CAUSES OF DEATH IN TEN ENGLISH-SPEAKING CARIBBEAN COUNTRIES AND TERRITORIES[1]

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This article presents a preliminary comparison of mortality data from 10 island countries and territories in the Caribbean Major differences were observed between the mortality on different islands ascribable to the four causes of death assessed—these being cancer, ischemic heart disease, diabetes mellitus, and automobile accidents.

Introduction

The English-speaking West Indian islands could conceivably provide an ideal "laboratory" for the epidemiologic study of causes of death. However, to date analyses have been hampered by the possible noncomparability of mortality data arising from lack of standardized procedures for making diagnoses and compiling cause of death data. Such analyses have also been hampered, to a lesser extent, by the fact that census information about the populations at risk on different islands has been of variable quality.

For some years the Ministers of Health of the various countries and territories involved have recognized the handicap created by this lack of comparative information. As a result, at the 1979 Ministers' Conference on Antigua, the Pan American Health Organization was asked to initiate an enquiry to establish whether any sources of quantitative information could be utilized for comparative study. This article reports the preliminary findings of a partial evaluation of that question carried out through a geographic pathology survey in the autumn of 1980 with the financial support of the Commonwealth Foundation in London. More detailed age-adjusted analyses, corrected for the effects of chance upon small numbers of occurrences, will be reported later, as will analyses of possible relationships between cause-specific mortality patterns and socioeconomic and dietary data.

Materials and Methods

Personal visits, made between September and December 1980, were used to collect data on causes of death, as codified in the International Classification of Diseases, from health department records in each of 10 island nations and territories of the English-speaking Caribbean. These were Antigua, Barbados, Dominica, Grenada, Jamaica, Montserrat, St. Kitts-Nevis, Saint Lucia, St. Vincent, and Trinidad and Tobago.

Mortality data for each sex were collected. These included data on four major causes of death (all cancers, ischemic heart disease, diabetes mellitus, and motor vehicle accidents) as well as deaths from all causes, each type of data being broken down into 17 five-year age groups. The four causes of death listed were selected because they were of special concern to the Ministers of Health, were numerically major causes of death, or were especially apt to be correctly diagnosed and reported on death certificates.

In order to stabilize the mortality figures, annual averages were calculated. These averages were based on three years' data (1976 onwards) for Jamaica and Trinidad and Tobago; on four years' data (1975 onwards) for Barbados, Saint Lucia, and St. Vincent; and on five years' data (1975 onwards) for Antigua,

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Dominica, Grenada, Montserrat, and St. Kitts-Nevis.

For each island, official estimates of male and female populations (by 17 five-year age groups) were recorded, each estimate being for the midyear of the respective mortality information period. In most cases the estimates were corrected projections based on the 1970 census, though in some cases straight-line interpolations between the 1970 census and the new 1980 census were available. On four islands (Grenada, Jamaica, St. Kitts-Nevis, and Saint Lucia), information on age-specific deaths was available only by ten-year age groups for individuals over 20 years of age; in these cases an estimating procedure based on data from the overall study area was used. Inaccuracies in these population estimates presumably had some effect on rates derived from what appear to be reasonably accurate fatality data. However, in practical terms these population errors could have made only slight differences in the direct inter-island comparison of crude cause-specific mortality that follows.

The crude birth rates, infant death rates, and crude death rates used were based on five-year aggregations of data in order to remove the worst effects of random fluctuations. These rates (Table 1) thus represent averages about a 1977 midpoint.

It should also be emphasized that the mortality information utilized in this study is based upon causes of death cited in locally issued death certificates. These certificates necessarily have lower diagnostic reliability than pathology reports, but they also constitute the only source of data suitable for comparison and capable of providing wide geographic coverage.

Results

All Causes of Death

The graph of overall age-specific mortality among males (Figure 1A) shows a crude annual mortality from all causes of 681 deaths per 100,000, which includes the relatively high average rate of 621 deaths per 100,000 in the 0-4 age group. The graph also shows a relatively high rate of 123-124 deaths per 100,000 among males 15-24 years of age; it is felt that trauma must be responsible for a large share of these deaths.

The corresponding graph for females (Figure 1B) shows lower death rates at all ages. A numerical comparison of these rates is provided in Table 2.

