

Mortality Trends and Potential Years of Life Lost in the English and Dutch-speaking Caribbean, 1985–2000

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ABSTRACT

Objective: To describe mortality trends and potential years of life lost (PYLL) due to leading causes of death in 21 Caribbean countries during 1985, 1990, 1995 and 2000.

Methods: Mortality data for 1985, 1990, 1995 and 2000 were analyzed to identify regional mortality trends using crude, age-specific and age-adjusted death rates and potential years of life lost. The variables used were age, gender and underlying cause of death.

Results: During 1985–2000, there was an overall 5% decrease in age-adjusted mortality rates and male mortality exceeded female mortality. Heart disease was the leading cause of death, with cancers, cerebrovascular diseases, diabetes mellitus and hypertensive disease also among the top five causes in most years. Prostate cancer and cancer of the uterus and breast were the leading causes of death due to cancers. HIV disease (AIDS) featured in the ten leading causes of death for the first time in 1995 and was the 5th leading cause in 2000.

Conclusion

During the period 1985–2000, countries experienced an increase in mortality due to non-communicable diseases, AIDS and assaults (homicides); the latter two causes were most common among the 15–44 year age group. In 2000, AIDS, heart disease and assault (homicide) were the largest contributors to PYLL.

Tendencias de la Mortalidad y Años Potenciales de Vida Perdidos en el Caribe de Habla Inglesa y Holandesa, 1985–2000

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RESUMEN

Objetivo: Describir las tendencias de la mortalidad y los años potenciales de vida perdidos (APVP) debido a las causas principales de muerte en 21 países caribeños durante 1985, 1990, 1995 y 2000.

Métodos: Se analizaron los datos de la mortalidad de los años 1985, 1990, 1995 y 2000, a fin de identificar tendencias de mortalidad regionales, usando tasas crudas de mortalidad ajustadas por edad y específicas por edad, así como años potenciales de vida perdidos. Las variables usadas fueron la edad, el género y la causa subyacente de muerte.

Resultados: Durante 1985–2000, hubo una disminución general de un 5% en las tasas de mortalidad ajustadas por edad y la mortalidad masculina excedió la mortalidad femenina. Las enfermedades cardíacas fueron la causa principal de muerte, hallándose junto a distintas formas de cáncer; las enfermedades cerebrovasculares, la diabetes mellitus, y la hipertensión, entre las cinco causas principales de muerte en la mayor parte de los años. El cáncer de próstata y el cáncer de útero y mamas, se encontraban entre las principales causas de muerte. El VIH (SIDA) se sumaba a la lista de las diez causas principales de muerte, por primera vez, en 1990, y fue la 5ta causa principal en el año 2000.

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Conclusión: *En el 2000, el SIDA, las enfermedades cardíacas y los asaltos (homicidios) fueron los principales contribuyentes de APVP.*

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INTRODUCTION

Surveillance of mortality data is vital to the development of regional and national health policies and aids in the prevention and control of diseases in public health settings. Mortality statistics, compiled from medical certificates of death, are the only disease-related data collected on a routine basis that is population based (1). In spite of limitations with respect to data quality, as a health indicator, mortality is easier to measure than morbidity and is historically more often complete. Mortality data are very useful for monitoring trends, making comparisons between and within countries and regions and estimating the burden of premature death.

Major changes in mortality trends and patterns, in particular leading causes of death, have been reported in various studies (2). A major feature of the health transition that has taken place in many countries is that populations that previously experienced high mortality rates mainly due to communicable diseases, particularly at young ages, now experience lower overall mortality rates mainly due to non-communicable diseases especially at older ages (3, 4). Studies have indicated that the greatest morbidity and mortality burdens are now due to chronic non-communicable diseases, paralleled and sometimes driven by social and behavioural changes that affect health (3–5).

Most Caribbean countries have experienced a health transition, with decreases in fertility and mortality rates and changing disease patterns. Leading up to the mid 1990s, the mortality pattern changed from deaths being mainly due to communicable diseases to them being mainly due to non-communicable diseases (6, 7). More recently, these countries have also been observing the re-emergence of 'old' communicable diseases (*eg* tuberculosis) and the emergence of new communicable diseases (*eg* AIDS), together with an increasing prominence of non-communicable diseases (*eg* cardiovascular disease, cancers and diabetes mellitus). A study conducted in 10 Caribbean countries during 1975–1979, observed that the leading causes of death were similar to those found in industrialized countries (8). Additionally, with 15–20% and 20–25% of the adult population in English and Dutch-speaking Caribbean countries having diabetes and hypertension, respectively, these non-communicable diseases account for the single largest expenditure in national drug budgets (9). Morbidity and mortality patterns in recent decades are largely explained by individual lifestyle choices and social, cultural and economic determinants that affect these choices (10).

