

Temporal variations of health indicators in Iran comparing with other Eastern Mediterranean Region countries in the last two decades

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ABSTRACT

Background The recent significant improvement in most health indicators in Iran has not been explored deeply particularly in comparison with other countries in Eastern Mediterranean Region (EMR). We aimed to explore the temporal variations of five main indicators in Iran and compare their variations in EMR countries.

Methods Data on DPT vaccination and birth weight were obtained from EMR office reports, and total fertility rate, under 5 mortality rate (U5MR) and adult literacy rate (ALR) were obtained from WHO sources for the time period 1995–2005. Using linear regression, we modeled the temporal variations in Iran and other EMR countries classified by their human development index (HDI) levels.

Results The estimated annual decline rate of U5MR in Iran as a middle HDI country was 2.5 per 1000 live birth which was much greater than the corresponding number in countries with medium HDI (1.85) and very close to countries with high HDI (2.67). The WHO data showed that Iran was very successful in increasing ALR.

Conclusion It seems that most health indicators in Iran have improved more rapidly compared with countries with low and medium HDI in EMR. The improvement rates were also very close to countries with high HDI in the region.

Keywords active immunization, child mortality, economic development, female fertility, health status indicators, Iran, Middle East

Introduction

Despite occurring huge socio-historical events such as revolution in 1979 and the eight-year war, establishment of modern health-care network in Iran within the three recent decades has caused significant changes in the health system.^{1,2} In fact, improvement in Iranian's health status through the establishment of a Primary Health Care (PHC) network over the last three decades has been one of the main reasons for increasing human development index (HDI) in Iran and placing it as a medium HDI country. In 1979, the general health status of the country was still unacceptable. The infant mortality rate was 104 per 1000 live births and life expectancy was 57 years and the total number of nurses was 7100 with just 2.1 nurses per 10 000 population.³ Several thousand foreign physicians were present in different regions of the country, at an annual

cost of nearly US\$ 100 million.³ After the Revolution, three major changes were introduced in the national health system. First, an extensive public PHC network was developed; secondly, medical education was incorporated into the public health-care delivery system and thirdly, there was an intensive expansion of the human and physical resources of the health system.

PHC was the leading strategy for achieving WHO's vision of Health for All by the year 2000. The PHC network of

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Iran is an integrated and stratified health-care delivery system. The rural health centre is a village-based facility staffed by a general practitioner, several health technicians and administrative personnel, and has 1–5 health houses under its supervision. The ‘health house’ is the most peripheral rural facility in the network, covering an average of 1500 people. A male and a female villager known as ‘Behvarz’ work in each health house. Their principal duty is the provision of PHC services for the covered population. Every health house covers one or several villages (satellite villages). A village on the route to urban areas is accessible to a larger population, and is usually the site of establishment of the health house.⁴

After the setting up of PHC networks, the most important intervention in the creation of a nationwide health system was the formation of the Ministry of Health and Medical Education (MOHME) in 1986. In a historical perspective, four major reasons underpinned the integration of medical education with the health-care delivery system, resulting MOHME: (i) expansion of physical resources for medical education, with the inclusion of health-care facilities in medical schools; (ii) conduct of appropriate research and education inside the health-care delivery system at all levels of care; (iii) increasing the presence of academic members in society and (iv) coordination of medical education with the needs of society by creating a harmonious management on both the supply and the demand side of human resources.³

Many studies conducted within last decades indicated that the health indicators have been improved to a large extent in Iran. For instance, in 1976, the neonatal mortality rate (NMR), infant mortality rate (IMR) and under 5 mortality rate (U5MR) were 32, 93 and 135 per 1000 live birth, respectively,⁵ but they decreased to 18.3, 28.6 and 36 per 1000 live birth, respectively, in 2000.⁶ Another study in 1971 in Tehran, capital of Iran, showed that 60% of deaths occurred in under 5 children were due to upper respiratory tract infection and diarrhea⁷ while, according to the country death registry in 2004, only 4.5% of deaths were due to parasitic and infectious diseases.⁸

Nonetheless, to assess the efficiency of the health system in Iran more deeply, we need to compare its improvement rate with other countries in the region.

World Health Organization (WHO) provides annual report including a core set of some health and development indicators to demonstrate a brief health status of the countries around the world. The values of these indicators were calculated by applying estimation and modeling techniques. In addition, the Eastern Mediterranean Regional (EMR) office publishes similar annual reports based on the latest available values provided by member states of the

region. These reports compare the health status among the countries, but there are many missing values from most of the countries in consecutive years.