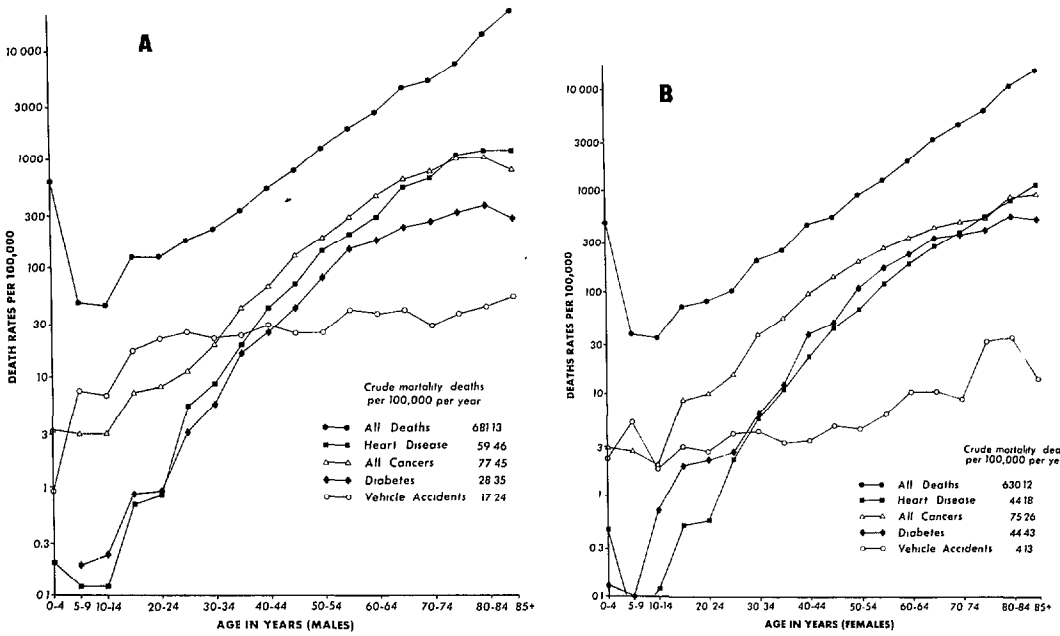
Figure 2 shows the percentages of male and female mortality attributable to each of the

Table 1. Annual rates of birth, death, and infant death per 100,000 individuals in 10 English-speaking Caribbean countries and territories, showing the relative ranking of each. (Figures based on averages of 1975-1979 data.)

	Crude births		Infant deaths		Crude deaths	
	Births per 1,000 population	Rank	Deaths per 1,000 infants	Rank	Deaths per 1,000 population	Rank
Antigua	19.5	8	30.8	3	6.4	7
Barbados	18.4	9	27.8	4	8.8	2
Dominica	21.9	6	23.8	7	6.1	8
Grenada	24.8	4	22.4	8	6.9	4
Jamaica	28.7	3	17.5	9	6.6	5
Montserrat[a]	18.3	–	43.6	–	11.4	–
St. Kitts-Nevis	23.8	5	41.7	2	9.7	1
Saint Lucia	35.7	1	27.1	5	7.2	3
St. Vincent	30.1	2	49.1	1	6.6	6
Trinidad and Tobago	21.0	7	24.0	6	5.7	9

[a]The numbers of vital events on Montserrat were too small to be confident of their statistical reliability, and so the territory was omitted from the rankings.

Figure 1. Crude annual mortality among the study area population, with data for males (A) and females (B) showing the contributions made by each of the four causes studied.



four selected causes of death, by age group, while Figure 3 shows the percentages of total male and female mortality attributable to each of the four selected causes in each of the 10 countries and territories studied.

Cancer

Deaths from all malignant neoplasms represented 11.4 and 11.9 per cent of total mortality among males and females, respectively, the crude annual mortality figures showing 77.5 cancer deaths per 100,000 for males and 75.3 cancer deaths per 100,000 for females. By international standards these are remarkably low figures. For instance, to cite a strongly contrasting example, the crude annual cancer mortality figures for all United States male residents are over twice as high as these Caribbean figures. Data for these various populations, by age group, are presented in Table 2.

The age-specific data in Figure 1 show the expected fairly regular rise in cancer death rates above age 20. However, there is a noteworthy difference between male and female cancer mortality when the contribution of cancer to all deaths is considered. That is, as Figure 2 shows, the percentage of all male deaths attributed to cancer reaches a "plateau" of about 15 per cent that extends from 45 to 74 years of age. In the case of females, the 15 per cent mark (extending from 25 to 64 years of age) is reached sooner, and the percentage of all female deaths attributed to cancer varies more sharply with age. Among other things, it should be noted that cancer accounts for over 25 per cent of all female deaths in the 45-49 age group.

When each of the 10 countries and territories is viewed separately, more emphasis needs to be placed on the presence or absence and the varying quality of cancer diagnostic facilities. The smaller islands' facilities were generally less sophisticated, a fact that could have led to some cancer deaths not being correctly recorded. Similarly, the present or past existence of cancer registries in Barbados (until 1972), Trinidad (not currently functional),

Table 2. Age-specific mortality from all causes and from cancer in the 10 areas studied, by sex, and age-specific cancer mortality in the United States among the general population and U.S. whites. Caribbean data based on latter 1970s death certificate information.

