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Preventable Mortality: Indicator or Target? Applications in Developing Countries

Objectives

The purpose of this exercise is to show some applications of mortality statistics based on the concepts of "excess" and "premature" mortality, in the hope they may become useful components of health situation analyses performed by countries with the aim of contributing to priority setting in the health services system, and to surveillance and evaluation of service and program outcomes. Specifically, the gap between the country's current mortality situation and one observed in a more developed country will be quantified for cause-specific data using (a) broad causal categories to visualize changes in the overall mortality structure, and (b) selected, more specific cause groups that might be useful as sentinel or tracer categories. A discussion to estimate gains and challenges in relation to mortality from all causes has been presented in a previous paper *(1)*.

Procedures

Excess mortality will be defined empirically, that is, mortality will be understood to be preventable if it has shown a sustained reduction over time, either in the country being analyzed or in another country being used as reference. The procedures to estimate excess mortality will be the same as for mortality from all causes *(1)*. Two indicators will be used: the standardized mortality ratio (SMR), and the ratio of observed over expected years of potential life lost (RYPLL). Premature mortality will be defined as that occurring under 65 years of age. Both indicators will be computed for each sex; the SMR will be computed for premature mortality and for all ages.

To compute age-specific frequencies age groups are defined as follows: under 1 year of age, 1-4 years, 10-year groups from 5 to 64 years, and 65 years and above.

As before, data from Argentina and Mexico will be used to illustrate the proposed procedures. These two countries were chosen because their population size prevents excessive instability of observed frequencies in specific categories; the proportion of deaths classified as due to symptoms, signs and ill-defined conditions is well under 10%; and their cause-specific mortality structures are different from one another.

IN THIS ISSUE ...

As reference for a more favorable situation the 1982 mortality data for the United States of America (U.S.A.) will be used. The reference population will be the mid-year population estimate for 1982 for Argentina and Mexico respectively. To stabilize the mortality data the average number of deaths occurring in the years 1981-1982-1983, that is, the 3-year average centered on 1982 will be used. Expected deaths will be computed applying the 3-year 1982-centered age-and sex-specific death rates of the U.S.A. to the 1982 population of Argentina and Mexico.

The overall SMR is computed by dividing total observed by total expected deaths; the SMR for mortality under 65 is restricted to the ratio of observed and expected deaths below that age limit. Observed and expected YPLL are computed by multiplying (weighting) age-specific YPLL per death by the observed and expected number of deaths respectively, and adding over all age groups up to but not including 65. The RYPLL is the ratio of the observed YPLL and those expected.

For a general view of the changes in the overall *mortality structure* causes of death were grouped into ten broad categories roughly following the chapters of the 9th Revision of the International Classification of Diseases (ICD-9): 1. Infectious and parasitic diseases (001-139); 2. Neoplasms (140-239); 3. Diseases of the circulatory system (390-459); 4. Diseases of the respiratory system (460-519); 5. Diseases of the digestive system (520-579); 6. Complications of pregnancy, childbirth and the puerperium (630-676); 7. Congenital anomalies (740-759); 8. Certain conditions originating in the perinatal period (760-779); 9. All other diseases (remainder of 001-779); and 10. External causes (E800-E999). Deaths due to symptoms, signs and ill-defined conditions (780-799) are shown separately as an indicator of data quality; they were not redistributed among defined causes. Table 1 (A and B) shows observed and expected deaths for these categories, cause-specific proportional mortality and number and percentage of deaths prior to age 65.

Some *sentinel* or *tracer* categories were defined, to explore their potential use for surveillance and evaluation. They will be described in the next section.

Results

Table 2 (A and B) shows the number and percentage distribution of observed and expected YPLL, the YPLL rates per 100,000 population under 65 and the RYPLL for *broad causal categories*. While for all causes mortality under age 65 accounts for 49 and 37% of all deaths in men and women in Argentina, and for 71 and 60% in Mexico, there is wide cause-specific variation reflecting the age at which different conditions strike (see also Table 1).

The information provided by the SMRs and the RYPLL in comparison to other indicators will be illustrated using two cause-of-death categories only: diseases of the circulatory system (390-459) and infectious and parasitic diseases (001-139). Most countries in the Americas exhibit diseases of the circulatory system among the five leading causes of death while infectious and parasitic diseases rarely appear among the leading five. In Argentina diseases of the circulatory system are the leading cause of death for men in 1982, representing 45% of all male deaths from defined causes, and their mortality rate amounts to 401.4 per 100,000 male population. Infectious and parasitic diseases, by comparison, rank 8th for Argentinian men with 3.3% of all male deaths and a death rate of 29.8 per 100,000 male population, 13.5 times smaller than the rate for the leading cause. The observed YPLL rates are closer to each other, with 1,957 YPLL per 100,000 male population under 65 for diseases of the circulatory system and 901 for infectious and parasitic diseases.

The SMRs for infectious and parasitic diseases are 3.89 for all ages and 5.59 for deaths prior to age 65; for diseases of the circulatory system these ratios are 1.18 and 1.26 respectively. The most striking piece of information, however, is provided by the RYPLL: for Argentinian men this amounts to over 8 observed YPLL from infectious and parasitic diseases for every year of life expected to be lost due to this cause group according to U.S.A. rates, while for diseases of the circulatory system the multiplying factor is only about 1.5. This situation is even more pronounced in Mexico, where for infectious and parasitic diseases the YPLL observed for women exceed YPLL expected according to U.S.A. rates by a factor of 33, while there appears practically no excess for disease of the circulatory system.

In some countries deaths due to complications of pregnancy, childbirth and the puerperium (630-676) are used as sentinel events; any death in this category is deemed excessive, and an investigation of the why and how is set in motion whenever one occurs. However, although important progress has been achieved in regard to improving maternal care, the RYPLL for maternal deaths still exceeds 13 in Argentina and 24 in Mexico.

Although originally defined from a different perspective *(2,3), the concept of tracer* and *sentinel* categories can be extended to include cause groups which

Table 1. Deaths observed in 1982 and expected according to U.S.A. 1982 rates by broad causal categories. Argentina and Mexico.