The Caribbean Epidemiology Centre (CAREC) has 21 member countries with a combined population of approximately 7 million (11). CAREC maintains a regional mortality database which comprises data routinely collected from

its member countries. Individual countries are encouraged to develop local mortality profiles while CAREC generates regional reports which should inform public health decision-making and guide the development of disease prevention and control programmes as well as national and regional policies.

This paper describes mortality trends and potential years of life lost (PYLL) for leading causes of death in CAREC member countries (CMCs) for the years 1985, 1990, 1995 and 2000.

METHODS

A descriptive study of mortality data from all CMCs was conducted for four point years: 1985, 1990, 1995 and 2000. These years were selected as they reflected the most complete years of data for all countries at the time of the study.

Mortality data from medical certificates of death in each country were processed by either the Health Information Unit of the Ministry of Health or the Central Statistical Office. Although medical certificates of death may vary between countries, the cause of death section from which the underlying cause is obtained is standard. Data from Ministries of Health were cleaned and validated by CAREC to ensure that the reported codes were valid for their age and gender and as an underlying cause of death. Errors were returned to the countries for corrections and then re-submission to CAREC.

Variables used in the analyses were age, gender and underlying cause of death. Codes for the underlying cause of death used in these analyses comprised a mixture of the ninth and tenth revision of the World Health Organization (WHO) International Classification of Diseases (ICD9 and ICD10, respectively). The comparability of the codes were rationalized based on the PAHO 6/67 (ICD-10) and 6/61 (ICD-9) lists for the tabulation of mortality data (12).

Mortality rates were computed using population figures for census years and population projection estimates obtained from countries' Central Statistical Offices. In cases where these were not available, data from the prior or subsequent year were substituted. In two instances where mortality data were not available for a given study year, the nearest-year substitution was made: namely, Curaçao (1987 for 1985) and Jamaica (1996 for 1995 and 1998 for 2000). To compute rates, the nearest-year populations were also substituted for those countries as well as for: Belize (1986 for 1985), Grenada (1984 for 1985) and Guyana (1984 for 1985) where data were unavailable. However, there remained a total of seven missing years of data for five countries: Aruba for 1985, Bahamas for 1990, Curaçao for 1995 and 2000, Montserrat for 1985 and Grenada for 1995 and 2000. Rates are presented per estimated population.

Data from countries were combined to calculate regional frequencies, crude, specific and age-adjusted death rates and PYLL. For age-adjusted rates, the direct method was used with the WHO standard population for 1990. Potential years of life lost was calculated for persons less than 65 years of age using the following formulae:

- * Potential Years of Life Lost (PYLL) = Sum of Age-specific YLL before the age of 65 years
- * Age-Specific Years of Life Lost = (65 – Midpoint of selected age group) × Number of deaths in selected age group
- * Midpoint of selected age group = (Age groups youngest age + oldest age + 1) ÷ 2

The Health Information Retrieval System (HIRS) and Microsoft EXCEL were used to retrieve and compute summary statistics and generate graphs and charts.

RESULTS

The total number of deaths in the 21 CMCs for 1985, 1990, 1995 and 2000 was 162 636 out of a total population of about 6.4 million, with crude rates ranging from 634.9 per 100 000 in 1985 to 652.0 per 100 000 in 2000; a 3% increase (Table 1). When adjusted for age, death rates showed a 5% decrease

Heart disease was the leading cause of death for each of the four years under review among males and females, accounting for 16%–17% of all deaths annually. During 1985–2000, heart disease showed a 4% decrease (Table 2, Fig. 2). Cancers, cerebrovascular diseases and diabetes mellitus were among the five overall leading causes of death in each of the four years reviewed. Death due to cancers and diabetes mellitus increased by 18% and 78% respectively and deaths due to cerebrovascular diseases decreased by 24% (Table 2, Fig. 2). Hypertensive disease, which was the 5th leading cause of death from 1985–1995, was replaced in 2000 by HIV disease (AIDS) which first appeared in the top ten ranking in 1995 as the eighth leading cause of death; there was a 103% increase in HIV disease [AIDS] (Table 2, Fig. 2). Accidents also featured in the top ten leading causes of death in each of the four years as either the 6th or 7th leading cause of death and assault (homicide) appeared in the top ten listing for the first time in 1995 as the 9th leading cause of death and moved up one rank in 2000 (Table 2).

The leading causes of death among males and females were similar during 1985–2000 (Fig. 3–4). Heart disease, cancers and cerebrovascular diseases were the three leading causes of death among males, accounting for 40% of all male

Table 1: Age and sex specific mortality rates (per 100 000 population) by year: All CAREC Member countries (1985, 1990, 1995, 2000).