Age group	Data from the 10 areas studied				U.S. data[a]	
	Deaths from all causes per 100,000 inhabitants per year		Cancer deaths per 100,000 inhabitants per year		Cancer deaths per 100,000 inhabitants per year	
	Males	Females	Males	Females	General population	White population
0 – 4 years	621	492	3	3	11	10
5 – 9 "	48	38	3	3	9	7
10 – 14 "	45	35	3	2	7	5
15 – 19 "	124	73	7	9	9	6
20 – 24 "	123	82	8	10	11	7
25 – 29 "	174	104	11	15	15	13
30 – 34 "	224	203	20	38	21	25
35 – 39 "	329	252	43	55	34	49
40 – 44 "	526	455	67	95	62	89
45 – 49 "	770	540	127	139	116	145
50 – 54 "	1,205	894	186	196	214	214
55 – 59 "	1,877	1,222	285	262	359	293
60 – 64 "	2,609	1,909	455	332	559	387
65 – 69 "	4,279	3,084	643	418	788	505
70 – 74 "	5,032	4,354	761	473	1,053	663
75 – 79 "	7,191	5,931	985	528	1,455	935
80 – 84 "	13,237	10,264	991	823		
≥ 85 "	21,321	14,491	759	889	1,799	1,231
All ages	681	630	78	75	174	130

[a]From T. J Mason, *et al., Atlas of Cancer Mortality for U.S. Counties, 1959-1969,* DHEW Publication No. NIH 75-780, U.S. Department of Health, Education, and Welfare, Washington, D.C., 1975.

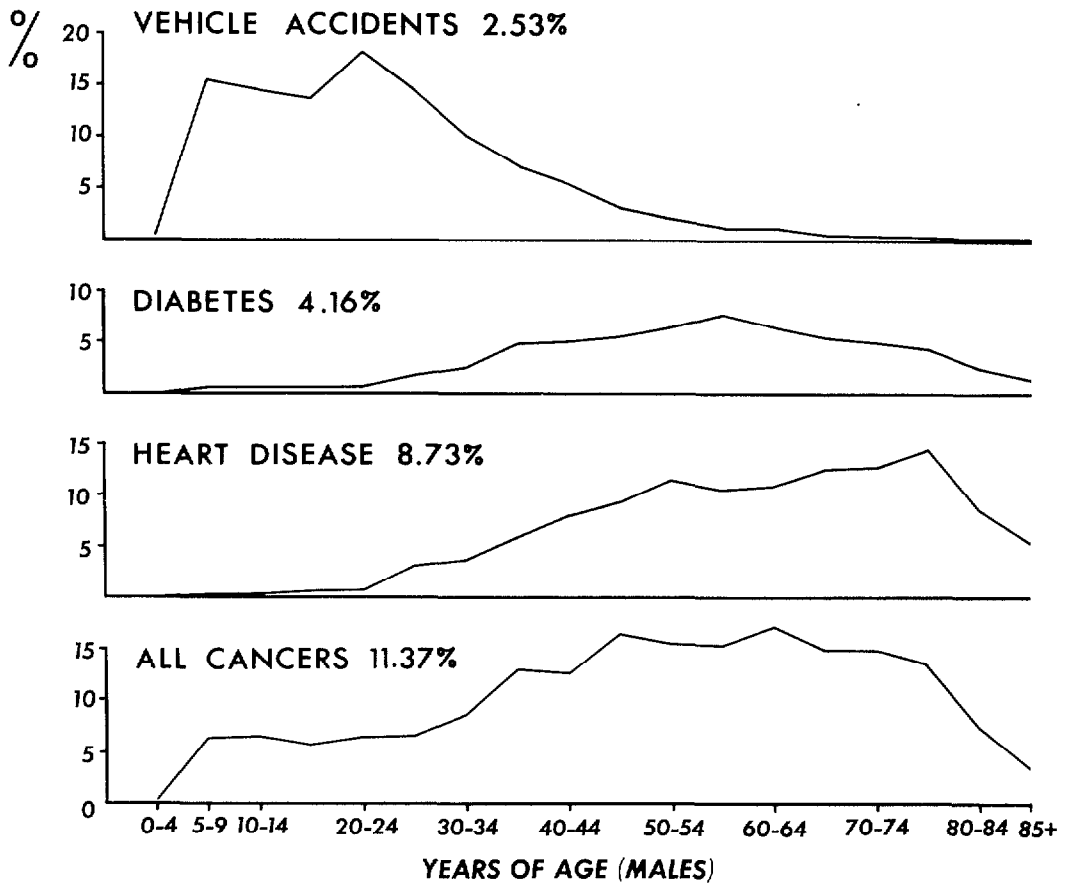
and Jamaica (for the Kingston metropolitan area only) could have had a noteworthy effect; and while such registries might not be expected to greatly alter the specific causes recorded on death certificates directly, they could be expected to have helped focus more local medical attention on malignancy as a cause of death.

