Mortality in the Islamic Republic of Iran, 1964–2004

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Objective Reliable information on the pattern, level and trend of mortality is essential for evidence-based policy to improve health. Various sources of mortality data in the Islamic Republic of Iran have not been critically assessed. This paper aims to document and evaluate the completeness of the different data sources on mortality and to estimate the level and trends of mortality over the past 40 years according to various mortality indices such as child mortality, adult mortality and life expectancy.

Methods We undertook a systematic review of all available studies on infant mortality from 1964 to 2004 and estimated the most probable trend in child mortality. Death registration data from between 1992 and 2004 were assessed for completeness to estimate the level of adult mortality. Life tables for 2004 were constructed for the Islamic Republic of Iran based on these data, corrected for underregistration of death.

Findings Infant mortality decreased from an estimated 154 deaths per 1000 live births in 1964 to 26 in 2004. The risk of adult mortality in 2004 was estimated to be 0.124 and 0.175 for females and males respectively. According to adjusted death registration data, life expectancy at birth in 2004 was 71.2 for females and 68.7 for males. The average completeness of death registration for ages 5 years and older across all systems was 76% for the period 2001–2004.

Conclusion There has been a general decline in child mortality in the Islamic Republic of Iran over the past three decades. Adult mortality levels also have declined, but less substantially. Mortality information systems have improved, yet serious concerns remain regarding the completeness and quality of data.

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Une traduction en français de ce résumé figure à la fin de l'article. Al final del artículo se facilita una traducción al español. الترجمة العربية لهذه الخلاصة في نهاية النص الكامل لهذه المقالة.

Introduction

Reliable information on a population's levels and patterns of causes of death is essential for health planning and priority-setting for interventions to control diseases and injuries, and for population-based evaluation of health programmes.[1] The ultimate data source is an accurate and complete national vital registration system. Unfortunately, WHO reports that complete mortality data are available routinely for only a minority of countries worldwide. Completeness is highest (> 90%) in developed countries (e.g. in Europe and North America) and lowest in developing countries, particularly in Africa.[2,3]

Mortality data sources

As in many other developing countries, the Islamic Republic of Iran has incomplete mortality information.[4–6] Currently, the National Organization for Civil Registration (NOCR) and the Ministry of Health and Medical Education (MOH&ME) operate death registration systems (Fig. 1).

The NOCR was established in 1918 and is responsible for the registration of births, marriages, divorces and deaths.[7] In 1984 the Iranian Parliament revised and passed civil registration legislation requiring a report to be sent to the NOCR within ten days of any Iran resident's death. In addition, deaths must be confirmed by a physician or two witnesses.[7]

Of the four vital events registered by the NOCR, mortality data are the least complete and of the poorest quality.[6] This may be due in part to unregistered births when the infants die soon after birth. Recent assessments suggest some progress in capturing and registering deaths but problems remain, including delayed registration and inaccurate recording of causes of death. As a result, previous studies generally have not used this data source for analysing Iranian mortality.[6,8]

Until 2002, the MOH&ME Deputy of Research and Technology (DRT) operated a system to record the causes of deaths.[9–11] Between 1966 and 1995, mortality data based on cemetery records were collected in a sample of 24 cities. In 1995, the system was redesigned to cover the entire country.[9,12] This did not allow delayed registration of deaths and thus was more timely than the NOCR data. However, the causes of death were based on cemetery records and therefore were susceptible to bias (e.g. information bias due to misclassification).[8] No study has assessed the validity of this data. The system was discontinued after the launch of the MOH&ME Deputy of Health (DH) programme.

The DH established a comprehensive programme for death registration in order to improve district health networks' registration and certification of all deaths by age, sex, cause and place of residence. This was piloted in Busher Province in 1997. To improve the level of registration, different sources of mortality data in a district (e.g. NOCR, cemetery and hospital) are cross-checked for omissions and duplication. The annual report of mortality data in ten provinces for 2000 compared these results with those from the NOCR and the DRT and found more reliable completeness

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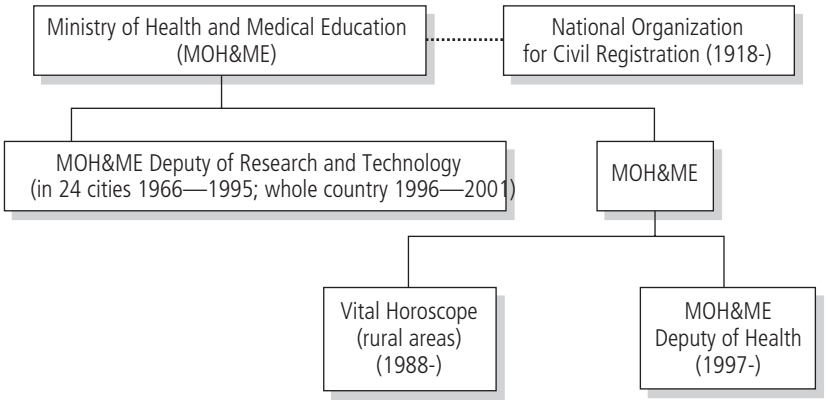
and classification of the causes of death.[13] For instance, the DH recorded 6 681 more deaths than the NOCR and 15 390 more than the DRT.[13] The DH system is being implemented progressively and currently covers 29 provinces. It is expected that all 30 provinces will be covered by the end of 2007.