We need to mention that there are challenges regarding the quality of data and the methodology used to calculate the indicators^{9–11} in these reports; also, we should consider the fact that the predicted values generated by models are different from the values produced inside the countries. Nonetheless, since the methodology and definition of these indicators had no remarkable changes during the recent years, analyzing the trend of the indicators within these years is still valuable and may enable us to monitor the progress of Iran in its health indicators comparing with the other countries in EMR region.

On the basis of the above explanation in this study, we conducted a trend analysis on some of the main health indicators in Iran and compared their trends with other countries in the region using the data in WHO and EMR annual reports.

Methods

In this study, we explored the temporal variations of five main indicators which were total fertility rate (TFR), U5MR, and the percentage of newborns with birth weight greater than 2.5 kg (BW), diphtheria, pertussis, tetanus vaccination percentages (DPT) and adult literacy rate (ALR).

We first reviewed the WHO and EMR formal publications and reports for all indicators between 1990 and 2005 from Iran and other countries in EMR region. We searched all relevant web pages, in addition to hand-searched all annual statistical reports. On the basis of the availability and coverage of data, DPT and BW were obtained from EMR office reports; U5MR, TFR and ALR from WHO sources. These indicators were selected because they had less missing values and were reported from most of the countries in the region more or less regularly. From the beginning as our inclusion criteria, we only selected those indicators that we could find at least four values within our time period.

We then modeled the temporal variations of these five indicators in Iran and compared their variations in EMR countries. To generate a more comprehensive picture of the variations, we categorized the EMR countries into three groups based on their HDI: high (HHDI), middle (MHDI) and low (LHDI).¹² On the basis of this categorization, Iran is located in the MHDI class (Table 1).

Statistical analysis

Using linear regression, we estimated the values of these indicators in Iran and EMR countries classified by their

Table 1 The list of countries in EMR grouped by HDI

LHDI	MHDI	HHDI
Afghanistan	Jordan	Kuwait
Somalia	Lebanon	Qatar
Iraq	Islamic Republic of Iran	United Arab Emirate
Yemen	Syrian Arab Republic	Bahrain
Djibouti	Egypt	Saudi Arabia
Palestine	Pakistan	Cyprus
	Sudan	Oman
	Tunisia	
	Morocco	
	Libyan Arab Republic	

HDI levels. In these models, the selected indicators were treated as dependent variables; year and the level of HDI were treated as independent variables. The statistical software of STATA, version 8.0, was used to analyze the data. The values in the results and tables were extracted from the models and values presented in the graphs are actual values obtained from EMR and WHO sources.

Results

Under 5 year mortality rate

The WHO data showed that the U5MR in Iran were 72 and 36 per 1000 live birth in 1990 and 2005, respectively (Fig. 1a). The estimated annual decline rate was 2.5 which is much greater than the corresponding number in countries with MHDI (1.85) and is very close to that number in countries with HHDI (2.67). On the basis of these figures, U5MR in Iran was three times of that in HHDI in 1990 (73.7 versus 23.7), but in 2005, their differences were very small (33.4 versus 31) which means that the progress rate in Iran was much faster than HHDI countries.

Total fertility rate

The slope of this indicator was much steeper in Iran than that in the other countries in EMR. Annually, TFR dropped 0.20% while even in HHDI this figure was 0.15%. Our estimations for TFR in Iran in 1990 and 2005 were 5.2% and 2%, respectively (Fig. 1a). Again the estimated TFR in Iran in 2005 was much lower than the corresponding figures in countries with LHDI (6.2%) and MHDI (3.22%); it was very close to TFR in HHDI countries (1.95%).

Adult literacy rate

The WHO data show that Iran was very successful in increasing ALR (Fig. 1a). This rate increased 1.64% annually

in Iran, whereas even in HHDI countries, the increasing rate was 0.72%. This ascending trend in Iran pushed the ALR from 55.1% in 1990 to 81.3% in 2005. Although ALR in Iran was even less than that in MHDI countries in 1990, the latest figures showed that ALR in Iran was 15% greater than those figures in MHDI (68.4%) and HHDI (66.6%).

Newborns with birth weight >2.5 kg

On the basis of EMR office data, the percentage of newborns with birth weight >2.5 kg in Iran was 93.3% in 1995 and was more or less constant (Fig. 1b) during last decade. Our model showed that each year this index decreased around 0.04% in Iran, whereas this figure had increasing trends in LHDI and MHDI (0.68 and 0.05, respectively). This index in Iran in 2005 was very close to that number in HHDI countries (92.7% and 91.7%).

DPT vaccination percentage

The vaccination percentage in Iran was very close to 100% from 1997 based on EMR office data (Fig. 1b). Our findings show that the vaccination percentage in MHDI and HHDI countries were very high and the annual variations were <0.5%, while this percentage was <90% in LHDI countries in the beginning and unfortunately it had a decreasing trend; the predicted vaccine coverage in 2005 in LHDI countries was around 73% (Table 2).