Nevertheless, the percentages of all deaths due to cancer on different islands show little sign of correlation with the size of locally available medical facilities (Table 3). According to these figures, the relative role of cancer was greatest on Barbados (where it accounted for 15.3 per cent of male mortality and 14.9 per cent of female mortality), least on Saint Lucia (where it accounted for 6.6 per cent of male mortality and 7.9 per cent of female mortality), and about the same as for the whole area studied in Jamaica (where it accounted for 13.3 per cent of male mortality and 12.8 per cent of female mortality). Whether these place-to-place variations are statistically significant has not yet been determined, but they are clearly of a high magnitude.

Ischemic Heart Disease

The ischemic heart disease figures, which accounted for a sizable share of all male deaths (8.73 per cent) and female deaths (7.01 per cent) in the area studied, include data from all death certificates citing International Classification of Diseases items 410 through 414 as the cause of death. As elsewhere in the world, male mortality from ischemic heart disease

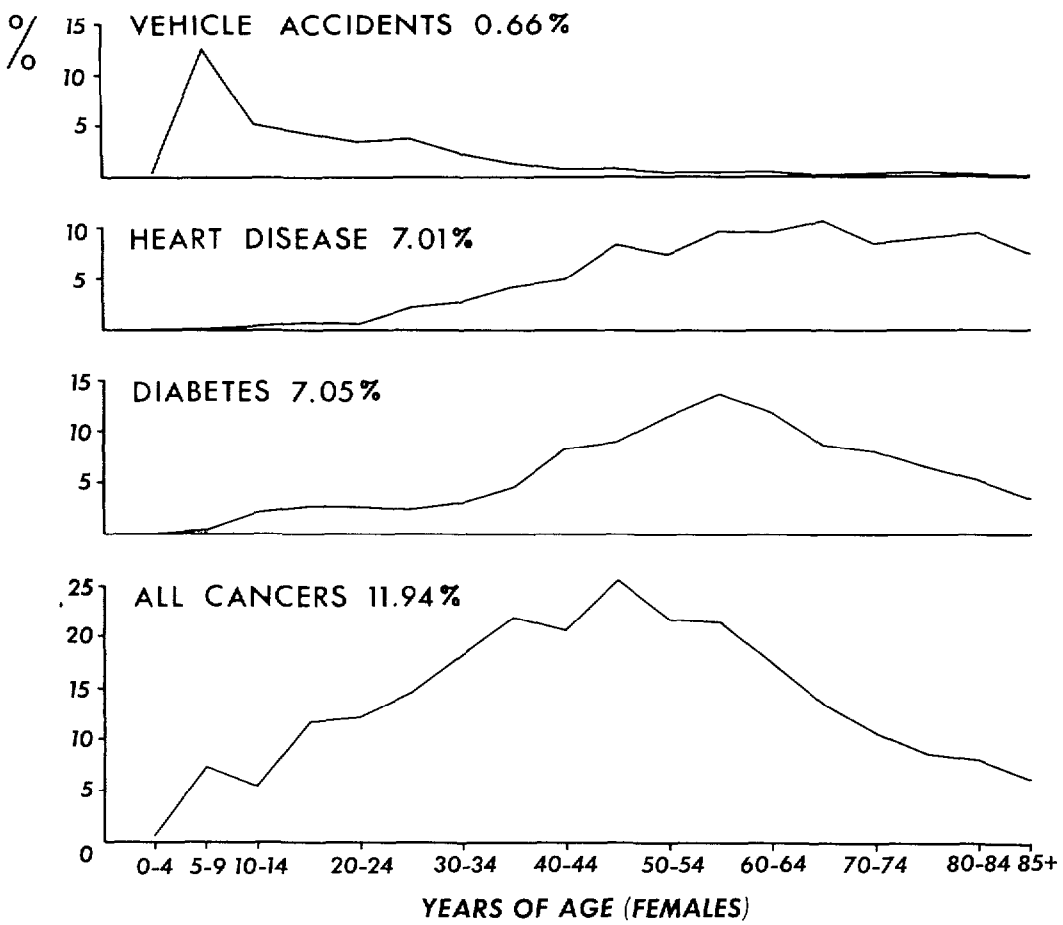
Figure 2a. The percentages of crude annual mortality among males due to each of the specific causes examined in the study area, by age.



was higher than female mortality from this cause in virtually all age groups, and in many age groups was nearly twice as high (see Figure 2 and Table 4). The percentage of all male deaths attributed to this cause reached a plateau of more than 10 per cent around age 50, a gently sloping plateau that rose slowly to a peak of 14.5 per cent in the 70-74 age group. The pattern among females was less regular, but only in the 65-69 age group did ischemic heart disease account for over 10 per cent of all deaths.