A. Argentina

Causes of death	Males				Females			
	All ages		Under 65		All ages		Under 65	
	Number	% all causes	Number	% all ages	Number	% all causes	Number	% all ages
Observed deaths, 1982								
All causes (001-E999)	133,887	100.0	66,019	49.3	102,429	100.0	38, 329	37.4
Symptoms and ill-defined conditions (780-799)	3,511	2.6	2,090	59.5	2,729	2.7	1,405	51.5
Total from defined causes	130,376	100.0	63,929	49.0	99,701	100.0	36,925	37.0
Infectious and parasitic diseases (001-139)	4,323	3.3	3,125	72.3	3,388	3.4	2,362	69.7
Neoplasms (140-239)	24,098	18.5	11,292	46.9	18,199	18.2	8,108	44.6
Diseases of the circulatory system (390-459)	58,212	44.6	20,134	34.6	49,135	49.3	9,546	19.4
Diseases of the respiratory system (460-519)	8,141	6.2	3,751	46.1	5,413	5.4	2,283	42.2
Diseases of the digestive system (520-579)	7,467	5.7	4,128	55.3	4,771	4.8	1,923	40.3
Complications of pregnancy, childbirth and the puerperium (630-676)	..	..	..	..	443	0.4	443	100.0
Congenital anomalies (740-759)	1,557	1.2	1,543	99.1	1,345	1.3	1,330	98.9
Certain conditions originating in the perinatal period (760-779)	5,543	4.3	5,543	100.0	4,108	4.1	4,108	100.0
All other diseases (Remainder of 001-779)	9,550	7.3	4,834	50.6	8,591	8.6	3,845	44.8
External causes (E800-E999)	11,485	8.8	9,578	83.4	4,307	4.3	2,976	69.1
Expected deaths according to 1982 U.S.A. rates								
All causes (001-E999)	111,847	100.0	49,955	44.7	79,621	100.0	27,776	34.9
Symptoms and ill-defined conditions (780-799)	2,094	1.9	1,433	68.4	1,356	1.7	840	61.9
Total from defined causes	109,753	100.0	48,522	44.2	78,265	100.0	26,936	34.4
Infectious and parasitic diseases (001-139)	1,110	1.0	559	50.4	888	1.1	393	44.3
Neoplasms (140-239)	24,638	22.4	10,396	42.2	18,959	24.2	8,818	46.5
Diseases of the circulatory system (390-459)	49,456	45.1	15,944	32.2	37,496	47.9	6,797	18.1
Diseases of the respiratory system (460-519)	7,801	7.1	2,031	26.0	4,524	5.8	1,223	27.0
Diseases of the digestive system (520-579)	4,271	3.9	2,407	56.4	3,032	3.9	1,307	43.1
Complications of pregnancy, childbirth and the puerperium. (630-676)	..	..	..	..	32	0.0	32	100.0
Congenital anomalies (740-759)	1,220	1.1	1,183	97.0	1,067	1.4	1,027	96.3
Certain conditions originating in the perinatal period (760-779)	2,207	2.0	2,207	100.0	1,667	2.1	1,667	100.0
All other diseases (Remainder of 001-779)	6,394	5.8	2,747	43.0	6,111	7.8	2,165	35.4
External causes (E800-E999)	12,656	11.5	11,048	87.3	4,489	5.7	3,507	78.1

Table 1 (cont'd). Deaths observed in 1982 and expected according to U.S.A. 1982 rates by broad causal categories. Argentina and Mexico.

B. Mexico

Causes of death	Males				Females			
	All ages		Under 65		All ages		Under 65	
	Number	% all causes	Number	% all ages	Number	% all causes	Number	% all ages
Observed deaths, 1982								
All causes (001-E999)	232,691	100.0	164,416	70.7	173,795	100.0	103,911	60.0
Symptoms and ill-defined conditions (780-799)	11,823	5.1	6,949	58.8	11,173	6.4	5,793	51.8
Total from defined causes	220,868	100.0	157,467	71.3	162,622	100.0	98,117	60.3
Infectious and parasitic diseases (001-139)	27,309	12.4	22,830	85.6	23,727	14.6	19,446	81.2
Neoplasms (140-239)	13,929	6.3	6,604	47.4	16,913	10.4	9,425	55.7
Diseases of the circulatory system (390-459)	34,619	15.7	14,034	40.5	35,223	21.7	11,406	32.4
Diseases of the respiratory system (460-519)	27,183	12.3	17,917	65.9	22,868	14.1	14,253	62.3
Diseases of the digestive system (520-579)	21,054	9.5	14,751	70.1	11,122	6.8	5,983	53.8
Complications of pregnancy, childbirth and the puerperium (630-676)	..	..	..	..	2,148	1.3	2,148	100.0
Congenital anomalies (740-759)	3,480	1.6	3,464	99.5	2,995	1.8	2,977	99.4
Certain conditions originating in the perinatal period (760-779)	13,188	6.0	13,188	100.0	9,165	5.6	9,165	100.0
All other diseases (Remainder of 001-779)	27,928	12.6	16,854	60.3	26,572	16.3	13,508	50.8
External causes (E800-E999)	52,177	23.6	47,825	91.7	11,889	7.3	9,805	82.5
Expected deaths according to 1982 U.S.A. rates								
All causes (001-E999)	160,012	100.0	88,994	55.6	106,867	100.0	50,816	47.6
Symptoms and ill-defined conditions (780-799)	4,368	2.7	3,610	82.6	2,818	2.6	2,261	80.2
Total from defined causes	155,644	100.0	85,384	54.9	104,049	100.0	48,555	46.7
Infectious and parasitic diseases (001-139)	1,725	1.1	1,092	63.3	1,355	1.3	820	60.5
Neoplasms (140-239)	30,492	19.6	14,305	46.9	23,529	22.6	12,647	53.8
Diseases of the circulatory system (390-459)	59,797	38.4	21,221	35.5	42,739	41.1	9,460	22.1
Diseases of the respiratory system (460-519)	9,915	6.4	3,259	32.9	5,681	5.5	2,111	37.2
Diseases of the digestive system (520-579)	5,681	3.6	3,555	62.6	3,882	3.7	2,020	52.0
Complications of pregnancy, childbirth and the puerperium. (630-676)	..	..	..	..	81	0.1	81	100.0
Congenital anomalies (740-759)	3,904	2.5	3,862	98.9	3,407	3.3	3,365	98.8
Certain conditions originating in the perinatal period (760-779)	7,491	4.8	7,491	100.0	5,662	5.4	5,662	100.0
All other diseases (Remainder of 001-779)	9,193	5.9	4,988	54.3	8,213	7.9	3,948	48.1
External causes (E800-E999)	27,446	17.6	25,611	93.3	9,500	9.1	8,441	88.9

Source: PAHO technical data base.

Table 2. Years of potential life lost by broad causal categories. Argentina and Mexico, 1982.

