Mortality from Violent Causes in the Americas[1]

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This article provides an assessment of 1986 mortality from violent causes in the Americas. Directed at assisting with development of preventive public health measures, it employs data available in the PAHO data base to focus on the under-25 year age group, compare mortality from violent causes with mortality from infectious and parasitic diseases, and evaluate the relative role of motor vehicle traffic accidents, other accidents, suicide, homicide, and deaths from unknown causes in mortality from violent causes. The study uses the classification of causes presented in the International Classification of Diseases, Ninth Revision.

The results show that 517 465 deaths from violent causes were registered in 28 countries and political units of the Americas in 1986, mortality from these causes ranging from 19.3 deaths per 100 000 inhabitants in Jamaica to 125 in El Salvador. Examination of available 1980–1986 data from five countries points to steady increases in mortality from violent causes in Brazil and Cuba that began respectively in 1983 and 1984. Assessment of male and female 1986 mortality from these causes in nine countries showed male mortality to be substantially higher, the lowest male:female ratio (in Cuba) being 1.9:1.

Among infants, infectious and parasitic disease mortality was greater than mortality from violent causes in most countries. However, from age 1 to the study's 25-year cutoff, mortality from violent causes was found to exceed infectious and parasitic disease mortality in most countries and to play an especially large role in deaths among those 19–24 years old.

Data from eight countries suggested that accidents other than motor vehicle traffic accidents were accounting for much of the mortality from violent causes among infants and the 1–4 year age group in 1986, while motor vehicle traffic accidents rivaled other accidents in importance among the older (5–9, 10–14, 15–19, and 19–24) age groups.

It appears that the information presented could prove of considerable use in developing policies designed to reduce morbidity and mortality from violent causes (1).

In the public health field, study of diseases and causes of death has had as its primary aim prevention and reduction of sickness and death. Generally speaking, such study has dealt with diseases and deaths that occur "naturally." However, in recent years the public health aspects of deaths with external or violent causes have attracted increasing attention.

In 1950, Wheatley, founder of the "Committee for Accident Prevention" in the United States of America,[3] noted that for every violent accident-attributable death, nearly 200 accident-attributable nonfatal injuries occurred that caused

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[3]Cited in: Mello-Jorge MH (4). Mortalidade por causas violentas no Município de São Paulo, São Paulo, 1979. Doctoral dissertation. Faculdade de Saúde Pública da Universidade de São Paulo.

varying degrees of disability. In this same vein, San Martín (*1*) has pointed out the importance of studying accidents because besides causing deaths they may cause recurrent sequelae and premature physical disability.

The importance of deaths from violent causes may be assessed as a function of years of potential life lost. Such an assessment tends to point up the significance of these deaths; for while studies have demonstrated that deaths with violent causes affect all age groups, in some areas they constitute the leading cause of death among those under 24 years old (*2*, *3*).

Another matter that justifies growing concern is the high economic cost of deaths and disabilities due to accidents and other violent causes. This is even true if one only considers their direct economic costs, without considering that violence has many other social effects, death and disability being merely the tip of the iceberg.

Clearly, the problem of violent deaths does not fall solely within the purview of the health sector. Such deaths, as well as violence-related injuries, relate to a diverse array of biologic, psychological, educational, economic, legal, and political factors. Nevertheless, despite other sectors' involvement, the health sector will always bear the responsibility for dealing with the damage caused by violence, and so health facilities must be capable of providing effective treatment. Consequently, the Pan American Health Organization (PAHO) has drawn attention to the fact that since "...violence erodes the quality of life for vast segments of the population; exacts a high toll in lives, especially among teenagers and young adults; leads to social and economic costs; and further burdens the already stressed health services' resources, it has come to rank as one of today's top public health priorities" (3).

Relatively few studies have been carried out in Latin America and the Caribbean on the effects of violence on public health. Among the most recent works published are those of the following authors: Anzola-Pérez and Bangdiwala at PAHO (*2*); Mello-Jorge and Bernardes-Marques (*4*) and Minayo in Brazil (*5*); Higar-Medina et al. in Mexico (*6*); Danielsen et al. in Argentina (*7*); and Aalund et al. in Chile (*8*). Also, in 1990 Minayo published an annotated bibliography (*9*) of the various scientific works published in Brazil on violence and health which may be of great interest to investigators in this field.

Partly because of its many causes, the problem of violence is very complex. Consequently, it is often hard to interpret the concept of violence and its interaction with the health sector. This suggests a need to learn more about the epidemiologic profile of deaths from violent causes for the purpose of proposing and applying appropriate prevention programs.

The work presented here has the following aims: (1) to assess violence-related mortality and its trends in the countries of the Americas, especially among those under 24 years old; (2) to relate these findings with other causes of death in those countries; and (3) to provide a useful basis for political decision-making directed at preventing deaths from violent causes.

MATERIALS AND METHODS

The demographic and mortality data presented here were derived from the PAHO data base. The causes of death have been grouped in accordance with the International Classification of Diseases, Ninth Revision (ICD-9) (*10*), as described below.