As Table 3 and Figure 3 indicate, the percentage of all deaths caused by ischemic heart disease was found to vary greatly from place to place. Trinidad and Tobago showed by far the highest percentages of male and female deaths from this cause, the respective figures being 14.4 and 11.8 per cent. Barbados ranked second for both males and females. In contrast, data from Dominica, Saint Lucia, and St. Vincent showed relatively low percentages for both males and females, the observed figures ranging from less than a quarter to slightly over a third of the percentages found in Trinidad and Tobago. The magnitude of these variations, like the magnitude of the variations in the cancer mortality data, deserves attention. It also justifies considering possible preventive action in Trinidad and Tobago, where internal regional variations are likely to be high.

Figure 2b. The percentages of crude annual mortality among females due to each of the specific causes examined in the study area, by age.



Diabetes Mellitus

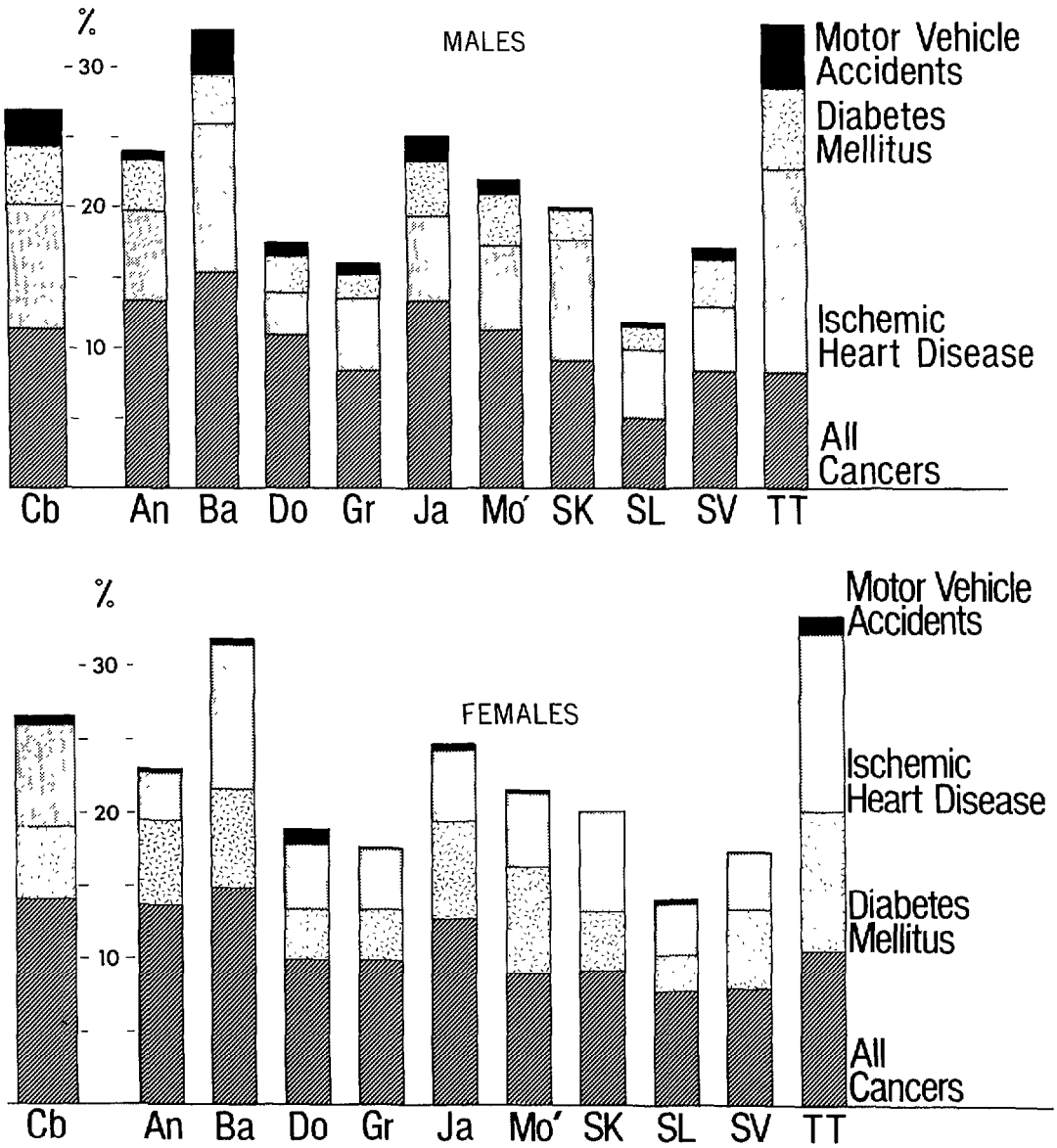
Diabetes mellitus caused the death of more women than men in the area studied. In fact, diabetes in women (producing a crude annual mortality of 44.4 deaths per 100,000) outstripped heart disease (producing a crude annual mortality of 44.2 deaths per 100,000), and in older age groups approached the mortality caused by all cancers (see Figure 1B). The impact of diabetes, expressed as the percentage of deaths from all causes that were due to diabetes, was greatest in the 55-59 age group for both males and females, the disease accounting for 7.8 per cent of all male deaths and 13.9 per cent of all female deaths in this age group (see Figure 2).

