequate HRH-related data;
  - teaching curricula at medical schools not geared towards general medicine/public health.
- **Procurement and supply chain management/ laboratories**
  - poor quantification and inadequate management system for procurement and supply chain management;
  - product storage facilities falling short of standards;
  - lack of supervision and training of product management staff;
  - commodity quality assurance system not sufficiently in place;
  - lack of sufficient standardization, oversight, coordination and governance of laboratories.
- **Governance:**
  - lack of integration and coordination by vertical health programmes;
  - limited exposure to results-based planning methods;
  - limited inclusion of private or community-based partners in planning;
  - limited managerial capacity in decentralized structures;
  - limited incorporation of gender approach in health sector terms of responsibilities.
- **Surveillance/health information system:**
  - lack of integration of parallel vertical programmatic information systems with national system;
  - lack of robust information exchange systems and response capacity with laboratories;
  - gaps in use of information for decision-making (policies, actions).
- **HIV-specific gaps**
  - testing provision inadequate in key populations (e.g. sex workers, men who have sex with men, people who inject drugs);
  - inadequate prevention of maternal to child transmission (Option B+) coverage (estimated at 52% in 2014);
  - expansion of antiretroviral therapy coverage needed (estimated at just 48% of people living with HIV in 2016);
- **TB-specific gaps:**
  - dilapidated infrastructure and equipment in certain TB diagnostic and treatment centres;
  - high cost of TB medicines;
  - shortage of laboratory personnel, programme managers, disparities in distribution of pulmonary specialists;
  - gaps in case management, notably with children and with cases lost to follow-up;
  - limited TB control cooperation with community and nongovernmental organizations.
- **Community systems:**
  - insufficient identification of community-based organizations;
  - gaps in consistent capacity, quality of work and availability of services in target areas;
  - lack of integrated coordination mechanisms between government sector actors and civil society;
  - lack of recognition, motivation and training of community workers, leading to high turnover;
  - limited involvement of the private sector in service delivery targeting HIV, TB and maternal, newborn and child health.

The request for funding to the Global Fund, thus, sought to fill many of these gaps. The Concept Note development process was led by a steering committee, which included CCM members, Ministry of Health leaders and representatives from the Management Unit for Global Fund TB/HIV programmes as well as WHO and UNAIDS country directors and experts. The HSS Concept Note was drafted over a period of 3 months. Based on the identified bottlenecks, key actions and measures that could potentially be funded by the Global Fund and other financing partners were identified and prioritized for inclusion after a consultative process. Three national dialogues were held, facilitated by 4 technical consultants and supported by the 5% Initiative and UNAIDS, to reach consensus on the analysis of gaps and to discuss and validate the identified priorities. The 5% Initiative supported technical assistance with 3 experts: a country dialogue expert, a Concept Note development expert and a budget expert. Their primary objective was to assist Morocco's CCM and the Ministry of Health in preparing the HSS Concept Note by facilitating the 3 country dialogues; they also assisted the CCM in preparing and budgeting the grant according to Global Fund guidelines and incorporating all changes in the final grant document as per the Technical Review Panel's review comments. The dialogues also sought to bring all stakeholders, including key populations, on board towards a common understanding of HSS and the importance of moving beyond vertical programming to address health system bottlenecks in order to improve key disease control efforts. (*15*,*16*).

Documentation revealed a set of criteria, agreed upon by national dialogue participants, to prioritize interventions for inclusion in the Concept Note. This included: alignment with the Sectoral Health Strategy 2012–2016; consideration of the needs of the underserved; adherence to guidelines from the Global Fund for producing the HSS Concept Note; results of regular exchanges and ongoing consultations with the Global Fund country team (e.g. conference calls and country visits); consideration of human rights, gender and basic needs of the key populations and people living with HIV; mapping of available domestic and international funding; complementarity with other funded programmes/projects aimed at strengthening the health system; and financial resources needed to cover the needs of priority programmes. The final preparatory phase encouraged the integration of comments and remarks from the various stakeholders, and the final draft of the Concept Note included several key content areas that met the above criteria. Main content areas and objectives are described below (17):

- **Service delivery**
  - represented 58% (US$ 4.6 million) of total grant amount;
  - promotion of integrated approach through the delivery of minimum packages of activities at the primary health care level;
  - promotion of local care/family medicine;
  - strengthen referral pathways to ensure continuity of case management and reduce loss to follow-up;
  - strengthen the integration of HIV (i.e. prevention of maternal to child transmission) and TB prevention/curative services at all levels (*18*).
- **Procurement and supply management/laboratory systems**
  - represented 17% (US$ 1.34 million) of total grant amount;
  - ensure the availability of essential drugs of high quality and proven efficacy [note: funding for pharmaceuticals primarily from domestic resources (US$ 250 million in 2014)];
  - address funding gaps related to logistics management, infrastructure improvement and quality assurance.
- **Human resources for health (HRH)**
  - represented 15% (US$ 1.2 million) of total grant amount;
  - skills development for HRH including community workers;
  - address funding gaps related to management and training (i.e. initial and continuing education).
- **HSS programme management**
  - represented 11% (US$ 852 450) of total grant amount;
  - strengthen monitoring of RSSH interventions to guarantee efficient implementation/risk management.

Qualitative interviews

In-depth interviews provided detail on context and process as well as on key barriers and facilitators for Concept Note development and informed lessons learned and recommendations.

National champions advocating for more attention towards HSS articulated that the country had reached the limits of vertical programming with the existing TB/HIV projects. They strongly believed that the availability of the Global Fund's HSS funding provided a timely opportunity for the country. One stakeholder asserted, "We knew that the way forward would be a health systems approach … that would tackle specific systemic and cross-cutting bottlenecks, including addressing issues of equity and quality of care." Another said, "The situation is changing, people with HIV and TB have comorbidities and chronic diseases that they need comprehensive care for … also there is now more mixing of the population with migration and new cultural liberties, so HIV risks may spread to others not normally at risk. We need to go beyond business as usual." Key stakeholders interviewed emphasized that a cross-cutting systems approach would enable a more expeditious reform process leading to more sustainable health interventions for the target diseases laterally across all health programmes, especially given the increased pressure on the health system related to population growth and increased health seeking behaviours. One interviewee noted, "This opportunity came at the right time. We needed these funds urgently in order to face increased demand coming from increased access of the population."

Advocates at the Global Fund described the grant as an opportunity for the country to capitalize on what had been achieved by the HIV and TB programmes to date and to enable the country to take a decisive step forward, in both quantitative and qualitative terms, by removing barriers to prevention and care for the most vulnerable, with an eye towards sustainability. It was also seen as an opportunity for the Global Fund to ensure long-term benefits from the investments it had made in Morocco for over 10 years and demonstrate its commitment to investing in strengthening health systems globally.

The interviewees provided valuable insight on the barriers facing those advocating for a systems approach, notably the reluctance of some in-country stakeholders and Global Fund headquarters staff who questioned the approach with intense scrutiny, and expressed concerns about the potential negative effect on HIV and TB activities as well as the presumed difficulties from a new way of working and the corresponding increases in workload. Stakeholders noted that skilled facilitation and diplomacy was required to convince the communities affected and all partners of the expected benefits of pursuing a more integrated systems approach – compared with a vertical disease-specific approach – and to arrive at a successful

prioritization of the needs. **Additional barriers noted in key stakeholder interviews are summarized below:**

- **Compressed HSS Concept Note development and project implementation timeline:**
  - ambitious and condensed preparatory process over 18 months, from the initial communication noting HSS funding opportunities in March 2014 to successful approval of request by the Technical Review Panel in September 2015;
  - preparatory consultations conducted on a very tight timeline, given deadlines set by the Global Fund;
  - ambitious 3-year implementation timeline for the HSS grant;
  - potential of system-wide bottlenecks to impede sustainability of HIV/TB national responses.
- **Investment in and negotiation with all parties to support and advocate for HSS:**
  - need for full collaboration and integration across multiple central Ministry of Health directions and constituents;
  - internal scepticism from disease-specific colleagues in the Global Fund Secretariat.
- **New procedures and management approaches for all:**
  - new Global Fund HSS procedures and the technical requirements were challenging;
  - new structures required for community involvement in co-management of health facilities;
  - incorporating civil society organizations into health system decision-making processes;
  - boundaries pushed on discussions about human rights and discrimination;
  - complicated context of changing political and cultural norms post-Arab Spring;
  - need to strengthen civil society organizations to fill gaps in services to key populations;
  - need to bridge cooperation with civil society organizations and to increase capacity and quality of civil society organization partners.

There was consensus among the interviewees that Morocco's success in leveraging Global Fund investments for its health system was in large part due to the vision and advocacy of critical stakeholders, notably the Secretary General of the Ministry of Health, with critical support from senior staff at WHO, UNAIDS and the 5% Initiative. One individual highlighted, "The Secretary General personally made a presentation to the CCM to demystify the HSS approach and to inform key stakeholders about the timeliness and urgency of this Global Fund opportunity." Other facilitators identified in the interviews included the capacity of the Ministry of Health to take a coordinating role; CCM leadership; and support from key partners, particularly WHO and UNAIDS, who pushed in-country disease-specific colleagues and communities to embrace a health systems approach and committed financial resources to the process. Interviewees discussed how experts at the 5% Initiative provided timely, high-quality technical assistance, skillfully assisting CCM and Ministry of Health leaders to manage the prioritization exercise for Concept Note development, given the sensitivities involved in making difficult choices. One interviewee noted, "HIV and TB national leadership and key populations had to be willing to consider their priority needs and programmes within a cross-cutting, systems perspective. This was not "obvious or easy". Another said, "Technical and financial partners came together and supported a unique vision, and this was essential."

