

Life expectancy and cause of death in the Kuwaiti population 1987–2000

M. El-Shazly,¹ G. Makboul² and A. El-Sayed³

مأمول الحياة وأسباب الوفيات لدى السكان الكويتيين 1987-2000

مدحت الشاذلي، جمال مقبول، علي السيد

الخلاصة: تم تحليل معضيات التعداد والمعضيات الصحية لمعرفة التغيرات في مأمول الحياة عند الولادة في الفترة 1987-2000 لدى السكان الكويتيين ولربط ذلك مع معدلات الوفيات السنوية المرتبطة بسبب معين. وقد ارتفع مأمول الحياة من 73.3 عاماً إلى 75.5 عاماً مع وجود فجوة بين الرجال والنساء اتسعت من 2.2 إلى 4.5 سنوات. وتكون معدلات الوفيات لجميع الأسباب باستثناء فرط ضغط الدم أعلى لدى الرجال منها لدى النساء. والأسباب الرئيسية لوفاته بين الرجال هي مرض القلب الإقفاري وحوادث الطرق والسرطان، أما بين النساء فهي السرطان ومرض القلب الإقفاري وفرط ضغط الدم. إن المشكلات المرافقة لتشيخ السكان ستحتاج لمزيد من الاهتمام في تخطيط السياسات الصحية في الكويت.

ABSTRACT Census and health data were analysed to determine changes in life expectancy at birth during 1987–2000 in the Kuwaiti population and to correlate these with cause-specific annual mortality rates. Life expectancy at birth rose from 73.3 to 75.5 years with a gap between females and males, which increased from 2.2 to 4.5 years. For all causes of death except hypertension and ill-defined conditions, males had higher mortality than females. The leading causes of death in males were ischaemic heart diseases, traffic accidents and cancer, while in females they were cancer, ischaemic heart diseases and hypertension. The problems of an ageing population will need to be considered in planning the health policies of Kuwait.

Espérance de vie et causes de décès dans la population koweïtienne, 1987-2000

RESUME On a analysé les données de recensement et données sanitaires pour déterminer les changements survenus dans l'espérance de vie à la naissance entre 1987 et 2000 dans la population koweïtienne et les corrélés avec les taux annuels spécifiques de mortalité par cause. L'espérance de vie à la naissance est passée de 70,0 à 75,5 ans, l'écart entre les femmes et les hommes étant passé de 2,2 à 4,5 ans. La mortalité était plus élevée chez les hommes que chez les femmes pour toutes les causes de décès sauf pour l'hypertension. Les cardiopathies ischémiques, les accidents de la circulation et le cancer étaient les principales causes de décès chez les hommes, tandis que chez les femmes, c'étaient le cancer, les cardiopathies ischémiques et l'hypertension. Les problèmes d'une population vieillissante devront être pris en compte dans la planification des politiques de santé au Koweït.

¹Department of Medical Statistics, Medical Research Institute; ²Department of Community Medicine, Faculty of Medicine, University of Alexandria, Alexandria, Egypt.

³Department of Health and Vital Statistics, Ministry of Health, Kuwait.

Received: 15/09/02; accepted: 18/08/03

Introduction

The epidemiological transition is the most important historical change affecting the level and pattern of human mortality. The transition refers to the decline of acute infectious disease and the rise of chronic degenerative disease over time [1]. Consequently, life expectancy has been increasing around the world. It is one of the key indicators of population health and economic development. Early and rapid gains in life expectancy in the early 20th century were due to improvement in living standards and organized efforts to control the spread of infectious disease [2]. The rise of life expectancy during the second half of the 20th century was slower because it depended on the reduction of death rates at older ages [3]. The most significant component of the mortality decline at older ages is the reduction of the rates of death from cardiovascular diseases, including heart disease and stroke, and from cancer [4].

The causes of change in life expectancy are many and varied. Epidemiological and public health factors such as lifestyles and behaviours, along with the pattern of diseases, play major roles. The historical stability of biological and other factors affecting mortality decline suggests that the most reliable method of predicting the future is merely to extrapolate past trends. Such methods suggest that life expectancy at birth in industrialized countries will be about 85–87 years at the middle of the 21st century [5,6].