A. Argentina

Causes of death	YPLL (thousands) Obs.	Exp.	Percent Obs.	Exp.	YPLL rate (a) Obs.	Exp.	RYPLL Obs/Exp
			Males				
All causes (001-E999)	1,702.4	1,081.4	100.0	100.0	12,655.9	8,037.6	1.57
Symptoms and ill-defined conditions (780-799)	80.9	59.1	4.8	5.5	601.7	439.3	1.37
Total from defined causes	1,621.5	1,022.3	100.0	100.0	12,054.0	7,598.1	1.59
Infectious and parasitic diseases (001-139)	121.2	14.7	7.5	1.4	901.1	109.3	8.24
Neoplasms (140-239)	147.9	122.6	9.1	12.0	1,099.4	911.1	1.21
Diseases of the circulatory system (390-459)	263.3	176.2	16.2	17.2	1,957.4	1,309.8	1.49
Diseases of the respiratory system (460-519)	125.1	35.0	7.7	3.4	930.1	260.3	3.57
Diseases of the digestive system (520-579)	64.2	37.0	4.0	3.6	476.9	274.9	1.74
Complications of pregnancy, childbirth and the puerperium (630-676)	..	..	..	..	..	..	..
Congenital anomalies (740-759)	95.8	70.4	5.9	6.9	712.4	523.0	1.36
Certain conditions originating in the perinatal period (760-779)	357.4	142.3	22.0	13.9	2,657.2	1,058.0	2.51
All other diseases (Remainder of 001-779)	146.5	61.6	9.0	6.0	1,088.8	457.8	2.38
External causes (E800-E999)	299.9	362.6	18.5	35.5	2,229.6	2,695.7	0.83
			Females				
All causes (001-E999)	1,159.0	617.4	100.0	100.0	8,699.8	4,635.1	1.88
Symptoms and ill-defined conditions (780-799)	61.3	38.0	5.3	6.2	460.1	285.1	1.61
Total from defined causes	1,097.6	579.4	100.0	100.0	8,239.2	4,349.5	1.89
Infectious and parasitic diseases (001-139)	103.8	11.1	9.5	1.9	778.9	83.0	9.39
Neoplasms (140-239)	120.4	111.0	11.0	19.2	904.1	833.4	1.08
Diseases of the circulatory system (390-459)	145.8	77.6	13.3	13.4	1,094.3	582.6	1.88
Diseases of the respiratory system (460-519)	94.7	23.9	8.6	4.1	710.8	179.3	3.96
Diseases of the digestive system (520-579)	35.9	20.5	3.3	3.5	269.2	154.1	1.75
Complications of pregnancy, childbirth and the puerperium. (630-676)	15.6	1.2	1.4	0.2	116.8	8.9	13.08
Congenital anomalies (740-759)	82.6	61.2	7.5	10.6	620.0	459.4	1.35
Certain conditions originating in the perinatal period (760-779)	265.0	107.5	24.1	18.6	1,988.9	807.0	2.46
All other diseases (Remainder of 001-779)	127.1	46.7	11.6	8.1	954.0	350.5	2.72
External causes (E800-E999)	106.9	118.7	9.7	20.5	802.6	891.1	0.90

(a) Rates per 100,000 population under age 65.

Table 2 (cont'd). Years of potential life lost by broad causal categories. Argentina and Mexico, 1982.

B. Mexico

Causes of death	YPLL (thousands) Obs.	Exp.	Percent Obs.	Exp.	YPLL rate (a) Obs.	Exp.	RYPLL Obs/Exp
			Males				
All causes (001-E999)	6,441.9	2,741.4	100.0	100.0	18,162.1	7,728.7	2.35
Symptoms and ill-defined conditions (780-799)	289.5	183.2	4.5	6.7	816.2	516.5	1.58
Total from defined causes	6,152.4	2,558.2	100.0	100.0	17,345.9	7,212.8	2.40
Infectious and parasitic diseases (001-139)	1,208.2	40.2	19.6	1.6	3,406.4	113.4	30.03
Neoplasms (140-239)	143.0	221.5	2.3	8.7	403.3	624.6	0.65
Diseases of the circulatory system (390-459)	296.9	287.8	4.8	11.3	837.1	811.5	1.03
Diseases of the respiratory system (460-519)	943.8	86.7	15.3	3.4	2,660.8	244.4	10.89
Diseases of the digestive system (520-579)	309.0	69.6	5.0	2.7	871.2	196.2	4.44
Complications of pregnancy, childbirth and the puerperium (630-676)	..	..	..	..	..	..	..
Congenital anomalies (740-759)	215.8	237.3	3.5	9.3	608.4	669.1	0.91
Certain conditions originating in the perinatal period (760-779)	850.6	483.1	13.8	18.9	2,398.2	1,362.0	1.76
All other diseases (Remainder of 001-779)	526.0	156.4	8.6	6.1	1,483.1	440.9	3.36
External causes (E800-E999)	1,659.0	975.6	27.0	38.1	4,677.3	2,750.5	1.70
			Females				
All causes (001-E999)	4,320.8	16,370.5	100.0	100.0	12,305.2	4,663.2	2.64
Symptoms and ill-defined conditions (780-799)	247.6	1,208.5	5.7	7.4	705.1	344.2	2.05
Total from defined causes	4,073.2	15,162.0	100.0	100.0	11,600.1	4,318.7	2.69
Infectious and parasitic diseases (001-139)	10,510.4	317.8	25.8	2.1	2,993.3	90.5	33.07
Neoplasms (140-239)	1,812.0	2,033.3	4.4	13.4	516.0	579.1	0.89
Diseases of the circulatory system (390-459)	2,555.4	1,414.8	6.3	9.3	727.8	402.9	1.81
Diseases of the respiratory system (460-519)	7,692.8	619.5	18.9	4.1	2,190.8	176.4	12.42
Diseases of the digestive system (520-579)	1,418.1	421.5	3.5	2.8	403.9	120.0	3.36
Complications of pregnancy, childbirth and the puerperium. (630-676)	758.6	31.1	1.9	0.2	216.0	8.8	24.43
Congenital anomalies (740-759)	185.3	2,070.3	4.5	13.7	527.6	589.6	0.89
Certain conditions originating in the perinatal period (760-779)	5,911.4	3,651.4	14.5	24.1	1,683.5	1,039.9	1.62
All other diseases (Remainder of 001-779)	4,255.0	1,211.2	10.4	8.0	1,211.8	344.9	3.51
External causes (E800-E999)	3,964.2	339.1	9.7	22.4	1,129.0	965.7	1.17

(a) Rates per 100,000 population under age 65.