Additionally, Morocco's Global Fund TB/HIV management unit and the unit coordinator, with 13 years of experience dating back to the early days of Global Fund support, worked in close cooperation with the new HSS Management Unit during the programme start-up period for the purpose of tool sharing and skills transfer and to ensure an integrated approach to activities. Morocco was the first country in the MENA region, and was among the first 7 countries in the world, to receive Global Fund financing in 2003. **Further facilitators are summarized below:**

- **National experience and past achievements:**
  - Ministry of Health and the coordinator of the Global Fund TB/HIV Management Unit built on 13 years of Global Fund experience;
  - previous health system achievements by Morocco aided the process of Concept Note development.
- **Leadership by the Ministry of Health:**
  - personal involvement and commitment of the Secretary General of the Ministry of Health;
  - strong support from the Minister of Health;
  - target disease national leadership (e.g. National AIDS Control Programme, National TB Control Programme) willing to invest in a cross-cutting approach;
  - the HSS programme start-up led by small, skilled HSS management unit
  - key committees to monitor the execution of the HSS programme: HSS steering committee (Comité de Pilotage du Programme renforcement du système sanitaire), HSS coordination committee (Comité de Coordination renforcement du système sanitaire) (with bilateral and multilateral donors), and oversight committee (Suivi);
- **Significant involvement by key technical partners: WHO, UNAIDS and the 5% Initiative:**
  - WHO and UNAIDS country offices participated in the steering committee for Concept Note preparation;
  - WHO and UNAIDS country offices supported financially and with technical expertise;

  - 5% Initiative supported technical assistance with 3 experts.
- **Strong leadership by CCM:**
  - CCM had over 13 years of experience with Global Fund grant management;
  - CCM successfully coordinated an ambitious and condensed HSS preparatory process;
  - CCM is involved in the oversight of HSS implementation and monitoring, including field visits.
- **Support from the Global Fund Secretariat and the Technical Review Panel:**
  - Technical Review Panel approved the entire HSS reallocation request and acknowledged the hard work done;
  - Global Fund Morocco Country Team, FPM and RSSH experts supported Morocco from Geneva and through in-country visits, providing guidance into HSS funding options and opportunities.
- **Favourable health policy environment:**
  - The 2011 Moroccan constitution stated that health is a human right and set a vision of gender equity; the consistency between constitutional rights, health policy as articulated in the Health Sector Strategy (2012–2016) and the HSS Concept Note was important for a harmonized approach;
  - HSS programme expanded services for vulnerable populations in line with a human rights approach (planned improvements in health services for key populations included universal access to quality risk reduction services for addiction prevention and treatment for people who inject drugs; addressing inadequate prison health services, including access to HIV/TB services; improving HIV/TB prevention and care for Moroccan police; and increasing access to HIV/TB prevention and care for immigrants/migrants and asylum-seekers);
  - national commitment to universal health coverage and primary health care was the driver for health system reform; the creation of a national health insurance programme (RAMED) in June 2012 also increased access to health care.
- **Involvement of community partners:**
  - the essential contribution made by civil society organizations to health systems acknowledged;
  - commitment to developing the capacity of civil society organizations in planning, monitoring and evaluating interventions;
  - sense of the urgency to developing a shared vision of partnership with the private health sector, including results/target-based approaches and contracting between the Ministry of Health and private actors;
  - commitment to involvement of local public authorities and local private sector for effective mobilization and efficient use of decentralized funds, which would lend itself to sustainability.
- **Strong governance:**
  - political stability and transparency in Morocco lent itself to full involvement by donors;
  - financial stability facilitated Morocco's contribution via 40% of project co-funding through transport vehicles, salaries to civil servants, infrastructure, medication procurement and training initiatives;
  - strong governance allowed for the timely development of the high-quality HSS Concept Note;
  - the transparent process for the choice of Principal Recipient and Sub-recipient included agreement on selection criteria and multipartner elections for Principal Recipient and Sub-recipient selection; transparent democratic procedures were also utilized for the selection of rotating CCM chairs (2003, 2006, 2012);
  - a performance-based funding project for 2015–2018 (World Bank & European Union) signed prior to HSS Concept Note submission, bringing complementarity;
  - performance-based funding HSS programmes were planned to improve governance in the health system.

Discussion

In this case study, we sought to better understand Morocco's process of developing its novel funding request focused on leveraging Global Fund investments to strengthen the health system. We explored barriers and facilitators to the process, in particular the role of divergent actors and a dynamic context. The initial desk review provided necessary background information, while insights gleaned by qualitative interviews enabled a deeper understanding of the issues, including certain insights that would not have been found in published reports. **These insights contributed to the formulation of key lessons learned and recommendations, summarized below:**

- **Be strategic:** Targeted investments in key elements of resilient and sustainable systems for health can be used to leverage broader health reforms.
- **Country ownership is the foundation:** Morocco took a proactive approach to reforming its health system and requesting HSS support from the Global Fund.
- **Build upon positive experiences:** Morocco built upon its national experience with the Global Fund and past health system achievements.
- **Good governance enables action:** Stability, transparency and strong governance favoured a high-quality Concept Note and strong grant start-up.

- **Strong leaders champion innovation:** Visionary leadership, commitment, innovative thinking and creativity of a small group made a difference.
- **Promote equality and equity:** Involvement of key populations, young people and women enriched the process.

In the case of Morocco, a collective understanding emerged from the Concept Note development process that investment in cross-cutting interventions could lend critical support towards overcoming specific systemic bottlenecks and more complex systems issues, pushing the country towards improved health coverage of previously under-prioritised populations and towards sustainability of actions. The process of developing a funding request for HSS support and putting the programme in place also served to reinforce national competence to assess and manage cross-cutting initiatives for the long-term for sustainable and cost-effective gains (*19*). This was, and remains, an innovative approach to leveraging Global Fund resources, clearly demonstrating how a systems approach can be used to improve the health of all, including by working towards ending communicable disease epidemics. The example of Morocco further reveals how targeted investments in strengthening key elements of health systems can contribute to integration and leverage broader health sector reforms.

We note 2 main limitations to this study. The interview schedule during the in-country visit was compressed. Additional time would have allowed for field visits and additional interviews, although overall the research approach generated a sufficient amount of data to answer key questions adequately. Additionally, the case study stops short of exploring the implementation period. Future research evaluating the success of the programme would likely reflect additional challenges encountered during the implementation phase of the project and provide further valuable lessons learned.

Conclusion

The Global Fund's vision has evolved over time to reflect the consensus that strong and effective health systems are a necessary prerequisite for, rather than the outcome of investment in disease control. The new Global Fund Strategy 2017–2022 now explicitly encourages countries to make use of the investments to build resilient and sustainable systems for health, with the aim of reaching more people affected by the target diseases and to increase the overall impact of funding by improving synergies between disease-specific programmes and the primary health care system.

Morocco is a case study of a country that embraced change and leveraged the financial opportunities from the Global Fund to strengthen the health system more broadly, moving beyond traditional disease-specific programming. It set forth an ambitious integrated health systems strategy in order to improve access and quality of health care for all Moroccans. This shift in thinking deviated from the way the country had historically invested Global Fund resources; thus, it required a concerted effort and innovative vision on the part of key stakeholders to advocate for a systems-based approach. Key individuals at the Ministry of Health, WHO and UNAIDS country offices, the 5% Initiative and the Global Fund Secretariat in Geneva, motivated by a sense of the importance of HSS in the context of Morocco, were also eager to depart from the traditional disease investment model and embrace a new comprehensive systems approach. Collectively, they provided essential support to the process to succeed in moving Morocco and the MENA region forward.

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Mobilisation des investissements du Fonds mondial pour le renforcement des systèmes de santé : une étude de cas qualitative sur l'élaboration de la note conceptuelle du Maroc

Résumé

Contexte : En 2014, le Fonds mondial de lutte contre le sida, la tuberculose et le paludisme (Fonds mondial) a introduit un nouveau modèle de financement. Suite à la notification de la mise à disposition de leur allocation pour 2014-2016, le Maroc a pris la décision audacieuse de réaffecter la totalité de l'investissement alloué (8 029 632 dollars US) au renforcement des systèmes de santé et a soumis une demande de financement globale uniquement pour les interventions allant dans ce sens.

Objectifs : Étudier les obstacles et les facteurs favorables au développement novateur du Maroc spécifiques au pays et examiner la soumission d'une demande de financement transversale au Fonds mondial pour le renforcement des systèmes de santé. Documenter également les enseignements tirés et les recommandations pour les responsables de politiques et de programmes qui souhaitent tirer parti des investissements du Fonds mondial pour les systèmes de santé.

Méthodes : Un examen approfondi des documents clés et 15 entretiens qualitatifs approfondis ont été menés auprès des principales parties prenantes au Maroc en 2017.

Résultats : En préparation de la demande de financement, le Maroc a procédé à une évaluation exhaustive du système de santé, qui comprenait un dialogue approfondi avec les parties prenantes et les partenaires.

Cette action était essentielle pour développer une compréhension et un soutien communs afin d'adopter une approche transversale du renforcement des systèmes de santé. Malgré les préoccupations concernant les effets négatifs potentiels d'un détournement du financement de programmes spécifiques à certaines maladies, des dirigeants visionnaires ont plaidé efficacement en faveur d'un investissement dans le renforcement des systèmes de santé, ce qui a ouvert la voie à l'élaboration d'une note conceptuelle claire demandant au Fonds mondial de soutenir financièrement le système de santé de manière plus générale.

Conclusion : Le Maroc a été le premier pays de la Région Moyen-Orient/Afrique du Nord à investir la totalité de son allocation du Fonds mondial dans le renforcement du système de santé. De nombreux enseignements importants ont été tirés de cette expérience inédite et sont présentés afin de servir à toutes les parties intéressées. Cette opportunité d'apprentissage arrive à point nommé, alors que les pays commencent à se préparer pour le prochain cycle de financement.

الاستفادة من استثمارات الصندوق العالمي لتعزيز النُّظم الصحية: دراسة حالة نوعية حول إعداد المذكرة المفاهيمية للمغرب

نانسي بولان، عبد اللطيف عزوزي، كمال علمي، عبد العالي علوي، إيرين فيرينشيك، حافظ عشري، فيفيانا مانجياترا، سيلفيا موراي، جورج شاكريشفيلي، إيف سوتيران

الخلاصة

الخلفية: في عام 2014، استَحدث الصندوق العالمي لمكافحة الإيدز والسُّل والملاريا (الصندوق العالمي) نموذجاً جديداً للتمويل. وعقب أن تلقى المغرب الإخطار الخاص به عن الفترة بين عامي 2014–2016، اتخذ قراراً جريئاً بشأن إعادة تخصيص الاستثمار المُخصَّص له بالكامل (وقيمته 8,029,632 دولاراً أمريكياً) لتعزيز النظم الصحية، وقدَّم طلباً شاملاً لتمويل التدخلات فقط لتعزيز النظام الصحي.

الأهداف: هدفت الدراسة إلى استكشاف العقبات الماثلة أمام التطور الجديد في المغرب، والعوامل المُيسِّرة لذلك، وتقديم طلب تمويل شامل لتعزيز النظم الصحية إلى الصندوق العالمي، وتوثيق الدروس المُستفادة والتوصيات الخاصة بالسياسات، وتحديد قادة البرامج المُهتمين بتحقيق الاستفادة القصوى من استثمارات الصندوق العالمي لصالح النظم الصحية.

طرق البحث: إجراء استعراض مستندي شامل للمستندات الرئيسية و15 مقابلة نوعية متعمقة مع أصحاب المصلحة الرئيسيين في المغرب في عام 2017.

النتائج: في إطار التحضير لطلب التمويل، أجرى المغرب تقييماً شاملاً للنظام الصحي، وشمل ذلك إجراء حوار مكثف مع أصحاب المصلحة والشركاء. وكان هذا الإجراء ضرورياً للوصول إلى فهم مشترك، والحصول على دعم لتبني نهج شامل لتعزيز النظم الصحية. وعلى الرغم من المخاوف بشأن الآثار السلبية المترتبة على تحويل التمويل بعيداً عن البرامج المعنية بأمراضٍ محددة، دعت القيادة التي تتمتع برؤية واسعة إلى الاستثمار في تعزيز النظم الصحية بشكل فعال، وقد مهَّد هذا بدوره الطريق أمام إعداد مذكرة مفاهيمية واضحة التماساً للدعم المالي من الصندوق العالمي على نطاق أوسع من أجل النظام الصحي.