Age Group	1985			1990			1995			2000		
	Male	Females	Both Sexes	Male	Females	Both Sexes	Male	Females	Both Sexes	Male	Females	Both Sexes
0-4	603.7	514.9	559.8	513.1	424.2	469.2	518.2	428.3	488.7	451.9	387.0	425.9
5-14	47.8	39.1	43.5	46.3	37.6	42.0	44.2	29.8	37.1	43.3	33.2	38.3
15-24	120.8	62.9	91.7	113.1	61.1	87.2	169.2	80.4	124.9	150.5	73.3	112.1
25-44	262.5	147.8	204.1	247.9	142.9	194.5	365.7	191.9	277.2	365.5	207.6	284.9
45-64	1251.1	889.6	1064.0	1164.8	819.0	988.0	1189.3	826.0	1005.2	1115.5	789.9	950.5
65+	6052.2	5173.0	5571.5	5695.2	5058.5	5348.7	6145.9	5181.1	5616.4	5745.2	4656.8	5146.8
Crude Rates	682.4	588.4	634.9	664.0	587.0	625.2	750.1	614.9	683.6	719.6	583.9	652.0
Age-adjusted Rate	738.4	575.1	653.0	686.8	544.7	613.3	761.6	569.3	663.6	714.1	530.2	618.8

to 618.8 per 100 000 during the same time period (Table 1). Age specific rates were highest in the 65+ age group and lowest in the 5–14-year age group. There was a 24% decrease in deaths among children less than five years, with mortality rates falling from 559.8 to 425.9 per 100 000 between 1985 and 2000 (Table 1, Fig. 1). Except for the 15–24 and 25–44 year age group, age-specific mortality rates generally declined from 1985 to 2000 (Table 1, Fig 1). Males accounted for 54% of deaths and exceeded female mortality overall and in all age groups (Table 1).

deaths (Fig. 3). The mortality rate due to diabetes mellitus increased from 29 per 100 000 in 1985 to 55 per 100 000 in 2000; going from the 5th to the 4th leading cause of death among the male population. The mortality rate due to accidents decreased slightly from 38 to 35 per 100 000; it fell from the 4th leading cause of death in 1985 to the 7th in 2000 (Fig. 3). Among the men, mortality due to hypertensive disease increased from 26 to 35 per 100 000 during the period but remained the 6th leading cause of death. HIV disease (AIDS) and assault (homicide) which were not among the ten

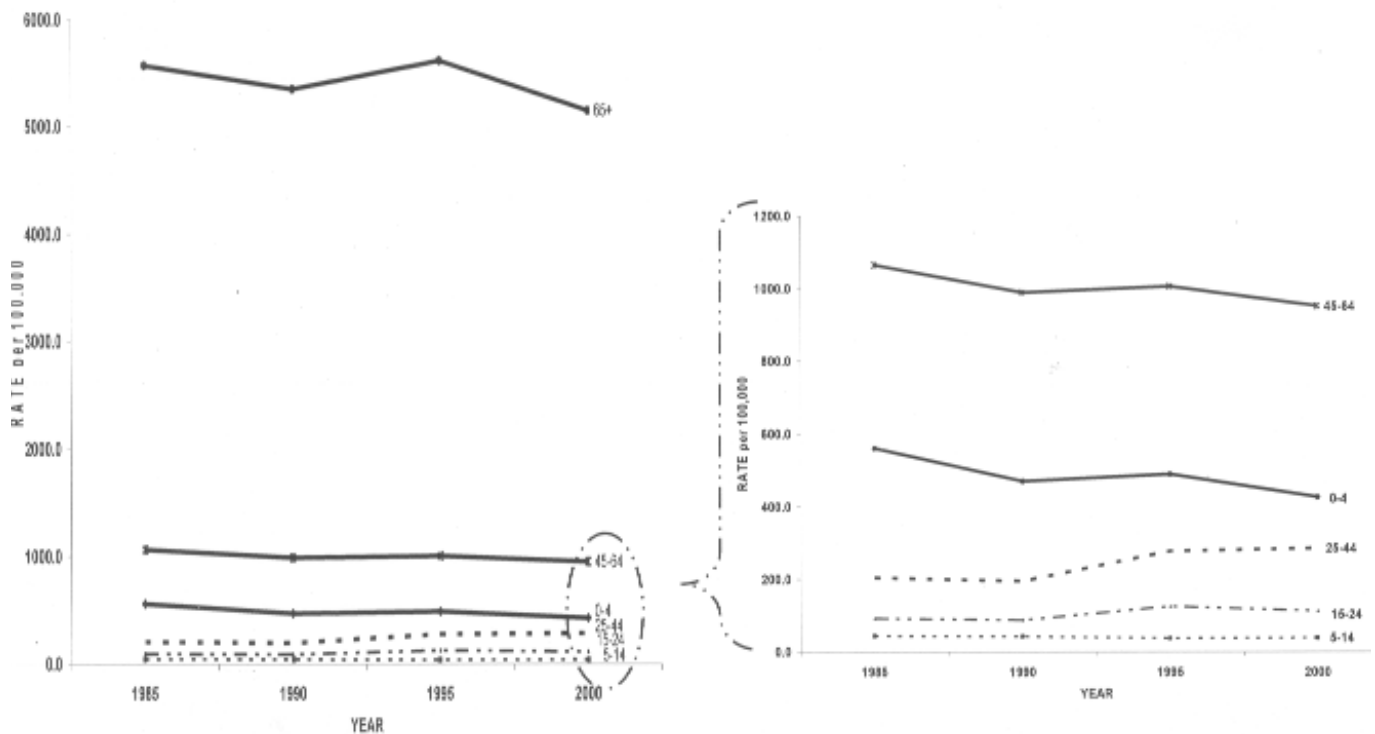


Fig. 1: Age-specific mortality rates (per 100 000 population) by Year: All CAREC Member countries (1985, 1990, 1995, 2000)