Regarding variations by area, Trinidad and Tobago registered the highest overall percentage of diabetes-caused deaths, followed by Barbados and Jamaica. Saint Lucia and Grenada showed the lowest overall percentages of diabetes-caused deaths in both sexes.

Motor Vehicle Accidents

Two sources of data were used to compile road death information in the study area. The first source was the regular death certificates that provide comparable information for each

Figure 3. The percentage contributions of each of the four causes to overall mortality in each of the countries and territories studied, by sex. (Cb = Overall Caribbean study area, An = Antigua, Ba = Barbados, Do = Dominica, Gr = Grenada, Ja = Jamaica, Mó = Montserrat data too limited for confidence in statistical reliability, SK = St. Kitts-Nevis, SL = Saint Lucia, SV = St. Vincent, and TT = Trinidad and Tobago.)



country and territory. However, these certificates list medical diagnoses, and so they may or may not mention that a motor vehicle accident caused the fatal injury. Indeed, some physicians regard it as outside their immediate jurisdiction to make any statement about how an injury was caused.

For this reason, it may be that the police records of fatal traffic accidents are more reliable. Generally, however, these are less

Table 3. Percentages of all deaths due to cancer, ischemic heart disease, diabetes mellitus, and motor vehicle accidents, by sex, in each of the 10 areas studied, showing the relative ranking of each area. Data are based on latter 1970s death certificate information.

	Data for males								Data for females							
	Cancer[a]		Ischemic heart disease		Diabetes mellitus		Motor vehicle accidents		Cancer[a]		Ischemic heart disease		Diabetes mellitus		Motor vehicle accidents	
	% of all deaths	Area rank	% of all deaths	Area rank	% of all deaths	Area rank	% of all deaths	Area rank	% of all deaths	Area rank	% of all deaths	Area rank	% of all deaths	Area rank	% of all deaths	Area rank
Antigua	13.2	3	6.5	4	3.5	3[c]	0.7	6[c]	13.6	2	3.3	9	5.9	4	0.3	5
Barbados	15.3	1	10.6	2	3.5	3[c]	3.1	2	14.9	1	9.8	2	6.8	2	0.4	3[c]
Dominica	10.9	4	3.0	9	2.6	6	0.8	5	10.0	5[c]	4.4	5	3.5	7	1.1	2
Grenada	8.3	7[c]	5.2	6	1.6	8[c]	0.7	6[c]	10.0	5[c]	4.3	6	3.4	8	0.1	7[c]
Jamaica	13.3	2	6.0	5	3.8	2	1.8	3	12.8	3	4.9	4	6.7	3	0.4	3[c]
Montserrat[b]	11.2	–	5.9	–	3.6	–	1.0	–	9.0	–	5.1	–	7.3	–	0.3	–
St. Kitts-Nevis	9.1	5	8.6	3	2.1	7	0.1	9	9.3	7	6.9	3	4.0	6	–	9
Saint Lucia	6.6	9	4.9	7	1.6	8[c]	0.3	8	7.9	9	3.5	8	2.6	9	0.2	6
St. Vincent	8.4	6	4.5	8	3.3	5	0.9	4	8.1	8	3.9	7	5.4	5	0.1	7[c]
Trinidad and Tobago	8.3	7[c]	14.4	1	5.7	1	4.5	1	10.7	4	11.8	1	9.6	1	1.4	1
Average (weighted for population)	11.4		8.7		4.2		2.5		11.9		7.0		7.1		0.7	

[a]All malignant neoplasms.
[b]The numbers of deaths from the four causes were too few on Montserrat to ensure statistical reliability, and so the territory was omitted from the rankings.
[c]Percentage of all deaths the same as that found for another area.

Table 4. Age-specific mortality from ischemic heart disease, diabetes mellitus, and motor vehicle accidents in different age groups of the whole study area population, by sex.

