Report

Impact of rural health development programme in the Islamic Republic of Iran on rural–urban disparities in health indicators

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أثر برنامج تنمية الصحة الريفية في جمهورية إيران الإسلامية على تقليص الفوارق بين المؤشرات الصحية في الريف والحضر

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الخلاصة: قبل قيام الثورة الإسلامية في عام 1979، كانت قد مرت خمسون عاماً من الجهود الحكومية غير المتوازنة في مجال التنمية والتحديث، التي تركت المناطق الريفية لجمهورية إيران الإسلامية في وضع صحي واقتصادي يُرثى له. وتستعرض هذه الورقة أثر برنامج تنمية الصحة الريفية المنفَّذ بوصفه طريقة فعَّالة وغير مكلِّفة لتحسين صحة السكان الريفيِّين، ولاسيَّما الأمهات والأطفال. وتتناول هذه الورقة بالوصف نظام مراكز الصحة الريفية، والمنازل الصحية، والعاملين في صحة المجتمع، وتبيِّن فعَّالية البرنامج من حيث تقليص الفوارق في المؤشرات الصحية في الريف والحضر. كما تناقش الورقة تأثير سياسات تنمية الصحة الريفية غير الباهظة التكاليف في بلدان أخرى من بلدان الإقليم، مثل أفغانستان وبلدان وسط آسيا المشابهة في الهيكل الاجتماعي والثقافي.

ABSTRACT By 1979 50 years of uneven development and modernization by governments prior to the Islamic Revolution had left rural parts of the Islamic Republic of Iran with extremely low economic and health status. This paper reports on the impact of the rural health development programme implemented as an effective and inexpensive way to improve the heath of the rural population, especially mothers and children. It describes the system of rural health centres, health houses and community health workers (*behvarz*) and demonstrates the effectiveness of the programme through declining measures of rural–urban disparities in health indicators. The implications of inexpensive rural health policies for other countries in the region such as Afghanistan and Central Asian countries with a similar sociocultural structure are discussed.

Impact du programme de développement de la santé en secteur rural en République islamique d'Iran sur les disparités des indicateurs de santé entre les milieux rural et urbain

RÉSUMÉ En 1979, 50 années d'inégalité en matière de développement et de modernisation héritées des gouvernements antérieurs à la Révolution islamique ont laissé les zones rurales de la République islamique d'Iran dans un état économique et sanitaire déplorable. Cet article concerne l'impact du programme de développement de la santé en secteur rural mis en œuvre afin d'améliorer de manière efficace et peu onéreuse l'état de santé des populations rurales, en particulier des mères et de leurs enfants. Il décrit le système des centres ruraux de santé, des « maisons de santé » et des agents de santé communautaires (*behvarz*) et démontre l'efficacité de ce programme, que confirme la réduction des disparités des indicateurs de santé entre milieux rural et urbain. Les implications de politiques de santé rurale à bas coût pour d'autres pays de la région tels que l'Afghanistan et les pays d'Asie centrale, de structure socio-culturelle comparable, y sont discutées.

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Introduction

Many countries in western and central Asia suffer from rural underdevelopment and poor health indicators among rural populations. Conventionally, greater economic development of a country ultimately leads to improvements in the health status of the population. However, there is a significant lag between initiating development efforts and the time it takes for them to impact on health status. Hence there is an urgent need for implementation of inexpensive and effective programmes to improve the health status of rural populations in the short run. These may in fact also contribute to the success of rural economic development projects.

Even after almost 50 years (1921–77) of modernization and economic development by the oil-rich state of the Islamic Republic of Iran, after the Islamic Revolution in 1979, rural areas were still extremely poor and underdeveloped, with very low health indicators. The modernization and economic development efforts which started in the 1920s and intensified through the 1960s and 1970s were not balanced across social classes, regions and economic sectors, resulting in rural underdevelopment and a decline in agriculture [*1–2*]. Despite the rapid and heavy industrial investment and strong modernization effort of the Iranian state, poverty and underdevelopment remained persistent in rural communities and villages at the dawn of the Revolution in 1978–79. The land reforms by the state had not prevented the rural population falling deeper into poverty and underdevelopment [*3–5*].

Iranian economic development of the 1960s and 1970s was industrial and urban-based, and concentrated mainly in the national capital and a few large provincial capitals. In rural areas, agricultural productivity was declining and poverty and landlessness expanding. When the elements of the Islamic Republic were starting to take shape in 1976, almost 18 million people lived in 66 000 villages and settlements with less than 5000 people [*6*]. About 80% of the rural population aged 10 years and older worked in agriculture. The majority were family farmers working small plots of land. Landless workers were the poorest sector of the population and in some areas 15% of the families were landless and surviving in extreme poverty and debt [*7,8*].