The Iranian Vital Horoscope (VH) is another mortality and population source that operates in rural areas. Rural health workers (*behvarz*) conduct periodic censuses and household visits to record information in family files. A notice pinned to the wall of each Health House (the basic primary health-care unit, covering between one and four villages) displays this up-to-date information on the number of births, deaths and population and family planning activities within the rural community. The VH is sent to the District Health Centre at year's end; these data are entered into a customized computer programme and forwarded to Tehran for aggregation at national level.[14] Since 1988, the Deputy of Health has analysed and published the results of this innovative system.[15]

Other mortality data sources include censuses and surveys conducted by the Statistical Centre of Iran (SCI), and MOH&ME surveys. Mortality estimates obtained from censuses or surveys using direct methods (retrospective questions about deaths in households during the previous 12 months) suffer from well-known problems of undercounting and misreporting of age and sex, particularly for adult mortality. For this reason, indirect demographic techniques have often been used to estimate the level of mortality and to create life tables. The level of child mortality and information on children ever born and children surviving (CEBCS) have been estimated by collecting and analysing data according to the Brass methodology.[4,6] The results of this analysis and data sources are shown in Fig. 2.

Fig. 1. **Overview of death registration systems of various organizations in the Islamic Republic of Iran**



MOH&ME: Iranian Ministry of Health and Medical Education.

Methods

A systematic review was conducted to obtain all published and unpublished documents in Farsi and/or English concerning child mortality in Iran between 1973 and 2004. Unpublished data and government reports were obtained from various organizations that collect mortality data, such as the NOCR, SCI and MOH&ME.[4,5,16–18] The SCI carried out the most comprehensive assessment of infant mortality trends from 1956 to 2021, based on data from various studies conducted between 1973 and 2001 using Brass's indirect CEBCS method (Table 1, available at: http://www.who.int/bulletin).[4] Adult mortality was estimated as the risk of death between ages 15 and 60 based on the following available data sources:[6,16–27]

(1) DRT: death registration system for 2001 (entire country except Tehran Province);
(2) DH: VH data for 1992–2004; death registration in 18 provinces in 2000–2001, 23 in 2003, and 29 (of 30) in 2004; and
(3) NOCR-registered deaths in 2002 and 2003 for the whole country. To remove natural disaster effects on background mortality rates, 28 745 deaths from the Bam earthquake in 2003 were excluded from the analysis.

The most recent population census in the Islamic Republic of Iran was carried out in 1996 and no up-to-date population estimates by age or sex were available.[28] As a result, we used the United Nations (UN) estimated population size by age and sex to calculate national age-specific death rates from 2001 onwards. We applied the observed ratio in the Iranian Demographic and Health Survey (DHS) 2000 to the under-5 population estimated by the UN in order to separate this population into those aged 0–1 and 1–4 years.[18]

Analytical methods

Estimation of child mortality from previous studies

With relatively few studies on child mortality over the past three decades, trends in infant mortality were assessed first as estimates of these were more readily available. The results of all studies carried out between 1973 and 2001, and of MOH&ME death registrations between 1992 and 2004, were collected and located in time between 1958 and 2004 (Fig. 2). Given the methodological limitations of some estimation techniques and small sample sizes, some estimates were judged to be implausible and needed to be censored. Standard statistical methods were used to censor implausible data points and infant mortality for 2004 was predicted from the fitted trend line (Fig. 2).[29] Child mortality by sex was then estimated from overall infant mortality based on observed age-sex patterns from the Iranian DHS.

Assessment of 2004 death registration data

Brass's growth balance method was used to adjust for undercounting in mortality data for those aged over 5. This assumes that a population is stable and closed to migration, and that the partial birth rate has a linear relationship with the partial death rate (deaths above age x in population aged x and over) for ages over 5. Standard procedures were applied to estimate the slope of the fitted line describing the relationship between the birth and death rates.[30,31] We applied this technique to all data sources for the period 2001–2004, and used the average completeness estimate (65.0% for females and 89.8% for males) to adjust the DH registration data to estimate adult mortality in 2004. Estimated completeness for each data source is summarized in Table 2.

Comparison of adjusted and registered child mortality from death registration systems suggests that the completeness of data for both sexes was about 59% for the DRT (2001), 50% for NOCR (2002–2003) and 61% for DH (2001–2004) (Table 2). Completeness of death registration data for females in all systems and all age groups was lower. Completeness of death registration for age groups above 5 years was estimated at 74% for DRT, 74% for NOCR (2002–2003) and 79% for DH (average completeness 2001–2004). Since each system had similar estimated completeness, we used the average assessment of underreporting to correct reported mortality rates.