Discussion

Main findings

Trend analysis of data distributed by EMR and WHO office shows a significant improvement in Iran's health indicators in the recent decades. This improvement was very fast and more prominent than the improvement in most of the other countries in the region.

What is already known

We knew that most of health indicators were improved in EMR as well as in Iran in recent decades. After Alma Ata conference in 1978, a new PHC system was implemented in Iran which have efficiently improved national health indicators.^{13,14} In addition, medical universities have found a principle role in management of health systems and providing preventive and curative services in provincial levels by the integration of medical education and the MOHME since 1985. By the end of 2003, more than 86% of rural population has easy access to the

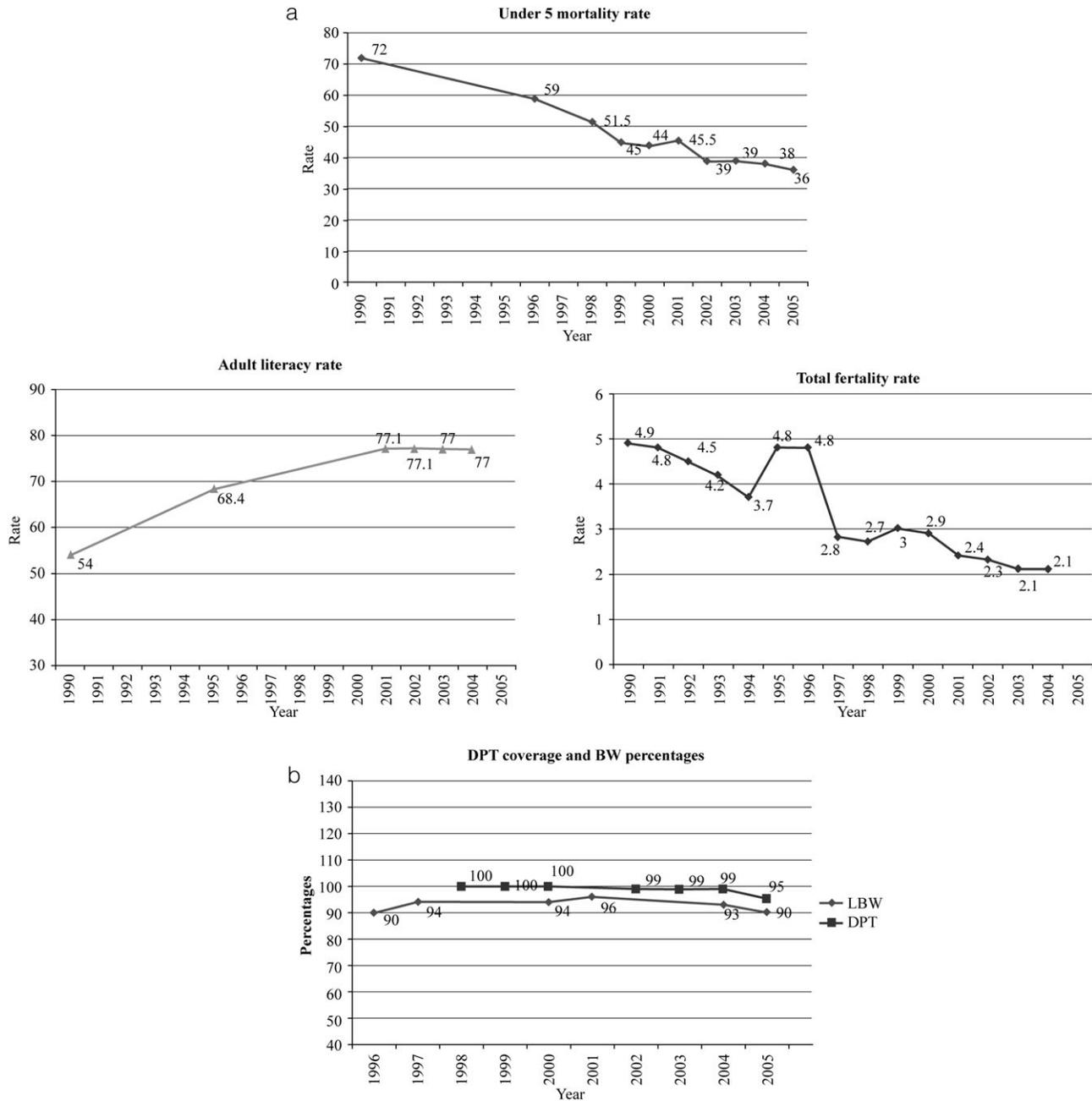


Fig. 1 The trend of main health indicators of Iran from 1990 to 2005 based on EMR and WHO report. (a) Indicators obtained from WHO report and (b) EMR report.