An outcome of persistent rural–urban inequality and extreme rural poverty was the low health status of rural populations. After the success of the revolution, a major issue for the government was improvement of the health and life chances of the rural population. In this paper we describe the fast-paced, low cost, health devlopment programme that the revolutionary government implemented to reduce the deep rural–urban health disparities and attempt to illustrate its impact with data from various sources.

Rural health intervention programme

Faced with the situation of major underdevelopment and low levels for health indicators for over 50% of the population living in rural areas, the Islamic government set about improving the situation with rural development projects which are conventionally considered as the precursor to improved health of the community [*9,10*]. However, it was clear that the existing extremely low health status could not wait for the impact of rural development to take effect and that rapid action was needed to improve the health and wellbeing of the disadvantaged population who ought to be equal benefici-

aries of the revolution. To this end the main innovation of the government was a strong push to establish an inexpensive community-based primary health care (PHC) system in the early 1980s and oversee its wide expansion in the 1990s.

The focus of the programme on primary care and prevention rather than on the capital-intensive tertiary sector made it relatively inexpensive. The main element of the programme was establishing a strong network of rural health centres (RHCs) and smaller centres called "health houses" to deliver low-technology PHC through indigenous health care providers at village level. Hence, training and utilization of local personnel was a key part of the system.

Based on the results of a few small-scale experimental studies carried out in the 1970s, the Ministry of Health and Medical Education launched in the early 1980s a large-scale PHC system with a focus on rural areas and small towns [*11*]. The focal point of activity for this programme was the establishment of the health houses (*khane behdasht*). Each health house is designed to cover a target population of about 1500. Since most Iranian villages have fewer than 1500 residents, each health house also serves several "satellite" villages. Such villages are carefully grouped according to a realistic consideration of their cultural and social compatibility. The distance between the main and satellite villages is also pragmatically defined to be no more than 1-hour's walk (rather than a certain number of kilometres).

Each health house is staffed by 1 or more female and 1 male community health workers who are known as *behvarz*. The *behvarz* comes from the same village where he/she is to be stationed in the future. Choosing *behvarz* from among the local population has been a key policy decision, closely observed throughout the expansion of the PHC network. As a result, the *behvarz* often knows every mother, child and family who seeks health care at the health house. Such a close relationship between the *behvarz* and his/her community facilitates the accurate collection of health information, among other things. According to the latest available statistics, there were 16 340 rural health houses scattered among the 66 000 villages and settlements, covering about 85% of the rural population [*12*].

The rest of the rural population is covered by mobile teams. Each team is composed of doctor from the RHC, a health technician for basic laboratory tasks and 1 or 2 *behvarz*. The team visits their designated remote villages each month and provides PHC support. If there are any patients that need to be referred to larger health centres in rural or urban areas the team provides support and referrals.

The main function of a health house is to offer PHC services to the community it serves including:

- annual census of the population covered,
- collection, recording and storage of health information and regular reports,
- public health education and promotion of community participation,
- provision of family health care,
- antenatal, prenatal and postnatal care,
- care of children under 5 years,
- care of school-age children,
- family planning services,
- immunizations,
- disease control services,
- environmental health activities.

Each health house is supported by an RHC, which is a village-based facility. It supervises the health house in its own village, and a few more health houses in neighbouring villages. Each RHC covers

about 7500 people on average. Apart from a physician, the RHC includes the at least 1 of each of the following staff specialties: family health, disease control, environmental health, oral health, laboratory technician, nurse-aid(s) and administrative staff. All staff members function under the doctor's leadership. About 3000 RHCs support the network of rural health houses. The chief responsibilities are to support health houses and supervise their activities; accept referred cases; and maintain proper contact with the higher levels of the health system. Other major functions include carrying out basic laboratory tests, participation in human resources training, taking samples of food products, monitoring environmental health in schools and workplaces, carrying out statistical studies and preparation of reports. In the area of reproductive health, providers at RHCs are authorized to insert intrauterine devices (IUDs).

Specifically, the RHCs support the health house by:

- providing outpatient care and case-finding among referred patients,
- advising on monitoring and follow-up of the treatment schedule of established cases,
- supervising family health, disease control and environmental health activities of health houses,
- offering oral health services,
- monitoring basic environmental sanitation (water sampling where required),
- supporting health houses in the procurement of necessary drugs and equipment.