Estimation of adult mortality

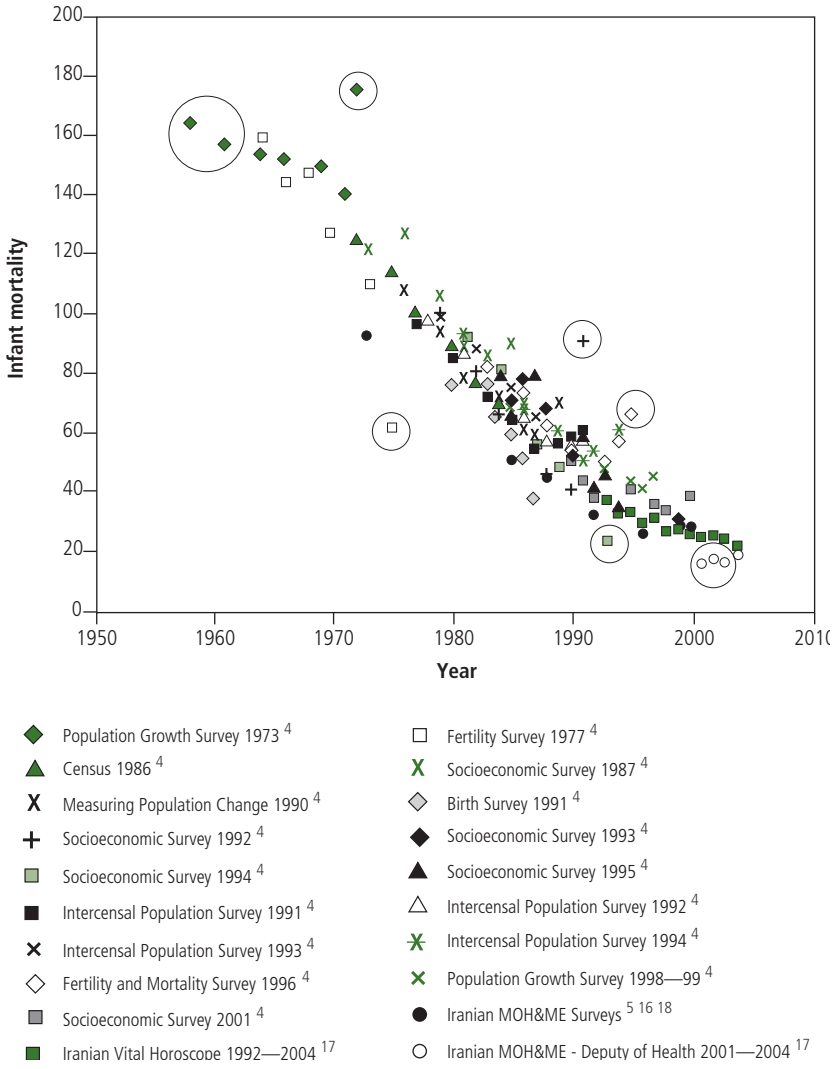
We began the assessment of the risk of adult mortality between ages 15 and 60 ($_{45}Q_{15}$), the key summary indicator, by assessing the trends. We did this by examining results of all studies between 1973 and 2000 and of deaths registered between 1992 and 2004 (Table 1, available at: http://www.who.int/bulletin, Fig. 3, Fig. 4). Estimates that were clear outliers were censored based on plausibility or known methodological problems with estimation techniques or data sources. A logistic curve was fitted to the remaining points and trends were estimated. Current (2004) levels were estimated based on the predicted value of the fitted line for 2004 (Fig 3, Fig. 4).

Constructing 2004 life tables

Life tables based on adjusted data from death registration systems were constructed for both sexes according to data from 2004 DH death registration in 29 provinces. Child mortality was estimated based on the methods described earlier, and all death rates at ages 5 and over were adjusted based on the correction factor from Brass's growth balance method.

An alternative approach predicts the level of adult mortality corresponding to observed (estimated) child mortality. Our prediction model is based on a modification of Brass's relational model life table. Brass proposed that the logit of the survival values at each age x (l_x) in a given life table has a linear relationship with the logit of the survival values in a standard life table.[32] As departures from the standard lead to a systematic bias in predictive ability, particularly among children and older adults, a modified model based on two additional correction factors for child and adult mortality, has been proposed.[33] This enables us to predict the level of adult mortality based on the estimate of child mortality, and compare this with the observed values in the life tables based on adjusted data (as before). Using the estimated level of child mortality for 2004, the modified logit life table system was also used to estimate a life table for the Islamic Republic of Iran for 2004.[33,34]

Fig. 2. **Estimates of infant mortality per 1000 live births according to different sources, Islamic Republic of Iran, 1958–2004**



Circled data were censored by Cook's distance method.

Results

Child mortality estimates from previous studies

Infant mortality has decreased sharply over the past three decades: from around 154 per 1000 live births in 1964 to about 26 per 1000 (95% confidence interval, CI: 19-36) in 2004. This implies child mortality levels of 30 and 34 per 1000 live births for females and males respectively.

Adult mortality

After censoring the outlying data, various mortality data sources suggest that adult mortality has been decreasing over the past four decades, particularly for females. The predicted adult mortality risk for females in 1960 was around 0.382 (95% CI: 0.277-0.52), dropping to 0.108 (95% CI: 0.08-0.146) by 2004. The male index was 0.370 (95% CI: 0.274-0.499) in 1960, declining to 0.160 (95% CI: 0.122-0.211) in 2004. In the adjusted life tables for 2004, based on DH data, adult mortality risk was 0.124 for females and 0.175 for males (Table 3). Based on the modified logit life table system (using estimated child

mortality for 2004), the predicted value of adult mortality was 0.128 (mean) for females, and 0.224 (mean) for males. The predicted levels of adult female mortality in the trend analysis and from the registered mortality data, corrected for undercounting, agree quite closely with predictions from applying model life tables based on observed values for child mortality. For males, the estimated level (0.160–0.175) is significantly lower than what is expected from model life tables (0.224) given the observed level of male child mortality (Table 3).