الاستنتاجات: يُعتبر المغرب أول بلد في إقليم الشرق الأوسط/ شمال إفريقيا التابع للصندوق العالمي يقرر استثمار مخصَّصات الصندوق العالمي بالكامل في تعزيز النظام الصحي. وهناك العديد من الدروس المهمة التي يمكن تعلمها من هذه التجربة الجديدة وهي مطروحة من أجل استفادة الجميع منها. وقد جاءت هذه الفرصة للتعلم في الوقت المناسب، حيث تبدأ البلدان الآن التحضيرات من أجل دورة التمويل المقبلة.

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In-hospital acute kidney injury

Ahmed M. Alkhunaizi[1] and Munifah Al Shammary[1]

[1]Johns Hopkins Aramco Healthcare Dhahran, Eastern Province, Saudi Arabia (Correspondence to: A.M. Alkhunaizi: aalkhunaizi@gmail.com).

Abstract

Background: Hospital-acquired acute kidney injury is associated with increased mortality and has major public health implications. The incidence of in-hospital AKI in Eastern Saudi Arabia is not known.

Aims: To determine the incidence of in-hospital acute kidney injury in Eastern Saudi Arabia.

Methods: A single centre, retrospective cohort study at a major community hospital between July 2015 and July 2017.

Results: A total of 26 383 patients were hospitalized and 293 (1.11%) were diagnosed with acute kidney injury. Drug-induced AKI was diagnosed in 38 (13%) patients, while 255 (87%) patients had acute kidney injury not attributed to drugs. Full recovery of renal function was observed in 39% and 44% in the drug induced and non-drug induced acute kidney injury groups, respectively.

Conclusions: acute kidney injury is a serious complication in hospitalized patients. Full recovery of renal function was observed in a minority of patients.

Keywords: acute kidney injury, adverse drug effect, community hospital, kidney function, Saudi Arabia

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Introduction

Acute kidney injury (AKI) is a major public health concern and is associated with high morbidity, mortality and healthcare costs. The incidence of AKI has increased recently, both in hospital and community settings (*1,2*). It is estimated that > 13 million people are affected by AKI annually worldwide, with wide geographic variations according to countries, regions and economies (*1,2*). In the developed world, AKI manifests mainly in older patients and in the intensive care unit, while in developing countries, adults and women are more commonly affected (*3,4*). Despite all the advances in the field, mortality of AKI remains high; estimated at 24% in adults and 14% in children (*2*). In addition to the high mortality, hospital-acquired AKI is associated with high resource utilization, prolonged hospitalization, prolonged mechanical ventilation, and development of chronic kidney disease (CKD) (*5*). Recovery from AKI is not always, as previously thought, complete and many patients progress to develop CKD, end-stage renal disease (ESRD) or worsening of pre-existing CKD later in life (*6–8*). The objective of this study was to determine the incidence of in-hospital AKI in Eastern Saudi Arabia and to assess the recovery of renal function following AKI.

Methods

This was a single-centre retrospective cohort study at Johns Hopkins Aramco Healthcare (JHAH), a large community hospital in Eastern Saudi Arabia, between July 2015 and July 2017. We included 26 383 adult patients aged ≥ 18 years. Cases of AKI were obtained from hospital discharge records and coded according to the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). Etiology of AKI was classified into drug induced (DI) and non-drug induced (NDI). DI AKI was considered when a nephrotoxic agent was administered, and other factors that are known to cause AKI such as sepsis, hypovolaemia, hypotension, urinary obstruction, major surgery, and administration of intravenous contrast agents were excluded. Preadmission creatinine clearance (Cr Cl) was considered as the baseline value. Cr Cl was calculated from serum creatinine, age, ideal body weight and sex, using the Cockcroft–Gault formula (*9*). Patients with advanced CKD with a baseline Cr Cl < 10 ml/min were excluded. Recovery of renal function was classified into full, partial or no recovery if follow-up Cr Cl was > 90%, 50–90% or < 50 % of the baseline, respectively. Follow-up Cr Cl was calculated from serum creatinine at the first post-hospitalization encounter or, if not available, the last recorded value.

Baseline and clinical demographics were reported as mean (standard deviation), or median and interquartile ranges. Categorical variables were reported as numbers and proportions. Comparison of the mean values was performed using Student's *t* test while median values were compared using the Mann–Whitney *U* test. Population proportions were compared using the *Z* test. Sex ratios were compared using the χ^2 test. $P < 0.05$ was considered significant. Microsoft Excel 2013 was used for statistical calculations.

Approval for the study was obtained from the Institutional Review Board at JHAH.

Results

A total of 26 383 patients were admitted to the hospital over the study period, and AKI was diagnosed in 293 (1.11%). The mean age of affected patients was 68 ± 14.7 years (range 19–95 years) and the median baseline Cr Cl was 43 (27–63) ml/min. DI and NDI AKI were diagnosed in 38 (13%) and 255 (87%) cases, respectively. The demographics of patients with DI and NDI AKI are summarized in Table 1. Full, partial and no recovery was observed in 39, 37 and 24% in the DI AKI group compared to 44, 33 and 23% in the NDI AKI group; P = 0.56, 0.63, 0.89 for full, partial and no recovery, respectively. Nonsteroidal ant-inflammatory drugs (NSAIDs) were the most common agents leading to AKI (32%) followed by antibiotics (24%) and diuretics (18%).

Discussion

The aim of this study was to determine the incidence of AKI among hospitalized patients at a major community hospital in Eastern Saudi Arabia. This is the first study to address the issue in this region. Despite all the improvement in hospital care, a decline in renal function among hospitalized patients remains a significant event and is associated with high mortality, prolonged hospitalization and high cost (*10–12*). The reported incidence of AKI among hospitalized patients is variable and depends on multiple factors including study design, population characteristics, definition of AKI, time of reporting and geographical location. In our cohort, the diagnosis of AKI was made in 1.11% of hospitalized patients. We have used the ICD-9-CM coding to identify cases of AKI. ICD-9-CM is specific but not sensitive in identifying cases of AKI as has been shown in earlier studies (*13*). Thus, the result of our study may underestimate the true magnitude of AKI encountered in hospital settings.

In the United States of America, using the National Hospital Discharge Survey database, the incidence of AKI was reported at 1.9% in 2001 (*12*). In an earlier study, Hou et al. reported an AKI incidence of 4.9% in 2200 medical and surgical inpatients whose medical records were reviewed (*11*). A higher incidence of 7% was reported in a tertiary referral centre (*10*). Unlike community hospitals, academic tertiary medical centres provide care to patients with greater severity of illness and in whom AKI is more likely to develop. Other studies from other countries have reported an AKI incidence varying between 0.37% in Spain to 7% in China (*14,15*).

Age is an important factor that predisposes to the development of AKI. In our cohort, the mean age of the patients who developed AKI was 68 years. Similarly, the median Cr Cl was 43 ml/min, reflecting the susceptibility of older individuals and those with CKD to renal injury. Age, pre-existing renal insufficiency and severity of CKD are risk factors for developing AKI (*10,16,17*). A number of meta-analyses have shown how AKI risk, ESRD and mortality are independently determined by severity of CKD (*17,18*).

Drugs were the cause of AKI in 13% of the cases, and 87% of patients developed AKI due to other causes. An earlier report from Southern Saudi Arabia implicated drugs in 7% of all cases of AKI (*19*). In our cohort, NSAIDs were the most common drugs causing AKI, which is not surprising due to their extensive use and over-the-counter availability (*20,21*). We have not individually studied other factors that typically cause AKI such as sepsis, administration of intravenous contrast agents and major surgery. It is well known that sepsis is a leading cause of AKI among patients admitted to the intensive care unit ,affecting > 50% of patients (*22*). Similarly, major surgery is associated with AKI. We previously found that AKI affected 29% of patients who underwent cardiac surgery at our institution (*23*).

The group who developed DI AKI was younger than the NDI AKI group. The cause for this is not clear, and may be related to the fact that older individuals are more likely to have comorbidities that predispose them to AKI, as compared to the healthier and younger population. Similarly, the baseline Cr Cl of the DI AKI group was higher than that of the NDI AKI group; most likely reflecting the younger age of the DI AKI group. Recovery of renal function was poor as < 50% of the patients had full recovery and around 25% had no recovery. AKI is a known cause of CKD and multiple studies have shown that patients with AKI are at high risk of progression to advanced-stage CKD and death following hospital discharge. In a meta-analysis of 13 cohort studies comparing the risk of CKD, ESRD and death in patients with and without AKI, the pooled incidence of CKD and ESRD in patients with AKI was 25.8 and 8.6 per 100 person-years, respectively (*8*). Patients with AKI had higher risks of developing CKD, ESRD and mortality than patients without AKI (*8*).

Table 1 Characteristics of patients with drug induced and non-drug-induced acute kidney injury.

	Drug-induced AKI	Non-drug-induced AKI	*P*
Number (%)	38 (13)	255 (87)	
% Female	47	44	0.18
% Male	53	56	
Mean age (SD) (range), yr	63 (14.8) (21–87)	68 (14.5) (19–95)	0.02
Median Cr Cl (IQR) ml/min	53 (34–67)	42 (27–62)	0.049

AKI = acute kidney injury; Cr Cl = creatinine clearance; IQR = interquartile range; SD = standard deviation.

This study had several limitations related to the retrospective nature of the design. First, we used ICD-9-CM codes to ascertain the diagnosis of AKI. There is a potential for misclassification when administrative coding that depends on accurate documentation by healthcare professionals and hospital coders is used. Second, we did not look at other factors besides age and baseline renal function that predispose to the development of AKI. Third, we did not report the impact of AKI on length of hospital stay and there was no follow-up to evaluate long-term outcome and mortality. Finally, there was no cost analysis to assess the financial impact of AKI.

Despite the limitations, this study sheds light on the magnitude of AKI in the hospital setting and should help to implement standards for prevention, early recognition, and intervention. Future research should focus on more-accurate estimates of AKI and better describe the relative contribution of AKI to the utilization of healthcare resources in this region.

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Insuffisance rénale aiguë en milieu hospitalier

Résumé

Contexte : L'insuffisance rénale aiguë (IRA) d'origine nosocomiale est associée à une mortalité accrue et ses conséquences en matière de santé publique sont importantes. L'incidence de l'IRA en milieu hospitalier dans l'est de l'Arabie saoudite n'est pas connue.

Objectifs : Déterminer l'incidence de l'IRA en milieu hospitalier dans l'est de l'Arabie saoudite.

Méthodes : Il s'agissait d'une étude de cohorte rétrospective à centre unique qui a été menée dans un grand hôpital communautaire de juillet 2015 à juillet 2017.

Résultats : Au total, 26 383 patients ont été hospitalisés et 293 (1,11 %) ont été diagnostiqués comme étant atteints d'une insuffisance rénale aiguë. Une IRA d'origine médicamenteuse a été diagnostiquée chez 38 patients (13 %) tandis que 255 patients (87 %) ont développé une IRA qui n'a pas été attribuée à la prise de médicaments. Le rétablissement complet de la fonction rénale a été observé chez 39 % et 44 % des patients souffrant d'une IRA d'origine médicamenteuse ou non médicamenteuse, respectivement.