In the Eastern Mediterranean Region, published studies about trends of life expectancy at birth are scarce [7–12]. In a study carried in North Africa, it was found that life expectancy at birth was 50–52 years in 1970 and rose to 64–70 years in 1993, a change that was attributed to the decrease of infant and female mortality [7]. In the Arabian peninsula, due to the in-

creased socioeconomic levels and gradual improvement in health status, life expectancy at birth has increased markedly [10,11]. The health of Kuwaitis has improved considerably in the past 20 years, owing to economic and social transformations that have ameliorated the problems of feeding, sanitation, hygiene, housing and social conditions in general, as well as health services [12]. It was postulated, in a study in 1984, that the potential gain in life expectancy of the Kuwaiti population was due to elimination of infectious diseases. Since this date, no study to determine trends in life expectancy has been conducted.

In this study, we aimed to define trends in life expectancy at birth in the Kuwaiti population during 1987–2000 and correlate the trends with changing patterns of causes of death during the same period.

Methods

Study design

This study was conducted in the Department of Health and Vital Statistics, Ministry of Health, Kuwait. Data on all deaths in Kuwait between 1987 and 2000 inclusively were collected retrospectively from copies of original Kuwaiti death notification forms and the computer database in the department. Data were analysed by sex and cause of death to examine trends in life expectancy at birth and cause-specific patterns of mortality among the Kuwaiti population over this period.

Data coding

Death notification forms in Kuwait are sent by health care facilities to 4 registration offices distributed regionally to cover all governorates in the country. Copies of the original death notification forms are then sent to the Department of Health and Vital Statistics for processing. First, the forms

are revised and corrected through feedback channels with the registration offices and health care facilities, then the cause of death is coded, followed by data entry, tabulation and reporting. Up to 1994, causes of death were coded according to the *International classification of diseases, 9th revision (ICD-9)* [13], after which the coding changed to *ICD-10* [14]. For the purpose of this study, to avoid incompatibility of the data, we recoded the underlying causes of death from 1995 to 2000 according to *ICD-9*. There were no valid data for the year 1990 because it was the year of the Iraqi invasion of Kuwait.

Causes of death were aggregated into 10 broad classes: ischaemic heart diseases; hypertension; diseases of the pulmonary circulation and other forms of heart diseases; lower respiratory diseases; cancer; congenital anomalies; perinatal conditions; endocrine and metabolic diseases; traffic accidents; and ill-defined conditions (symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified).

Statistical analysis

Mortality rates were computed for all causes of death combined and for the 10 leading cause groups, ranked according to the mean number of deaths during the study period. For the selected causes of death, we calculated the mortality rates over the 13 years, for each sex and for both sexes combined, per 100 000 Kuwaiti population. Mid-year population estimates were obtained from the Ministry of Planning, Central Statistical Office.

Life tables were used to determine the life expectancy at birth, i.e. how long the people live on average in a population [15]. It was calculated for each year using standard life table techniques. Annual abridged life tables are constructed using age-specific death rates derived from vital registration and census population data. Popu-

lation data were aggregated into 5-year age intervals except for the first and last intervals. The first interval contained infants less than 1 year and the last those aged 85 years and over. As a result, the life table closed with the category 85 years and over. Calculation of the abridged life table was derived from the probability of death (q_x), which depends on the number of deaths (D_x) and the mid-year population (P_x) for each age interval (x) observed during the calendar year of interest [16].

The number of deaths in each age category was adjusted proportionally to account for those whose age was not stated. An assumption was made that deaths with unreported age were distributed among the various age groups in the same proportions as those for which age was reported.

The numbers of deaths in this study represent complete counts of this event. As such, they were not subject to sampling error, although they were subject to non-sampling error in the registration process. However, in the comparison of rates over time and among different groups, the results were subject to random variation and were compared according to certain statistical assumptions. The difference between 2 rates was regarded as statistically significant at the 5% level if it exceeded

$$2 \times \sqrt{\left\{ \frac{R_1^2}{N_1} \right\} + \left\{ \frac{R_2^2}{N_2} \right\}}$$

where R is the rate corresponding to N number of events. Detailed information on random variation may be found in the technical appendix of *Vital statistics on the United States* [17].