Estimation of life expectancy in 2004

We chose the adjusted (higher) levels of adult mortality as the best estimate, given our preference for using local evidence over models. This suggests that life expectancy at birth in 2004 was 71.2 years for females and 68.7 years for males (Tables 3 & 4, available at: http://www.who.int/bulletin). By comparison, the values based on the modified logit life table system suggested a larger sex differential, with implied life expectancies of 72.5 years for females and 66.8 for males (Table 3).

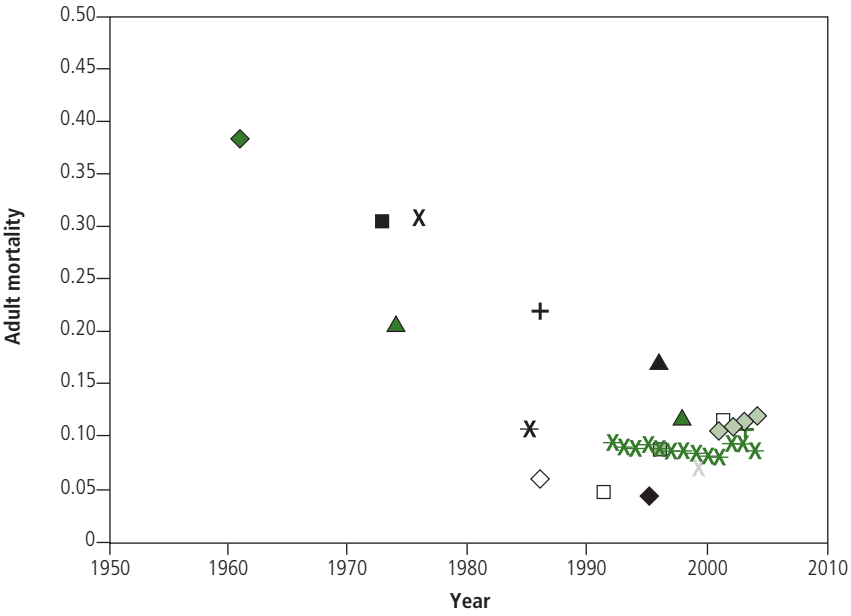
Discussion

Lack of documentation about methods and data sources is of major concern when studying mortality. This study presents the first comprehensive analysis of mortality levels and trends in the Islamic Republic of Iran, using different methods and sources of published and unpublished information and registration data. Previous attempts by organizations such as the UN and WHO have used substantially poorer and less complete data sets and have not been explicit about methods.

Review of infant mortality trends based on various sources (surveys, censuses, registration systems) indicates that over the past three decades this indicator has declined dramatically. A key factor in this decline may have been the expansion of the Iranian health network and access to primary health care, particularly in rural areas.[35]

Studies to estimate infant and child mortality using indirect demographic methods, such as the CEBCS technique, generally yield more plausible estimates than other methods. Although these methods are valuable in situations where death registration is incomplete,

Fig. 3. **Estimates of female adult mortality according to different sources and surveys, Islamic Republic of Iran, 1960–2004**



- Life tables based on two successive censuses (1956—1966) [24]
- Survey 1973; retrospective method and final tables were based on corrected mortality rates (logit life table) [16]
- Multi round survey 1973—76 by Statistical Centre of Iran [27]
- Life tables based on 1976 census data (stable population and logit life tables) [27]
- Survey 1985, retrospective method in rural areas [22]
- Census 1986, retrospective method (estimated by authors) [20]
- Life tables based on child mortality data in 1986 census [4]
- Intercensal survey 1991, retrospective method (estimated by authors) [25]
- Life tables based on Vital Horoscope 1996 (main villages) [21]
- Survey based on census 1996, retrospective method (estimated by authors) [19]
- Life tables based on relationship between population aged 65+ and crude death rate based on the 1996 census (Mazur and Palmor method) [6]
- Multi-round survey (1998—99) (estimated by authors) [26]
- DHS 2000, retrospective method (estimated by authors) [18]
- The Iranian Vital Horoscope, rural areas, unadjusted data, 1992—2004 (estimated by authors) [17]
- Adjusted data from MOH&ME - Deputy of Health Death Registration Sytem 2001—2004 (estimated by authors) [17]
- Adjusted data from NOCR Death Registration 2002—2003 (estimated by authors) [23]
- Adjusted data from MOH&ME - Deputy of Research and Technology Death Registration Sytem 2001 (estimated by authors) [17]

Table 2. **Estimated completeness (%) of Iranian data on child and adult deaths according to different death registration systems, 2001–2004**

	Child deaths			Deaths above 5 years		
	Females	Males	Both	Females	Males	Both
DRT[a] (2001)	50	48	49	63	84	74
NOCR[b] (2002/03)	53	47	50	62	85	74
DH[c] (2001/04)	59	63	61	67	90	79

[a] Ministry of Health and Medical Education Deputy of Research and Technology.
[b] National Organization for Civil Registration.
[c] Ministry of Health and Medical Education Deputy of Health.

the results depend on the quality of the reported information. In addition, this method assumes stable fertility and child mortality during recent decades. The fertility rate in the Islamic Republic of Iran has increased dramatically over the past three decades,[31,36] so caution is necessary when interpreting these estimates of child mortality.

