**IN DEVELOPING COUNTRIES**
Populatio

# YEARS OF LIFE EXPECTANCY LOST TO AIDS IN THE AMERICAS *

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** Pan American Health Organization (PAHO/WHO), Washington, D.C., U.S.A. The views expressed in the paper do not imply the expression of any opinion on the part of the United Nations Secretariat.

## A. INTRODUCTION

Over the past decade, health conditions have been steadily improving in the Region of the Americas, according to several average national indicators such as increased life expectancy at birth and lower mortality rates (PAHO/WHO, 2002a). By 2000, 37 of the 48 countries and territories of the Americas have exceeded a 70-year life expectancy at birth for both sexes. Haiti has a life expectancy at birth of less than 60 years. Child mortality has also decreased by 50% to a low of 6.9 deaths per 1,000 population compared to 1980. This progress in the Region has been associated with improvements in social, environmental, and technological factors, as well as the expanded coverage of selected health care services and public health programs. At the same time, countries are also experiencing the aging of their populations, lower fertility and population growth rates, and high urbanization rates (PAHO/WHO, 2002a).

In spite of the overall improvement in the Region, there are still major health and social disparities that need to be addressed to advance national policies for poverty reduction and human development. The Region has the highest level of inequity in terms of per capita income distribution of any region in the world, both between and within countries. In 1990, the wealthiest 20% of the population in Latin America earned 54.4% of the total income, while the poorest 20% earned only 4.5%, for a ratio of 11.6:1 (Alleyne et al., 2002). These social differences are reflected by persistence of communicable diseases in deficient living conditions, including absolute poverty and progressive environmental degradation, in the most unfavorable health situations. At the other end of the spectrum, chronic diseases related to lifestyle, urbanization and population aging are also found in a large segment of the population (PAHO/WHO, 2002a). In those circumstances, life expectancy at birth in North America reached 76.9 years in 2000, but only 69.8 years for the subregions of Latin America and the Caribbean. Furthermore, the gap between the highest and lowest life expectancy at birth by country (79.2 years in Canada and 54.1 in Haiti) is 25.1 years. Notably, in all subregions of the Americas, women enjoy on average 6.3 years of life expectancy at birth longer than men.

In these scenarios, the Americas, and especially Latin America and the Caribbean, continue to experience a demographic transition and an epidemiological polarization of varying degrees, g47.3017 Tm(mTjt.98 10.9

Health Organization (PAHO/WHO), Regional Technical Program on AIDS and Sexually Transmitted Infections and from the Joint United Nations Program on HIV/AIDS (UNAIDS), that collect the data directly from the Member Countries (PAHO/WHO, 2002b, UNAIDS/WHO, 2002). Mortality events and data on underlying causes of death were extracted from PAHO/WHO's Mortality and Population Database of the Technical Information System (TIS). Each country reports its mortality data directly to the Health Analysis and Information Systems Area of PAHO/WHO, where it is validated and checked for consistency, prior to its release in the TIS. To analyze the impact of underlying causes of death on life expectancy, deaths were sorted by country. If their causes belonged to codes 279.1, 279.4-279.6 or 042-044 according to the International Classification of Diseases, 9th Revision (ICD-9) (WHO, 1978) or to codes B20-B24 according to ICD-10 they were considered as death due to AIDS (WHO, 1994). If the underlying cause codes were different, these deaths were grouped as "other causes".

The Arriaga and the Pollard methods can estimate the contribution of changes in age-specific mortality rates due to specific mortality causes and changes in life expectancy. This property is very attractive for identifying losses in life expectancy in age-specific groups attributable to leading mortality causes for formulating policy and targeting specific interventions for high-risk population groups, such as children and young adults, as in the case of AIDS.

The Arriaga method takes into account the reciprocal relationship between life expectancy at birth to summarize changes in a population's mortality and vice versa. The method makes it possible to measure the specific attributable contribution that each cause (or group of causes) of death, in each age group, has on observed changes in life expectancy at birth for that age-specific group, in a defined period of time. By definition, a reduction or an increase in mortality due to a specific cause, such as AIDS, will make a positive or negative contribution to the change in life expectancy, respectively. This contribution is expressed in Years of Life Expectancy Gained (YLEG, positive and negative as would be the case), attributable to observed changes in the absolute risk of dying from that specific cause.