Ages	Deaths per 100,000 caused by:					
	Ischemic heart disease		Diabetes mellitus		Motor vehicle accidents	
	Among males	Among females	Among males	Among females	Among males	Among females
0 – 4 years	0.2	0.5	–	0.1	0.9	2.3
5 – 9 "	0.1	–	0.2	0.1	7.5	5.3
10 – 14 "	0.1	0.1	0.2	0.7	6.8	1.8
15 – 19 "	0.7	0.5	0.9	2.0	17.3	3.0
20 – 24 "	0.8	0.6	0.9	2.3	22.4	2.8
25 – 29 "	5.4	2.3	3.1	2.7	25.8	4.1
30 – 34 "	8.7	5.7	5.7	6.2	22.6	4.3
35 – 39 "	19.9	10.8	16.5	12.0	24.2	3.3
40 – 44 "	42.4	23.2	26.8	38.0	29.9	3.5
45 – 49 "	70.4	45.1	42.7	49.1	25.4	4.8
50 – 54 "	139.9	66.9	80.5	105.9	25.6	4.5
55 – 59 "	199.0	120.2	145.8	170.0	40.9	6.2
60 – 64 "	284.9	183.8	174.4	229.1	38.0	10.4
65 – 69 "	541.1	273.0	233.8	329.5	40.8	10.4
70 – 74 "	647.5	369.1	254.4	353.0	29.6	8.8
75 – 79 "	1,045.2	536.0	310.6	395.1	37.3	13.2
80 – 84 "	1,164.1	784.9	360.9	552.9	43.7	13.5
≥ 85 "	1,155.6	1,098.0	269.5	504.0	53.3	11.4

medically specific, usually classifying victims only as children under 15 or as male or female adults. Subsequent determination of the victims' ages from these records is therefore not possible.

To maintain comparability with the other three causes of death, the motor vehicle data shown in Figures 1 through 3 and in Tables 3 and 4 were derived from death certificates. These data show sex and age-related patterns that are quite different from those found for the three other causes of death. Specifically, as Table 4 and Figure 1 show, beyond age nine death rates were generally much higher among men than among women. For women, relatively high risk was experienced by the 5-9 year age group (5.3 deaths per 100,000); and while this rate was generally exceeded above age 55, it was not equalled by any group below that age. In sharp contrast, the early 5-9 male peak of 7.5 deaths per 100,000 was greatly exceeded by a rate of 17.3 in the 15-19 group, and the rate continued high thereafter, ranging from 22.4 deaths per 100,000 in the 20-24 age group to 53.3 in the group over 84 years old.

These findings are in accord with information from other countries, where risks related with learning to drive and alcohol abuse are known to raise motor vehicle accident mortality among younger males *(1)*. A marked difference between male and female mortality from this cause is also characteristic of data from other countries *(2,3)*. The impact of motor vehicle accident mortality—as a percentage of total mortality—was particularly pronounced among young age groups; because even though the mortality per 100,000 from this cause was as high or higher in older groups, overall mortality (from all causes) was far lower in the younger groups. As a result, in the 5-9 year age group almost one death in six was caused by a motor vehicle; and in the male 20-24 year age group nearly one death in five was ascribed to this cause. In contrast, overall motor vehicle accidents accounted for only one male death in 20 and one female death in 140. This more pronounced impact

of motor vehicle mortality upon younger age groups is shown graphically in Figure 2.

Regarding geographic variations, Figure 3 indicates that Trinidad and Tobago again had the highest recorded mortality of the areas studied, and that Barbados was again in second place. The lowest recorded rates were found in St. Kitts-Nevis and Saint Lucia.

Information obtained from police reports, the alternative data source, is shown in Table 5. Except on Trinidad and Tobago, police invariably recorded more road accident fatalities than were recorded as being due to this cause on death certificates. For the whole study area population, the ratio of police report mortality to death certificate mortality was 166:100, the crude annual mortality indicated by the police report data being 17.5 deaths per 100,000 and that indicated by the death certificate data being 10.6 per 100,000. In each case, the local differences permit an estimation of the degree of inaccuracy in the local compilations, since ideally the correlation between the two sets of data should be nearly perfect. Regarding the largest islands, the observed differences were small in the case of Trinidad and Tobago and relatively large in the case of Jamaica. Considering the study area as a whole, however, a significant degree of correlation was observed between the two sets of data from the various localities studied ($r = 0.764$, $p. < 0.01$). The ratio of police-reported injuries to certificated deaths was found to be 1,938:100, or 19.4 injuries for each fatality. Overall, there appears to be a significant degree of correlation ($r = 0.781$, $p < 0.01$) between the two sets of data from the 10 areas studied.

The degree of disagreement between the police reports and death certificates permits assessment of the reliability of the data obtained on any given island. The combined data also indicate the places with the most serious traffic accident problems. Specifically, regardless of which data are used, Trinidad and Tobago and Barbados emerge as having the highest rates of vehicular injury and death. Montserrat also appears to have a fairly high rate of vehicular injury, but the vehicular death rate is relatively low. In contrast, the data give Jamaica the appearance of having a high vehicular death rate and a low rate of vehicular injury—a finding which suggests that routine traffic accidents in Jamaica, especially those causing only slight injuries, are underreported. Several of the smaller islands (Dominica, Grenada, St. Kitts-Nevis, Saint Lucia, and St. Vincent) apparently have lower rates of injurious or fatal motor vehicle accidents per 100,000 inhabitants than the other areas studied.