leading causes of death for men in 1985, featured as the 5th leading cause of death with 51 deaths per 100 000 and the 8th leading cause of death with 30.1 deaths per 100 000 respectively, in 2000.

Among females, during the period 1985 to 2000, heart disease, cancers, diabetes mellitus, cerebrovascular diseases and hypertensive disease were among the five leading causes of death with the largest rate increase (72%) observed for diabetes mellitus which rose from 43 to 74 per 100 000 (Fig. 4). Heart disease, cancers and cerebrovascular diseases collectively accounted for 45% of all female deaths. HIV disease (AIDS) was not among the ten leading causes of death in 1985 but featured as the 6th leading cause of death in 2000 (Fig. 4).

Cancer of the prostate was the leading cause of death due to cancers among males (16.8 per 100 000 in 1985 and 30.6 per 100 000 in 2000) and among females, cancers of the uterus (14.8 per 100 000 in 1985 and 16.2 per 100 000 in 2000) and breast (13.4 per 100 000 in 1985 and 17.1 per 100 000 in 2000) were the leading causes of death due to cancers.

There was a total of 511 235 potential years of life lost (89.9 years per 1000) in 1985 and 522 775 potential years of life lost (84.9 years per 1000) in 2000 (Table 3). In 1995 and 2000, HIV/AIDS, heart disease and assaults were the largest contributors to potential years of life lost (Fig. 5). In 2000, HIV disease (AIDS) far surpassed assaults and heart disease to be the largest contributing cause to the potential years of life lost (Table 3, Fig. 5).

DISCUSSION

During the past 50–60 years in CMCs, health conditions have improved dramatically with decreased mortality rates (particularly among children) and increased life expectancy at birth (13). Additionally, as in most developing countries, in CMCs mortality among males was higher than among females (14). However, during the period 1985–2000, CMCs observed an increase in mortality rates among those aged 15–44 years, mainly due to AIDS and assaults (homicides), which featured in the ten leading causes of death for the first time in 1995. In 1995, AIDS was the leading cause of death in the 25–44-year age group (15), an age group which constitutes the largest proportion of the labour force.

The tourism sector is the most important service sector in the Caribbean and with a 36% contribution to GDP, this makes it one of the most tourism dependent regions in the world (16, 17). The human and economic impact of morbidity and premature mortality resulting from HIV/AIDS will likely impact the growth of regional economies due to losses in the critical workforce age group (15–44 years). Increases in assaults (homicides), apart from leading to a rise in morbidity, mortality and potential years of life lost, may also have an impact on tourism and thus the GDP of most CMCs.

During 1985–2000, non-communicable diseases (specifically heart disease, cancers, cerebrovascular diseases, diabetes mellitus and hypertensive disease) consistently featured in the five leading causes of death, with heart disease being the leading cause of death for each year. Most of these

Table 2: Ten Leading causes of death (rates per 100 000 population) by Year: All CAREC Member countries (1985, 1990, 1995, 2000).

Rank	Cause of Death	1985			1990			1995			2000		
		n	%	rate	n	%	rate	n	%	rate	n	%	rate
1	Heart Disease	6504	16.9	107.2	6629	17.5	109.5	7206	16.7	114.0	6764	15.7	102.5
2	Cerebro. Diseases [†]	4997	13.0	82.3	4943	13.1	81.6	6056	14.0	95.8	6301	14.6	95.5
3	Cancers	4924	12.8	81.1	4804	12.7	79.3	5593	12.9	88.5	4286	10.0	64.9
4	Diabetes Mellitus	2199	5.7	36.2	3025	8.0	50.0	3280	7.6	51.9	4264	9.9	64.6
5	Hypert. Disease [‡]	1854	4.8	30.6	1869	4.9	30.9	1983	4.6	31.4	2624	6.1	39.8
6	Accidents	1543	4.0	25.4	1354	3.6	22.4	1649	3.8	26.1	2596	6.0	39.3
7	ARI ^{††}	1462	3.8	24.1	1273	3.4	21.0	1506	3.5	23.8	1524	3.5	23.1
8	Nutri. Deficiencies ^{**}	1016	2.6	16.7	896	2.4	14.8	1238	2.9	19.6	1147	2.7	17.4
9	Dis. Urinary System ^{†††}	918	2.4	15.1	703	1.9	11.6	1190	2.8	18.8	1060	2.5	16.1
10	Intest Inf Diseases ^{††††}	720	1.9	11.9	602	1.6	9.9	744	1.7	11.8	783	1.8	11.9
	Symptoms/Signs/Ill-Defined Conditions	3280	8.5		3375	8.9		2094	4.8		1788	4.2	
	All Other Deaths	9109	23.6		8382	22.1		10680	24.7		9899	23.0	
	Total Deaths	38526			37855			43219			43036		