Source: PAHO technical data base.

might be used for surveillance of certain health situations or, at least, to illustrate the road still ahead. Table 3 shows three categories which, among others, might serve this purpose. Diseases preventable by vaccination, such as diphtheria, whooping cough, tetanus, poliomyelitis and measles (032; 033; 037; 045; 055) comprise a category useful for evaluation of vaccination programs. The category of intestinal infectious diseases (001-009) is proposed as an indicator of sanitary conditions and the nutritional status of the population. Finally, appendicitis, hernia and intestinal obstruction (540-543; 550-553; 560) is proposed as a category for assessing the quality of abdominal surgery, and even, to a certain extent, of general surgery and hospital care.

The discrepancies between observed and expected deaths, and, in consequence between observed and expected YPLL rates and the RYPLL itself are striking enough and the messages they convey differ sharply from those obtained when examining only leading causes of death and mortality rates. While reinforcing the conclusions regarding the importance of the category of infectious and parasitic diseases as a whole (Table 2), the first category of Table 3--vaccination programs--evidences a persistent public health challenge, while the second--sanitation and nutrition--may respond more to overall development, public health included. It is notable, and deserves further research, that the gap between developing and developed countries seems smaller once intra-hospital medical care is involved, as for abdominal surgery.

Discussion and Conclusions

An important consideration relevant to cause-specific analyses is the fact that mortality statistics in their usual form are based solely on the underlying cause of death and therefore tend to underestimate conditions rarely recorded as such, as is the case for malnutrition, among others *(4)*. In addition, it should be kept in mind that the way causal categories are grouped may greatly influence their relative ranking. These issues were discussed at a recent meeting on mortality analysis at which different criteria for cause-groupings, and the construction and use of the YPLL were presented by research teams from several Latin American countries *(5-7)*. One of the recommendations called for improved use of available data and the promotion of simple procedures such as YPLL to highlight preventable mortality.

In some countries in Latin America there exists a long tradition in the use of mortality analyses to assess health differentials *(8)*. Only a few specific examples will be mentioned: Behm *(9)* set a trend in regard to the analysis and interpretation of infant mortality in 1962; Taucher's avoidability criteria do not seem to have been fully exploited so far, in spite of their application in several countries *(10)*; Becker started using YPLL in 1984 *(11)*. Although comparative evaluations exist, there has not been an emphasis on target rates. Nor is there in this paper, since it is felt that, with few exceptions, conditions responsible for premature death in the developing countries of the Region of the Americas will respond only in part to actions of the health sector: health status appears to be more strongly influenced by the overall living conditions still prevailing for the vast majority of the population in those countries. This aspect, which to a lesser degree also seems to hold in the developed world, as Buck *(12,13)* and others have pointed out, should be kept in mind when societal determinants are interpreted as being individual choices and targeted for intervention *(14-16)*.

It should be remembered that SMRs and RYPLLs of different countries should be compared only to the extent that one would compare crude rates, as the population of each country is used in both numerator and denominator *(17)*. By the same token this simplifies interpretation, since the only difference in numerator and denominator of each ratio derives from the mortality rates used. Furthermore, cause-specific YPLLs represent the number of years lost due to the cause in question under the assumption that --up to the age set as the indicator's upper limit--the decedent would not have died from any other cause. Thus, unlike life table measures computed for competing risks, YPLL do not address the question of how much life expectancy would be gained should a certain causal category be eliminated or reduced *(18)*.

Another important choice involves the reference rates to be used, especially when assessing the gap between what is and what could be. This choice is entirely dependent on the purpose and intentionality of any given analysis, and the decisions to be based on it. In this context, and also in regard to sentinel categories, it is important to distinguish between outcome measures and health status indicators. Mortality from diseases preventable by vaccination can be easily interpreted as failure of the vaccination program, while mortality from intestinal infectious diseases appears to carry a more general message about prevailing health and general living conditions. It is well documented that some indicators such as infant mortality do not maintain their correlation with overall health or development status after having been subjected to sustained and effective interventions: they then measure--at least in part--the outcome of the intervention program.

Table 3. Ratios of years of potential life loss for sentinel categories related to different problems. Argentina and Mexico, 1982.

Sentinel categories for problems related to	Males					Females				
	Deaths under 65		YPLL rates(a)		RYPLL	Deaths under 65		YPLL rates(a)		RYPLL
	Obs.	Exp.	Obs.	Exp.	Obs/Exp	Obs.	Exp.	Obs.	Exp.	Obs/Exp
Argentina										
Vaccination programs (b)	99	-	37.3	-	..	116	1	39.9	0.5	83.0
Sanitation and nutrition (c)	914	23	417.9	9.2	45.4	809	18	375.1	6.6	56.7
Abdominal surgery (d)	261	82	53.4	17.7	3.0	211	65	38.7	11.7	3.3
Mexico										
Vaccination programs (b)	913	1	140.8	0.2	780.4	1,053	2	155.9	0.4	424.4
Sanitation and nutrition (c)	16,463	65	2,702.0	11.0	246.4	14,227	52	2,355.0	8.7	269.9
Abdominal surgery (d)	757	172	79.2	19.7	4.0	675	123	66.5	12.3	5.4

Note: Discrepancies with figures in previous tables are due to rounding.

(a) Rates per 100,000 population under age 65.
(b) Diphtheria (032), whooping cough (033), tetanus (037), acute poliomyelitis (045) and measles (055).
(c) Intestinal infectious diseases (001-009).
(d) Appendicitis (540-543), hernia of abdominal cavity (550-553) and intestinal obstruction without mention of hernia (560).

Source: PAHO technical data base.

Cause-specific reference rates can be defined based on the knowledge of state-of-the-art technology, and they can be constructed according to prospective planning or scenario techniques. They can also be chosen empirically, as was done here, based on observed mortality reduction in a more developed country.

As stated before, the indicators discussed can be used to highlight differentials and inequalities within a country: on a subnational level, the reference rates could be those of that region or area in the country exhibiting the least unfavorable sanitary conditions, as Farr proposed over 150 years ago. But, although in almost all countries of the Americas there exist mortality statistics of sufficient completeness to do this comparative exercise for mortality from all causes, cause-specific analysis will be restricted by data quality.

The ratios discussed should be a useful complement of the more traditional indicators. They are geared towards analysis to be used by a country or subnational area for its own benefit. Countries in the Americas are invited to replicate this exercise and enrich it with their own perspectives and experience. The quest for better mortality indicators and their application will no doubt contribute new insights to the health-disease processes. However, it should not be forgotten that low mortality is not synonymous with good health. The goals of public health are not--or should not be--restricted to making life longer; they should aim at making life better.

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(*Source:* Health Situation and Trend Assessment Program, PAHO. Based on Plaut, R. and Roberts, E. Preventable mortality: indicator or target? Applications in developing countries. *Wld hlth statist. quart.* 42(1): 4-15, 1989.)