Correlation coefficients between life expectancy at birth and cause specific mortality rates during the study period were determined using Pearson's correlation coefficient (r). Manipulation and analysis of data were performed using *Excel* and *SPSS*, version 9 computer packages.

Results

During the period 1987–2000, the total number of deaths per year in the Kuwaiti population rose from 1050 to 1448 among males and from 725 to 972 among females. However, life expectancy at birth increased from 73.34 years to 75.49 years for the total Kuwaiti population (Table 1). The increase in life expectancy was higher among Kuwaiti females (3.33 years) than males (1.05 years). The difference in life expectancy between males and females during each year was in favour of females and from 1987 to 2000 the difference in life expectancy between females and males increased from 2.19 years to 4.47 years (Table 1).

During the study period, life expectancy in both sexes reached its lowest value in 1992. After 1992, however, a steady up-

ward trend in life expectancy at birth was recorded which was more marked in females (Figure 1). Life expectancy for males was 72.22 in 1987, decreased to 70.47 years in 1992 then increased to reach 73.27 in 2000. The corresponding figures in females were 74.41, 72.47 and 77.74 years (Table 1).

Table 2 shows the mean annual rate of mortality for the study period, ranked by the cause of death in the 10 groups of conditions. The mean annual mortality rates varied considerably for males and females. For all causes of death, males showed higher mortality rates than females except for hypertension and ill-defined conditions. The excess in mortality rates among males over females was statistically significant for ischaemic heart diseases (58.17 per 100 000 males versus 31.20 per 100 000 females; $P < 0.05$), traffic accidents (39.01 per 100 000 males versus 8.18 per 100 000 females; $P < 0.05$), pulmonary circulation and other heart diseases (22.60 per 100 000 males versus 15.89 per 100 000 females; $P < 0.05$). Although females showed a higher mortality rate from hypertension and ill-defined conditions than males, these differences were not statistically significant.

During the study period, the leading causes of mortality among males were ischaemic heart diseases (58.17 per 100 000 males), traffic accidents (39.01 per 100 000 males) and cancer (37.75 per 100 000 males). Meanwhile, the leading causes of mortality among females were cancer (31.23 per 100 000 females), ischaemic heart diseases (31.20 per 100 000 females) and hypertension (30.52 per 100 000 females).

Table 3 shows the correlations between life expectancy at birth and cause specific mortality rates from the leading causes of death. Overall, there were significant negative correlations between life expectancy at

Table 1 Life expectancy at birth among males and females in the Kuwaiti population 1987–2000

Year*	Life expectancy at birth (years)			
	Male	Female	Female-male difference	Overall
1987	72.22	74.41	2.19	73.34
1988	72.14	73.80	1.66	73.00
1989	72.32	73.10	0.78	73.27
1991	71.38	75.14	3.76	73.10
1992	70.47	72.47	2.00	71.69
1993	73.94	75.25	1.31	74.67
1994	74.10	75.91	1.81	74.99
1995	72.69	77.42	4.73	74.91
1996	73.70	77.75	4.05	75.63
1997	73.25	77.14	3.89	75.21
1998	72.51	77.09	4.58	74.79
1999	73.32	77.70	4.47	75.40
2000	73.27	77.74	4.47	75.49

*No data available for the year 1990.