^{*}Cerebrovascular Disease; [†]Hypertensive Disease; [‡]Acute Respiratory Disease; ^{**}Nutritional deficiencies and Nutritional Anaemia; ^{††}Disease of the Urinary System; ^{†††}Intestinal Infectious Disease

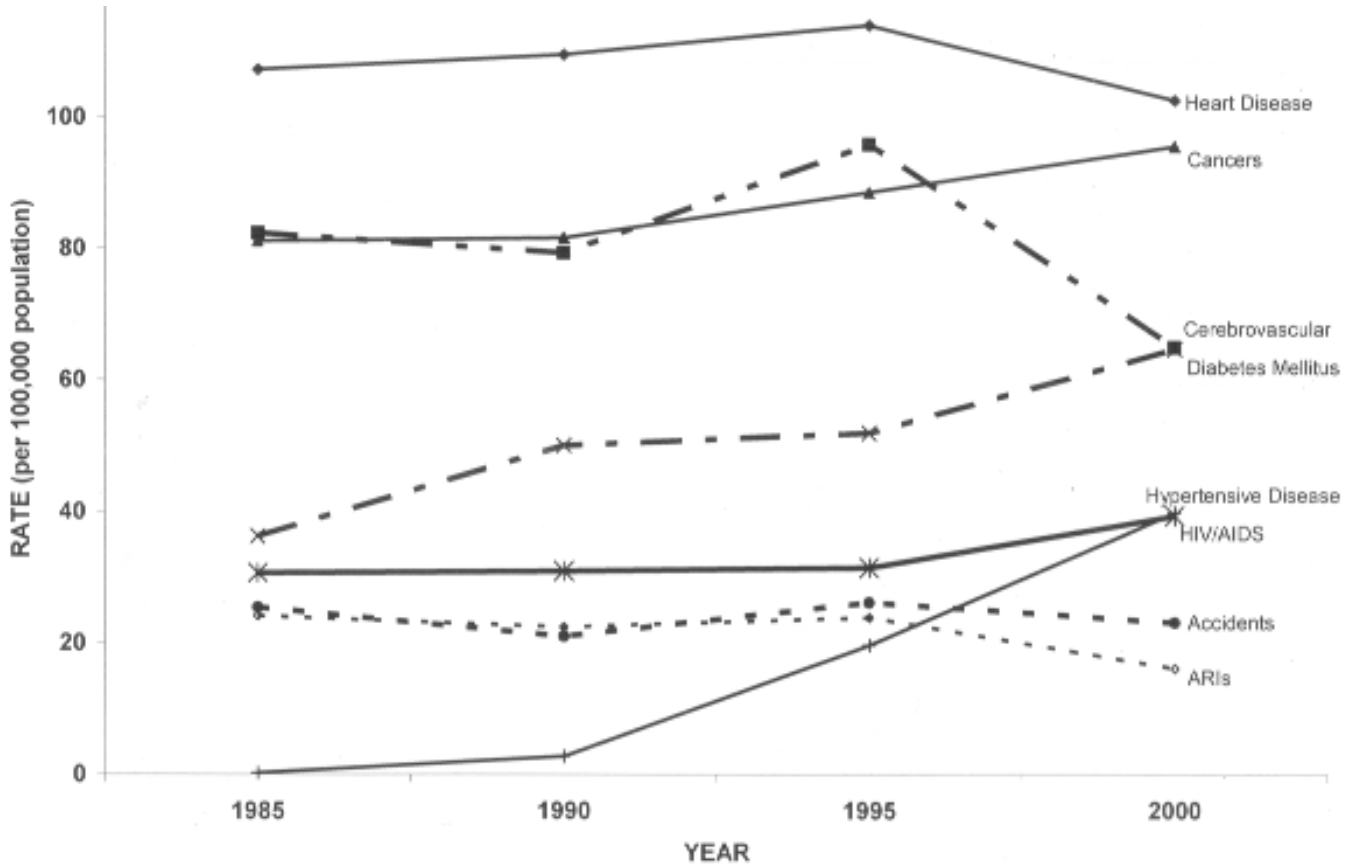


Fig. 2: Mortality rates for selected diseases by year: All CAREC Member Countries (1985, 1990, 1995, 2000)