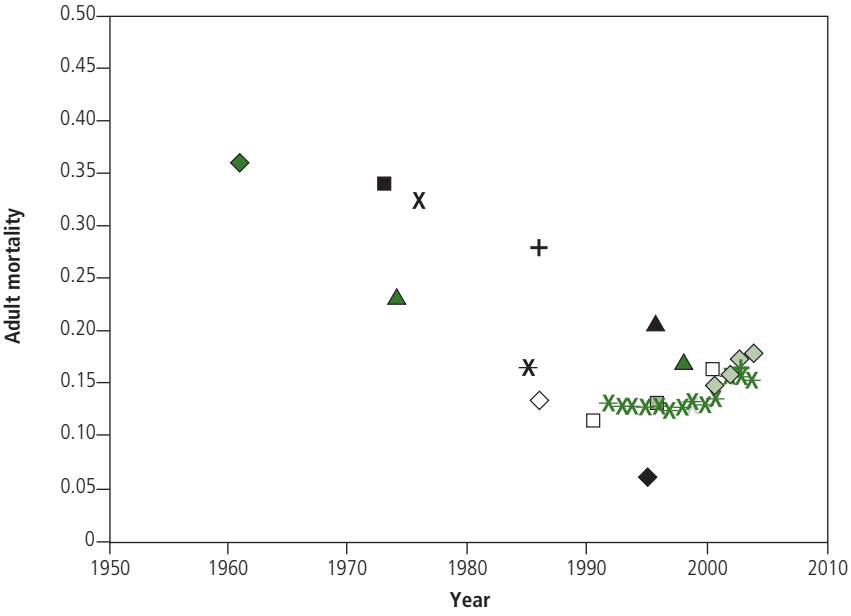
The few studies carried out to estimate adult mortality used the retrospective method and have serious problems with underrecorded deaths. Therefore, this study used demographic methods to estimate mortality levels and construct life tables. While Iranian death registration systems undercount deaths (particularly of females), our study suggests that these data sources may be useable in combination with other sources, such as survey or census data, to estimate adult mortality levels.

Our estimates of child mortality are somewhat lower than those of the UN and WHO (36–42 per 1000 live births). Our estimates of adult mortality risk in 2004 (0.124 and 0.175 for females and males respectively) are very nearly identical to WHO's figure (0.125) for females but somewhat lower than that for males (0.201).[37] Recent data showing a decline in child mortality may have been unavailable to WHO; this could explain the difference in these estimates. More comprehensive and recent data from the MOH&ME undoubtedly have helped in reducing uncertainly regarding adult mortality levels.

Despite the NOCR's long history of death registration, underreporting of death is common, particularly for females.[6] Delayed registration by individuals is this system's chief limitation: often there is a year or more between the date of death and its registration. The main aim of the DH registration system is to collate cause of death data from different sources. This system shows improving completeness and coverage, and the results of this study suggest sufficient completeness of data for use in mortality analysis, with appropriate corrections.

Although we have attempted a comprehensive evaluation of trends and levels of mortality, our study has several limitations. First, up-to-date population data by age and sex were not available for this study. The UN estimate of the Iranian population (2000–2005) was used although its method is not clear.[28]

Fig. 4. **Estimates of male adult mortality according to different sources and surveys, Islamic Republic of Iran, 1960–2004**



- Life tables based on two successive censuses (1956—1966) [24]
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- Multi round survey 1973—76 by Statistical Centre of Iran [27]
- Life tables based on 1976 census data (stable population and logit life tables) [27]
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- Adjusted data from NOCR Death Registration 2002—2003 (estimated by authors) [23]
- Adjusted data from MOH&ME - Deputy of Research and Technology Death Registration Sytem 2001 (estimated by authors) [17]

Second, since there were few sources of data on child mortality levels, we estimated these indirectly using infant mortality data and patterns observed in the Iranian DHS of 2000. Third, as the DH death registration system is not yet operational in Tehran province (population 12 million) we have assumed that its pattern of mortality is the average of all other provinces. Fourth, it is uncertain whether the Brass growth balance method is appropriate for estimating underregistration of deaths, given its assumption that populations should be stable and closed to migration. While there is little international migration to and from the Islamic Republic of Iran, the assumption of a stable population is unlikely to hold.

In conclusion, the Islamic Republic of Iran might be considered to be at the end of the second stage of health and demographic transition. Decreasing child and infant mortality indicate declines in infectious and nutritional diseases. It is probable that the leading causes of death will shift to chronic diseases in adults. Female mortality is now lower than that

Table 3. **Estimated Iranian adult mortality and life expectancy at birth by sex according to adjusted data (life tables 2004) and modified logit life table system (predicted, based on child mortality), 2004**

		Adult mortality		Life expectancy at birth	
		Females	Males	Females	Males
Estimated life tables 2004		0.124	0.182	71.2	68.7
Predicted life table based on estimated child mortality in 2004	+3 standard deviations[a]	0.141	0.252	71.8	65.6
	mean[a]	0.128	0.224	72.5	66.8
	−3 standard deviations[a]	0.116	0.200	73.1	67.8

[a] Of adult mortality risk.

of males at all ages, confirming the pattern observed in countries undergoing epidemiological transition. However, increases in male mortality from traffic accidents are a particular public health concern.