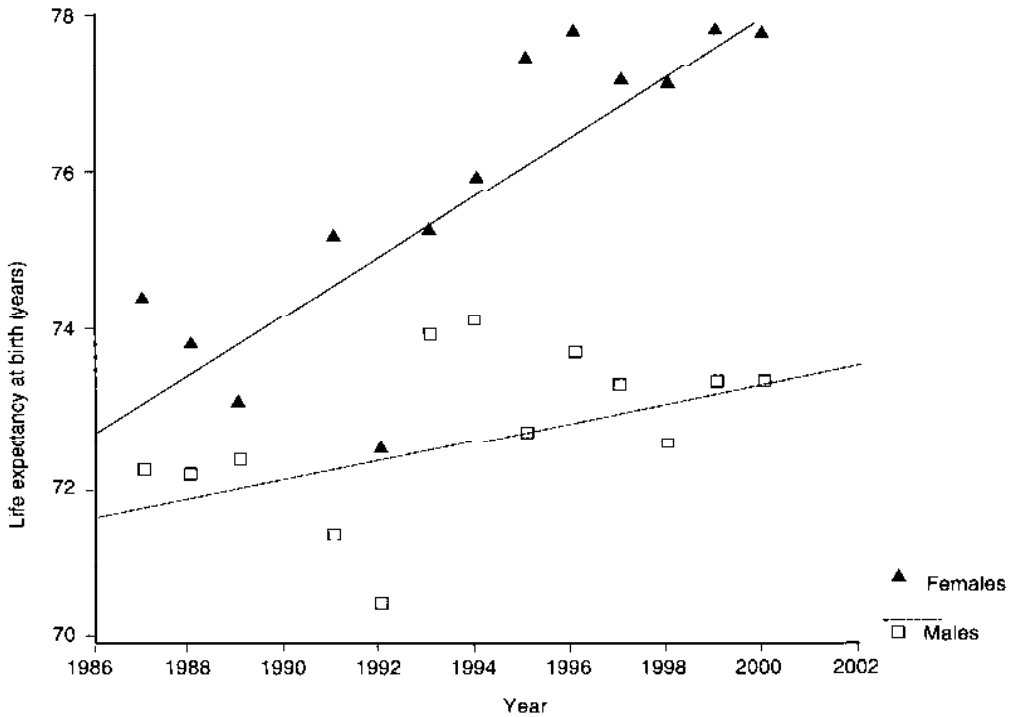


Figure 1 Trends of life expectancy at birth among males and females in the Kuwaiti population 1987–2000

birth and the mortality rates from ischaemic heart diseases, lower respiratory diseases and ill-defined conditions. Among males, only traffic accidents and lower respiratory diseases were negatively correlated with life expectancy. On the other hand, life expectancy among females was indirectly correlated with mortality rates from lower respiratory diseases, perinatal conditions and ill-defined conditions. However, mortality from pulmonary circulation and other heart diseases, which was ranked as the 7th leading cause of death in females, was positively correlated with female life expectancy. Figures 2 and 3 show the trends of these leading causes of death from 1987 to 2000.

Mortality from these causes changed during the study years. In males, the mortality rate from traffic accidents was 40.93/100 000 in 1987 and 41.13/100 000 in 2000, while the mortality rate from lower respiratory diseases decreased from 29.84/100 000 in 1987 to 16.55/100 000 in 2000. In females, the mortality rate from pulmonary circulation and other heart diseases was 9.01/100 000 in 1987, increasing to 22.57/100 000 in 2000. Mortality from lower respiratory diseases and from perinatal conditions during the study years fell from 20.76/100 000 and 29.77/100 000 to 14.50/100 000 and 9.27/100 000 respectively (Table 4).

Table 2 Mean annual rates of mortality ranked by cause of death among males and females in the Kuwaiti population 1987–2000

Cause of death	Mean annual mortality rate (per 100 000)			
	Overall	Male	Female	Female–male difference
Ischaemic heart diseases	44.70	58.17	31.20	–26.97*
Cancer	34.49	37.75	31.23	–6.52
Hypertension	29.08	27.66	30.52	2.86
Traffic accidents	23.61	39.01	8.18	–30.82*
Pulmonary circulation and other heart diseases	19.24	22.60	15.89	–6.72*
Lower respiratory diseases	18.88	20.87	16.88	–3.99
Congenital anomalies	18.55	20.44	16.66	–3.78
Perinatal conditions	18.87	21.11	16.63	–4.48
Endocrine diseases	16.27	17.28	15.28	–1.99
Ill-defined conditions ^a	16.39	16.27	16.54	0.27
Other causes	72.41	89.14	55.63	–33.82*
All causes	312.50	370.30	254.64	–115.66*

^aIncludes symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified.