This partition method has three important properties: 1) it reflects that comparable changes in mortality rates at different ages have a different effect on life expectancy; 2) it offers information about the substitution of competing causes of death; 3) it gives a quantitative measure that is easily interpreted. The method is sensitive to extreme values of the base mortality level for that cause. In other words, if mortality from a cause has already achieved a very low level, its subsequent reduction will represent only a small contribution to YLEG. In contrast, if the base level is very high, any reduction will produce a large contribution to YLEG.

This analysis incorporates a measure of the mortality level from AIDS, expressed in Years of Life Expectancy Lost (YLEL). The YLEL correspond to the difference (gap) between a biologically achievable life expectancy (in this analysis estimated as 85 years of age) and the life expectancy actually achieved. This gap is partitioned in a similar manner to that described for the change in YLEG, in order to isolate the specific contributions (expressed in YLEL) of each cause of death or age-specific group (or both) to that life expectancy gap. C8Yg5437 Tm(c group (or8 051 35d i.3004 Tm(s)Tj10.98g gaThis gap is partit)ce (g

that separates the wealthiest 20% from the poorest 20% of the population. Theoretically, this indicator can have values between 1 (perfect equality) and +∞ (complete inequality, as the poorest incom

*2. Changes in Life Expectancy due to overall mortality and to AIDS in the Americas*

*h. Changes in life expectancy due to AIDS in the Americas by socioeconomic groups*

Income level and distribution were used to identify four clusters of countries, using the median values of the GNP per capita for income level and the 20% Highest/ 20% Lowest Income ratio for income distribution as cut-off points (Figure III). The GNP per capita varied from a low of less than $2,000 in Cuba to a high of near $40,000 in the United States, representing a 20-fold difference. In turn, the 20% Highest/ 20% Lowest Income ratio varied from 5 in Cuba to 45 in Colombia, a disparity 9 times larger in the latter country. The median calculated values were US$5,515 and 14.2 for the GNP per capita and the 20% Highest/ 20% Lowest Income ratio for income level and distribution, respectively. As may be seen from the graph distribution most countries are clearly classified (Figure III); however, there are a number of countries that are in the margins of the cut-off points and, thus, could confound the interpretation of results if they were missclassified. Table IV shows the clusters of countries with Low Income/Narrow Gap (LN), the Low Income/Wide Gap (LW), the High Income/Narrow Gap (HN) and the High Income/Wide Gap (HW) groups.

routine for the calculations of YLEL; this software will be released in Spanish in October and shortly thereafter in other languages.

Pressat, R. (1985). Contribution des Écarts de Mortalité par Âge à la Diférence des Vies Moyennes. *Population*, 4-5: 765-770.

Sanders, B.S. (1964). Measuring community health levels. *American Journal of Public Health*, 54(7): 1063-1070.

Sullivan, D.F. (1966). *Conceptual problems in developing an index of health*. US Public Health Service Publication Series No. 1000. Vital and Health Statistics Series 2. No. 17. National Center Health Statistics.

Sullivan, D.F. (1971). A single index of mortality and morbidity. *HSMHA Health Reports*. 86: 347-354.