Preventable Mortality Criteria. Cuba

Editor's Note:

This article is part of a study on health profiles and evaluation of mortality in Cuba in a three-year period of each decade of the revolutionary period, prepared with the support of the PAHO/WHO Research Grants Program and presented at the Regional Meeting on Guidelines and Procedures for Mortality Analysis, held in Washington, D.C., from 22 to 26 February 1988. The original document consists of the following chapters: determining factors of the state of health of the population; population and fertility; mortality (primary purpose of the paper); morbidity, human growth and development, and nutritional surveillance; and organization of the health system. The chapter on Mortality discusses the coverage and quality of the data, including medical certification of death. The methodology used in the research is described, together with the results of the study in terms of the evolution of mortality and analysis of the leading causes of death, both for the country as a whole and in four provincial capital cities. The periods analyzed, the information on mortality and the methodology employed in this article are the same as those used in the original study.

The publication of this article has been considered of interest to the readers of the Bulletin because it constitutes another illustration of how mortality analysis can be enriched by the complementary use of different indicators and classification criteria. However, the selection of which to use will depend on the objectives and circumstances of each particular case.

The purpose of this article is to analyze mortality in terms of the criterion of preventable death. This criteria is defined in accordance with current scientific knowledge and the medical progress achieved to date, and it was considered appropriate to use the classification employed in a similar study published by the Latin American Demography Center (CELADE)*(1)* as a point of departure. The analysis presented in the paper is expanded with an estimate of the potential years of life lost (YPLL).

The assignment of some causes of death to one group or another according to their preventability has a subjective component and, as such, is dependent on different criteria; however, if the same criterion is used for different periods the results are comparable and provide an acceptable approach to reality. It should also be borne in mind that this type of work is founded on the idea of preventing early death, that is, of prolonging life, which at times is achieved by preventing disease and at others by treating it adequately once it occurs.

The criteria for prevention and health education are applicable to all groups, since even with regard to diseases considered to be unpreventable or preventable with difficulty it is being demonstrated that the control of risk factors, the change of habits harmful to health, and other preventive measures are capable of mitigating or preventing chronic and degenerative

diseases, and of prolonging socially active life for human beings. Accordingly, the words *prevention, education, preventable*, and *unpreventable* are used to label or to give short titles to the groups, not to restrict to a mere formula the broad concepts they represent in reality.

In grouping diseases according to this criterion the first step is a preliminary division of deaths into preventable and unpreventable, followed by the grouping of preventable deaths in 4 groups, according to the various measures that can be taken to prevent them. This grouping differs slightly from the grouping used in the study mentioned as a reference. Six groups are thus formed:

1. *Deaths preventable by vaccination or preventive treatment:* anthrax, diphtheria, whooping cough, tetanus, acute poliomyelitis and its sequelae, smallpox, measles, human rabies, and venereal diseases.

2. *Deaths preventable through early diagnosis and timely treatment:* plague; meningococcal infections; malignant tumors of the skin, breast, cervix, and prostate; diabetes mellitus; avitaminosis and other nutritional deficiencies; anemias; meningitis; epilepsy; active rheumatic fever and chronic rheumatic diseases of the heart; bronchitis, emphysema, and asthma; peptic ulcer; gastritis and duodenitis; appendicitis, intestinal obstruction, and hernia; cholelithiasis and cholecystitis, acute nephritis, and other forms of nephritis; infection of the kidney and calculus of the urinary tract.

3. *Deaths preventable by the application of hygienic measures and environmental sanitation, and health education:* cholera, typhoid fever, paratyphoid fever and other salmonellosis infections; bacillary dysentery and amebiasis, enteritis, and other diarrheal diseases; yellow fever; infectious hepatitis, typhus and other rickettsiae infections; ancylostomiasis and other helminthiasis infections.

4. *Deaths preventable by the application of mixed measures:* all types of tuberculosis, brucellosis, streptococcal angina, and scarlatina; erysipelas and other bacterial diseases; malaria; schistosomiasis; hydatidosis and filariasis; acute respiratory infections; viral pneumonia and other pneumonias; cirrhosis of the liver; complications of pregnancy, childbirth, and the puerperium; diseases of newborns; and violent causes.

5. *Deaths difficult to prevent with current knowledge and technological development:* malignant tumors, except cancer of the skin, breast, cervix and prostate; multiple sclerosis; other diseases of the nervous system and of the sense organs; cardiovascular diseases; cerebrovascular diseases; diseases of the arteries, arterioles, and capillaries; influenza; and birth defects.

6. *Remainder of deaths:* the distribution of deaths in the various groups includes all causes of deaths. All deaths whose cause has a logical reason for inclusion are assigned to one of the first five groups, and the remaining deaths that cannot be identified with any of the previous groups are left for the group *Other causes of death* (in this paper such deaths accounted for between 4% and 6% of the total number of deaths analyzed).

Results

In Table 1 an evaluation is made of the constant decline in the rates in the four groups of causes in which applicable preventive measures act in the short and medium term. The decline of deaths from diseases preventable by vaccination or direct preventive measures is very marked, as are deaths from causes able to be prevented through hygiene, health education, and sanitation. In this last group nutrition also plays a fundamental role, since it includes deaths from acute diarrheal diseases whose substratum, as a social problem, is undernutrition. The rates of the four groups of preventable causes decline by 24% from the first three-year period to the second and by 32% from the first to the third. This trend is inverted with regard to diseases difficult to prevent, whose rates rise from the first to the second three-year period by 2% and by 13% from the first to the last.

The specific rates according to age groups (Table 2) show that although infants under 1 year old have benefited markedly from vaccination and other measures, this effect is also observed in other ages. The rates of the group of diseases difficult to prevent are high for persons 75 years of age and older, but they are also high for infants under 1 year old, in which birth defects are included.

In light of the changes in the age structure of the population in the period studied, the crude rates should be standardized in order to estimate, for the population as a whole, what would have occurred if the death rates obtained according to the groups of causes for the three-year period 1963-1965 had been maintained for the population structure of the three-year period 1982-1984. In Table 3 it may be observed that, in light of this assumption, mortality would have been extraordinarily greater for all groups of causes without changing the relative order of the groups, although the percentage structure of the expected results would have varied if the population of 1982-1984 had been exposed to the death rates registered 20 years before.

The SMR column of Table 3 shows the percentage of the deaths observed in 1982-1984 compared with those expected if the population of that three-year period had been exposed to the rates of 1963-1965.

Table 1. Deaths and crude mortality rates per 100,000 population, annual averages in three-year periods 1963-1965, 1972-1974 and 1982-1984.