*P < 0.05.

Discussion

One aim of this study was to examine the changes in life expectancy over time for both sexes of the Kuwaiti population. Our results indicate that life expectancy at birth has increased from 73.34 years in 1987 to 75.49 years in 2000. This gain of life expectancy (2.14 years) was mainly due to a decrease in crude death rates over the years of the study from 3.44/1000 to 2.91/1000 [18].

In spite of the 36.3% increase in the actual number of deaths from 1775 in the 1987 to 2420 in 2000, there was a progressive decrease in mortality rates per 100 000 Kuwaitis of both sexes during this period. This decrease can be mainly attributed to the considerable improvement of health status in the past 20 years. Economic and social transformations have led to the pro-

gressive amelioration of health problems and improvements in health services. The reduction in rates of transmitted diseases and in infant, perinatal and maternal mortality rates have also contributed [12,18].

According to the World Health Organization report of life expectancy for 191 countries in 2000, Japan had the highest life expectancy for both males (77.5 years) and females (84.7 years). Sierra Leone had the lowest male life expectancy (37.0 years) while Malawi had the lowest female life expectancy (37.8 years) [19]. Kuwait was ranked as the 19th for male and 45th for female life expectancy. Differences in life expectancy between countries can be attributed to many epidemiological and public health factors [20,21], including the relationship between low life expectancy and poor income [22,23].

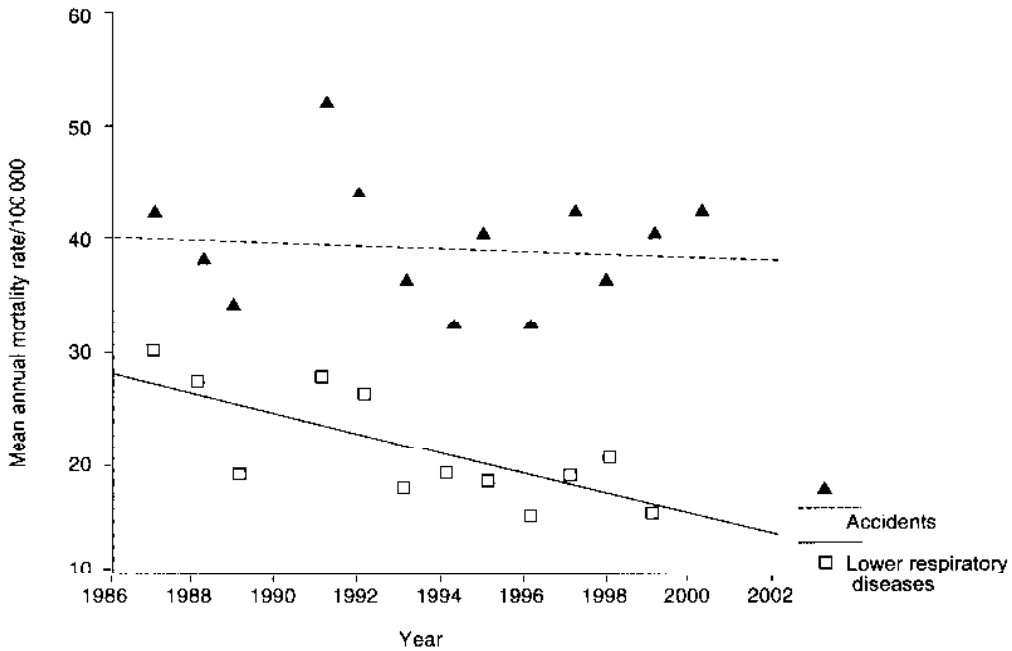


Figure 2 Trends of cause-specific mortality rates among males in the Kuwaiti population 1987-2000

Regarding sex differences, our results revealed that changes in life expectancy at birth were in favour of females. While the improvement of life expectancy was 3.33 years in females, it was only 1.05 years in males during the study years. The difference in life expectancy between males and females has doubled over the 13-year period (from 2.19 to 4.47 years). This gender gap in life expectancy can be attributed to increasing male mortality from ischaemic heart disease and lung cancer, presumably due to the early and widespread adoption of cigarette smoking by men [24]. It has also been postulated that although women live longer than men in all areas the difference is most marked in poorer areas [25].