Undoubtedly, high-quality and complete national vital registration is the best data source to measure mortality. The Islamic Republic of Iran has made considerable progress towards this, but a focus on better registration of adult mortality, particularly of females, is an urgent priority for public health policy. Direct measurement of undercounting in the vital registration system would increase confidence in the data. A specific investigation to measure the completeness of data from death registration systems by conducting surveys (e.g. capture-recapture method) and subsequent improvements in infrastructure, capacity-building and resources for death registration are priorities. ■

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Résumé

Mortalité en République Islamique d'Iran, 1964 – 2004

Objectif Des informations fiables sur les caractéristiques, le niveau et les tendances de la mortalité sont essentielles à une politique d'amélioration de la santé reposant sur des bases factuelles. On n'a pas évalué d'une manière critique les diverses sources de données sur la mortalité en République Islamique d'Iran. Nous souhaitons dans cet article documenter et évaluer l'exhaustivité des différentes sources de données sur la mortalité et estimer le niveau et les tendances de cette dernière au cours des 40 dernières années, grâce à plusieurs indices tels que la mortalité de l'enfant, la mortalité de l'adulte et l'espérance de vie.

Méthodes Nous avons procédé à une revue systématique des études disponibles sur la mortalité infantile de 1964 à 2004 et estimé la tendance la plus probable de la mortalité de l'enfant. Nous avons évalué le degré d'exhaustivité des données provenant de l'enregistrement des décès entre 1992 et 2004 pour estimer le niveau de la mortalité adulte. Nous avons établi les tables de survie pour la République islamique d'Iran pour 2004 sur la base de ces données, en les corrigeant pour tenir compte du sous-enregistrement des décès.

Résultats La mortalité infantile a diminué, passant de 154 décès pour 1000 naissances vivantes en 1964 à 26 en 2004 selon les estimations. Le risque de mortalité adulte en 2004 a été estimé à 0,124 pour les femmes et 0,175 pour les hommes. Selon les données ajustées provenant de l'enregistrement des décès, l'espérance de vie à la naissance en 2004 était de 71,2 ans pour les femmes et de 68,7 ans pour les hommes. Le degré d'exhaustivité de l'enregistrement des décès pour les personnes âgées de 5 ans et plus a été de 76% pour la période 2001 - 2004 pour l'ensemble des systèmes d'enregistrement.

Conclusion Il y a eu au cours des trois dernières décennies une baisse générale de la mortalité de l'enfant en République islamique d'Iran. La mortalité adulte a elle aussi diminué, mais moins fortement. Les systèmes d'information sur la mortalité se sont améliorés, mais il subsiste de sérieux problèmes quant à l'exhaustivité et à la qualité des données.

Resumen

La mortalidad en la República Islámica del Irán durante el periodo 1964-2004

Objetivo La disponibilidad de información fidedigna sobre las pautas, niveles y tendencias de la mortalidad es fundamental para poder formular políticas de mejora de la salud basadas en la evidencia. Algunas de las fuentes de datos sobre la mortalidad en la República Islámica del Irán no han sido objeto de una evaluación crítica. Este artículo tiene por objeto documentar y evaluar la completud de las diferentes fuentes de datos sobre la mortalidad y estimar el nivel y las tendencias de la mortalidad durante los últimos 40 años a partir de diversos índices, como la mortalidad en la niñez, la mortalidad de adultos y la esperanza de vida.

Métodos Emprendimos una revisión sistemática de todos los estudios disponibles sobre la mortalidad infantil entre 1964 y 2004 y estimamos la tendencia más probable de la mortalidad en la niñez. Los datos de los registros de defunción correspondientes al periodo 1992-2004 fueron evaluados para determinar su completud a fin de estimar la mortalidad de adultos. A partir de

esos datos se confeccionaron las tablas de vida de 2004 para la República Islámica del Irán, corrigiendo los valores en función del subregistro de las defunciones.

Resultados La mortalidad infantil disminuyó de las 154 defunciones por 1000 nacidos vivos estimadas en 1964 a 26 en 2004. El riesgo de mortalidad de adultos en 2004 fue de 0,124 para las mujeres y 0,175 para los hombres. Según los datos ajustados de los registros de defunción, la esperanza de vida al nacer en 2004 fue de 71,2 años para las mujeres y 68,7 para los hombres. El grado medio de completud de los registros de defunción para las personas de 5 y más años en todos los sistemas fue del 76% durante el periodo 2001-2004.

Conclusión Durante los tres últimos decenios se ha registrado una disminución general de la mortalidad en la niñez en la República Islámica del Irán. La mortalidad de adultos también ha descendido, pero de forma menos marcada. Los sistemas de información sobre la mortalidad han mejorado, pero el tema de la completud y calidad de los datos sigue suscitando gran preocupación.