	1963-1965		1972-1974		1982-1984	
Causes of death preventable through:	Deaths	Rates	Deaths	Rates	Deaths	Rates
1. Vaccination or direct prevention	557	7.3	124	1.4	27	0.3
2. Timely diagnosis and treatment	5,689	74.4	5,978	66.3	6,545	66.1
3. Hygiene, sanitation and education	2,895	37.9	926	10.3	396	4.0
4. Combined actions	13,125	171.7	13,007	144.3	12,678	128.1
Subtotal	**22,266**	**291.3**	**20,035**	**222.3**	**19,646**	**198.5**
5. Currently preventable with difficulty	24,131	315.6	29,038	322.3	35,362	357.3
6. All other deaths	2,672	35.0	2,137	23.8	3,106	31.4
Total	**49,069**	**641.9**	**51,210**	**568.4**	**58,114**	**587.2**

This percentage is equivalent to the standardized mortality ratio (SMR), and it may be calculated either from the number of the deaths (as in the present instance) or from the death rates observed and expected.

The SMR, that is, the percentage of deaths observed as compared with the percentage expected, is high in diseases preventable with difficulty, a total of 78.7% and even more in deaths preventable through mixed measures, which account for 86.5% of the total number of deaths expected. The small gain observed in this last group is related to the causes of neonatal death, pneumonias, and cirrhosis of the liver, whose preventability presents complexities similar to those of the group of diseases preventable with difficulty. The last column of Table 3 estimates at 20,960 the annual average number of lives saved in the three-year period 1982-1984 as compared with 20 years before, when certain causes affected young ages more severely and life expectancy was 8.5 years less. To complement the preceding analysis we have used the indicators of years of potential life lost (YPLL) in the groups of causes according to criteria for preventability *(2,3)*.

In Table 4 it may be observed that although the total number of YPLL in the 1 to 64-years age group increases as a consequence of the increase in deaths by virtue of the growth of the population, the rate of YPLL from all causes declines from 51.5 years per 1,000 population in the 1 to 64-years group in the first three-year period to 42.9 years in the last.

Although groups 1 and 3 constitute a small percentage of overall mortality, its decline is such that the YPLL in the last three-year period are almost negligible. If, for instance, we take the 488 YPLL from deaths preventable by vaccination or other very effective measures in the three-year period 1982-1984 and we estimate what this means for each isolated individual in the population between 1 and 64 years of age, we see that what is lost at the present time represents only two and a half minutes per person.

In the early diagnosis and timely treatment group, which accounts for between 11% and 12% of deaths, a significant decline is observed between the first and the third three-year period. In the groups of diseases preventable by mixed measures and of diseases preventable with difficulty there is a minor decline, although by virtue of the great volume of deaths they both include, the gains noted are very significant.

In Table 4 the behavior of the YPLL may also be observed with regard to other age limits. When infants under 1 year old are included in order to form the universe of those under 65 years of age, it may be observed that the YPLL increase notably. In general the decline of the YPLL--or the gain in years between the first and the last three-year period--is similar with any age limit that is used to estimate the YPLL, but the intensity with which each group of causes declines is different. If we observe group 3, in which acute diarrheal diseases, typhoid fever, parasitism, and other diseases are included, we see that in the three-year period 1963-1965 they were responsible for 23.1 YPLL per 1,000 population among those under 65 years of age, but after the first year of life, that is, from 1 to 64 years of age, they cause a loss of 3.6 years. Twenty years after only 1.4 years are lost for those under 65 and a fraction of a year for those from 1 to 64 years of age; however, the imbalance brought about by infants under 1 year old is maintained in a similar proportion. In group 4, which includes problems of pregnancy, childbirth and newborns, more than 50% of the YPLL are saved in the three-year period 1982-1984 than in the three-year period 1963-1965. In this case the gains occur only in the first year of life, since in the 1 to 64-year age group the variations between the three-year periods are small.

Table 2. Deaths and crude mortality rates per 100,000 population, annual averages in three-year periods 1963-1965, 1972-1974 and 1982-1984.

	1963-1965		1972-1974		1982-1984	
Causes of death preventable through:	Deaths	Rates	Deaths	Rates	Deaths	Rates
1. Vaccination or direct prevention	60.0	3.6	3.7	0.0	48.5	1.8
2. Timely diagnosis and treatment	116.7	94.4	32.0	24.3	1,512.9	789.0
3. Hygiene, sanitation and education	830.6	96.2	2.7	0.5	99.7	39.3
4. Combined actions	2,263.3	992.2	83.7	82.4	1,137.1	1,215.3
5. Currently preventable with difficulty	389.8	385.4	56.0	56.3	8,756.3	5,664.3

Table 3. Deaths and crude mortality rates per 100,000 population, annual averages in three-year periods 1963-1965, 1972-1974 and 1982-1984.

	1963-1965		1972-1974		1982-1984	
Causes of death preventable through:	Deaths	Rates	Deaths	Rates	Deaths	Rates
1. Vaccination or direct prevention	27	675	0.0	0.9	4.4	648
2. Timely diagnosis and treatment	6,545	9,711	11.3	12.3	67.4	3,166
3. Hygiene, sanitation and education	396	4,690	0.7	5.9	8.6	4,294
4. Combined actions	12,678	14,664	21.8	18.5	86.5	1,986
Subtotal	**19,646**	**29,740**	**33.8**	**37.6**	**66.1**	**10,094**
5. Currently preventable with difficulty	35,362	44,925	60.8	56.8	78.7	9,563
6. All other deaths	3,106	4,409	5.4	5.6	70.4	1,303
Total	**58,114**	**79,074**	**100.0**	**100.0**	**73.5**	**20,960**

Table 4. Years of potential life lost in age groups 1-64, 0-64 and 1-84, according to causal categories for three-year periods 1963-1965, 1972-1974 and 1982-1984.

		YPLL/1,000 population (a)		
Causes of death preventable through:	YPLL 1-64 years	1-64 years	0-64 years	1-84 years
	Three-year period 1963-1965			
1. Vaccination or direct prevention	8,888	1.3	2.6	2.2
2. Timely diagnosis and treatment	54,541	7.8	10.3	17.4
3. Hygiene, sanitation and education	24,873	3.6	23.1	4.9
4. Combined actions	158,675	22.7	75.4	37.2
5. Currently preventable with difficulty	112,743	16.1	24.8	51.5
Total	359,720	51.5	136.2	113.2
	Three-year period 1972-1974			
1. Vaccination or direct prevention	2,382	0.3	0.6	0.4
2. Timely diagnosis and treatment	57,247	7.0	8.8	16.5
3. Hygiene, sanitation and education	7,449	0.9	6.2	1.3
4. Combined actions	157,555	19.2	51.5	31.9
5. Currently preventable with difficulty	146,360	17.8	21.9	48.8
Total	370,993	45.2	89.0	98.7
	Three-year period 1982-1984			
1. Vaccination or direct prevention	488	0.0	0.1	0.1
2. Timely diagnosis and treatment	52,091	5.8	6.9	14.5
3. Hygiene, sanitation and education	2,772	0.3	1.4	0.6
4. Combined actions	189,508	21.2	32.4	35.5
5. Currently preventable with difficulty	139,860	15.6	19.8	54.0
Total	384,669	42.9	60.6	104.7

(a) Population for each age age in the respective three-year periods.