An additional goal of the study was to study the relationship between patterns of cause of death and life expectancy in Ku-

wait. Cause-specific annual mortality varied from males to females. Our study revealed that for all causes except hypertension and ill-defined conditions, males had higher mortality than females. The leading causes of death in males were ischaemic heart diseases, traffic accidents and cancer. Meanwhile cancer, ischaemic heart diseases and hypertension were more common in females. This pattern of mortality mirrors the reported process of health transition in the developing world. The ageing of the population, reductions in fertility, improved preventive and therapeutic control of infectious diseases, and more affluent lifestyle may all contribute to a decrease in communicable diseases and to an increase in degenerative and 'man-made' diseases and injuries [1,26,27].

Table 3 Correlations between life expectancy at birth and cause-specific mortality rates due to leading causes of death, among males and females in the Kuwaiti population 1987–2000

Cause of death	Overall		Male		Female	
	<i>r</i>	<i>P</i> -value	<i>r</i>	<i>P</i> -value	<i>r</i>	<i>P</i> -value
Ischaemic heart diseases	-0.61	0.03	-0.47	0.11	-0.50	0.08
Cancer	0.40	0.18	0.27	0.38	0.30	0.32
Hypertension	0.27	0.37	0.08	0.80	0.01	0.98
Traffic accidents	-0.49	0.09	-0.62	0.02	-0.13	0.68
Pulmonary circulation and other heart diseases	0.57	0.04	0.19	0.53	0.73	0.005
Lower respiratory diseases	-0.89	< 0.001	-0.75	0.003	-0.72	0.005
Congenital anomalies	0.17	0.59	0.14	0.65	0.14	0.65
Perinatal conditions	-0.52	0.07	-0.25	0.41	-0.64	0.02
Endocrine diseases	0.27	0.38	0.06	0.84	0.29	0.34
Ill-defined conditions ^a	-0.78	0.002	-0.51	0.08	-0.71	0.006
Other causes	-0.64	0.02	-0.49	0.09	-0.84	< 0.001
All causes	-0.77	0.002	-0.77	0.002	-0.77	0.002

r = Pearson's correlation coefficient.

^aIncludes symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified.

Our data showed that male life expectancy was negatively correlated with death rates due to traffic accidents and lower respiratory diseases. The increase in life expectancy in males during the study years was associated with a decrease in mortality due to lower respiratory disease from 29.84/100 000 in 1987 to 16.55/100 000 in 2000. However, the mortality rate from traffic accidents did not change during the study years. This means that by lowering the death rate from accidents, life expectancy for men could be improved.

Female life expectancy was negatively correlated with mortality rates for perinatal conditions, lower respiratory diseases and ill-defined conditions and positively correlated with the death rate from pulmonary circulation and other heart diseases. All

these causes of death showed decreased rates in females over the study period, except mortality from pulmonary circulation and other heart diseases, which showed an upward trend over time. Increasing death rate from pulmonary circulation and other heart diseases was compensated by falling death rates from lower respiratory diseases and perinatal conditions.

Overall, for both sexes combined, death rates due to ischaemic heart diseases and lower respiratory diseases were negatively correlated with life expectancy. The decline in mortality from these 2 causes was significantly associated with increasing life expectancy. This fits with the fact that 73% of the decline in total death rates over this time period was due to a reduction in cardiovascular disease mortality. The cause