External Causes

External causes of injury and death, equated for purposes of this presentation

with violent causes, are defined in the International Classification's "Supplementary Classification of External Causes of Injury and Poisoning," which encompasses codes E800 through E999 (*10*). With regard to divisions established for the study of these external causes, criteria established by PAHO have been followed whenever possible, resulting in certain changes in the order of the ICD-9 categories. These divisions and their corresponding ICD-9 categories are as follows:

- Traffic accidents involving motor vehicles (motor vehicle traffic accidents, E810–E819).
- Other accidents (railway accidents, E800–E809; motor vehicle nontraffic accidents, E820–E825; other road vehicle accidents, E826–E829; and other accidents, E830–E949).
- Suicide (suicide and self-inflicted injury, E950–E959).
- Homicide (homicide and injury purposely inflicted by other persons, E960–E969; legal intervention, E970–E978; and injury resulting from operations of war, E990–E999).
- Unknown causes (injury undetermined whether accidentally or purposely inflicted, E980–E989).

This classification sought to separate accidental deaths from both intentional deaths and deaths from "unknown causes." As may be seen, within each subdivision the original ICD-9 categories were maintained. However, motor vehicle traffic accidents were separated from other accidents (as well as from suicide), and the homicide category was broadened to include fatal legal interventions and war operations, all of which share a common denominator (the intentional killing of one person by another).

Infectious and Parasitic Diseases

For purposes of comparison, violent deaths were juxtaposed with those caused by infectious and parasitic diseases. This latter group of causes corresponds to the first section of the ICD-9 classification (codes 001 through 139). (Throughout this article, the percentages of deaths attributed to violent causes and to infectious and parasitic diseases take as their denominator the total number of deaths with well-defined causes.)

With regard to age, the groupings used are identical to those employed by PAHO in *Health Conditions in the Americas* (1990 edition) (*3*). In general, data on numbers and rates of death from violent causes include all age groups. At times, however, the population 0 to 24 years old has been subdivided into 5-year age groups for purposes of closer examination, and children under 5 years of age have likewise been separated into those 1 to 4 and those under 1 year old.

Within the Region of the Americas, countries were selected for special study based on geographic location and the availability and quality of their vital statistics. With these criteria in mind, studies were made of data from Argentina, Brazil, and Chile in the Southern Cone; Venezuela in the Andean area; Cuba in the Latin Caribbean; Trinidad and Tobago in the English-speaking Caribbean; Costa Rica in Central America; and the United States and Mexico in Northern America. For purposes of comparison, where appropriate data from other countries of the Region were available, those data were included in the study.

Because data were available from the greatest number of countries in 1986, that year was selected for the study. Mortality trends from 1980–1986 were also evaluated in a number of countries with data covering that period.

The study took into account certain

limitations of the data—including the quality of death registration with respect to population coverage, reliability regarding the declared cause of death, and accuracy in coding the basic cause of death. Despite limitations in all these areas, it was possible to make a worthwhile assessment of the situation.

RESULTS

Mortality from Violent Causes

All Age Groups

Twenty-eight countries and political units of the Americas providing data for 1986 reported a total of 517 465 deaths from violent causes that year (Table 1). The percentage of all registered deaths attributed to violent causes ranged from 3.7% in Jamaica to 26.8% in El Salvador. The corresponding rate of violent deaths (including deaths from war operations) per 100 000 inhabitants was 19.3 in Jamaica and 125.7 in El Salvador, indicating that mortality from violent causes in El Salvador was more than double that found in all but nine of the others. (Those of the 28 with recorded rates exceeding 60 deaths per 100 000 were the Bahamas, Brazil, Chile, Colombia, Cuba, Ecuador, El Salvador, Mexico, Puerto Rico, Suriname, the United States, and Venezuela.)

Figure 1 compares the levels of registered mortality from violent causes per 100 000 inhabitants in those countries and political units listed in Table 1 where that mortality exceeded 45 deaths per 100 000 population.

Figure 2 compares mortality from violent causes in Brazil, Cuba, Mexico, the United States, and Venezuela in 1970, 1975, and each of the years from 1980 through 1986. These data point to steady apparent rises in Brazil's rate beginning in 1983 and in Cuba's rate beginning in 1984.

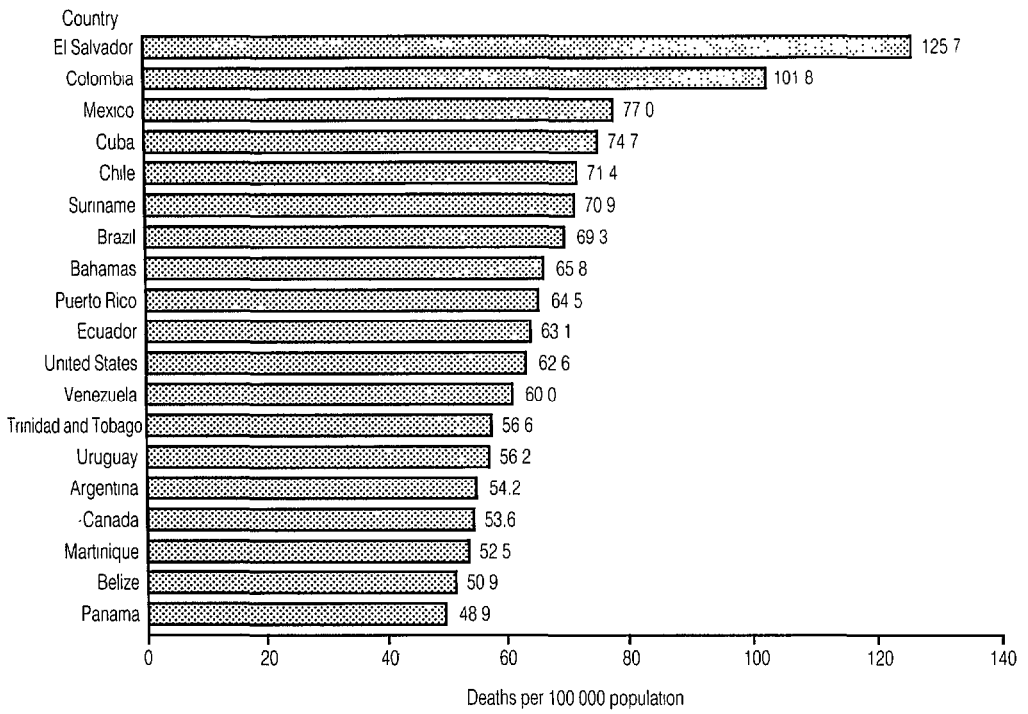
Table 1. 1986 mortality from violent causes in 28 countries and political units of the Americas. The left-hand column shows mortality from violent causes (deaths per 100 000 inhabitants), while the right-hand column shows the percentage of all deaths accounted for by such mortality.