Conclusions : L'IRA est une complication grave chez les patients hospitalisés. Le rétablissement complet de la fonction rénale a été observé chez une minorité de patients.

إصابة الكلى الحادة داخل المستشفى

أحمد الخنيزي، مُنيفة الشمري

الخلاصة

الخلفية: يرتبط حدوث إصابة الكُلَى الحادة داخل المستشفيات بزيادة معدل الوفيات، ويترتب عليها آثار كبيرة على الصحة العامة. وليس معروفاً تحديداً معدل حدوث إصابة الكُلى الحادة داخل المستشفيات في شرق المملكة العربية السعودية.

الأهداف: هدفت الدراسة إلى تحديد معدل حدوث إصابة الكلى الحادة داخل المستشفيات في شرق المملكة العربية السعودية.

طرق البحث: أُجريت دراسة أترابية استرجاعية في واحدٍ من المراكز الصحية بأحد المستشفيات المجتمعية الكبرى في الفترة بين يوليو/ تموز 2015 ويوليو/ تموز 2017.

النتائج: بلغ مجموع المرضى الذين دخلوا المستشفى 26383 مريضاً، وشُخص 293 منهم (1.11٪) بإصابة الكلى الحادة. وشُخصت حالة إصابة الكلى الحادة الناجمة عن الأدوية في 38 مريضاً (13 ٪)، بينما لم تُعْزَ إصابة الكلى الحادة لدى 255 مريضاً (87 ٪) إلى الأدوية. ولوحظ حدوث تعافٍ تام لوظائف الكلى في 39٪ و44٪ في حالات إصابة الكلى الحادة الناجمة وغير الناجمة عن الأدوية، على التوالي.

الاستنتاجات: تُعتبر إصابة الكُلى الحادة من المضاعفات الخطيرة التي تحدث للمرضى الموجودين في المستشفيات. وقد لوحظ حدوث تعافٍ تام لوظائف الكلى لدى قليلٍ من المرضى.

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Sources of health information used by Qatari adolescents

Klaus Schoenbach[1]

[1]Northwestern University, Doha, Qatar. (Correspondence to: klaus.schoenbach@northwestern.edu).

Abstract

Background: In Qatar, health media campaigns and applications (apps) have not been particularly successful among adolescents. Arab culture suggests personal communication as a promising alternative.

Aims: This study aimed to assess the importance of personal communication for health information among Qatari adolescents compared with other sources.

Methods: A secondary analysis of a representative sample of 1117 Qatari adolescents was done in 2017 of their sources of health information. Data were analysed according to age group and sex.

Results: Personal communication was the most important source of health information (particularly parents and friends), together with a few selected Internet platforms for both sexes and age groups. Significantly more females used parents and Instagram as a source of health information than males ($P \leq 0.01$). Males used traditional media channels, online forums and Facebook significantly more often than females (all $P < 0.001$). Siblings, doctors/nurses, Twitter and Wikipedia were significantly more important for older adolescents ($P < 0.05$). Younger respondents relied on YouTube and health classes significantly more than older adolescents ($P < 0.05$).

Conclusions: Providers of health information for adolescents should take advantage of personal communication and pay attention to which Internet channels are used. Parents and friends are particularly important sources of health information.

Keywords: adolescents, health, health information, media of communication, Qatar

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Introduction

Qatar is a country with health problems among its adolescents *(1–3)*. The authorities have tried to convince them to become more health-conscious through campaigns and an online application (app) *(3,4)*. So far, not a single recent campaign has reached most Qatari adolescents *(3)* and the app has only been "ever downloaded or used" by 5% of Qatari adolescents *(3)*.

Scattered evidence about alternative sources of health information has already hinted at family and friends as the most used channels in Qatar, followed by the Internet *(5,6)*. In the Gulf region, personal communication appears important as well *(7–9)*, as also in South America *(10,11)* and Europe, North America, Australia and New Zealand *(12)*, above all among adolescents *(4,13–22)*. Arab culture should even strengthen the role of personal communication since it is more relationship-based *(23)* where personal connections play an important role *(24)* and social behaviour tends be more 'other-directed,' i.e., more determined by one's family, elders and peers *(25)*.

In particular, adolescents' friends should be a promising personal source for health information. Research has found that adolescents from 12 years upwards become increasingly less dependent on their parents *(26)*. Instead, they are receptive to approval or disapproval from peers outside the family; this seems even more the case among females *(27)*. Thus, personal sources seem to be particularly promising for reaching young people with health information, specifically in Arab cultures. Among these sources, the importance of adolescents' friends has been emphasized *(26)*.

The objectives of this study were to examine how popular personal contacts are for general health information among Qatari teenagers, specifically the role of friends, when compared to other sources of information. Research on sex and peer orientation *(27)* suggests two hypotheses: H1) female adolescents consult their friends more often than males for health information; and H2) the older adolescents are, the more often they consult their friends for health information *(26)*.

Methods

This study is a secondary analysis of a large representative survey of Qatari adolescents aged 13–20 years in order to gauge their health information behaviour *(3)*. Informed consent was obtained beforehand from both the adolescents and their parents. The survey was commissioned by Northwestern University in Qatar, administered by the Social and Economic Survey Research Institute, Qatar University, and conducted in Arabic on laptop

computers at schools, from 22 April to 17 May 2017. In total, 1117 Qatari nationals participated (response rate: 72%).

The sources for health information that Qatar's adolescents turn to was addressed by the question: "People get information about health from many different sources. For each of the following sources please indicate whether you have used them *at all* to get information about health topics." Possible answers were "yes", "no", "refused" and "not applicable" *(3)*. The 23 sources presented to respondents were compiled into the following categories:

- *Personal sources*: guardians (parents in most cases), siblings, friends, doctors/nurses;
- *Websites*: YouTube, Wikipedia, *SahtakAwalan* (Qatari health website), a medical website, online forums about health information, newspaper articles (online version), magazine articles (online version);
- *Social media:* Facebook, Snapchat, Twitter, Instagram;
- *Traditional media:* television (TV) news, TV shows (talk shows, reality shows, medical or other dramas), newspaper articles (print version), magazine articles (print version), radio, books;
- *Other*: leaflets/pamphlets (from a hospital, clinic or medical practice), health classes in school.

To test H1 and H2, the responses of females and males, and younger and older adolescents were compared. In the survey, sex was addressed by the question "What is your gender?" with responses "I am a female" and "I am a male" (50% of the respondents each). The age of the respondents was gauged by "What is your age in years?" *(3)*. The median age divided the respondents into a younger cohort (13–15 years, 45% of the respondents) and an older cohort (16–20 years, 55%).

The chi-square or Fisher exact test (one-sided) was used to assess the statistical significance of differences between these groups. A *P*-value ≤ 0.05 was considered statistically significant.

Results

For more than three quarters of all respondents and for their four subgroups separately, personal sources were the most popular source for health information, in this order: parents, friends, siblings and doctors/nurses. One website (YouTube) and two social-media platforms (Instagram and Snapchat) were equally important. Fewer Qatari adolescents mentioned other social-media platforms and websites, or more traditional sources such as medical leaflets/pamphlets, TV, books and health classes. Radio, printed newspapers and magazines were consulted by about 30% of respondents (Table 1).

H1 (females consult friends more often than males) was not confirmed. On the contrary, parents were a more usual source of health information for females than for males ($P < 0.001$), and also Instagram ($P = 0.01$). Males, in contrast, used traditional media channels (TV news, print media and radio) significantly more often than females, as well as online forums, Facebook and heath classes (all $P < 0.05$).

H2 (the older adolescent are, the more friends-oriented they become) was also not confirmed. Siblings ($P < 0.001$) and doctors/nurses ($P = 0.04$) were significantly more important for older adolescents, as were Twitter ($P = 0.02$) and Wikipedia ($P = 0.05$). Younger respondents relied on YouTube ($P = 0.05$) and health classes ($P = 0.03$) significantly more than older adolescents.

Discussion

This analysis supports the assumption that personal sources of health information are the most important among Qatari adolescents. In Qatar, only two social-media platforms (Instagram and Snapchat) and one website (YouTube) were close in usage to personal sources. This result was valid equally for females and males, and younger and older adolescents.

Among the personal sources, and as predicted by previous research *(26)*, friends are extremely important, surpassed only slightly by parents. Females and males, and younger and older adolescents rely equally on their friends as sources of health information. Therefore, assumptions that females and older adolescents should be more friends-oriented (H1 and H2) are not supported. Instead, females depend slightly more than males on their parents for health information in general, which would contradict previous evidence *(27)*. In contrast to the concept of moral development *(26)*, the dominant role of the family in Qatari culture, especially that of parents, would appear to prevail even among females and older adolescents.

As a promising conclusion, health campaigns for adolescents in Arab countries should take advantage of personal communication with parents and friends to disseminate health information, supported by careful use of specific Internet platforms.

Limitations

Friends as sources of health information might possibly be more popular than measured in this secondary analysis because they could also be the unmentioned sources of health information on social media. Also, since this study is about health information in general, it could well be that adolescents use personal sources even more extensively the more serious the health issues are *(9)*.

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Table 1 Communication channel used to get information about health topics

Channel	All respondents	Females	Males	*P*-value	13–15-year-olds	16–20-year-olds	*P*-value
	% (*n*)	% (*n*)	% (*n*)		% (*n*)	% (*n*)	
Guardians	87 (1014)	90 (510)	83 (501)	< 0.001**	85 (420)	88 (591)	0.08
Friends	85 (1004)	86 (512)	84 (487)	0.31	86 (411)	84 (532)	0.33
YouTube	80 (1010)	80 (512)	80 (495)	0.48	82 (414)	78 (536)	0.05*
Siblings	79 (986)	79 (500)	78 (484)	0.31	74 (398)	82 (532)	< 0.001**
Instagram	78 (1011)	82 (509)	75 (499)	0.01**	78 (421)	79 (526)	0.30
Doctors/nurses	77 (981)	79 (500)	75 (479)	0.09	74 (400)	79 (516)	0.04*
Snapchat	76 (1013)	75 (505)	77 (505)	0.25	78 (421)	76 (529)	0.28
Medical leaflets	66 (964)	66 (485)	67 (476)	0.39	66 (395)	66 (512)	0.53
Television shows	66 (962)	65 (485)	67 (474)	0.36	66 (392)	66 (507)	0.48
Medical websites	64 (941)	66 (468)	62 (471)	0.11	66 (380)	62 (506)	0.12
Books	62 (972)	63 (488)	61 (481)	0.33	60 (392)	62 (519)	0.29
Television news	62 (959)	57 (469)	67 (480)	< 0.001**	60 (389)	63 (501)	0.20
Twitter	57 (975)	60 (489)	55 (484)	0.08	5 (397)	61 (518)	0.02*
Health classes	57 (952)	54 (470)	60 (481)	0.03*	60 (389)	54 (501)	0.03*
Wikipedia	57 (960)	59 (475)	55 (483)	0.14	53 (387)	59 (512)	0.05*
SahtakAwalan	52 (941)	50 (468)	53 (470)	0.26	50 (382)	53 (502)	0.20
Newspapers (online)	47 (909)	46 (461)	49 (445)	0.22	46 (369)	47 (485)	0.40
Magazines (online)	46 (935)	47 (469)	44 (462)	0.20	47 (381)	44 (496)	0.21
Online forums	43 (944)	39 (479)	48 (463)	< 0.001**	42 (383)	43 (500)	0.36
Magazines (print)	37 (904)	31 (455)	42 (447)	< 0.001**	38 (362)	34 (487)	0.18
Newspapers (print)	36 (909)	31 (460)	41 (447)	< 0.001**	32 (371)	38 (484)	0.06
Radio	34 (903)	24 (446)	44 (454)	< 0.001**	32 (359)	35 (486)	0.22
Facebook	26 (862)	16 (415)	35 (444)	< 0.001**	24 (341)	26 (470)	0.26

**Statistically significant difference at P < 0.05 (chi-squared, Fisher exact test, one-sided). **Statistically significant difference at P < 0.01 (chi-squared, Fisher exact test, one-sided).*
[a]*Qatari health website.*
Values for n differ because of missing data (refused/not applicable responses).

