Mortality From Infectious Diseases in Israel, 1979–1992, Based on Revised *ICD-9* Codes: Implications for International Comparisons

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ABSTRACT

Objectives. This study examined trends in infectious disease mortality rates in Israel between 1979 and 1992, using a traditional and a revised set of *International Classification of Diseases, Ninth Revision* (*ICD-9*) codes.

Methods. A revised scheme of *ICD-9* codes was used to compute mortality rates from infectious diseases for the period 1979 through 1992 by sex and for different age categories.

Results. Age-adjusted infectious disease mortality rates based on the revised *ICD-9* codes were 3 times higher than those based on traditional codes. Between 1979 and 1992, age-adjusted mortality rates declined more under the revised method than under the traditional method (20% vs 1.7%).

Conclusions. The revised set of *ICD-9* codes allows a more comprehensive view of the burden of infectious diseases on public health. (*Am J Public Health.* 1999;89:1855–1857)

Infectious diseases remain the world's leading cause of death.[1,2] Traditionally, mortality rates from infectious diseases are estimated on the basis of *International Classification of Diseases, Ninth Revision* (*ICD-9*) codes 001 through 139.[3] However, Pinner et al.[4] demonstrated that these codes include only 67% of the 1131 codes that could be categorized as infectious diseases or consequences of infections. For example, otitis media (*ICD-9* code 382.0) is classified as a disease of the ear rather than as an infectious disease. A better estimate of the impact of infectious diseases can be obtained with a revised scheme that includes all codes that could represent infectious diseases. The aim of this study was to evaluate trends in infectious disease mortality rates in Israel between 1979 and 1992, using *ICD-9* codes 001 through 139 and the revised set of codes.

Methods

Pinner et al.[4] reviewed the *ICD-9* codes and constructed a comprehensive revised set of codes that better represent the group of infectious diseases. We obtained these codes from the National Technical Information Service in the United States (order number PB96–500194). A detailed explanation of the coding methodology is given elsewhere.[4]

Information on underlying cause of death for the years 1979 through 1992 in Israel was obtained from the Central Bureau of Statistics. All deaths in Israel are documented with a death certificate completed by a physician. The underlying cause of death is assigned to each death from all the causes of death listed in the death certificate.[5] Deaths whose underlying cause would be coded as infectious disease according to the revised *ICD-9* codes were identified, and annual mortality rates were calculated for males and females and for different age groups.

Crude mortality rates were adjusted to 1983 census data. To reduce random fluctuations in mortality rates, we calculated the average annual rates for the periods 1979 through 1983, 1984 through 1988, and 1989 through 1992. To estimate the burden of infectious diseases, we calculated the number of years of potential life lost by summing all the years lost as a result of deaths before the age of life expectancy in 1992 (i.e., deaths before 76.4 years) that resulted from *ICD-9* codes 001 through 139, and then we performed the same calculations using the revised coding scheme.

Results

In 1992, there were 748 deaths (2.2% of all deaths) in Israel attributable to *ICD-9* codes 001 through 139. Under the revised coding scheme, there were 2229 deaths (6.7% of all deaths) with an underlying cause of infectious disease. Under the revised scheme, both the crude mortality rates from infectious disease and the age-adjusted rates were 3 times higher than the rates under the traditional scheme.

Under the traditional scheme, there was a small decrease of 1.7% in age-adjusted mortality rates over the period 1979 through 1992. However, under the revised scheme, age-adjusted mortality rates decreased by 19.1% (Table 1).

Mortality rates for males were 10% to 14% higher than those for females. Although there were nonsignificant changes under the traditional scheme, under the revised scheme there were decreases in mortality rates of 16.5% for males and 21.7% for females from the period 1979 through 1983 to the period 1989 through 1992 (Table 1).

The highest mortality rates were in the age group 65 years and older (Table 2). In this age group there was a 30% increase in mortality rates from the period 1979 through 1983 to the period 1989 through 1992 under the traditional scheme, and no change under

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the revised scheme. The lowest mortality rates were observed for the age groups 5 through 24 years and 25 through 44 years. A remarkable decrease in mortality rates was observed under both schemes in the age group birth to 4 years (Table 2).