Conclusions

In 1971 Omran *(4)* described a continuum of change in the mortality patterns for nations in various stages of development that theoretically permits the overall health status of each country to be assessed. For instance, Saint Lucia has a very high birth rate, very low cancer mortality, and low rates of death from heart disease, diabetes, and vehicular accidents. This implies quite a different set of vital circumstances than that prevailing on Trinidad and Tobago, where the data indicate low crude birth and death rates but very high mortality from heart disease and vehicular accidents—the latter two being commonly associated with "modernization" and "development."

This "epidemiologic transition" concept implies that different countries and territories are located at different points along an epidemiologic spectrum—points determined by mortality patterns and also in part by other factors such as nutritional and socioeconomic indicators. Overall, the major local variations observed in our study area tend to support the epidemiologic transition concept. For this reason, the applicability of the concept to this study area needs to be examined in greater depth, taking advantage of age-corrected data adjusted for differences in the demographic structures of the various countries and territories involved.

Table 5. Data on average annual automobile accident fatalities and injuries derived from death certificates and police reports, by area.

		Death certificate data		Police report data					
	Population (in thousands)	Average no. killed per year	Crude annual mortality (per 100,000)[a,b]	Adults killed per year (1975-1980 average)	Children killed per year (1975-1980 average)	Crude annual mortality (per 100,000)[a]	Serious injuries per year (1975-1980 average)[c]	Slight injuries per year (1975-1980 average)	No. injured annually per 100,000[b]
Antigua	72.3	2.2	3.04	5	4	12.4	49	131	248.8
Barbados	244.8	36.5	14.91	39	11	20.4	224	800	418.2
Dominica	80.0	4.6	5.75	8	5	16.2	26	27	66.2
Grenada	108.1	2.8	2.59	4	1	4.6	12	100	103.6
Jamaica	2,081.3	14.5	6.97	313	69	18.4	1,545	2,024	171.5
Montserrat	11.5	0.8	6.96	1	–	8.7	21	22	374.1
St. Kitts-Nevis	49.7	0.2	0.40	3	1	8.1	43	89	265.9
Saint Lucia	117.5	2.25	1.91	11	1	10.2	60	95	131.9
St. Vincent	113.2	3.25	2.87	5	1	5.3	50	103	135.1
Trinidad and Tobago	1,098.2	223.33	20.34	179	36	19.6	877	4,770	514.2
Total	3,976.7	420.92	10.59	568	129	17.5	2,907	8,161	278.3

[a]Correlation between columns 3 and 6 (crude annual mortality): $r = 0.764$, $p < 0.01$.
[b]Correlation between columns 3 and 9 (crude annual mortality derived from death certificates and rates of injury derived from police reports): $r = 0.781$, $p < 0.01$.
[c]A serious injury is defined as involving at least one night's hospitalization.

ACKNOWLEDGMENTS

Financial support provided by the Commonwealth Foundation, leave of absence granted by the University of Tasmania, and the cooperation extended by the West Indies Health Statisticians and Medical Officers are all gratefully acknowledged. The personal assistance of Dr. P. J. S. Hamilton of the Caribbean Epidemiology Center, Port-of-Spain, and of Dr. M. U. Henry of the Pan American Sanitary Bureau, Bridgetown, was particularly valuable.

SUMMARY

A preliminary comparison was made of mortality from all causes and from four specific causes in 10 English-speaking countries and territories of the Caribbean. The death certificates and police reports used to gather data on overall mortality and mortality from cancer, ischemic heart disease, diabetes mellitus, and automobile accidents demonstrated marked differences between the places studied. For example, crude annual cancer mortality among males ranged from 132 deaths per 100,000 on Barbados to 51 deaths per 100,000 on Saint Lucia; similarly, crude annual cancer mortality among females ranged from 133 deaths per 100,000 on Barbados to 51 deaths per 100,000 on Saint Lucia. Male deaths from ischemic heart disease went from 100 per 100,000 on Trinidad and Tobago to 15 on Dominica, while female deaths from the same cause went from 87 per 100,000 on Barbados to 21 on Antigua. Male diabetes mellitus mortality varied from 41 deaths per 100,000 on Montserrat to 11 on Granada, and female diabetes mellitus mortality varied from 85 deaths per 100,000 on Montserrat to 17 on Saint Lucia. The rate of road accident deaths was notably lower among women than among men; but the death rates in different places also varied widely—male mortality ranging from 32 deaths per 100,000 on Trinidad and Tobago to 1 on St. Kitts-Nevis, and female mortality ranging from 9 deaths per 100,000 on Trinidad and Tobago to none on St. Kitts-Nevis. It is suggested that these data might be used to position the different areas involved along a continuum of changing mortality patterns that parallel the different areas' varying degrees of socioeconomic development.

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