Sources d'information sanitaire utilisées par les adolescents qatariens

Résumé

Contexte : Au Qatar, les campagnes médiatiques et les applications dans le domaine de la santé n'ont pas eu beaucoup de succès auprès des adolescents. Dans la culture arabe, la communication personnelle semble être une alternative prometteuse.

Objectifs : La présente étude visait à évaluer l'importance de la communication personnelle pour la diffusion d'informations sanitaires auprès des adolescents qatariens, en comparaison avec d'autres sources.

Méthodes : Une analyse secondaire des sources d'information sanitaire a été réalisée dans un échantillon représentatif de 1117 adolescents qatariens en 2017. Les données ont été analysées en fonction du groupe d'âge et du sexe.

Résultats : La communication personnelle était la principale source d'information sanitaire (notamment avec les parents et les amis), ainsi qu'un nombre limité de plateformes Internet pour chaque sexe et groupe d'âge. Les filles étaient nettement plus nombreuses que les garçons à recueillir des informations sanitaires auprès de leurs parents et sur Instagram ($p \leq 0{,}01$). Les garçons utilisaient les médias traditionnels, les forums en ligne et Facebook beaucoup plus fréquemment que les filles (en tout, $p < 0{,}001$). Les frères et sœurs, les médecins et le personnel infirmier, ainsi que Twitter et Wikipédia, constituaient des sources significativement plus importantes pour les adolescents plus âgés ($p < 0{,}05$). Les répondants plus jeunes s'appuyaient sur YouTube et les cours de santé de manière significativement plus importante que les adolescents plus âgés ($p < 0{,}05$).

Conclusions : Les fournisseurs d'informations sanitaires destinées aux adolescents devraient tirer profit de la communication personnelle et faire attention aux canaux Internet qui sont utilisés. Les parents et les amis sont des sources particulièrement importantes d'informations sanitaires.

مصادر المعلومات الصحية التي يستخدمها المراهقون القطريون

كلاوس شونباخ

الخلاصة

الخلفية: لم تُلاَق الحملات الإعلامية والتطبيقات الصحية نجاحاً بين المراهقين في قطر على وجه الخصوص. ووَفْقاً لمنظور الثقافة العربية، فقد يُعتبر التواصل الشخَصي بديلاً واعداً.

الأهداف: هدفت هذه الدراسة إلى تقييم أهمية التواصل الشخصي كمصدرٍ لحصول المراهقين القطريين على معلومات صحية مقارنةً بمصادر أخرى.

طرق البحث: في عام 2017، أُجري تحليل ثانوي شملَ عينةً تمثيليةً تتألف من 1117 مراهقاً قطرياً حول المصادر التي يحصلون منها على معلومات صحية. وحُللت البيانات حسب الفئة العمرية ونوع الجنس.

النتائج: كان التواصل الشخصي أهم مصدر للمعلومات الصحية (خاصةً من الأبوين والأصدقاء)، بالإضافة إلى قليل من منصات الإنترنت المُختارة لكلا الجنسين والفئة العُمرية. وتبين أن الإناث يلجأن إلى الأبوين أو الإنستجرام كمصدر للمعلومات الصحية بنسبةٍ أعلى بكثير من الذكور ($P < 0.01$). أما الذكور فكانوا يستخدمون الطرق التقليدية أكثر مثل القنوات الإعلامية، والمنتديات الإلكترونية والفيسبوك بنسبة أعلى بكثير من الإناث ($P < 0.001$). وبالنسبة للمراهقين الأكبر سناً، كان الإخوة والأطباء/ الممرضون (الممرضات)، وتويتر، وويكيبيديا مصادر مهمة للغاية ($P < 0.05$). أما المستجيبون الأصغر سناً، فكانوا يعتمدون بصورةٍ أكبر على يوتيوب والفصول الصحية مقارنةً بالمراهقين الأكبر سناً ($P < 0.05$).

الاستنتاجات: يجب أن يستفيد مقدمو المعلومات الصحية للمراهقين من التواصل الشخصي، مع الانتباه إلى نوعية قنوات الإنترنت المُستخدمة. ويُعتبر الآباء والأصدقاء مصادر مهمة للمعلومات الصحية على وجه الخصوص.

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Shiga toxin-producing bacteria as emerging enteric pathogens associated with outbreaks of foodborne illness in the Islamic Republic of Iran

Elahe Tajeddin,[1,2] Leila Ganji,[1,3] Zahra Hasani,[1] Fahimeh Sadat Ghoalm Mostafaei,[1] Masoumeh Azimirad,[1] Parisa Torabi,[1] Seyed Reza Mohebbi,[4] Nooshin Aghili,[5] Mohammad Mehdi Gouya,[5] Babak Eshrati,[5] Mohammad Rahbar,[3] Siamak Mirab Samiee,[3] Marjan Rahnamaye Farzami[3], Mohammad Reza Zali[4] and Masoud Alebouyeh[1]

[1]Foodborne and Waterborne Diseases Research Center, Research Institute for Gastroenterology and Liver Diseases, Shahid Beheshti University of Medical Sciences, Tehran, Islamic Republic of Iran. [2]National Nutrition and Food Technology Research institute, Shahid Beheshti University of Medical Sciences, Tehran, Islamic Republic of Iran. [3]Reference Health Laboratories Research Center, Ministry of Health and Medical Education, Tehran, Islamic Republic of Iran. [4]Gastroenterology and Liver Diseases Research Center, Research Institute for Gastroenterology and Liver Diseases, Shahid Beheshti University of Medical Sciences, Tehran, Islamic Republic of Iran. [5]Center for Communicable Disease Control, Ministry of Health and Medical Education, Tehran, Islamic Republic of Iran. (Correspondence to: Masoud Alebouyeh: Masoud.alebouyeh@gmail.com).

Abstract

Background: Detection of the cause of diarrhoeal diseases is important for the management of the outbreaks.

Aims: This study investigated the prevalence of Shiga toxin-producing bacteria in stool samples of patients with diarrhoea associated with outbreaks of foodborne illness in the Islamic Republic of Iran.

Methods: A total of 532 stool and rectal swab samples from 70 sporadic outbreaks during May 2014 to August 2015 were examined for infection with Shiga toxin-producing bacteria. The isolates were examined for carriage of the virulence genes stx_1 and stx_2 in all isolates and *eae*/*ehx*A in *Escherichia coli*.

Results: *E. coli*, *Shigella* spp., *Citrobacter* spp., *Enterobacter* spp., *Klebsiella* spp. and other enteric bacteria were detected in 77.7% (376/484), 5.0% (24/484), 3.9% (19/484), 0.4% (2/484), 3.7% (18/484) and 9.3% (45/484) of the samples respectively. Of the 196 sorbitol-negative *E. coli* strains, 3 (1.5%) carried the stx_1 gene as did 2 of the 19 (10.5%) *Citrobacter* strains.

Conclusion: Shiga toxin-producing *Citrobacter* spp. strains should be considered as a newly emerging foodborne pathogen in outbreaks.

Keywords: Shiga toxin, *Citrobacter*, foodborne diseases, disease outbreaks, Islamic Republic of Iran.

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Introduction

Shiga toxin-producing bacteria are the main cause of bloody or non-bloody diarrhoea. They can produce a life-threatening disease known as haemolytic uraemic syndrome. While *Shigella dysenteriae* serotype 1 most commonly produces this toxin, other members of the Enterobacteriaceae family, such as Shiga toxin-producing *Escherichia coli* and enterohaemorrhagic *E. coli*, as well as *Citrobacter spp., Enterobacter spp., Acinetobacter spp., Aeromonas spp. and Campylobacter spp., could also carry different* Shiga toxin (*stx*) *genes and their variants* (stx_1 and/or stx_2) *(1,2)*. Cooperation of Shiga toxins with other virulence factors, such as aggregative adhesin and intimin (*eae*), could induce more severe disease in infected patients *(3)*.

The *stx* genes are encoded in the genome of heterogeneous lambdoid bacteriophages and can be passed to other bacteria during horizontal gene transfer *(4)*. A high distribution of *stx* genes in farm or wild animals, wastewater, and land and aquatic environments suggests possible involvement of different bacterial species carrying these genes when *stx*-related diseases occur during outbreaks of water- and foodborne illness *(5)*. Prompt laboratory diagnosis of these pathogens could allow more effective outbreak responses and control measures to be instituted. We therefore investigated the prevalence of *stx*-encoding bacterial strains and typical virulence genes (stx_1, stx_2, *eae* and *ehx*A) in pathogenic bacteria isolated from diarrhoeal stool samples of patients taken during sporadic outbreaks of foodborne illness in the Islamic Republic of Iran.

Methods

Patients and samples

The Center for Communicable Diseases Control of the Iranian Ministry of Health and Medical Education provided 532 stool and rectal swab samples from 70 sporadic outbreaks of foodborne illness from 14 provinces of the Islamic Republic of Iran during May 2014 to August 2015. All data on patient symptoms and demographic characteristics were provided through a nationally approved

standardized questionnaire for outbreaks of foodborne illness.

Culture and characterization

Fresh stool or rectal swab samples were obtained from each patient in a sterile container and transferred to the laboratory of the Foodborne and Waterborne Diseases Research Center in Cary Blair medium at 4 °C. Rectal swab samples were immediately cultured on MacConkey and sorbitol MacConkey agar media (Merck, Germany), while stool samples were enriched in Selenite F broth. To find the common Shiga toxin-producing bacteria, all the purified lactose-fermenting and non-fermenting colonies were characterized biochemically, according to the standard identification guideline *(6)*. Serogrouping of non-sorbitol-fermenting *E. coli* (O157) and *Shigella* (A-D) strains was done using specific antisera (Baharafshan, Islamic Republic of Iran).