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**Table I. Summary of ma**

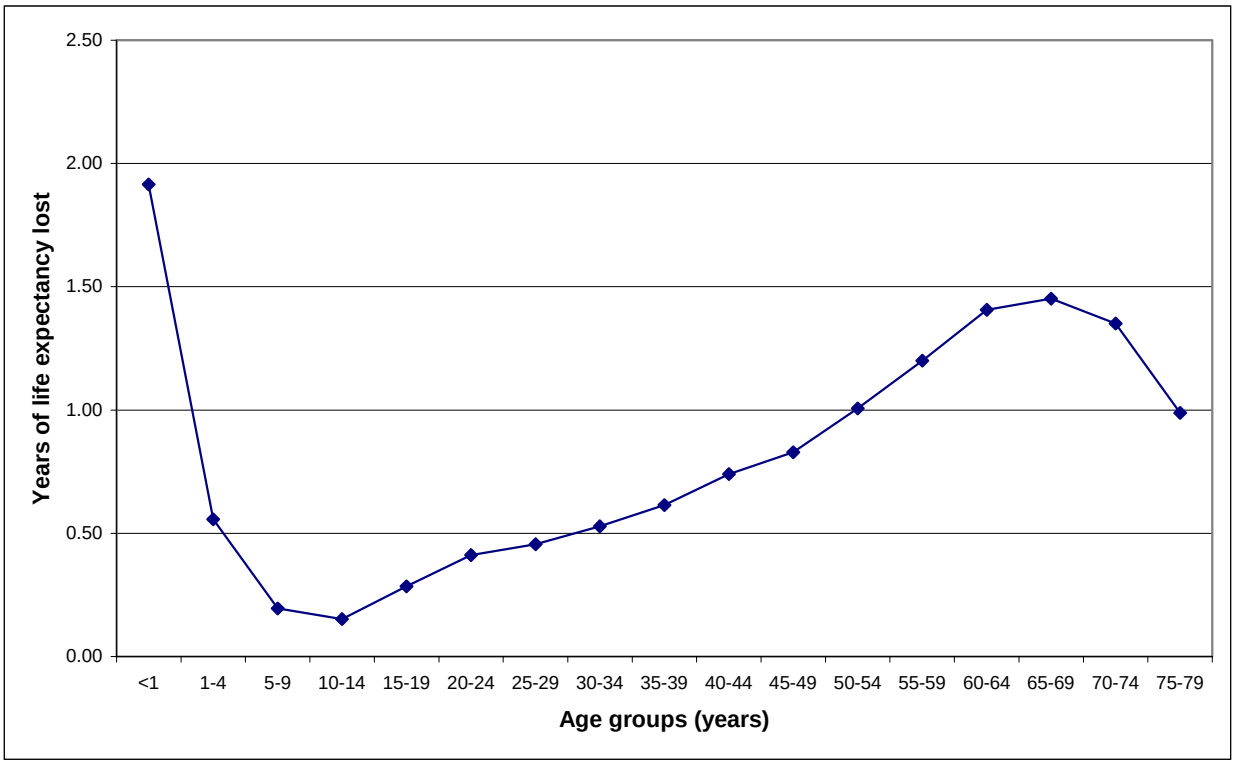
**Table II. Average number of AIDS deaths, population, AIDS-specific estimated and age-adjusted mortality rates per 100,000 population by selected country and subregion of the Americas, around 1990-2002 (estimates based on last available years).**

| COUNTRY/SUBREGION | Years | No. deaths | Population | Estimated rate | Age-adjusted rate |
|---|---|---|---|---|---|
| **REGIONAL TOTAL** | | **42,230** | **663,557,409** | **6.4** | |
| **NORTH AMERICA** | | **15,467** | **306,612,888** | **5.0** | |
| Bermuda | 1992-1994 | 28 | 58,947 | 47.5 | 36.5 |
| Canada | 1997-1999 | 514 | 30,235,294 | 1.7 | 1.4 |
| United States | 1997-1999 | 14,915 | 276,203,704 | 5.4 | 4.6 |
| Virgin Islands (USA) | 1997-1999 | 10 | 114,943 | 8.7 | 8.5 |
| **LATIN AMERICA** | | **25,834** | **353,820,174** | **7.3** | |
| **MEXICO** | **1998-2000** | **4,174** | **83,480,000** | **5.0** | **5.1** |
| **CENTRAL AMERICA** | | **942** | **12,511,839** | **7.5** | |
| Belize | 1996-1998 | 19 | 215,909 | 8.8 | 10.2 |
| Costa Rica | 1999-2001 | 124 | 3,875,000 | 3.2 | 3.2 |
| El Salvador | 1997-1999 | 320 | 4,000,000 | 8.0 | 8.2 |
| Nicaragua | 1998-2000 | 23 | 2,300,000 | 1.0 | 1 |
| Panama | 1998-2000 | 456 | 2,120,930 | 21.5 | 18.8 |
| **ANDEAN ARE** | | | | | |

**Table III. Estimated age-specific mortality rates due to AIDS per 100,000 population by selected country and subregion of the Americas, around 1990-2002 (estimates based on last available years).**