The main groups of diseases contributing to mortality from infectious diseases in 1992, observed under the revised scheme, were respiratory tract infections (35.8%), septicemia (28.0%), and infections of the kidney and urinary tract (19.8%). Respiratory infections accounted for the majority of deaths of both males and females. Although mortality rates from respiratory tract infections decreased by 37.3% from the period 1979 through 1983 to the period 1989 through 1992, there was a 34.4% increase in mortality rates from septicemia during the same period. There were no major changes in mortality rates from infections of the kidney and urinary tract.

According to the traditional method, using *ICD-9* codes 001 through 139, infectious diseases accounted for 2.2% of all deaths and ranked seventh among the leading underlying causes of death in Israel in 1992.[5] According to the revised method, infectious diseases accounted for 6.7% of all deaths and ranked fourth.

In 1992, mortality attributed to *ICD-9* codes 001 through 139 resulted in 7112 years of potential life lost (2.2% of all years of potential life lost); under the revised coding scheme, infectious diseases resulted in 19451 years of potential life lost (6.1% of the total). Mortality from respiratory infections, for example, resulted in 4261 years of potential life lost in 1992; under the traditional coding scheme, this group of infectious diseases is not coded as such.

TABLE 1—Number of Deaths and Age-Adjusted Annual Average Mortality Rates (per 100 000) From Infectious Diseases, According to the Revised Coding Scheme and the Traditional Coding Scheme (in Parentheses), by Time Period and Sex: Israel, 1979–1992

	Time Period			% Change From
	1979–1983	1984–1988	1989–1992	1979–1983 to 1989–1992
Males				
No.	4432 (1138)	5001 (1380)	3887 (1153)	...
Rate	49.1 (12.4)	47.1 (13.2)	40.9 (12.5)	–16.7 (0.8)
Females				
No.	4190 (1170)	4771 (1423)	3819 (1249)	...
Rate	42.5 (11.8)	40.0 (12.1)	33.2 (11.2)	–21.9 (–5.1)
Total				
No.	8622 (2308)	9772 (2803)	7706 (2402)	...
Rate	45.8 (12.1)	43.6 (12.6)	37.0 (11.8)	–19.2 (–2.5)

TABLE 2—Age-Adjusted Annual Average Mortality Rates (per 100 000) From Infectious Diseases, According to the Revised Coding Scheme and the Traditional Coding Scheme (in Parentheses), by Age Group: Israel, 1979–1992

	Time Period			% Change From 1979–1983 to
Age Group, y	1979–1983	1984–1988	1989–1992	1989–1992
Birth–4	47.6 (19.3)	30.9 (11.1)	22.1 (6.7)	–53.6 (–65.3)
5–24	3.7 (0.7)	3.7 (0.9)	2.8 (0.7)	–24.3 (0)
25–44	4.4 (1.6)	5.1 (1.5)	3.8 (1.4)	–13.6 (–12.5)
45–64	25.6 (9.0)	24.7 (10.5)	21.3 (9.7)	–6.8 (7.8)
>65	363.3 (84.2)	400.8 (106.7)	357.8 (108.9)	–1.5 (29.3)

Discussion

When estimating the burden of infectious diseases as a public health issue, it is important to include as many diseases that are related to infectious agents as possible. Under the revised scheme of *ICD-9* codes, mortality rates from infectious diseases were 3 times higher than the rates obtained under the traditional scheme, and infectious diseases ranked fourth among the leading causes of death and accounted for 6.1% of years of potential life lost.

The higher mortality rates from infectious disease observed in males in comparison with females are in accordance with higher morbidity rates from infectious diseases reported previously in males.[4,6–9] These sex differences are not observed under the traditional scheme.

The data presented here indicate that mortality rates from infectious diseases decreased by 20% between 1979 and 1992. This decrease is attributable mainly to the remarkable decrease in mortality rates in the age group birth to 4 years. The observed 30% increase in mortality rates from septicemia may be attributable to longer survival of chronically ill patients, many of whom may be immunocompromised. These trends could be missed if the traditional scheme was used.