If the 0 to 1-year age group is eliminated and the upper age limit increased, analysis of the situation in the 1 to 84-year age group, shows that in group 2--diseases preventable through early diagnosis and timely treatment--the number of years lost with respect to the 1 to 64-year age group doubles, and that a similar situation occurs with causes preventable by mixed measures, although less markedly. On the other hand, and as might be expected, the YPLL from causes preventable with difficulty triple in number, since this group includes the chronic and degenerative diseases of advanced age.

Table 5 presents the extreme age limits analyzed, from 0 to 84 years, and it may be observed that the loss of years of life is not equal for both sexes. For males the greatest loss of years of life increases from 55.6% in the first three-year period to 57.9% of the losses in the last. This excess male mortality appears constantly for all the age groups studied, with the sole exception of excess female mortality in disease group 2. This group includes prostate cancer and bronchial asthma, but also breast and uterus cancer, in addition to diabetes, anemia, and other diseases known as predominant causes of female deaths. Although the loss of years of life in this group has declined, it has done so to a lesser extent than in males. This group, however, offsets excess male mortality by less than 2%.

Table 6 summarizes the changes in the proportion of deaths by age groups from one three-year period to another and clarifies Table 4, since the number of deaths of infants under 1 year old has declined by 73.3% between the extreme three-year periods, while the number of deaths among those 65 years of age and older has increased by 67.3%. This is reflected in the YPLL, which are very directly related to age at death.

If we add the percentage of deaths corresponding to extreme age-groups, that is to say of infants under 1 year old and of those 65 years of age and older for each three-year period--although their percentages in relation to the total are very different--we find that two-thirds of the population have always died in age groups below one year old and 65 years of age and over, that is, 69%, 66.7%, and 66.1% for each three-year period respectively. This reflects that the occurrence of deaths has shifted rapidly toward increasingly higher ages.

Few global indicators other than these figures could better synthesize the significance of social change, including the health care of the population. However, preventive orientation demands care as

Table 5. Ratio of years of potential life lost per 1,000 population under 85 years of age, by sex, in five groups of causes, three-year periods.

	Groups of causes					All groups	
Sex	1	2	3	4	5	Ratio	%
			Three-year period 1963-1965				
Male	3.92	19.91	31.14	116.79	69.22	241.0	55.6
Female	3.76	20.53	27.33	88.07	52.74	192.4	44.4
Both sexes	3.85	20.21	29.29	102.88	61.20	217.4	100.0
			Three-year period 1972-1974				
Male	0.80	16.04	8.17	87.40	64.18	176.6	57.5
Female	0.70	18.88	7.27	55.06	48.69	130.6	42.5
Both sexes	0.75	17.43	7.73	71.61	56.62	154.1	100.0
			Three-year period 1982-1984				
Male	0.21	13.76	2.26	60.38	67.40	144.0	57.9
Female	0.07	16.60	1.57	37.22	49.41	104.9	42.1
Both sexes	0.14	15.16	1.92	48.91	58.49	124.6	100.0

Table 6. Deaths of infants under 1 year old and of those 65 years and older, and percentage of total number of deaths at all ages.

	Under 1 year old		65 years of age and older	
Three-year period	Deaths	%	Deaths	%
1963 - 1965	10,033	20.4	21,373	4.6
1972 - 1974	6,583	12.9	27,558	5.8
1982 - 1984	2,677	4.6	35,749	6.5

the fundamental line of development of public health, so that together with the trend of increasing life expectancy, we may continue to bring about the full expansion of faculties and of socially active life up to the end.

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(Source: Adapted from Ríos Massabot, NE. and A. Tejeiro Fernández: Perfiles de salud; investigación de mortalidad, 1988.)

Calendar of Courses

Summer Courses in Epidemiology in the United States

• The Johns Hopkins University School of Hygiene and Public Health is sponsoring the Eighth Annual Graduate Summer Program in Epidemiology, to be conducted from 18 June to 6 July 1990. The program includes: applied multivariate statistics; cancer risk and prevention; design and conduct of clinical trials; epidemiologic methods for evaluating health services; epidemiology and the law; epidemiology of AIDS; epidemiology of mental disorders, alcohol and drug problems; infectious disease epidemiology; methods of health risk assessment; nutritional epidemiology; principles of epidemiology, and use of microcomputers in epidemiology. Proficiency in the English language is required.

Further information is available from Helen Walters, Program Coordinator, Graduate Summer Program in Epidemiology, The Johns Hopkins University, School of Hygiene and Public Health, 615 North Wolfe Street, Baltimore, Maryland 21205.

• Tufts University at Medford, Massachusetts, The New England Epidemiology Institute and the Postgraduate Medical Institute are sponsoring the Tenth Annual New England Epidemiology Summer Program, to be conducted from 15 July to 3 August, 1990. The course will cover the theory and practice of epidemiology; causal inference; biostatistics for epidemiologists; regression and categorical data methods; logistic regression and survival analysis; ecologycal analysis; statistical inference; conducting epidemiological research; the biology and epidemiology of cancer; nutritional epidemiology; clinical epidemiology, and environmental epidemiology. Proficiency in English is essential.

For more information contact The New England Epidemiology Institute, 826 Boylston Street, Chesnut Hill, Massachusetts 02167.

• The University of Michigan School of Public Health announces the 25th International Graduate Summer Session in Epidemiology to be conducted from 8 to 28 July 1990. Courses will be offered in

fundamentals of biostatistics and epidemiology; design and conduct of epidemiologic studies; advances statistical methods in the analysis of epidemiologic studies; microcomputer applications in epidemiologic research; epidemiology, control and prevention of infectious and chronic diseases; epidemiology and health policy, and epidemiology of injuries. Special courses will also be offered in basic concepts of clinical epidemiology; clinical trials: design and conduct, and analytical methods; sexually transmitted diseases; AIDS; drug abuse; environmental exposure assessment; environmental epidemiology; occupational epidemiology, and pharmacoepidemiology. Proficiency in the English language is needed.