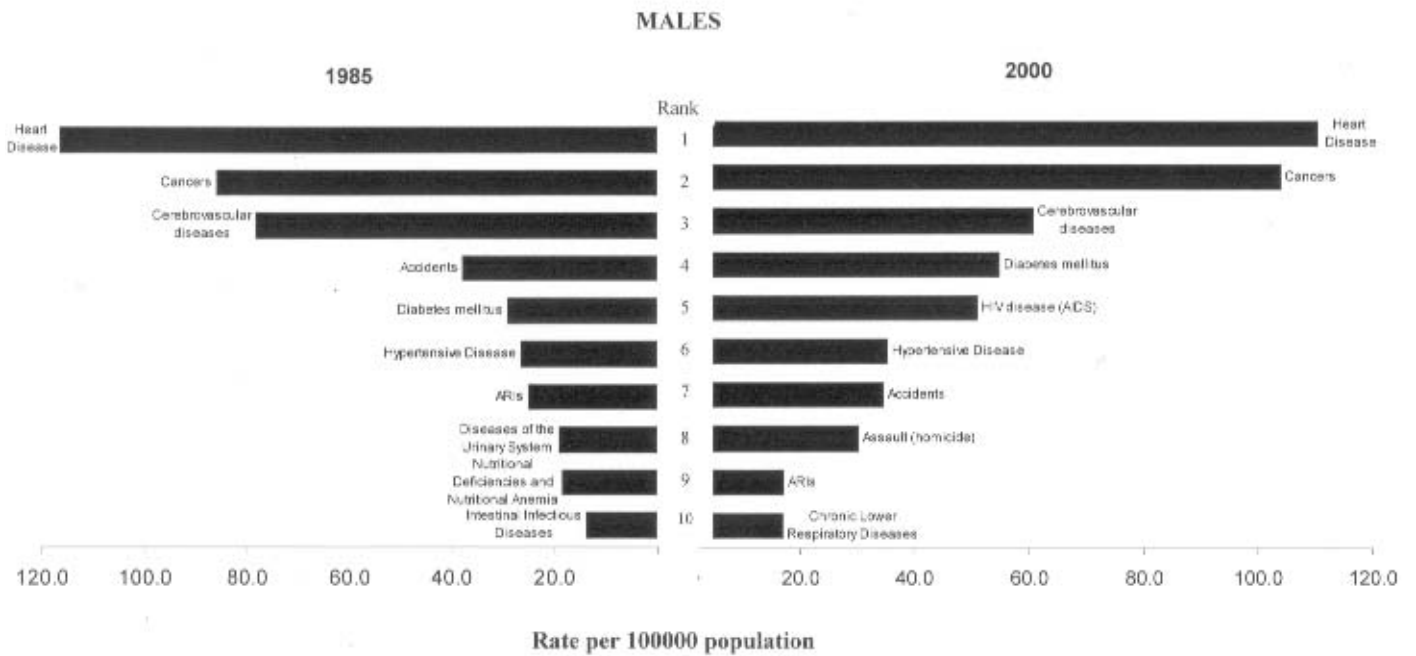


Fig. 3: Ten leading causes of death in males: All CAREC Member Countries (1985 and 2000)