ملخص

معدل الوفيات في جمهورية إيران الإسلامية في الفترة 1964 - 2004

الغرض: تعتبر المعلومات التي يُعول عليها حول نمط ومستوى واتجاه معدل الوفيات عنصراً أساسياً في السياسات المسندة بالبيانات والرامية إلى تحسين الوضع الصحي. ولم يسبق تقييم عدد من المصادر المختلفة للمعطيات المتعلقة بمعدل الوفيات في جمهورية إيران الإسلامية تقييماً نقدياً. وتستهدف هذه الورقة توثيق وتقييم مدى اكتمال مختلف مصادر المعطيات المتعلقة بمعدل الوفيات، وتقدير مستوى واتجاهات معدل الوفيات خلال الأربعين سنة الماضية وفقاً لمجموعة مختلفة من مؤشرات الوفيات، مثل معدل وفيات الأطفال، ومعدل وفيات البالغين، ومأمول الحياة.

الطريقة: قمنا في هذه الدراسة بمراجعة منهجية لجميع الدراسات المتاحة حول وفيات الرضّع من عام 1964 إلى عام 2004، وقمنا بتقدير الاتجاه الأكثر احتمالاً لمعدل وفيات الأطفال. وتم تقييم مدى اكتمال معطيات تسجيل الوفيات من عام 1992 إلى عام 2004، من أجل تقدير مستوى وفيات البالغين.

وتم إعداد جداول مجريات الحياة لعام 2004 لجمهورية إيران الإسلامية بناءً على هذه المعطيات مع تصحيحها لتدارك النقص في التسجيل.

الموجودات: لوحظ انخفاض معدل وفيات الرضع من 154 وفاة لكل 1000 مولود حي في عام 1964 إلى 26 في عام 2004. أما المخاطر المقدَّرة لتعرض البالغين للوفاة في عام 2004 فبلغت 0.124 للإناث و 0.175 للذكور. ووفقاً لمعطيات تسجيل الوفيات المصححة، بلغ مأمول الحياة عند الولادة 71.2 للإناث و 68.7 للذكور في عام 2004. وبلغ متوسط اكتمال تسجيل الوفيات لمن هم في سن 5 أعوام فأكثر، في جميع نظم التسجيل، 76% للفترة 2001 – 2004.

الاستنتاج: حدث انخفاض عام في معدل وفيات الأطفال في جمهورية إيران الإسلامية خلال العقود الثلاثة الأخيرة. كما انخفضت مستويات وفيات البالغين، ولكن بنسبة أقل. وتحسنت نظم المعلومات الخاصة بمعدل الوفيات، ولكن لايزال هناك قلق شديد بشأن اكتمال جودة المعطيات.

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Table 1. **Studies on Iranian mortality, 1973–2001**

Year	Researcher/survey	Organization	Indexes	Study method
1973–1976	Baseline population growth survey	Statistical Centre of Iran	a, b	c, d, e
1973	Iran's vital indexes survey	Tehran University	a, b	f, d, e
1977	Fertility survey	Statistical Centre of Iran	a, b	c, d, e
1978	Farhani, EM, (abridged life table of Iran, 1956-1966)	–	b	g
1982	Iran's life tables based on 1976 census	Statistical Centre of Iran	b	g
1984	Mortality and fertility survey	MOH&ME	a, b	f, e
1986	Census	Statistical Centre of Iran	a, b	f, d, e
1987	Socioeconomic characteristics of Iranian households	Statistical Centre of Iran	a, b	c, d, e
1990	Measuring population change	Statistical Centre of Iran	a	c, d
1991	Birth survey	NOCR	a	f, d
1991–1994	Intercensal population survey	Statistical Centre of Iran	a, b	c, d, e
1994	Mortality and fertility survey	MOH&ME	a	h
1992–1995	Socioeconomic characteristic of Iranian households	Statistical Centre of Iran	a, b	c, d, e
1996	Mortality and fertility survey	MOH&ME	a, b	f, d, e
1998–1999	Measuring population growth survey	Statistical Centre of Iran	a, b	c, d, e
2000	Zanjani and Nourollahi	–	b	g
2000	Iranian DHS	MOH&ME and Statistical Centre of Iran	a,b	f, h, d, e
2001–2003	Socioeconomic characteristics of Iranian households	Statistical Centre of Iran	a, b	c, d

[a] Infant mortality.
[b] Adult mortality.
[c] Multiple-round surveys (retrospective method, questioned member of household on number of deaths at different stages of the study).
[d] Children ever born/children surviving.
[e] Retrospective study for adult mortality (deaths in household during last 12 months).
[f] Single-round survey (retrospective method, questioned on number of deaths in household in past 12 months).
[g] Life tables based on census data.
[h] Direct information.