Molecular characterization

Identification of each bacterial strain and carriage of stx_1, stx_2, *ehxA* and *eae* genes in *E. coli* and stx_1, stx_2 and *eae* in non-*E. coli* strains was done using specific primers as shown in Table 1. DNA was extracted from the freshly grown colonies of the bacteria by a boiling method *(7)*. All polymerase chain reaction (PCR) amplifications were done in 25 µL volumes containing 4 µL of DNA template, 0.5 mM concentrations of deoxynucleoside triphosphates, 2.5 µL of 10X PCR buffer (GeneFanavaran, Islamic Republic of Iran), 0.75 mM $MgCl_2$, 0.3 µM concentrations of each forward and reverse primer and 0.2 U of Taq DNA polymerase (GeneFanavaran, Islamic Republic of Iran) under the following conditions: initial denaturation at 95 °C for 5 minutes, then 35 cycles of denaturation at 94 °C for 1 minute, followed by annealing at defined temperatures as shown in Table 1 for 1 minute, and finally extension at 72 °C for 1 minute.

Analysis

Descriptive analysis was done to report frequency of Shiga toxigenic and non-toxigenic bacteria in outbreaks of foodborne illness in the Islamic Republic of Iran. All the analysis was done using *SPSS*, version 17.0.

Ethical consideration

Ethical approval for the study was given by the Center for Disease Control and Prevention, Ministry of Health and Medical Education, and the National Institute for Medical Research Development, Islamic Republic of Iran.

Results

The samples were obtained from patients with symptoms of diarrhoea – at least five loose stools in 24 hours, vomiting, abdominal cramp, nausea, headache and/or fever. The patients were aged between 1 and 70 years. About one fifth (21.2%) of the patients with complete demographic data were younger than 10 years. Infection of different etiology was common in the patients at aged 6–10 years.

Of the 532 samples provided, 26 (4.9%) showed no growth for bacteria and 22 (4.1%) had positive results for intestinal viruses and parasites. These samples were excluded from the study, leaving 484 samples in which bacteria were identified.

E. coli was found in 376 samples, followed by *Shigella* spp. in 24 samples and *Klebsiella* spp. in 18 samples. The clinical finding associated with the type of infection are shown in Table 2. Blood in stools was found in a greater proportion of samples with *Shigella* infection (12.5%) than other bacterial infections. Vomiting and abdominal pain were found in a considerably greater proportion of infections with Shiga toxin-producing *E. coli* and *Citrobacter* strains compared with non-toxigenic ones. Infection with *Klebsiella* spp. was detected only in patients younger than 10 years; however infection with *Shigella* spp. was found in all age groups.

Infection with *Shigella* spp. was found in samples from eight different outbreaks of foodborne illness, mostly in the spring and summer (6/8, 75.0%). Samples with high counts of *Klebsiella* spp. or *Enterobacter* spp. were also found in samples from eight different outbreaks, mostly in the autumn and winter (5/8, 62.5%). *Citrobacter* infection was found in samples from 10 distinct outbreaks with no seasonal tendency. Faecal carriage of *E. coli* was confirmed in 77.7% of the samples (376/484), while infection with

Table1 Primer sequences used in the study

Gene	Primer sequences 5′–3′	Length of product (bp)	Annealing temperature (°C)	Reference
eae	F: TCAATGCAGTTCCGTTATCAGTT	482	54	8
	R: GTAAAGTCCGTTACCCCAACCTG			
stx_1	F: GAAGAGTCCGTGGGATTACG	130	50	9
	R: AGCGATGCAGCTATTAATA			
stx_2	F: GGATGCATCTCTGGTCATTG	478	50	10
	R: CTTCGGTATCCTATTCCCGG			
ehxA	F: AGCTGCAAGTGCGGGTCTG	569	55	11
	R: ACGGGTTATGCCTGCAAGTTCAC			

bp: base pairs; F: forward; R: reverse.

Table 2 Clinical symptoms of patients and microscopy findings according to the bacterial species isolated from patient samples during outbreaks of foodborne illness in the Islamic Republic of Iran

Bacteria[a]	Clinical and microscopy findings No. (%)[b]					
	Vomiting	Nausea	Fever	Abdominal pain	Headache	Blood in stool
Escherichia coli (*n* = 376)	71/129 (55.0)	91/126 (72.2)	52/115 (45.2)	10/115 (8.7)	38/117 (32.5)	10/376 (2.7)
Shigella spp. (*n* = 24)	4/9 (44.4)	7/10 (70.0)	10/10 (100.0)	3/11 (27.3)	4/11 (36.4)	3/24 (12.5)
Klebsiella spp. (*n* = 18)	2/2 (100.0)	2/2 (100.0)	2/2 (100.0)	2/2 (100.0)	2/2 (100.0)	0/18 (0)
Enterobacter spp. (*n* = 2)	NR	NR	NR	NR	NR	0/2 (0)
Citrobacter (non-toxigenic) (*n* = 17)	7/12 (58.3)	7/12 (58.3)	1/1 (100.0)	0/12 (0)	8/12 (66.6)	0/17 (0)
Shiga toxin-producing *E. coli* (*n* = 3)	2/3 (66.6)	2/3 (66.6)	1/3 (33.3)	2/3 (66.7)	0/3 (0)	0/3 (0)
Shiga toxin-producing *Citrobacter* (*n* = 2)	2/2 (100.0)	2/2 (100.0)	2/2 (100.0)	2/2 (100.0)	2/2 (100.0)	0/2 (0)

NR: not reported.

[a]*Other enteric bacteria were found in 45 samples. Other enteric bacteria were found as a single infection or in coexistence with some of the bacteria shown in Table 2.*

[b]*The difference in denominators from the total number of bacteria isolated (n) is because of missing information on symptoms in the questionnaires.*

Shigella spp. (5.0%, 24/484), *Enterobacter* spp. (0.4%, 2/484), *Citrobacter* spp. (3.9%, 19/484), *Klebsiella* spp. (3.7%, 18/484), and other enteric bacteria (9.3%, 45/484) was found in 22.3% of these samples (≥ 10^5 colony forming units/g).

Serological and molecular characterization

All the *Shigella* strains reacted with a polyvalent antiserum, defined as *Shigella* Poly A, and were characterized as *S. dysenteriae*. Serotyping of *E. coli* strains also verified association of these strains with non-O157 Shiga toxin-producing *E. coli* serological groups. The non-O157 Shiga toxin-producing *E. coli* strains showed *eae* negative/*ehxA* negative genotypes.

Infection with Shiga toxin-encoding bacteria

Analysis of sorbitol fermentation for colonies grown on sorbitol MacConkey agar plates showed infection with sorbitol-negative *E. coli* strains in 52.1% (196/376) of the samples. Carriage of stx_1 was determined in 1.5% (3/196) of sorbitol-negative *E. coli* and 10.5% (2/19) of *Citrobacter* strains. All the Shiga toxin-producing *Citrobacter* and *E. coli* isolates belonged to two distinct outbreaks in two neighbouring cities, about 80 km apart. The Shiga-toxin *Citrobacter* isolates were related to the same outbreak, which was reported 3 months after an outbreak caused by Shiga toxin-producing *E. coli*.

Discussion

Shiga toxins 1 and 2 are related toxins produced by certain bacteria and are implicated in bloody diarrhoea, haemorrhagic colitis, haemolytic uraemic syndrome and central nervous system complications *(12,13)*. An increased number of outbreaks caused by Shiga toxin-producing bacteria, especially in developed countries, is considered an important problems in health care systems *(14)*. While there are several reports of diarrhoea and outbreaks caused by Shiga toxin-producing *E. coli* serotypes, little is known about the other Shiga toxin-producing bacteria, such as *Citrobacter* spp., which is sporadically isolated from patients during outbreaks of food- and waterborne illness *(15)*. We found several outbreaks where *Citrobacter* spp., *Enterobacter* spp., *E. coli* and *Shigella* spp. were isolated from the patients as the only enteric pathogens. *Citrobacter* is an aerobic, Gram-negative bacillus commonly found in water, soil and food, and is part of the normal enteric flora of animals and humans. Few data are available on the overall frequency of *C. freundii* harbouring Shiga toxins 1 and 2 in outbreaks of foodborne illness and only sporadic cases of diarrhoea are documented compared with other enteric pathogens. In fact, the involvement of Shiga toxin 2-producing *C. freundii* in severe diarrhoea and haemolytic uraemic syndrome is limited to two reports *(16,17)*. A study in China investigated the presence of *stx* genes in 26 strains of *C. freundii* that were isolated from patients with diarrhoea. Their results suggest that Shiga toxin 2 is a virulence factor that plays an important role in the pathogenesis of *C. freundii (18)*. Analysis of our results showed carriage of the stx_1 gene in 10.5% (2/19) of *Citrobacter* strains. To the best of our knowledge, this is the first time that the occurrence of outbreaks of foodborne illness by stx_1-encoding *C. freundii* strains has been recorded. Since only a small proportion of these strains carried the stx_1 gene, the existence of other virulence factors in this bacterium seems possible. The other virulence factors that have been proposed for diarrhoea associated with *C. freundii* include heat stable toxins, cholera-like toxin and eae. The above-mentioned study in China showed that the capacity of *C. freundii* for aggregative adherence and cytotoxicity could explain most of its pathogenicity *(18)*. While the emergence of stx_1-encoding *C. freundii* in diarrhoea in our study is significant, *the* clinical importance and the role of these emerging strains in human pathogenicity have not yet been addressed. The *spread of* Shiga toxin-producing phages by horizontal gene transfer through environmental stimuli, such as antibiotics, may explain this emergence *(19)*.

The role of non-O157 Shiga toxin-producing *E. coli* in the occurrence of outbreaks of foodborne illness, as well as severe diseases such as haemolytic uraemic syndrome and haemorrhagic colitis, is well known *(3)*. Shiga toxin-producing *E. coli* was identified as the responsible

agent in nearly two thirds of outbreaks of foodborne illness associated with vegetables in the United States of America *(20)*. Shiga toxin-producing *E. coli* has been reported to be the cause of 2–40% of cases of diarrhoea in different studies *(21–24)*. In our study, only 1.5% (3/196) of non-O157:H7 sorbitol negative *E. coli* strains were positive for *stx*1. This frequency is lower than that reported in Shiga toxin-producing *E. coli* in Sweden (30.3% in non-bloody diarrhoea patients) *(25)*. This difference could be explained by the method used for characterization of Shiga toxin-producing *E. coli* strains, since we analysed only sorbitol negative isolates for screening of *stx* genes.

In conclusion, our results show the involvement of Shiga toxin-producing *Citrobacter* and *E. coli* in the occurrence of outbreaks of foodborne illness in the Islamic Republic of Iran. These results highlight the possibility for conversion of commensal intestinal bacteria to pathogenic *stx*-encoding strains, which is clinically important.

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Les bactéries productrices de Shigatoxines en tant que nouveaux agents pathogènes entériques associés aux flambées épidémiques de maladies d'origine alimentaire en République islamique d'Iran

Résumé

Contexte : La détection de la cause des maladies diarrhéiques est importante pour la gestion des flambées épidémiques de ce type de maladies.

Objectifs : La présente étude examinait la prévalence des bactéries productrices de Shigatoxines dans des échantillons de selles de patients souffrant de diarrhées associées à des flambées épidémiques de maladies d'origine alimentaire en République islamique d'Iran.

Méthodes : Au total, 532 échantillons de selles et d'écouvillons rectaux prélevés au cours de 70 flambées sporadiques survenues entre mai 2014 et août 2015 ont été examinés pour détecter une infection par des bactéries productrices de Shigatoxines. Les isolats ont été examinés à la recherche du portage des gènes de virulence stx_1 et stx_2 dans tous les isolats et *eae/ehx* A chez *Escherichia coli*.