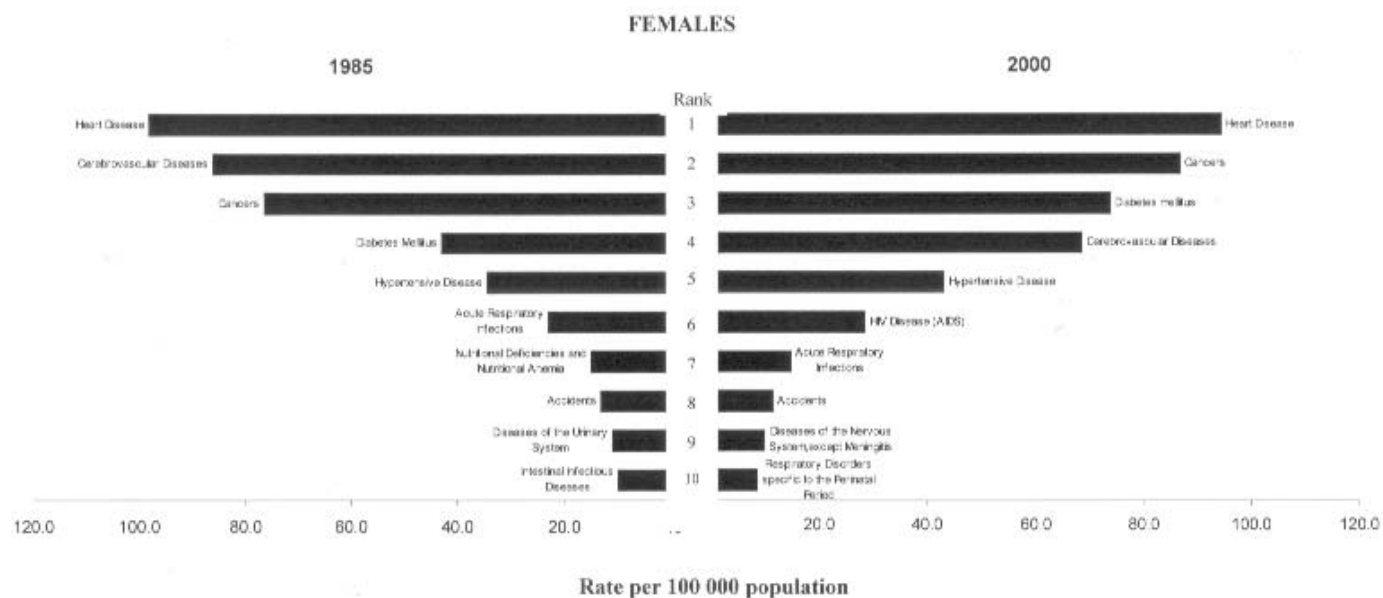


Fig. 4: Ten leading causes of death: All CAREC Member Countries (1985 and 2000)

Table 3: Potential years of life lost for selected diseases by year: All CAREC Member countries (1985, 1990, 1995, 2000).

Diseases	Year			
	1985	1990	1995	2000
Assault homicide	9855	11073	32265	30815
Cerebrovascular disease	18610	16890	20518	13695
Diabetes mellitus	10640	11520	13645	19205
Heart disease	36245	34895	36388	33895
HIV disease (AIDS)	403	4920	33318	72113
Hypertensive disease	6885	5395	6125	9055
Potential years of life lost (All causes)	511235	446035	531000	522775
<i>Rate (per 1000 population)</i>	89.9	79.1	89.9	84.9