	Mortality from violent causes	
Country	Deaths per 100 000 population	% of total mortality
Argentina	54.2	7.0
Bahamas	65.8	11.7
Barbados	44.0	5.4
Belize	50.9	12.1
Brazil	69.3	14.8
Canada	53.6	7.5
Chile	71.4	13.2
Colombia	101.8	20.0
Costa Rica	40.1	10.7
Cuba	74.7	11.8
Dominica	27.6	5.4
Dominican Republic	33.7	9.1
Ecuador	63.1	14.0
El Salvador	125.7	26.8
Guatemala	52.0	6.7
Jamaica	19.3	3.7
Martinique	52.5	9.0
Mexico	77.0	16.3
Panama	48.9	13.2
Paraguay	40.3	8.7
Puerto Rico	64.5	9.7
Saint Lucia	44.6	7.9
St. Vincent and the Grenadines	38.1	6.9
Suriname	70.9	13.9
Trinidad and Tobago	56.6	9.0
United States of America	62.6	7.2
Uruguay	56.2	6.3
Venezuela	60.0	16.4

Source: Pan American Health Organization, Health Situation and Trend Assessment Program.

Figure 3 provides 1986 data on deaths from violent causes by gender in nine countries. These data show violence-related mortality to have been substantially higher among males than among females in all nine countries, the male: female mortality ratio ranging from 1.9 in Cuba to 4.5 in Mexico.

Figure 1. A chart showing countries or political units of the Americas where 1986 mortality from violent causes exceeded 45 deaths per 100 000 inhabitants.



Source: PAHO, Health Situation and Trend Assessment Program.

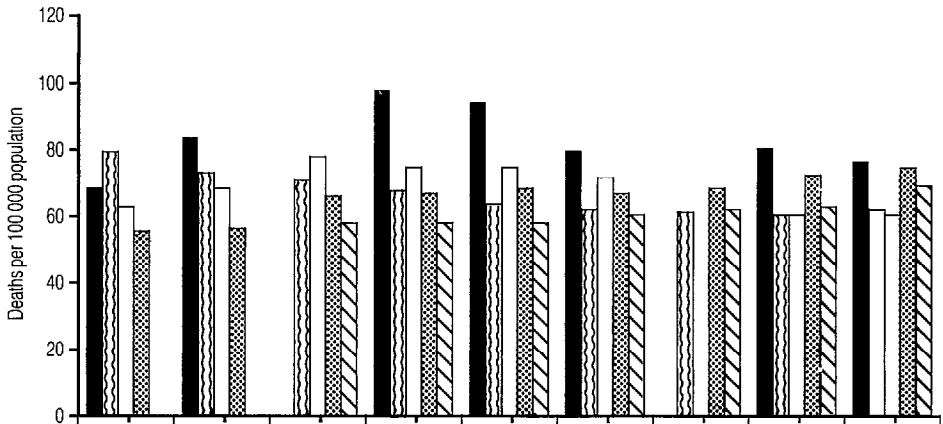
The same figure also indicates that mortality from violent causes among males ranged from 63.3 deaths per 100 000 inhabitants in Costa Rica to 125.9 per 100 000 in Mexico. The lowest mortality from violent causes among women in these countries was also found in Costa Rica (16.4 deaths per 100 000), while the highest (50.7 deaths per 100 000) was found in Cuba. As may be seen, however, the highest rate for females in any country (50.7) was still lower than the lowest rate for males (63.3).

The 0–24 Year Age Group

In general, mortality from violent causes tends to be higher among those under 25 years old than it is in the overall population. In the Americas, the reported data indicate that 36.0% of all violence-related deaths in 1980 occurred in the under-25 group, though this percentage declined to 32.3% in 1986, a year when available national data show this percentage ranging from 24.2% in Argentina to 42.2% in Venezuela. This percentage in other countries with 1986 data was 26.9% in the United States; 30.9% in Cuba; 31.5% in Costa Rica; 31.5% in Chile; 31.7% in Trinidad and Tobago; 35.9% in Brazil; and 36.0% in Mexico. As in the general population, mortality from violent causes in the under-25 group was always greater among males than among females, though within the group this difference tended to increase with age.

Table 2 shows data on deaths from violent causes and from infectious and parasitic diseases in 1986 within the under-

Figure 2. Mortality from violent causes in five countries of the Americas. The data charted are for 1970, 1975, and 1980–1986.