While RHCs provide the infrastructure of support for providers, the soul of the rural health network has been its most outlying facility, the health house, which is run by the *behvarz*. There are now almost 26 000 of these male and female community health workers serving their villages and satellite villages. The female *behvarz* is generally responsible for the tasks that are performed within a health house. The male *behvarz*, on the other hand, is predominantly concerned with activities outside the health house (i.e. follow-up of cases with communicable disease, case-finding, immunization, environmental health activities and routine care in satellite villages). This partial division of duties does not mean that either *behvarz* cannot perform all the duties on his/her own if required.

Behvarz have strong community ties with their villages. The *behvarz* is nearly always chosen from the main village where the health house will be stationed. However, if this is not feasible, a candidate is recruited from one of the satellite villages. The *behvarz* are selected from among 16- to 24-year-old female candidates, and 20- to 28-year-old males with direct participation from village authorities, such as the village council, local clergy and other influential figures of the community.

The process of training the *behvarz* provides a good example of the use of appropriate technology at the village level. Given the low rural literacy rate, candidates are required to have 8 years of formal schooling (nowadays frequently a high-school diploma). Candidates must successfully complete a written examination and interview before enrolment in the training course.

Their studies, which span 2 years, are a contrast with traditional pedagogy. Memorization of large amounts of written material has been eliminated. Training is effected through group discussion, role-playing exercises and working at the health houses alongside a carefully selected qualified *behvarz*. Students receive free training and financial support throughout the 2-year period of the programme. In return, they are formally obliged to remain and serve at

the village health house for a minimum of 4 years after completing their study. Each student's progress is assessed by instructors at monthly intervals. Students who successfully complete all the courses, pass the examination at the end of each block, and pass the final examination, receive the "Certificate for Completion of Behvarz Training". Then they are ready to start providing PHC in a friendly environment to their home villages and nearby villages, where they usually have relatives and family acquaintances.

Data collection

In order to document the impact of the rural health intervention programme on health indicators for Islamic Republic of Iran we compared data from a number of different sources in the period before the intervention (1976) with the period after the intervention had been in place for over 2 decades (2000).

The Iran Statistical Centre compiles official data from various ministries and provincial offices annually and publishes the *Annual statistical abstract of Iran.* Two major sections of this publication are related to population and health. A national census of population and housing has been conducted in the Islamic Republic of Iran since 1956. The published reports from these censuses provide key demographic and housing data by rural and urban residence. The survey of population growth provided reliable mortality data for the period 1975 through 1976 [*13*].

The data for our survey were gathered through dual record systems where both survey methods and a registration system were used to record the changes in the sample households due to birth, death, incoming and outgoing migration and marriage. The rates were then calculated based on person-years of exposure during the 2-year period (averaged to obtain an annual figure). These data represent the preintervention mortality and fertility level for the Islamic Republic of Iran at the peak of pre-Revolution development and modernization in 1976.

The data for the postintervention impact analysis come from the demographic and health survey (DHSI-2000) [*14*]. This is the first effort to apply a locally adapted version of the internationally recognized demographic and health survey instruments to a large sample of households representative of the urban and rural populations in all provinces of the country. The DHSI-2000 is probably unique both for its reliance on national expertise for advice in design and implementation of the survey and for its coverage of a huge sample (close to 114 000 households with a total population of about 475 000), selected so that it is possible to carry out separate analyses for the urban and rural areas of each of the 28 provinces of the Islamic Republic of Iran as well as the Tehran metropolitan area. The financial support of the project by the United Nations Population Fund and Children's Fund (UNFPA and UNICEF) and their participation in the various stages of the survey contributed significantly to the quality of the project implementation.

The DHSI-2000 was developed over a 3-year period. The Population and Family Health Department of the Ministry of Health and Medical Education was assigned overall responsibility for the design and implementation of the survey [*14*]. To ensure the technical quality of the survey and make its results acceptable to academic researchers as well as specialized agencies, a steering committee consisting of academic demographers, staff members from the Statistical Centre of Iran, staff members from the Civil Registration Organization and researchers with long track-records of research and

teaching on population and reproductive health oversaw the implementation of the project at various stages.