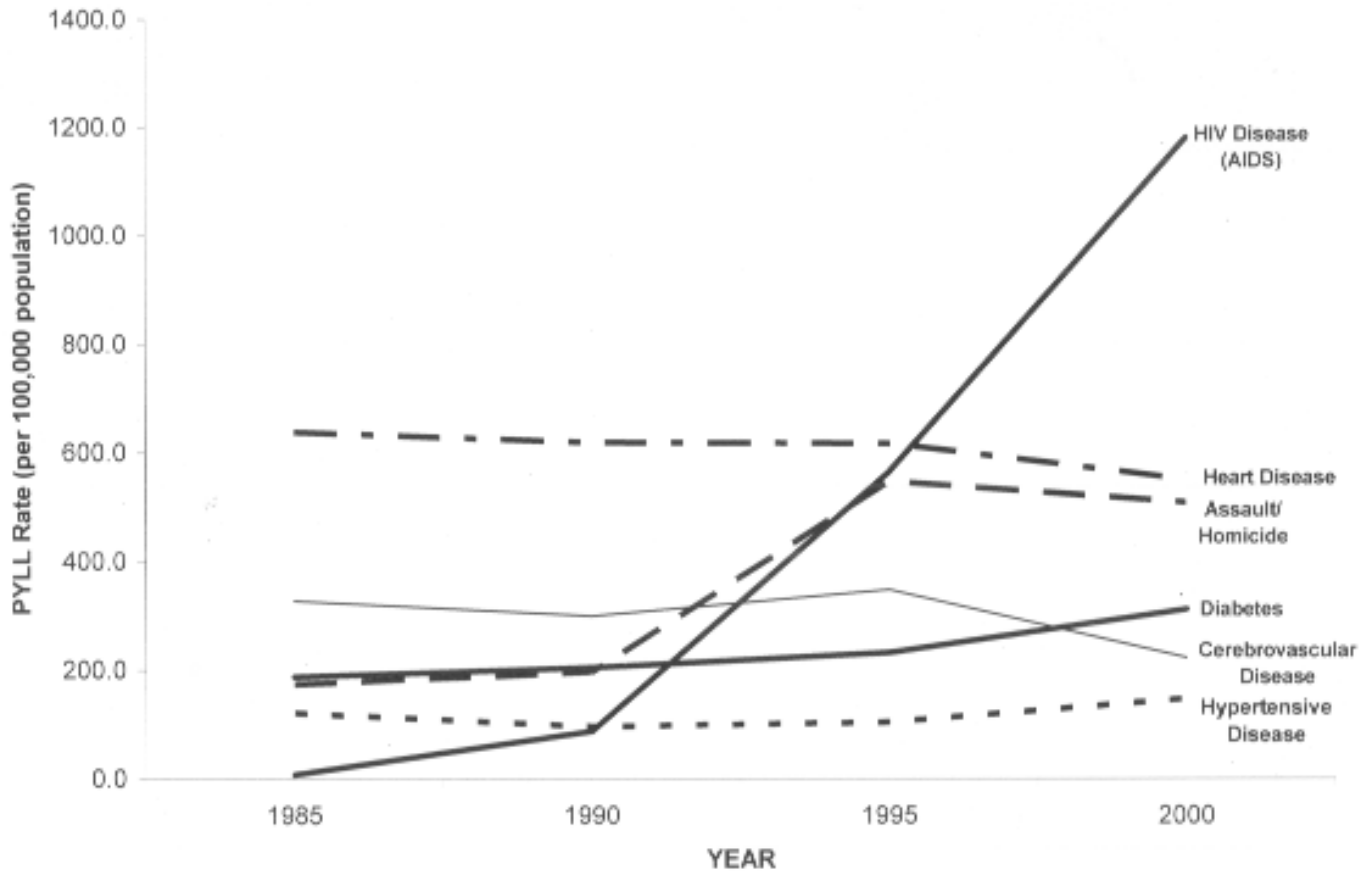


Fig. 5: Potential years of life lost, rates for selected diseases by Year: All CAREC Member Countries (1985, 1990, 1995, 2000)

conditions are influenced by lifestyle choices and are frequently preventable or controllable (18, 19). Studies have found positive associations between cancer and coronary heart disease and smoking and alcohol intake and also between body weight and mortality (20, 21). The WHO defines obesity as a disease which increases the risk of a number of other chronic diseases such as cardiovascular disease, hypertension, Type 2 diabetes mellitus and some cancers (22). In the United States of America, obesity is cited as the second leading cause of preventable death following smoking (23). Other studies have also shown obesity to be positively associated with increases in chronic diseases among persons of African descent (24–26).

Several factors may have contributed to the shift in leading causes of death in the Caribbean from communicable to non-communicable diseases. Improvement in countries' economies and advancements in technology, transportation and communication resulting in decreased physical activity and the adoption of an increasingly sedentary lifestyle could be contributing factors (27, 28). Greater access to high-fat, high caloric foods and decreased consumption of fresh fruits and vegetables usually result in a change in the population's nutritional status (29). Wang *et al* have concluded that in China, the increase in obesity and changes in peoples' life-

styles have contributed to changes in morbidity and mortality patterns with non-communicable diseases becoming more prominent (30).

Efficient and relevant programmes supported by both the public and private sectors are likely to reduce morbidity and potential years of life lost due to chronic non-communicable diseases. Wang *et al* came to the same conclusion in their study on the population in China (30). Programmes that promote healthy-eating habits and increased physical activity, particularly in school-aged children could be very effective in developing healthy lifelong habits (28, 31). Policies, legislation and guidelines on safe and healthy food production, pricing and marketing could contribute to decreased obesity and chronic diseases. In India, there have been successful initiatives for tobacco control, healthy food production and food labelling and the promotion of safe and pleasurable physical activity (32). However, since the prevalence of chronic diseases is likely to continue to increase in the Caribbean, as populations' age, policy makers need to take this into consideration as health plans are being made (33). There will be a need to ensure adequate resources are available for prevention, care and treatment of non-communicable diseases. It would be particularly important to strengthen and develop screening programmes for the more

common chronic diseases such as breast, cervical and prostate cancer, hypertension and diabetes mellitus.

This review is limited by quality issues that usually affect mortality data. These include differences in diagnostic and death certification practices, coding methods, revisions of the disease classification system, the effect of multiple causes of death and late or incomplete submission of mortality data from countries. Death certification is also not very useful for tracking rare diseases (34). In CMCs, death certification is based on underlying cause of death, ignoring other related diseases that may have contributed to death (34). Data are compiled and supplied by countries and this can also lead to differences as there are inconsistencies introduced by both medical coders and physicians. In-country coders are at different coding skill levels and can introduce their own interpretation when coding a certificate. They may also apply incorrect coding rules. Additionally, there are inconsistencies introduced by the physician through illegible hand writing and the use of abbreviations which can have more than one interpretation.

However, even with problems at the national and regional level, mortality data remain very useful for monitoring trends in public health, informing public health decision-making and policies and health programme planning and evaluation. Changes in the classification used in the member countries shifted from the 9th revision to the 10th revision in the late 1990s. However, a recent study conducted in Trinidad and Tobago on comparability ratios between ICD 9 and ICD 10 showed that although the revision changes affected some cause of death categories, the net effect was small and as such the use of comparability ratios may not be necessary (35). Also, substitution of data from adjacent years for those years where data were missing (*eg* Curaçao, 1987 for 1985) is not expected to affect overall mortality trends which do not change rapidly from year to year.

In concluding, CAREC member countries have observed an increase in mortality due to AIDS (especially among the 15–44-year age group) and non-communicable diseases generally, with diabetes mellitus showing a particularly sharp increase. High mortality rates for avoidable and preventable diseases and potential years of life lost are major public health concerns, especially for regional health planners and healthcare providers. These diseases are often considered to be a manifestation of lifestyle choices, though it must be recognized that choices are greatly affected by social, cultural and economic factors (5, 19, 28). A multi-sectoral, long-term approach is necessary to reverse the increasing mortality due to these conditions (19, 28). As such, increased prominence given to mortality surveillance in CMCs would directly benefit health planning and ultimately disease prevention and control.

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