Table 4(a). **Estimated life table (males) for the Islamic Republic of Iran, 2004**

Age group	Years in interval	Mid-year population	Adjusted deaths	Mortality rate	Probability of dying	Probability of surviving	Individuals surviving	Deaths in interval *x, x+n*	Years lived in interval *x, x+n*	Cumulative years lived	Life expectancy at age *x*
	n	${}_nN_x$	${}_nD_x$	${}_nM_x$	${}_nq_x$	${}_np_x$	l_x	${}_nd_x$	${}_nL_x$	T_x	e_x
0	1	*	*	*	0.028	0.972	100 000	2 843	98 010	6 872 228	68.72
1–4	4	*	*	*	0.006	0.994	97 157	622	387 134	6 774 218	69.72
5–9	5	2 539 219	1 455	0.0006	0.003	0.997	96 535	276	481 984	6 387 084	66.16
10–14	5	3 472 990	2 098	0.0006	0.003	0.997	96 259	290	480 568	5 905 100	61.35
15–19	5	3 693 569	5 731	0.0016	0.008	0.992	95 968	742	477 988	5 424 531	56.52
20–24	5	3 468 229	8 016	0.0023	0.011	0.989	95 227	1 094	473 399	4 946 543	51.94
25–29	5	2 568 691	6 224	0.0024	0.012	0.988	94 133	1 134	467 829	4 473 144	47.52
30–34	5	1 919 087	5 136	0.0027	0.013	0.987	92 999	1 236	461 905	4 005 315	43.07
35–39	5	1 689 984	4 836	0.0029	0.014	0.986	91 763	1 304	455 555	3 543 410	38.61
40–44	5	1 521 943	5 577	0.0037	0.018	0.982	90 459	1 642	448 190	3 087 855	34.14
45–49	5	1 294 589	6 499	0.0050	0.025	0.975	88 817	2 202	438 580	2 639 666	29.72
50–54	5	973 129	7 322	0.0075	0.037	0.963	86 615	3 198	425 080	2 201 086	25.41
55–59	5	647 310	6 822	0.0105	0.051	0.949	83 417	4 283	406 377	1 776 007	21.29
60–64	5	497 030	8 781	0.0177	0.085	0.915	79 134	6 695	378 934	1 369 630	17.31
65–69	5	447 735	13 043	0.0291	0.136	0.864	72 439	9 835	337 610	990 696	13.68
70–74	5	391 693	18 491	0.0472	0.211	0.789	62 605	13 217	279 980	653 086	10.43
75–79	5	268 477	21 249	0.0791	0.330	0.670	49 388	16 316	206 149	373 105	7.55
80–84	5	119 946	18 127	0.1511	0.548	0.452	33 072	18 138	120 015	166 957	5.05
85+	5	35 661	11 346	0.3181	1	0.000	14 934	14 934	46 942	46 942	3.14

* Deaths and population not required since ${}_0Q_5$ estimated from censuses and surveys (see fig. 2).

Table 4(b). **Estimated life table (females) for the Islamic Republic of Iran, 2004**

Age group	Years in interval	Mid-year population	Adjusted deaths	Mortality rate	Probability of dying	Probability of surviving	Individuals surviving	Deaths in interval *x, x+n*	Years lived in interval *x, x+n*	Cumulative years lived	Life expectancy at age *x*
	n	${}_nN_x$	${}_nD_x$	${}_nM_x$	${}_nq_x$	${}_np_x$	l_x	${}_nd_x$	${}_nL_x$	T_x	e_x
0	1	*	*	*	0.023	0.977	100 000	2 334	98 367	7 118 931	71.19
1–4	4	*	*		0.007	0.993	97 666	639	389 132	7 020 564	71.88
5–9	5	2 383 989	1 428	0.0006	0.003	0.997	97 027	290	484 411	6 631 432	68.35
10–14	5	3 258 197	1 607	0.0005	0.002	0.998	96 737	238	483 090	6 147 022	63.54
15–19	5	3 475 099	3 082	0.0009	0.004	0.996	96 499	427	481 427	5 663 932	58.69
20–24	5	3 282 897	3 266	0.0010	0.005	0.995	96 072	477	479 168	5 182 505	53.94
25–29	5	2 439 540	2 608	0.0011	0.005	0.995	95 595	510	476 702	4 703 337	49.20
30–34	5	1 864 658	2 406	0.0013	0.006	0.994	95 086	611	473 900	4 226 635	44.45
35–39	5	1 641 123	2 448	0.0015	0.007	0.993	94 474	702	470 617	3 752 735	39.72
40–44	5	1 434 407	2 961	0.0021	0.010	0.990	93 772	963	466 455	3 282 118	35.00
45–49	5	1 236 910	3 931	0.0032	0.016	0.984	92 810	1 463	460 390	2 815 663	30.34
50–54	5	1 038 742	5 279	0.0051	0.025	0.975	91 347	2 292	451 003	2 355 273	25.78
55–59	5	768 680	6 114	0.0080	0.039	0.961	89 054	3 472	436 591	1 904 271	21.38
60–64	5	531 669	8 044	0.0151	0.073	0.927	85 582	6 238	412 315	1 467 679	17.15
65–69	5	448 069	12 201	0.0272	0.127	0.873	79 344	10 114	371 434	1 055 364	13.30
70–74	5	370 373	18 426	0.0497	0.221	0.779	69 230	15 316	307 860	683 930	9.88
75–79	5	244 716	21 667	0.0885	0.362	0.638	53 914	19 542	220 715	376 070	6.98
80–84	5	114 808	20 060	0.1747	0.608	0.392	34 372	20 900	119 611	155 355	4.52
85+	5	39 497	14 887	0.3769	1	0.000	13 472	13 472	35 744	35 744	2.65

* Deaths and population not required since ${}_0Q_5$ estimated from censuses and surveys (see fig. 2).