health network via rural health works within a referral system.³ Iran has had remarkable improvement in most health indices including IMR, family planning, U5MR and TFR in the recent years particularly in rural population.¹⁵ The remarkable change in TFR made Iran as one of the most successful countries in family planning programs among developing world¹⁶ and reflects Iranians' unique

experience with implementation of a national family planning program. Erfani *et al.* in their study indicated that contraception had the largest effect on fertility, accounting for 61% of the reduction in fertility from its theoretical maximum. The fertility-inhibiting effect of marriage patterns accounted for an additional 31% reduction, and was most important among the young.¹⁷

Table 2 The annual variations and the estimated indices in the first and the last years of the study in Iran and other countries classified by their human development

Index	U5MR (Per 1000)	TFR (%)	BW (%)	DPT (%)	ALR (%)
Source of data	WHO	WHO	EMR	EMR	WHO
Annual variation of index (changed rate per year)					
Iran	-2.52	-0.20	-0.04	-0.51	1.64
Countries with low HDI	0.17	-0.05	0.68	-2.01	0.67
Countries with medium HDI	-1.85	-0.11	0.05	-0.50	0.83
Countries with high HDI	-2.67	-0.15	-0.10	-0.40	0.72
Index value in baseline year (1990) (the rate)					
Iran	73.7	5.20	93.3	105	55.1
Countries with low HDI	166	6.96	74.1	87.7	38.6
Countries with medium HDI	69.5	4.98	90.3	93.9	57.6
Countries with high HDI	23.7	4.33	93.1	93.9	74.8
Index value in last year (2005) (the rate)					
Iran	33.4	2.00	92.7	96.8	81.3
Countries with low HDI	168	6.20	85.0	72.8	65.8
Countries with medium HDI	39.9	3.22	98.0	96.8	68.4
Countries with high HDI	31.0	1.95	91.7	98.6	66.6

^aBold indicates $P < 0.05$.

What this study adds

In this study, we showed that the speed of health improvement in Iran was greater than most other countries in the EMR. Since Iran is one of a few countries around the world with integrated health system within universities of medical sciences, such evidence helps policy makers to explore the differences and assess the feasibility of such a scheme.

WHO data showed that Iran was very successful in increasing ALR. Although ALR in Iran was even less than that in MHDI in 1990, the latest figures showed that ALR in Iran was 15% greater than those figures in MHDI and HHDI countries. This very considerable progress can be attributed to the educating movement which began nearly three decades ago by 'Literacy Movement Organization'. Literacy is one of the main prerequisites of development and improvement in public health; therefore, we expect the improvement in ALR to show its impacts in following years. Nevertheless, much more should be done to push ALR toward 100% which is one of the main goals of Millennium Development Goals for whole world in following years.¹⁸

In terms of U5MR, this study showed that Iran had the greater improvement compared with MHDI and very close to HHDI countries. Expanding the PHC delivery network, establishing health houses even in remote villages with local trained staff, developing integrated preventive and curative guidelines for diarrhea and respiratory diseases in the

children and also very high vaccination coverage among population are the main reasons which declined U5MR in recent decades in Iran. Nevertheless, because of obvious changes in the disease pattern in the recent years in Iran, it seems that health system in Iran should adapt itself to deal with new threats such as accidents and non-communicable diseases as well as HIV/AIDS. Therefore, for further studies, we should look at more indicators which should be the performance of the system in controlling these threats.

Limitation of this study

Shortage of data from multiple sources, different years and also more health indicator from the EMR countries was one of the main limitations in our study. We could model better, the health situation of the country if we had access to more data about these indicators and also other health indicators. We did not check the validity of the reported data completely as there was no access to details of the original data from countries; therefore, we supposed that experts were critically appraised the data before approving and publishing by WHO and EMR. Nonetheless, as one of the limitation of this study, we cannot ignore the possible errors due to questionable validity of some data. For example, the increased rate of U5MR in 2000 might only be due to the WHO estimation method. The Demographic Health Survey (DHS) conducted in 2000 showed that the real value of this

indicator is 36.1 per 1000.⁶ In another example, based on Iran MOHME data, the TFR for rural population had a slight decline rate in years 1994–1996 (3.4, 3.0 and 2.6, respectively) which are different from the WHO estimated figures used in this study.^{14,15}

Conclusion

It seems that the health system of Iran was more or less successful in improvement of its indicators in EMR by implementing an extended PHC and seeking the contributions of all stockholders. However, change in life style, urbanization and patterns of diseases (new threats such as accidents and non-communicable diseases) in the recent years requires a flexible and comprehensive health program to keep the progress sustainable.

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