	1970	1975	1980	1981	1982	1983	1984	1985	1986
Mexico	68 5	83.4	. . .	97 6	93 2	79 8	.	80 2	77.0
United States	78 6	72 5	70.6	67.7	63.7	61 5	61 3	61 0	62.6
Venezuela	63.2	68 4	77 3	74 7	73 8	71 3	. . .	60 9	60 0
Cuba	55 7	56.3	66.1	67 0	68 3	66 5	68 0	72 5	74 7
Brazil	. .	.	57.9	57.9	57 9	60 1	62 1	63.3	69.3

Source: PAHO, Health Situation and Trend Assessment Program.

. . . = data not available.

25 group by age. These data show that mortality from infectious and parasitic diseases tended by and large to decline with increasing age in all the countries listed. This trend was found both in countries such as Canada with relatively low infectious disease mortality and those like Ecuador and Paraguay where such mortality was relatively high. On the other hand, after about age 10, registered mortality from violent causes increased with age in all the countries listed.

Other points brought out by this comparison:

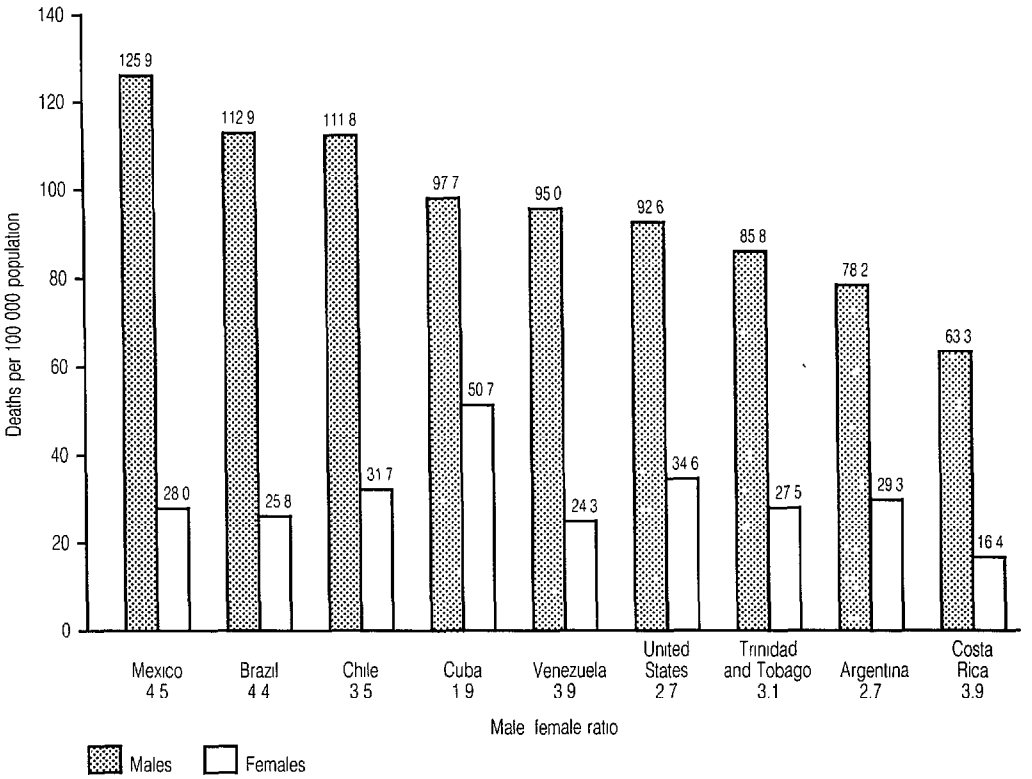
- Except in Canada, Chile, Puerto Rico, Trinidad and Tobago, and the United States, infant mortality from infectious and parasitic diseases was always higher than infant mortality from violent causes.
- The relative role of mortality from violent causes was greater in the 1–4 year age group, where it exceeded mortality from infectious and parasitic diseases in 10 of the 16 countries listed in Table 2.
- Regarding all the other age groups (5–9, 10–14, 15–19, and 20–24 years), mortality from violent causes was higher in every group and every country than was mortality from infectious diseases.

Causes of Death by Violence

All Age Groups

Table 3 shows the relative role played by different causes of violent death within eight countries in 1980 and 1986, according to available data. Figures 4, 5, and 6 provide graphic comparisons of 1986 mortality from motor vehicle traffic ac-

Figure 3. 1986 mortality from violent causes among males and females in nine countries of the Americas. The male:female ratio is shown below each pair of columns.



Source: PAHO, Health Situation and Trend Assessment Program

cidents, suicide, and homicide in these same countries.

Traffic accidents. Motor vehicle traffic accident mortality was lower in 1986 than it had been in 1980. While the reduction was not drastic in most cases, it occurred in all the countries with data for both years except Brazil, where mortality from this cause rose from 16.4 deaths per 100 000 inhabitants in 1980 to 21.4 in 1986.

It should also be noted that despite this decline, traffic accident mortality was still high in 1986, ranging from a low of 6.5 deaths per 100 000 in Chile to 24.4 in Venezuela.

Other accidents. Mortality from other accidents remained fairly stable between 1980 and 1986, declining in four countries and increasing in three. The greatest apparent increase (a rise of 18.5%) occurred in Brazil. The country registering the highest mortality from other accidents in 1986 was Mexico (38.4 deaths per 100 000), while those registering the lowest were Costa Rica (17.7) and Trinidad and Tobago (also 17.7).