The sampling frame for the survey was based on the 1996 census. The availability of data for the provincial level estimation of various indicators was carefully considered in the sampling process. The sample design was to select 400 primary sampling units (200 urban and 200 rural) from each of the 28 provinces of the country. In Tehran province, 400 primary sampling units were selected from urban and rural areas outside the Tehran metropolitan area. Tehran metropolitan area was treated as a separate urban province represented by an independently selected sample of 2000 households. An estimated total sample of 114 000 households (58 000 urban and 56 000 rural households) was expected to be covered by the study. The actual sample size achieved included 113 957 households (57 968 urban and 55 989 rural). The response rate was 97.5% in urban areas and 99.0% in rural areas. In addition to the heads of households (or other adult member of the household) who provided the household level information, a total of 91 604 ever-married women of reproductive age were interviewed (46 916 urban and 44 688 rural). These women provided data on reproductive health and other issues concerning women and young children.

The data collection instrument was a 213-item questionnaire adapted from the standard interview schedules used in demographic and health surveys. The questionnaire consisted of the following major sections:

- General household questionnaire, focusing on household members' data, including economic activity, migration status over the previous 5 years for all ages, loss of parents for those aged under 15 years, accidents, disability, deaths, household access to sanitary facilities and ownership of modern household comforts, communications and transportation.
- Questionnaire for ever-married women aged 10–49 years, focussing on pregnancies, births and family planning knowledge and practices.
- Questionnaire about nutrition and health of children aged under 5 years.

Outcomes

Preintervention: status of health care in 1979

Data on the status of health care in 1979 is limited to the official data reported in the *Statistical abstract of Iran* [*15*]. From these data it is obvious that the numbers of health care providers were minimal in rural areas. Of the 10 000 Iranian general medical practitioners in 1979, 54% were living in Tehran, the capital city and 5 other large cities, leaving 46% for other urban areas and almost none for rural areas. Of almost 6000 medical specialists, 87% practiced in Tehran and 5 other large cities. Out of nearly 2400 dentists, 65% worked in Tehran and 5 other large cities and practically none in rural areas. At the time, some 700 medical doctors graduated from the medical schools every year, half of whom would leave the country sooner or later because they were dissatisfied with their situation and could easily find work in developed countries. About 2.5%–3.5% of the total government budget was allocated to the health sector. Most of these resources were focused on expensive endeavours of building hospitals in big cities, to which access by the rural population was limited by economic, geographic and cultural factors.

Table 1 summarizes data from the population growth survey of 1975–76 [*13*].

The adverse health service infrastructure and strong health disparities between rural and urban populations are reflected in the mortality rates. The crude death rate for rural areas was 72% higher than the rate for urban areas. Overall infant mortality was high. However, the infant mortality rate of rural areas was one of the highest rates in 1976 and was 105% higher than the urban areas. The worst situation was observed for rural female infants whose mortality was 112% higher than the rate for urban female infants.

Similar disparities can be found in the measure of life expectancy. The difference in the life expectancy of rural and urban men was 10 years in favour of urban men. The life expectancy of rural women in 1976 was barely 52 years, which was 10 years less than urban men. These differences were not surprising in view of the prevailing urban–rural disparities in terms of other variables correlated with health status at the macro-level. Among these were access to such basic facilities as safe drinking water, electricity, and bathing facilities. By 1979, for instance, only 19.9% of rural households (compared with 90.1% of urban ones) had access to piped water while only 27.7% of them versus 97.8% of their urban counterparts had access to electricity. Similarly, only 2.8% of rural households, as compared with 45.7% of the urban, had a hot water bath/shower inside their dwellings.

Postintervention: impact of the programme

The PHC network has drastically improved the health status of rural communities over a relatively short period of time. Data from DHSI-2000 reported in Table 2 provides a number of indicators for rural and urban

Table 1 **Health and housing indicators in the Islamic Republic of Iran, 1976**

Indicator	Total	Urban	Rural	Rural:urban ratio
Crude death rate (per 1000 people)	12.0	8.3	14.3	1.72
Infant mortality rate (per 1000 live births)				
Total	105.4	60.4	123.7	2.05
Male	101.4	59.8	118.2	1.98
Female	109.9	61.1	129.5	2.12
Child mortality rate (ages 1–4 years per 1000 live births)				
Male	14.7	8.9	17.3	1.94
Female	18.9	10.4	22.8	2.19
Life expectancy at birth (years)				
Male	–	60.7	50.7	0.84
Female	–	62.2	51.7	0.83
Domestic facilities (%)				
Housing units with sanitary drinking water	–	90.1	19.9	0.22
Housing units with electricity	–	97.8	27.7	0.28
Housing units with hot water bath/ shower	–	45.7	2.8	0.06

areas in the year 2000. In most cases the indicators in rural areas were as good as urban areas or only slightly lower. For example, regarding neonatal mortality, an urban–rural difference of only 3 units was observed in favour of urban areas. The difference between rural and urban areas in mortality of children aged 1 to 4 years was not large.