Résultats : *E. coli*, *Shigella spp.*, *Citrobacter spp.*, *Enterobacter spp.*, *Klebsiella spp.* et d'autres entérobactéries ont été détectées dans 77,7 % (376/484), 5,0 % (24/484), 3,9 % (19/484), 0,4 % (2/484), 3,7 % (18/484) et 9,3 % (45/484) des échantillons, respectivement. Sur les 196 souches d'*E. coli* négatives au sorbitol, trois (1,5 %) étaient porteuses du gène stx_1, de même que deux (10,5 %) des 19 souches de *Citrobacter*.

Conclusion : Les souches de *Citrobacter spp.* productrices de Shigatoxines doivent être considérées comme un nouvel agent pathogène alimentaire lors de flambées épidémiques.

الجراثيم التي تفرز سُم الشيجا بوصفها أحد مُسببات الأمراض المعوية المُستجدَّة التي تقترن بظهور فاشيات للأمراض المنقولة بالأغذية في جمهورية إيران الإسلامية

إلهه تاج الدين، ليلى جانجي، زهراء حساني، فهيمة السادات غلام مصطفائي، معصومة عظيمي راد، باريسا ترابي، سيد رضا محبي، نوشين أغيلي، محمد جويا، بابك عشراتي، محمد رهبر، صيامك ميراب سميعي، مرجان رهنماى فرزامي، محمد رضا زالي، مسعود آليبويا

الخلاصة

الخلفية: من الضروري اكتشاف سبب أمراض الإسهال من أجل إدارة فاشيات هذه الأمراض حال حدوثها.

الأهداف: هدفت هذه الدراسة إلى تحري مدى انتشار الجراثيم التي تفرز سُم الشيجا في عينات البراز المأخوذة من المرضى المصابين بالإسهال المقترن بفاشيات الأمراض المنقولة بالأغذية في جمهورية إيران الإسلامية.

طرق البحث: خلال الفترة من مايو/ أيار 2014 إلى أغسطس/ آب 2015، بلغ مجموع عينات البراز والمسحات من المستقيم المأخوذة من 70 فاشيةً متفرقة، والتي فُحصت لمعرفة إذا كانت مصابة بالجراثيم التي تفرز سُم الشيجا، 532 عينةً. وفُحصت المعزولات للتعرف على نقل سُم الشيجا للجينات المسؤولة عن الشدة الفيروسية، وعلى سُم الشيجا الموجود في جميع المعزولات وسلالات eae /ehxA في الإشريكية القولونية.

النتائج: اكتُشف في العينات وجود: الإشريكية القولونية، والشيجيلا بأنواعها، والسيتروباكتر بأنواعها، والانتروباكتر بأنواعها، والكلبسيلة بأنواعها، وغيرها من الجراثيم المعوية بنسبة 77.7٪ (376/ 484)، و5.0٪ (24/ 484)، و3.9٪ (19/ 484)، و0.4٪ (2/ 484)، و3.7٪ (18/ 484)، و9.3٪ (45/ 484)، على التوالي. ومن بين سلالات الإشريكية القولونية التي جاءت نتيجة إصابتها بالسوربيتول سلبية وعددها 196 سلالة، كانت 3 منها (1.5٪) تحمل جين سُم الشيجا، كما هو الحال بالنسبة لاثنتين من سلالات السيتروباكتر البالغ عددها 19 سلالة (10.5٪).

الاستنتاجات: يجب أن تُعتبر سلالات السيتروباكتر بأنواعها التي تفرز سُم الشيجا من المسببات المُستجدة للأمراض المنقولة بالأغذية في الفاشيات.

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Prevalence of stammering among internally displaced population in North Waziristan Agency

Mehtab Khatoon,[1] Nazia Mumtaz[2] and Ghulam Saqulain[3]

[1]FATA Secretariat, Orakzai, Pakistan. Faculty of Rehab & Allied Health Sciences, Riphah International University, Lahore. Pakistan. [3]Capital Hospital, Post Graduate Medical Institute, Islamabad, Pakistan (Correspondence to: G. Saqulain: ghulam_saqulain@yahoo.com).

Abstract

Background: Stammering is a dysfluency disorder that is common in children exposed to stressful conditions. Displacement from home is one such situation. There is a large internally displaced population in Pakistan.

Aims: To determine the prevalence of stammering among children of internally displaced persons (IDPs) in North Waziristan Agency, Pakistan.

Methods: This cross-sectional survey included 400 Pushto-speaking children of IDPs, aged 5–18 years enrolled from schools in North Waziristan Agency, from July 2017 to July 2018. The Fluency Rating Scale was used for speech assessment. Data were analysed by SPSS version 20.

Results: The prevalence of stammering was 11%, with moderate stammering being more prevalent. Five (5.6%) girls and 39 (12.5%) boys were identified with stammering.

Conclusions: Stammering is highly prevalent among IDPs.

Keywords: disasters, internally displaced persons, prevalence, stammering, speech disorders.

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Introduction

Stammering/stuttering is a speech disorder in which speech may become dysfluent and its time pattern may be affected (*1*). Stammering is characterized by repetitions, pauses, unnecessary production of vowels and unintentional breaks, spasms and emotional swings during speech production, making it unintelligible**.** Thus, people with stammering face significant problems in communicating during routine interactions (*2*).

Stammering can occur at any age (*1*), although it typically starts in preschool years, suggesting that factors during child development are involved. Usually, both genetic and environmental factors are incriminated, with genetic factors such as dopamine imbalance (*1*) interacting with environmental factors. The latter include family, learning and socioeconomic conditions, which all may be psychological causes of stammering (*3*). Children are more prone to stressful situations, and develop anxiety in situations such as parental conflict, displacement from home, and separation from siblings. Furnham and Davis concluded that "social and emotional factors appear to be crucial to the onset and maintenance of stuttering" (*4*). Children with anxiety or those who are prone to situations like social anxiety, where they are evaluated by others; or children with separation anxiety or generalized anxiety disorder may have dysfluent speech with panic. These anxiety situations are all present in displacement situations.

Cohen noted that internally displaced persons (IDPs) are: "Persons or groups of persons who have been forced or obliged to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized state border" (*5*). According to Peek, in disaster situations, populations face psychological stress or trauma, with children being more prone to developing psychological problems (*6*). Children who are experiencing psychological stress, such as inappropriate family attitudes, children with broken families, moving from one place to another, loss of a beloved one or even a pet, family vacations, or conflict among siblings may develop stammering (*7*). According to Yairi and Ambrose, the impact of race, ethnic origin, culture, bilingualism, and socioeconomic status on the incidence/prevalence of stammering remains uncertain (*8*). Ajdacic-Gross et al. reported that there was no overwhelmingly strong risk factor for stammering (*9*).

There is a large internally displaced population in Pakistan because of terrorism and counter-terrorism activities, which may have resulted in an increase in emotional, psychological and communication disorders, such as speech disorders, especially stammering. To the best of our knowledge, there has been no study from this part of the world on this important health issue. Therefore, the current study was designed to determine the prevalence of stammering in IDPs in North Waziristan

Agency, Pakistan. This study is important since such large numbers of IDPs are rarely seen in any part of the world. Our results are important for rehabilitation by early identification, thus leading to timely intervention and resource allocation in such locations.

Methods

This was a cross-sectional survey carried out to determine the prevalence of stammering among children of IDPs attending schools in North Waziristan Agency. The study comprised 400 children of registered IDPs whose native language was Pushto. There were 312 (78%) boys and 88 (22%) girls with a male to female ratio of 3.54: 1, aged 5–18 years (Figure 1). They were enrolled through convenience sampling after obtaining consent for inclusion in the study. Children with other disabilities were excluded. The study was conducted over a period of 1 year from July 2017 to July 2018.

The Fluency Severity Rating Scale was administered in one-to-one sessions to investigate the prevalence of stammering among IDPs, and a score of < 4 was considered normal, whereas scores of 4, 5–6 and 7–9 were labelled mild, moderate and severe stammering, respectively.

Data were collected, coded and analysed with SPSS version 20. Variables studied included sex, age group and stammering severity, and were presented by absolute and relative frequency and *P* values were calculated.

Results

There was a high prevalence of stammering among children of IDPs (n = 44, 11%). The prevalence was 12.5% (n = 39) among boys, compared with 5.6% (n = 5) among girls (Figure 1), with a male to female ratio of 7.8: 1. As regards the severity of stammering, moderate stammering was predominant in boys (69.23%), followed by severe stammering (20.51%), while in girls, moderate stammering predominated with a relative frequency of 80%, followed by mild stammering (20%), with no case of severe stammering; however, the sex difference was not significant (P= 0.17) (Table 1).

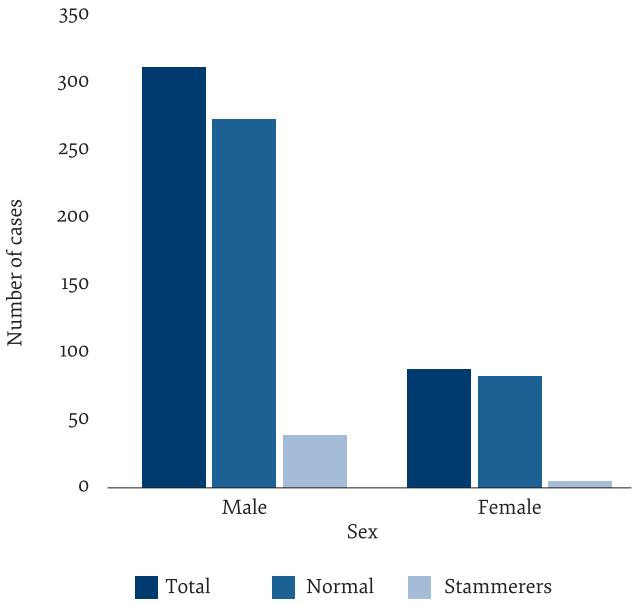

Figure 1 Gender distribution of study population (n = 400)

The study population was divided into 2 age groups. The prevalence of stammering in age group 5–11 years was 10.49% (28 affected cases out of 269), while in the age group 12–18 years, prevalence was 12.03% (16 affected cases out of 133) (Figure 2). As regards severity, moderate stammering predominated in both groups, with a relative frequency of 71.43% in the 5–11 years age group and 68.75% in the 12–18 years age group. The difference between age groups and severity of stammering was not significant (P = 0.62) (Table 1).

Discussion

In the present study the prevalence of stammering among children of IDPs was 11% (44 children) with a higher prevalence among boys of 12.5% (n = 39) compared with girls (5.6%; n = 5), with a male to female ratio of 7.8: 1.