Suicide. Mortality from suicide in 1986 exceeded that of 1980 in Argentina, Chile, Trinidad and Tobago, and the United States while remaining about the same or

Table 2. 1986 mortality from violent causes (V) and infectious and parasitic diseases (I) in 16 countries and political units of the Americas in the under-25 year age group, showing data for infants, the 1–4 year age group, and the four older 5-year age groups.

	Deaths per 100 000 population by age group (in years)					
Country and causes	<1	1–4	5–9	10–14	15–19	20–24
Argentina:						
I	189.7	14.9	2.9	1.8	2.7	4.9
V	88.7	24.5	15.1	18.2	43.0	53.0
Bahamas:						
I	—[a]	13.2	0.0	0.0	0.0	3.9
V	—	44.0	33.0	38.6	12.0	131.3
Brazil:						
I	423.5	30.1	5.4	3.6	5.2	6.3
V	21.1	19.0	19.3	23.0	68.0	100.8
Canada:						
I	7.5	1.3	0.5	0.1	0.5	0.5
V	22.6	17.8	11.4	12.5	56.1	64.8
Chile:						
I	134.8	8.3	2.2	1.9	2.5	2.7
V	228.9	33.3	17.6	16.0	42.9	67.4
Costa Rica:						
I	149.0	7.9	2.4	1.1	0.7	2.1
V	16.8	13.5	16.0	15.1	24.6	41.2
Cuba:						
I	106.6	10.5	3.4	3.0	1.7	1.7
V	51.8	24.1	17.9	23.3	64.6	86.5
Ecuador:						
I	1 109.8	132.4	15.4	8.1	10.8	15.0
V	70.9	35.3	24.1	21.6	46.2	79.1
Mexico:						
I	593.8	77.3	11.7	5.8	6.5	9.6
V	47.2	29.3	20.5	23.3	62.0	102.0
Panama:						
I	175.2	42.4	9.4	3.7	5.5	7.8
V	83.3	21.4	13.4	12.8	44.0	49.9
Paraguay:						
I	1 068.0	94.0	12.1	8.4	3.7	9.3
V	46.6	13.9	12.8	20.1	35.3	56.5
Puerto Rico:						
I	25.2	1.4	0.6	0.3	0.6	1.5
V	29.9	12.9	4.4	15.2	51.1	74.2
Trinidad and Tobago:						
I	31.4	10.5	0.8	0.8	1.6	2.2
V	40.8	31.6	13.0	8.9	37.8	67.9
United States of America:						
I	19.1	2.0	0.6	0.5	0.7	1.7
V	33.0	23.4	12.3	16.8	69.3	89.1
Uruguay:						
I	307.0	7.2	1.1	0.8	0.8	1.2
V	115.4	24.4	14.3	17.7	33.2	46.6
Venezuela:						
I	428.3	29.1	4.2	1.7	2.9	4.4
V	84.5	28.4	19.8	20.6	56.5	90.7

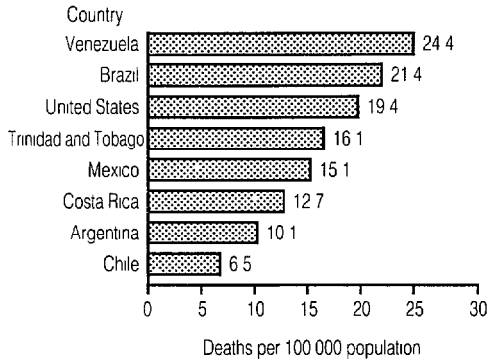
Source: Pan American Health Organization, Health Situation and Trend Assessment Program.
[a]— = data not available.

Table 3. A comparison of 1980 and 1986 mortality from violent causes, by type, in eight countries of the Americas. Mortality due to each type of violence (motor vehicle traffic accidents, other accidents, suicide, homicide, and unknown causes) is shown in the left-hand column, while the right-hand column shows the percentage of total mortality from violent causes that was accounted for by the type in question.

	Causes											
	Traffic accidents		Other accidents		Suicide		Homicide		Unknown causes		Total	
Country and year	Mortality	% of total	Mortality	% of total	Mortality	% of total	Mortality	% of total	Mortality	% of total	Mortality	% of total
Argentina:												
1980	13.4	23.0	28.7	49.4	7.0	12.1	—	—	—	—	58.1	—
1986	10.1	18.6	26.3	48.4	7.5	13.9	6.5	12.0	3.8	7.1	54.2	100.0
Brazil:												
1980	16.4	28.3	15.7	27.1	3.2	5.5	11.5	19.8	11.2	19.3	57.9	100.0
1986	21.4	30.8	18.6	26.9	3.1	4.5	14.8	21.3	11.4	16.5	69.3	100.0
Chile:												
1980	12.9	16.4	20.2	25.7	4.9	6.2	2.6	3.3	38.0	48.4	78.5	100.0
1986	6.5	9.0	21.0	29.5	5.3	7.4	3.1	4.3	35.5	49.8	71.4	100.0
Costa Rica:												
1980	18.4	33.9	23.6	43.5	5.4	9.9	5.7	10.5	1.2	2.2	54.3	100.0
1986	12.7	31.6	17.7	44.1	4.8	12.0	4.0	10.0	0.9	2.3	40.1	100.0
Mexico:												
1980	—[a]	—	—	—	—	—	—	—	—	—	—	—
1986	15.1	19.6	38.4	49.8	2.1	2.8	19.5	25.3	1.9	2.5	77.0	100.0
Trinidad and Tobago:												
1980	18.3	31.8	17.0	29.6	3.9	6.8	2.1	3.7	16.2	28.1	57.4	100.0
1986	16.1	28.5	17.7	31.3	8.6	15.3	7.6	13.4	6.6	11.5	56.6	100.0
United States of America:												
1980	22.9	32.4	23.7	33.5	11.8	16.7	10.7	15.1	1.6	2.3	70.6	100.0
1986	19.4	31.0	20.1	32.0	12.8	20.5	9.0	14.4	1.3	2.1	62.6	100.0
Venezuela:												
1980	34.7	44.9	25.9	34.3	4.8	6.2	11.8	15.3	0.1	0.1	77.3	100.0
1986	24.4	40.7	22.3	37.1	4.6	7.6	8.1	13.5	0.6	1.1	60.0	100.0