Table 2 **Health indicators related across rural and urban areas in the Islamic Republic of Iran, 2000**

Indicator	Urban %[a]	Rural %[a]	Rural:urban ratio
Neonatal mortality rate (per 1000 live births)	17.1	20.6	1.20
Infant mortality rate (per 1000 live births)	27.7	30.2	1.09
Child mortality rate (ages 1–4 years per 1000 live births)	6.9	4.6	0.67
Children with one illness during the last 2 weeks	41.6	41.6	1.00
Mothers treating their children's sickness correctly	93.0	92.0	0.99
Children under 5 years having diarrhoea	11.8	13.7	1.16
Children with diarrhoea correctly treated	91.1	91.0	1.00
Children with diarrhoea who used ORT	96.4	94.6	0.98
Children with respiratory infection correctly treated	93.6	91.9	0.98
Women with no prenatal care	5.2	10.1	1.94
Pregnant women who received vaccination	80.7	77.8	0.96
Received postnatal care at least once	63.9	56.6	0.89
Received postnatal care at least twice	30.7	31.6	1.03
Ever-married women who had knowledge about:			
Oral contraceptives	98.7	98.0	0.99
Condoms	93.3	84.5	0.91
IUDs	95.4	89.4	0.94
Injectable contraceptives	86.3	91.0	1.05
Vasectomy	94.6	86.5	0.91
Tubectomy	97.2	95.3	0.98
Safe period	48.7	25.1	0.52
Withdrawal	88.8	72.4	0.82
Ever-married women who used:			
Oral contraceptives	62.6	65.9	1.05
Condoms	33.6	21.3	0.63
IUDs	26.0	13.0	0.50
Injectable contraceptives	7.3	17.8	2.44
Vasectomy	3.7	1.5	0.41
Tubectomy	15.8	18.5	1.17
Safe period	4.3	1.4	0.33
Withdrawal	49.2	28.7	0.58

[a]*Except where otherwise indicated.*
ORT = oral rehydration therapy; IUD = intrauterine device.

Infant mortality for rural and urban communities has declined greatly but the most important observation is the sharp rate of decline in rural areas, which brought the level of infant mortality to almost the same level as in urban areas.

Other indicators of health of children and mothers, reported in Table 2, showed a similar pattern of rural–urban equality. The efficient delivery of family planning services by rural health workers definitely contributed to the effectiveness of the expansion of PHC and prevention.

Conclusions

This report has described and analysed the impact of a rural health programme delivered to communities suffering poverty and underdevelopment. The rural heath programme developed and implemented in the Islamic Republic of Iran was a very effective and inexpensive way to improve the heath of the population, especially children and mothers. By all indications this programme has accelerated the decline of infant mortality, child mortality and maternal mortality. It has improved the level of prenatal and postnatal care and increased the use of contraceptives as a way of reducing the future mortality of mothers and children. It has contributed to the promotion of healthy attitudes and behaviours, universal immunization of children, and correct treatment of children suffering from diarrhoea and acute respiratory infection. The presence of the friendly *behvarz* in the village and their constant interaction with the community and proactive interventions has enabled them to ensure that health education messages are effective. For example, according to the DHSI-2000, among the rural women who were pregnant during 1998–2000, 77.5% had visited a rural health house. Moreover, the ability of the PHC system to support the health messages by providing easy access to the tools needed (e.g. vaccines, oral rehydration therapy, essential drugs, etc.) where and when they were required contributed to bridging the traditional gap between knowledge, attitudes and practices.

The health and social returns of the PHC programme in rural areas of the Islamic Republic of Iran has been much higher than the cost of the programme. The Iranian government could not have made such gains in health outcomes by waiting for general economic development efforts to have an effect on population health and could not have continued to rely on investing in an extensive curative health infrastructure.

A number of countries neighbouring the Islamic Republic of Iran such as Afghanistan and central Asian countries such as Tajikistan, could benefit from our experience and success in implementing PHC in rural areas. These countries have a significant portion of their population in rural areas with high levels of poverty and underdevelopment. Using inexpensive programmes to promote PHC can in fact support the rural economic development efforts. The major factor in designing such programmes, however, should be a firm and rational basis for service delivery and the distribution of facilities guided by a master plan and continuous evaluation of the programme at each step in expansion. The plan should allow for assured, easy access to health service facilities, effective and appropriate training, availability and production of relevant statistics, selection of rural health care providers from the community and creation of a respected network, supported through the urban–rural hierarchy.

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