Table 1 Severity of stammering according to age group and sex (n = 44)

Variable	Stammering severity						Total		χ^2
	Severe		Moderate		Mild				
	n	%	*n*	%	*n*	%	*n*	%	
Sex									
Male	8	20.51	27	69.23	4	10.26	39	88.64	$\chi^2(3) = 5.01$ $P = 0.17$
Female	0	00.00	4	80.00	1	20.00	5	11.36	
Total	8	18.18	31	70.46	5	11.36	44	100	
Age group, yr									
5–11	4	14.28	20	71.43	4	14.29	28	63.64	$\chi^2(3) = 1.74$ $P = 0.62$
12–18	4	25.00	11	68.75	1	6.25	16	36.36	
Total	8	18.18	31	70.46	5	11.36	44	100	

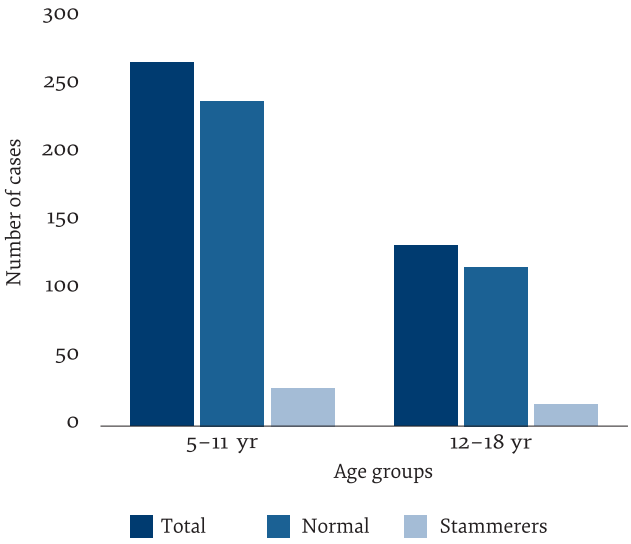

Figure 2 Age group distribution of study population (*n* = 400)

A literature search did not reveal any studies on prevalence of stammering among IDPs; however, the prevalence in the current study was higher (11%) than that found in different studies in non-IDP populations including a study from the Islamic Republic of Iran, which showed a prevalence of 0.72–1.5% (*10–12*), and a study on 10 425 children, aged 5–12 years reported a prevalence of only 0.33% (*13*). The high prevalence of stammering in the current study could be attributed to adverse social and emotional factors due to the displacement situation that this population faced. According to Furnham et al., social and emotional factors appear to be crucial to the onset and maintenance of stammering (*4*). Also, in a local study in Lahore, Pakistan, involving children aged 5–17 years with speech disorders, prevalence of stammering was 24%; however, this cannot be taken as a high prevalence of stammering because the sample population had speech disorders (*14*).

In the current study there was a high prevalence of stammering in boys, with a male to female ratio of 7.8: 1. Although most studies have reported higher prevalence of stammering in boys than girls, in contrast to our study, the male to female ratio was lower, ranging from 2.1: 1 to 2.8: 1 in studies from the Islamic Republic of Iran (*11,12*), Pakistan (*14*) and Brazil (*15*).

Adriaensens et al. found that severe stammering has a negative influence on adolescents' social acceptance, competence at school, formation of close friendships, and self-esteem (*16*). In the current study, among the 44 children with stammering, 8 (18.18%) had severe stammering, 31 (70.46%) moderate stammering and 5 (11.36%) mild stammering. O'Brian et al. noted a significant negative correlation between achievement of the highest educational levels and stammering severity (*17*).

In our study, the prevalence of stammering was 10.49% (*n* = 28) for children aged 5–11 years and 12.03% (*n* = 16) for those aged 12–18 years. These findings are higher than those reported by Keating et al. in a study in Australia of 12 388 children, aged 0–14 years (*18*). They found a maximum prevalence of 6.5% in boys aged 5 years and 1.8% in girls aged 3–4 years, with overall prevalence of 1.7% in children aged 0–14 years. We studied children aged 5–14 years. Also, Yairi and Ambrose (*2*) noted that risk of stuttering onset has usually passed by age 5 years, which is earlier than previously thought. De Oliveira et al. reported a high risk of developmental familial stammering at age 3–11 years (*15*).

Conclusions

Stammering was highly prevalent in children of IDPs in North Waziristan Agency, Pakistan, who were traumatized and living under stressful conditions. Although both sexes were affected, the prevalence in boys was higher than in girls.

Funding: None.

Competing interests: None declared.

Prévalence du bégaiement chez les populations déplacées internes dans l'agence du Waziristan du Nord

Résumé

Contexte : Le bégaiement est un trouble de l'élocution fréquent chez les enfants exposés à des conditions stressantes. L'éloignement du domicile fait partie de ces situations. Le Pakistan compte un grand nombre de déplacés internes.

Objectifs : Déterminer la prévalence du bégaiement chez les enfants des déplacés internes dans l'agence du Waziristan du Nord (Pakistan).

Méthodes : La présente enquête transversale portait sur 400 enfants de personnes déplacés internes, parlant le pashto, âgés de 5 à 18 ans et inscrits dans des établissements scolaires de l'agence du Waziristan du Nord, de juillet 2017 à juillet 2018. L'échelle d'évaluation de la fluidité verbale a été utilisée pour évaluer l'élocution. Les données ont été analysées à l'aide du logiciel SPSS (version 20).

Résultats : La prévalence du bégaiement était de 11 %, le bégaiement modéré étant le plus fréquent. Cinq filles (5,6 %) et 39 garçons (12,5 %) ont été identifiés comme bégayant.

Conclusions : Le bégaiement est très répandu chez les populations déplacées internes.

انتشار التلعثم بين السكان النازحين داخلياً في وكالة وزيرستان الشمالية

مهتاب خاتون، نازية ممتاز، غلام صقليان

الخلاصة

الخلفية: يُعتبر التلعثم نوعاً من أنواع اضطرابات القدرة على التعبير الشائعة لدى الأطفال الذين تعرضوا فيها للضغوط. ويُعتبر النزوح من المنزل مثالاً على مثل هذه الظروف. ويوجد في باكستان عددٌ كبيرٌ من السكان النازحين داخلياً.

الأهداف: تحديد مدى انتشار التلعثم بين أطفال السكان النازحين داخلياً في وكالة وزيرستان الشمالية، باكستان.

طرق البحث: شمل هذا المسح المقطعي 400 طفل من الناطقين بلغة الباشتو، تتراوح أعمارهم بين 5–18 عاماً، ومُقيدين في مدارس في وكالة وزيرستان الشمالية، وذلك خلال الفترة من يوليو/ تموز 2017 إلى يوليو/ تموز 2018. واستُخدم مقياس تقدير الطلاقة لتقييم القدرة على الكلام. وقد حُللت البيانات باستخدام الإصدار 20 من برنامج SPSS.

النتائج: بلغت نسبة انتشار التلعثم 11٪، وكان التلعثم من الدرجة المتوسطة هو الأكثر انتشاراً. واكتُشفت إصابة خمس فتيات (5.6٪) و39 فتىً (12.5٪) بالتلعثم.

الاستنتاجات: يُعتبر التلعثم من الاضطرابات الشائعة بين السكان النازحين داخلياً.

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Eleventh meeting of the regional Green Light Committee for the Eastern Mediterranean[1]

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Introduction

Tuberculosis (TB) is a highly contagious disease and the leading cause of death from a single infectious agent. Globally, TB affected 10 million people in 2018 and 1.5 million people lost their lives from the disease (*1*). TB cases from the WHO Eastern Mediterranean Region represent 8% of the global TB burden, with an estimated 810 000 TB cases in 2018, although only 537 761 cases were notified, which corresponds to a treatment coverage rate (notified/estimated incidence) of 65% (*2*). In 2018, a total of 38,000 multidrug-resistant TB (MDR-TB) cases were estimated in the Region; out of whom, only 12% (4566) started on treatment (out of total estimated MDR-TB cases) (*2*). Within the Region, 95% of the DR-TB burden was reported from five countries (Pakistan 72.4%, Somalia 10.3%, Afghanistan 6.5%, Iraq 2.8% and Sudan 2.8%) (*2*). The Region achieved a 91% treatment success rate among drug-susceptible TB patients in 2017 and a 65% rate among DR-TB treated patients in 2016, the highest among all WHO regions (*2*).

The regional Green Light Committee (rGLC) for the Eastern Mediterranean Region was established in 2012 in response to the need to scale up the programmatic management of DR-TB (PMDT). The rGLC functions as an advisory committee to Member States of the WHO Eastern Mediterranean Region, as well as partners, including donors. The Secretariat of the rGLC is hosted by the Regional Office. The eleventh annual rGLC meeting was held between 20–22 November 2019 in Karachi, Pakistan (*3*). The objectives of the meeting were to:

- review the overall DR-TB situation and progress on PMDT in the Region;
- assess progress made on the introduction of new DR-TB policies, treatment regimens and recommendations for universal PMDT coverage;
- review country-specific recommendations and actions proposed by rGLC missions conducted during 2019;
- assess and learn from the experience of public and non-public PMDT models in Karachi, Pakistan, and feedback given for PMDT improvement and universal access; and
- brief new rGLC members on their scope of work, roles and responsibilities.

Summary of discussions

Presentations were initially made on the TB situation in the Region, the UN General Assembly high-level meeting on TB and the resulting Political Declaration on TB, as well as WHO's multisectoral accountability framework. Participants were also updated on the progress made on the recommendations of the 10th annual rGLC meeting in 2018. The new rGLC members were briefed on the rGLC's scope of work, the roles and responsibilities of rGLC members and WHO's memorandum of understanding with the Global Fund. In fact, the rGLC mechanism plays a catalytic role in the uptake of the latest WHO diagnostic and treatment policies.

By the end of the meeting, rGLC members had reviewed the progress made in PMDT and the introduction of new DR-TB policies and treatment regimens in countries of the Region, and had produced recommendations to address the challenge of DR-TB diagnosis and treatment. The rGLC also recommended that WHO continues to provide technical support for the DR-TB component of TB programmes.

Recommendations

To WHO

- Building capacity and preparing a pool of consultants to support PMDT and provide the technical support needed by Member States; and
- providing technical support for countries to develop quantification and forecasting plans (gap analysis) for the new funding cycle (for WHO and partners).

To Member States

- Enhancing laboratory diagnosis capacities through expanding the availability of a quality assured laboratory system, defining and implementing clear screening and diagnostic TB algorithms, and strengthening communication between the laboratory network and PMDT sites;
- ensuring access through PMDT decentralization, patient-centred care and approaches for treatment adherence and follow-up, and scaling up use of recommended all-oral regimens;
- ensuring uninterrupted access to quality TB and DR-TB medicines;

[1] This report is based on the Summary Report on the Eleventh meeting of the regional Green Light Committee for the Eastern Mediterranean, 20–22 November 2019, Karachi, Pakistan (https://applications.emro.who.int/docs/EMTUB264E.pdf?ua=1&ua=1).

- improving data quality, recording and reporting DR-TB; and
- promoting operational research to produce country evidence on successful approaches for improving DR-TB services.

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Correspondence

Editor-in-chief

Eastern Mediterranean Health Journal
WHO Regional Office for the Eastern Mediterranean
P.O. Box 7608
Nasr City, Cairo 11371
Egypt
Tel: (+202) 2276 5000
Fax: (+202) 2670 2492/(+202) 2670 2494
Email: emrgoemhj@who.int

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