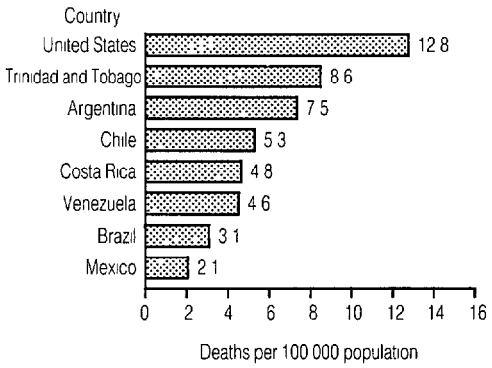
Source: Pan American Health Organization, Health Situation and Trend Assessment Program.
[a]— = data not available.

Figure 4. Motor vehicle traffic accident mortality in eight countries of the Americas, 1986.



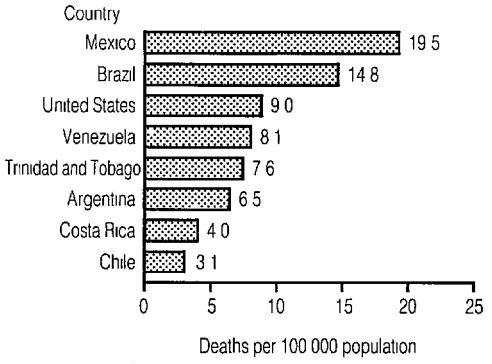
Source. PAHO, Health Situation and Trend Assessment Program

Figure 5. Mortality from suicide in eight countries of the Americas, 1986.



Source: PAHO, Health Situation and Trend Assessment Program

Figure 6. Mortality from homicide in eight countries of the Americas, 1986.



Source: PAHO, Health Situation and Trend Assessment Program

falling in Brazil, Costa Rica, and Venezuela. In 1986, recorded suicide mortality ranged from a high of 12.8 deaths per 100 000 inhabitants in the United States (where it accounted for over 20% of the deaths from violent causes) to a low of 2.1 deaths per 100 000 in Mexico.

Homicide. Mortality from homicide (including deaths caused by legal interventions and warfare) varied substantially among the countries listed in Table 3. Of the eight countries, Mexico had the highest mortality from homicide in 1986 (19.5 deaths per 100 000 inhabitants) while Chile had the lowest (3.1 per 100 000).

Unknown causes. It should be observed that substantial distortions in the above data could be introduced by large numbers of deaths ascribed to "unknown causes," where it is not known whether relevant injuries were accidentally or intentionally inflicted. As Table 3 indicates, the percentage of all 1986 violence-related mortality ascribed to unknown causes was fairly small in Costa Rica (2.3%), Mexico (2.5%), the United States (2.1%), and Venezuela (1.1%). But this percentage was considerably higher in Argentina (7.1%), Brazil (16.5%), and Trinidad and Tobago (11.5%); and it was very high in Chile, where nearly half (49.8%) of all violent deaths in 1986 were ascribed to unknown causes.

The 0–24 Year Age Group

Table 4 shows mortality from violent causes among those under 25 in eight countries, by type of cause and age. Prominent among these causes is "other accidents" (shown as "OA" in the table), which includes all railway accidents, all nontraffic motor vehicle accidents, and all accidents not involving motor vehicles.

Among infants (those under 1 year of age), "other accidents" accounted for most

Table 4. 1986 mortality from violent causes, by type of cause, in eight countries of the Americas in the under-25 age group, showing data for infants, the 1–4 year age group, and the four older 5-year age groups. TA = traffic accidents, S = suicide, H = homicide, UC = unknown causes, OA = other accidents.