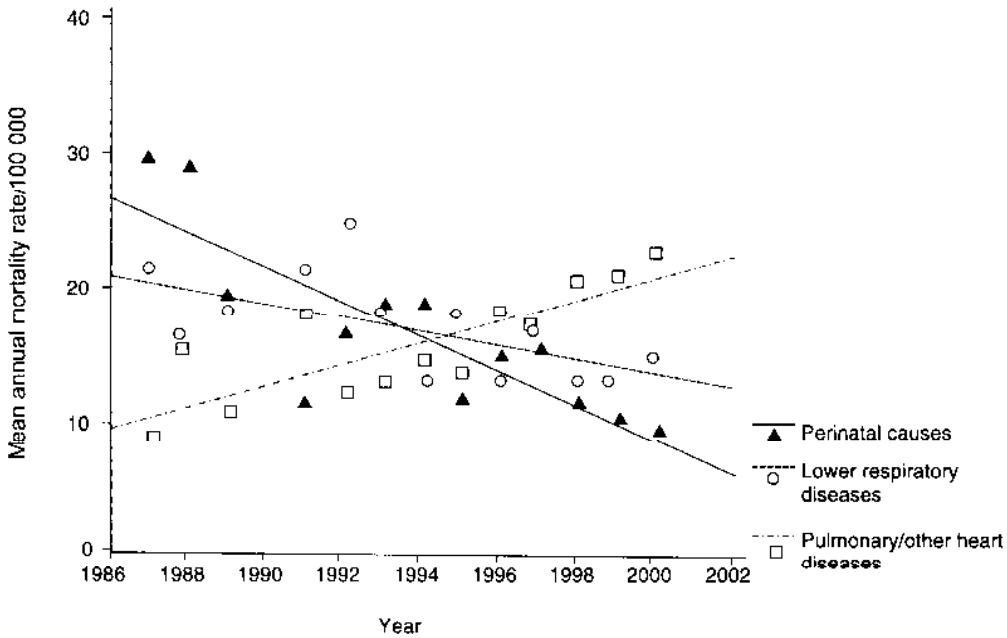


Figure 3 Trends of cause-specific mortality rates among females in the Kuwaiti population 1987-2000

of decline in cardiovascular disease mortality is likely to be due to a combination of factors, including improvements in medical care in the form of better diagnosis and treatment of heart disease and stroke, development of effective medications for treatment of hypertension and hypercholesterolaemia and an increase in coronary care units and in emergency medical services for heart disease and stroke [4].

Increased life expectancies at birth lead to population growth and an increase in the proportion of the population who are elderly. When there are more old people, *per capita* medical costs for a country will tend to be higher [2]. This raises the importance of defining health policies and programmes that will reduce the burden of ageing populations on society and its economy. The de-

velopment of more long-term and geriatric care facilities should also be considered [28].

Conclusion

Life expectancy at birth has increased in the total Kuwaiti population, more among females than males. Falling death rates from ischaemic heart diseases and lower respiratory diseases were correlated with rising life expectancy. With this continuing increase in life expectancy, survival to advanced ages is much more likely, leading to problems of an ageing population that must be taken into consideration in planning the health services in Kuwait.

Table 4 Mean annual rates of mortality from the leading causes of death among males and females in the Kuwaiti population 1987–2000

Year*	Mean annual mortality rate (per 100 000)				
	Males		Females		Perinatal conditions
	Traffic accidents	Lower respiratory diseases	Pulmonary circulation and other heart diseases	Lower respiratory diseases	
1987	40.93	29.84	9.01	20.76	
1988	37.48	27.19	15.42	16.17	26.96
1989	34.29	18.74	10.85	17.72	19.53
1991	51.46	27.53	18.10	21.45	11.40
1992	43.91	26.22	12.28	24.55	16.47
1993	36.27	17.68	13.09	18.08	18.70
1994	32.14	19.17	14.75	13.24	18.66
1995	39.47	18.28	13.71	17.43	11.71
1996	32.77	15.13	18.43	12.38	14.85
1997	42.80	18.69	16.67	16.93	15.35
1998	35.30	20.66	20.56	12.94	11.42
1999	39.11	15.64	21.10	13.25	10.06
2000	41.13	16.55	22.57	14.50	9.27

*No data available for the year 1990.