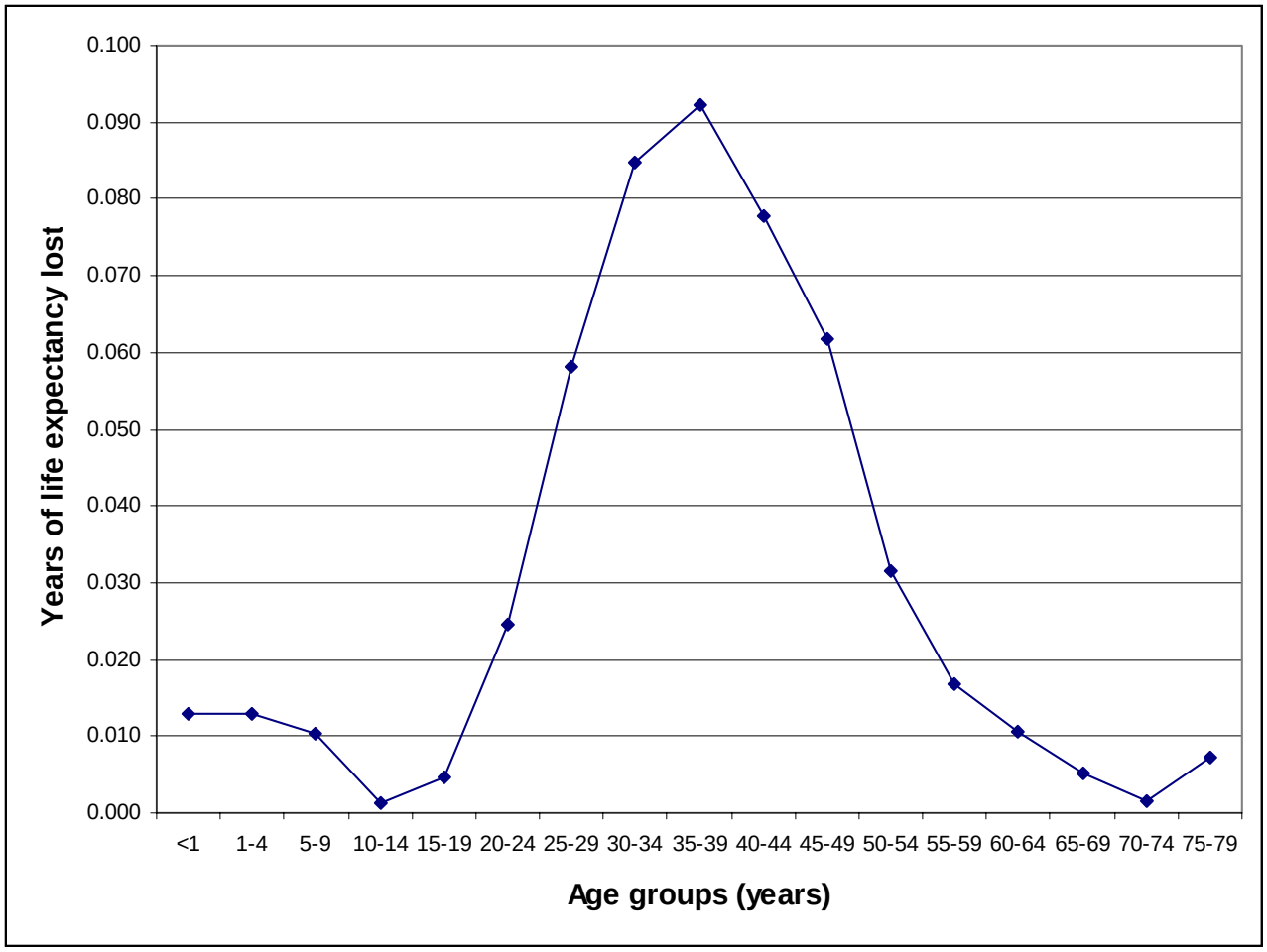
| COUNTRY/SUBREGION | Total | <1 yr. | |
|---|---|---|---|

**Figure I. Years of life expectancy lost due to overall mortality by age groups in selected countries of the Americas, around the 1990-2002 period**




SOURCE: Pan American Health Organization. Mortality and Population database. Technical Information System, 2002.

**Figure II. Years of life expectancy lost due to AIDS mortality by age groups in selected countries of the Americas, around the 1990-2002 period**




SOURCE: Pan American Health Organization. Mortality and Population database. Technical Information System, 2002.

**Figure III. Income level (GNP per c**