	Mortality (deaths per 100 000 population) by age group (in years)					
Country and cause	<1	1–4	5–9	10–14	15–19	20–24
Argentina:						
TA	3.0	4.4	4.3	5.0	8.0	10.2
S	—[a]	—	—	0.6	4.4	7.8
H	4.4	0.7	0.6	1.5	7.6	11.8
UC	4.1	1.6	0.8	1.3	4.0	3.5
OA	77.0	17.8	9.4	9.8	19.1	19.7
Brazil:						
TA	3.2	6.1	8.9	8.5	18.6	27.6
S	—	—	0.0	0.4	2.8	4.5
H	1.0	0.3	0.5	1.7	18.8	30.0
UC	2.4	2.0	2.1	2.7	11.1	17.5
OA	14.4	10.5	7.8	9.7	16.6	21.2
Chile:						
TA	0.7	2.5	3.4	2.2	4.9	5.9
S	—	—	—	0.9	4.5	7.0
H	4.0	0.2	0.3	0.4	2.0	5.2
UC	31.1	17.5	11.0	3.4	6.1	10.3
OA	193.0	13.2	2.9	9.0	25.3	39.0
Costa Rica:						
TA	—	4.3	7.0	5.3	6.7	16.6
S	—	—	—	0.7	3.7	5.5
H	2.4	0.7	1.5	1.8	3.7	6.2
UC	—	1.0	0.9	0.7	0.7	0.7
OA	14.4	7.6	6.6	6.7	9.8	12.1
Mexico:						
TA	2.6	5.9	6.4	6.0	11.3	19.5
S	—	—	0.1	0.5	2.4	3.9
H	2.7	1.5	1.2	2.4	16.8	34.1
UC	1.8	0.5	0.4	0.3	1.6	2.7
OA	40.0	21.5	12.5	14.1	29.9	41.8
Trinidad and Tobago:						
TA	6.3	7.0	7.7	5.7	13.7	28.8
S	—	—	—	0.8	8.1	11.1
H	—	2.6	—	0.8	3.2	8.1
UC	—	2.6	0.8	—	1.6	5.9
OA	34.5	19.3	4.6	1.6	11.3	14.0
United States of America:						
TA	4.6	6.0	5.8	7.3	37.1	39.8
S	—	—	0.0	1.5	10.2	15.8
H	7.4	2.7	0.8	1.5	10.0	17.9
UC	1.4	0.4	0.1	0.2	0.8	1.5
OA	19.6	14.4	5.7	6.2	11.2	14.0
Venezuela:						
TA	7.7	10.5	8.6	8.4	22.9	38.4
S	—	—	0.1	0.8	3.8	9.0
H	1.0	0.8	0.4	0.6	10.3	18.2
UC	0.2	0.0	0.1	0.1	0.6	1.3
OA	75.6	17.1	10.6	10.6	18.8	23.7

Source: Pan American Health Organization, Health Situation and Trend Assessment program
[a]— = data not available.

of the mortality from violent causes. With few exceptions, mortality due to "other accidents" was also higher among infants than it was in any of the other age groups shown in Table 4. (In Brazil and Mexico such mortality was higher in the 15–19 and 20–24 year age groups, respectively.)

In the 1–4 year age group, "other accidents" likewise accounted for most of the mortality from violent causes in seven of the eight countries shown (see Table 4). The sole exception was Chile, where mortality from "unknown causes" exceeded mortality from "other accidents."

In the 5–9 year age group, motor vehicle traffic accidents were the leading cause of mortality from violent causes in four of the eight countries (Brazil, Costa Rica, Trinidad and Tobago, and the United States); "other accidents" were the leading cause in Argentina, Mexico, and Venezuela; while in Chile the highest mortality was ascribed to "unknown causes."

The relative role of "other accidents" was slightly greater in the 10–14 year age group, they being the leading cause of violent death in six of the eight countries. (Motor vehicle traffic accidents were the leading cause in Trinidad and Tobago and the United States.)

This pattern changed only slightly in the 15–19 year age group, where "other accidents" were the leading cause of violent death in four countries, motor vehicle traffic accidents were the leading cause in the United States, Trinidad and Tobago, and Venezuela, and homicide was the leading cause in Brazil.

The role of motor vehicle traffic accidents was greater in the 20–24 year age group, where they were the leading cause of violent death in four countries (Costa Rica, Trinidad and Tobago, the United States, and Venezuela). "Other accidents" remained the leading cause in Argentina, Chile, and Mexico; and homicide remained the leading cause in Brazil.

It should also be noted that mortality from violent causes was generally higher in the 15–19 and 20–24 year age groups than it was among any other group except infants. If these two older groups are considered together, it may be seen that leading causes of this mortality were motor vehicle traffic accidents (especially in Brazil, Trinidad and Tobago, the United States, and Venezuela), "other accidents" (especially in Chile, Mexico, and Venezuela), homicide (especially in Brazil, Mexico, the United States, and Venezuela), and suicide (especially in the United States and Trinidad and Tobago).

CONCLUSIONS

Analysis of mortality from violent causes in the Americas leads to the following conclusions:

- Overall, the highest 1986 mortality from violent causes occurred in El Salvador and Colombia. These high rates can be ascribed in part to problems of public, political, and social order and to drug trafficking activities that merit attention beyond the scope of the present study. (Ruiz and Rincón (*11*), analyzing mortality from violent causes in Colombia, found that mortality from violent causes rose from 7.1% of overall mortality in 1965 to 23% in 1988.)

Except in Brazil and Cuba, mortality from violent causes in the countries listed in Figure 2 and Table 3 was lower in 1986 than in 1980.

A study carried out by Ortiz (*12*) on violence in the nine metropolitan regions of Brazil drew attention to the close association existing between increased violence in the country and rapid economic concentration of income in certain population groups, a situation aggravated by the proximity of abundance and poverty. With regard to research and public health activities, during the 1980s the problem of violence in Brazil prompted establish-

ment of two centers—the Center for the Study of Violence at the University of São Paulo and the Latin American Center of Studies on Violence and Health (CLAVES) at the Oswaldo Cruz Foundation.

The Government of Cuba has also recognized that death from violence, ascribed mainly to accidents, is a serious public health problem. An intersectoral national committee has been created in that country, presided over by the Academy of Sciences, to investigate the causes of such deaths and to implement a program for their control and prevention.

• Regarding the male:female ratio of mortality from violent causes, this ratio tended to increase with age and considerably exceeded 1 in all the countries studied (Figure 3).