Pinner et al.[4] showed a 39% increase in US age-adjusted mortality rates from infectious diseases between 1980 and 1992 under the revised scheme of *ICD-9* codes. Although in 1980, mortality rates in Israel were 42% higher than those in the United States (58.3 per 100 000 vs 41.1 per 100 000), in 1992 they were 30% lower (50 per 100 000 vs 65.1 per 100 000). Part of this difference may be a result of differences in recoding the cause of death on the death certificate.[10,11] However, most of the difference in mortality rates is explained by the lower rate observed in Israel for the age group 25 through 44 years: 3.5 per 100 000, compared with 38 per 100 000 for this age group in the United States. The high rate in the United States in this age group is attributable mostly to HIV/AIDS, which is not common in Israel (0.14 per 100 000 in 1992). Mortality rates in other age groups were similar in 1992 in Israel and the United States.

There are some limitations to this study. Our estimate of the burden of infectious diseases is probably an underestimate, for the following reasons: (1) It accounts only for mortality. (2) We used data on underlying cause of death and therefore missed deaths due to multiple causes without an underlying infectious disease etiology. (3) When information from death certificates is used, the validity of the diagnoses listed should be evaluated. This is especially true for infectious diseases, because the ability to diagnose certain pathogens may have changed with the years. Nevertheless, the revised codes are likely to give a much fairer representation of the burden of infectious diseases than the traditional codes. □

Contributors

T. Shohat planned the study and wrote the brief. G. Harari performed the statistical analyses. M. S. Green designed the study and contributed to the writing of the brief.

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Sonomorphologic Evaluation of Goiter in an Iodine Deficiency Area in the Ivory Coast

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ABSTRACT

Objectives. This study evaluated the extent of thyroid abnormalities in a remote iodine-deficient area of the Ivory Coast.

Methods. Ultrasonography was used in detecting the presence of goiter.

Results. The overall prevalence rates of goiter were 64.7% among females and 53.3% among males. In children aged 6 to 15 years (n = 314), the prevalence of goiter was 62% regardless of sex. Thyroid volume increased steadily with age, with significantly larger goiters in women 25 years and older. Frequency of cysts and calcifications did not correlate with sex.

Conclusions. Especially in developing countries, prophylaxis of iodine deficiency disorders must be improved in iodine-deficient areas to prevent substantial morbidity, which is more severe in women and elderly persons. (*Am J Public Health.* 1999;89:1857–1861)

Iodine deficiency disorders remain a global public health problem of major importance. Worldwide, nearly 1 billion people are living in iodine-deficient areas; of these individuals, 190 million[1] to 655 million[2] have goiter, and 3 million to 20 million[1] are suffering from severe thyroid disorders such as cretinism.[3–6] Of all human beings affected by iodine deficiency disorders, 75% are living in less developed countries.[7]

In Africa, one third of the population experiences iodine deficiency. To this point, national iodine supplementation programs and programs supported by the World Health Organization (WHO) have not succeeded in preventing related morbidity despite simple and comparatively inexpensive prophylactic measures. In 1983, Hetzel[5] stated that lack of political weight and geographic isolation were the main factors responsible for the persistence of this major public health problem.

Our study sought to evaluate, via ultrasonography, the extent of thyroid morbidity in a remote village in the Ivory Coast before the distribution of iodized salt.

Methods

The study was conducted in November 1996 in the village of Glanlé, which is located in the middle western region of the Ivory Coast. Field research conducted by Latapie et al.[8] and by Kouamé et al.[9] had shown this area to be iodine deficient and endemic for goiter. There was limited migration among the population studied owing to the area's geographically isolated location, lacking electricity and running water. Food is acquired only from residents' own agricultural resources. The staple foods are rice and, to a lesser extent, manioc. Dried fish is available only from a local lake. The water supply is provided by a few local wells.

Subjects provided informed consent (orally) after an explanation of the study protocol in the local language. Participation was voluntary. Forty-five percent of the population was studied. The study involved house-to-house demographic assessment; in the majority of cases, subjects were identified via

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