References

1. Omran A. The epidemiological transition. *Milbank memorial fund quarterly*, 1971, 49:509–38.
2. Wilmoth JR. Demography of longevity: past, present, and future trends. *Experimental gerontology*, 2000, 35:1111–29.
3. Wilmoth JR. In search of limits. In: Wachter KW, Finch CE, eds. *Between Zeus and the salmon: the biodemography of longevity*. Washington DC, National Academy Press, 1997:38–64.
4. Achievements in public health, 1900–1999. Decline in death from heart disease and stroke—United States, 1900–1999. *Morbidity and mortality weekly report*, 1999, 48:649–56.
5. Wilmoth JR. Mortality projections for Japan: a comparison of four methods. In: Caselli G, Lopez A, eds. *Health and mortality among elderly populations*. Oxford, Oxford University Press, 1996:266–87.
6. Bell FC. *Social security area population projections. Actuarial study no. 112*. Washington DC, Office of the Chief Actuary, 1997 (SSA Pub. No. 11–11553).
7. Tabutin D. Evolution comparée de la mortalité en Afrique du Nord de 1960 à nos jours. [Comparative evolution in

- mortality in North Africa from 1960 until today.] *Social science and medicine*, 1993, 36(10):1257-65.
8. Abyad A. Geriatrics in Lebanon: the beginning. *International journal of aging and human development*, 1995, 41(2): 299-309.
 9. Lambeth S. Health care in the Yemen Arab Republic. *International journal of nursing studies*, 1988, 25(3):171-7.
 10. Bener A, Abdullah S, Murdoch JC. Primary health care in the United Arab Emirates. *Family practice*, 1993, 10(4):444-8.
 11. Hamadeh RR. Bahraini women's health: a background paper. *Eastern Mediterranean health journal*, 2000, 6(1):159-67.
 12. Al-Bustan MA, el-Zein FM, Kohli BR. Potential gains in life expectancy of Kuwaiti nationals through partial and complete elimination of infectious and parasitic disease mortality. *APMIS: acta pathologica, microbiologica, et immunologica scandinavica Suppl*, 1988, 3:88-90.
 13. *International Classification of Diseases, Version 9 (ICD-9)*. Geneva, World Health Organization, 1978.
 14. *International Statistical Classification of Diseases and Related Health Problems, 1989 Revision. ICD-10*. Geneva, World Health Organization, 1992.
 15. *World population data sheet 1999*. Washington DC, Population Reference Bureau, 1999.
 16. Hertz E, Hebert JR, Landon J. Social and environmental factors and life expectancy, infant mortality, and maternal mortality rates: results of cross-sectional comparison. *Social science and medicine*, 1994, 39(1):105-14.
 17. *Vital statistics of the United States, 1991. Volume II, mortality. Part A*. Hyattsville, Maryland, National Center for Health Statistics, 1994.
 18. *Kuwait annual statistics reports*. Kuwait, Ministry of Health Department of Statistics and Medical Records, 1987-2000.
 19. *World health report 2001. Mental health: new understanding, new hope*. Geneva, World Health Organization, 2001.
 20. Wilkinson RG. Income distribution and life expectancy. *British medical journal*, 1992, 304:165-8.
 21. Chenet L et al. Changing life expectancy in central Europe: is there a single reason? *Journal of public health medicine*, 1996, 18:329-36.
 22. World Bank. *World development report 1996: from plan to market*. Oxford, Oxford University Press, 1996.
 23. Mackenbach JP. Income inequality and population health. *British medical journal*, 2002, 324:1-2.
 24. Waldron I. Recent trends in sex mortality ratios for adults in developed countries. *Social science and medicine*, 1993, 36:451-62.
 25. Abbasi K. Difference in life expectancy between rich and poor is widening. *British medical journal*, 1997, 315:1559-64.
 26. Gwatkin DR, Heuveline P. Improving the health of the world's poor. *British medical journal*, 1997, 315:497-8.
 27. Mosley WH, Bobadilla J-L, Jamison DT. The health transition: implications for health policy in developing countries. In: Jamison DT et al., eds. *Disease control priorities in developing countries*. New York, World Bank, 1993:673-99.
 28. Santana P. Ageing in Portugal: regional inequities in health care. *Social science and medicine*, 2000, 50:1036-52.