In general, the main reason for the disproportionately great male mortality was the more frequent exposure of males to certain risk factors. However, as women increase their levels of schooling and become more integrated into the labor market, they begin to increase their exposure to such risk factors. In the United States and Cuba, where there is more equality of opportunity for men and women, the male:female ratio of mortality from violent causes is relatively low (see Figure 3). In this regard, it is also interesting to note a recent study by Bhat (*13*) of mortality from violence in India and China, which indicates that the male:female ratio of such mortality in those countries is very low (1.3 and 1.1 in India and China, respectively).

• Infectious and parasitic diseases play a large role in infant mortality in the Americas. However, in countries where infectious and parasitic disease mortality has been substantially reduced (see Canada, Puerto Rico, Trinidad and Tobago, and the United States in Table 2), as of 1986 infant mortality from violent causes exceeded infant mortality from infectious and parasitic diseases.

In the case of Chile, the data indicate high infant mortality from both violent causes and infectious and parasitic diseases (see Table 2). PAHO has proposed doing research to study Chilean infant mortality from both sets of causes.

• All 16 of the countries listed in Table 2 were found to have higher 1986 mortality from violent causes than from infectious and parasitic diseases in the 5–24 year age group. This was also true of the 1–4 year age group in most of these countries, the only exceptions being Brazil, Ecuador, Mexico, Panama, and Paraguay. These findings are consistent with those of a study by Taket et al. (*14*) that found accidents to be the leading cause of death among those 1–24 years old in 58 countries, including 17 developing countries.

• Comparison of mortality from violent causes across a range of ages in the 0–24 year age group (see Table 2) shows that in most of the 16 countries studied the data would form a curve shaped roughly like the capital letter J (with fairly high infant mortality being followed by a period of lower mortality, being followed in turn by substantially higher mortality in the 15–24 year age group). However, in four countries (Argentina, Chile, Panama, and Uruguay) the curve would resemble a capital letter J reversed, with mortality from violent causes being higher among infants than among those 15–19 and 20–24 years old.

• Similar comparison of specific types of violence-related mortality across a range of ages in the 0–24 year age group (see Table 4) showed that mortality from traffic accidents, suicide, and homicide in the eight countries studied tended to increase with age, exhibiting especially

marked increases in the 15–19 and 20–24 year age groups. These latter increases were especially striking in Brazil, Mexico, the United States, and Venezuela.

It appears that the foregoing information could prove highly useful in developing policies designed to reduce morbidity and mortality from violent causes. It should also be noted, however, that the available data need to be improved or refined in many cases and that additional research is needed in order to gain further knowledge about the basic characteristics and magnitude of violence throughout our Region.

REFERENCES

1. San Martín H. *Salud y enfermedad.* Mexico City: Prensa Médica Mexicana; 1968.
2. Anzola-Pérez E, Bangdiwala S. La cambiante estructura de las muertes por accidentes y violencias en América Latina. [Paper presented at the CELADE-IUSSP-OPS Seminario sobre Causas y Prevención de la Mortalidad de los Adultos en los Países en Desarrollo held in Santiago, Chile, on 7–11 October 1991].
3. Pan American Health Organization. *Health conditions in the Americas (1990 ed, vol 1).* Washington, DC: PAHO; 1990:207. (Scientific publication 524).
4. Mello-Jorge MH, Bernardes-Marques M. Violent childhood deaths in Brazil. *Bull Pan Am Health Organ.* 1985;19:288–299.
5. Minayo MC de Souza. A violencia na adolescencia: em foco a adolescencia "descamisada." *Cad Saude Publica (Rio de Janeiro).* 1990;6(3):278–292.
6. Higar-Medina MC et al. Mortalidad por accidentes, violencias y envenenamientos en el Distrito Federal de 1980 a 1982. *Salud Publica Mex.* 1986;28:413–437.
7. Danielsen L, Aalund O, Mazza PH, Katz G. Injuries due to deliberate violence in areas of Argentina: II, lesions. *Forensic Sci Int.* 1989;42:165–175.
8. Aalund O, Danielsen L, Sanhueza RO. Injuries due to deliberate violence in Chile. *Forensic Sci Int.* 1990;46:189–202.
9. Minayo MC de Souza. *Bibliografía comentada da producão científica brasileira sobre violencia e saúde.* Rio de Janeiro: Centro Latino Americano de Estudos sôbre Violencia e Saúde; 1990.
10. World Health Organization. *International classification of diseases (ninth revision, 1975).* Geneva: WHO; 1977.
11. Ruiz M, Rincón M. Violent accidents and deaths in Colombia: a study of the demographic characteristics and congruences, 1965–1988. [Paper presented at the CELADE-IUSSP-PAHO Seminar on Causes and Prevention of Mortality in Adults in the Developing Countries held in Santiago, Chile, on 7–11 October 1991].
12. Ortiz LP. La violencia en las regiones metropolitanas del Brasil. [Paper presented at the CELADE-IUSSP-OPS Seminario sobre Causas y Prevención de la Mortalidad de los Adultos en los Países en Desarrollo held in Santiago, Chile, on 7–11 October 1991].
13. Bhat M. Mortality from accidents and violence in India and China. [Paper presented at the CELADE-IUSSP-PAHO Seminar on Causes and Prevention of Mortality in Adults in the Developing Countries held in Santiago, Chile, on 7–11 October 1991].
14. Taket AR, Manciaux M, Romer CJ. Mortality and morbidity: the available data and their limitations. In: Manciaux M, Romer CJ, eds. *Accidents in childhood and adolescence: the role of research.* Geneva: World Health Organization; 1991: 9–30.