For further information write to Jody Gray, Administrative Coordinator, Graduate Summer Session in Epidemiology, The University of Michigan, School of Public Health, 109 Observatory Street, Ann Arbor, Michigan 48109-2029.

International Track of the Epidemic Intelligence Service Course

• The International Health Program Office, Centers for Disease Control (CDC), and the Division of Public Health, Emory University, will conduct the International Track of the Epidemic Intelligence Service Course, from 1 to 16 October 1990, in Atlanta, Georgia. The course is designed to provide participants with basic epidemiologic skills useful for work in developing countries.

The main activities of the International Track are:

* Presentations and discussions on epidemiologic principles and basic statistical analysis; disease surveillance, and epidemiologic aspects of major problems in international health.
* Development of a surveillance model program.
* Problem sets, discussed in small groups, based on actual epidemiologic investigations.
* Presentations by participants of epidemiologic data from their own countries.
* A field exercise, involving data collection and analysis.
* Computer training in the use of a software program developed at CDC for epidemiologists which combines word processing, data management, analysis and graphics.
* Presentations on the organization and work of the CDC in international health.

Participants should have some epidemiologic background or have current or future job responsibilities related to epidemiology activities in a developing country. Proficiency in the English language is required. The fee is US$1,000 which includes tuition, books, materials, and supplies. Applications are due June 1, 1990. For further information or an application form, contac Philip S. Brachman, M.D., Emory University, Division of Public Health, 1599 Clifton Road, N.E., Atlanta, GA 30329, U.S.A.

Reports on Meetings

Regional Conference on Hospital Infection Control

The Pan American Health Organization/World Health Organization (PAHO/WHO) and the Society of Hospital Epidemiologists of America (SHEA), cosponsored a Regional Conference on Hospital Infection Control. The meeting took place at PAHO/WHO headquarters in Washington, D.C., from 11 to 15 December 1989 and participants included professionals from Argentina, Bermuda, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Jamaica, Mexico, Panama, Peru, Puerto Rico, Turks & Caicos Islands, United States of America, Uruguay, and Venezuela.

The objectives of the event were:

1. To propose mechanisms by the Ministries of Health in the Region to stimulate the standardization of prevention and control of hospital infection.
2. To propose recommendations for implementation of hospital epidemiology in the PAHO Member Countries, and of the methods and procedures to assure and guarantee the quality of medical care in hospitals.
3. To inform Member Countries of the recent advances in the control and use of antibiotics, precautions in intrahospital units for patients with AIDS, new approaches for disinfection or maintenance of hospital hygiene, and methods for monitoring the health of hospital workers.
4. To study the mechanisms for establishing a regional network, with the support of SHEA, for exchange and dissemination of

procedures and standards for prevention of hospital infections and for improving quality of care in the approximately 15,000 hospitals in the Region.

The topics discussed in the Conference were:

1. *Hospital epidemiology: From infection control to new horizons* - Historical review of hospital epidemiology; a discussion on the organization, responsibilities, and scope of existing programs; costs and consequences of hospital-acquired infections, and the recent developments of contemporary hospital epidemiology.

2. *Microbiological resources and useful microbiological techniques for hospital epidemiology* - Resources required to support hospital epidemiology. Aspects of personnel training, equipment and data management. Microbiology laboratory support.

3. *Surveillance strategies* - Hospital-based surveillance at national, regional, local, and hospital levels and methods for the collection, validation and analysis of data.

4. *Hospital hygiene* - Problems of disinfection, sterilization, and waste disposal.

5. *Mechanism of transmission of nosocomial pathogens and isolation systems* - Physio-pathology of nosocomial infections and the microbiological systems of isolation.

6. *Health of hospital workers* - Aspects on health control of personnel in the services.

7. AIDS - Discussion on the occupational aspects of HIV - Safety control of blood supply. Guidelines for preventing HIV transmission to personnel. Screening of patients; policies for seropositive patients. Impact of AIDS on health care facilities.

8. *Infections in high risk populations* - Infections in patients requiring intensive care and infections related to overuse of invasive devices. Improper utilization of technology not thoroughly evaluated.

9. *Epidemiology and control of antibiotic resistance* - Epidemiology of antibiotic resistance. Strategies for antibiotic utilization control. Problems related to bacterial resistance. International dissemination of antibiotic resistant strains and novel resistance mechanisms of nosocomial importance.

10. *Perspective of hospital infection control for less-developed regions* - Strategy for the control of the transmission in hospitals located in less developed areas, as well as policies for its effective implementation.

The main recommendations were:

1. To organize a survey in the Region that will make it possible to produce a diagnosis for each country similar to those done by WHO in Europe and Asia.

2. To support the existing national commissions on the prevention and control of hospital infections and create them in those countries where they do not exist.

3. To regulate the operation of health institutions. In order to be accredited, they should have a program of infection control that includes a multidisciplinary committee on the prevention and control of hospital infections, daily and monthly reports, active surveillance, and methods for preventing and controlling the infections.

4. To stimulate the creation of an Epidemiology Unit in the hospitals.

5. To establish centers at the national and regional level that will offer periodic courses on the prevention and control of hospital infections.

6. To include the subject of hospital infections in the curricula of disciplines related to the health sciences, as well as to establish continuing education programs.

7. To promote the establishment of a Society for the Prevention and Control of Hospital Infection in Latin America and the Caribbean.

8. To request PAHO to promote a meeting of experts to prepare a document that will identify standards and procedures for the prevention and control of infections in Latin America and the Caribbean.

9. To implement the regional distribution, on a regular basis, of up-to-date information on nosocomial infections.

10. To hold a regional working meeting for the purpose of establishing policy and defining a plan of action for the program on the prevention and control of hospital infection.

11. To carry out joint cooperative epidemiological research among health services and university institutions in the countries of the Region.

12. Given its importance, and in order to guarantee excellence in the quality of medical care, as well as to reduce its cost, it is proposed to invite the Latin American Federation of Hospitals to work jointly with the group on the prevention and control of hospital infections in the Region.

13. To identify microbiology laboratories of recognized excellence and effectiveness in the Region, to serve as a reference to ensure quality control.

14. To support the implementation or creation of national reference laboratories to improve the diagnoses of hospital infections.

15. To ask PAHO to arrange for courses and international conferences of experts from the countries so as to strengthen and enrich knowledge on the subject.

16. To create in each country a working group on the control of antibiotics as a part of the National Commission on Hospital Infection, with a view to carrying out the activities to standardize the diagnosis of resistance by the microbiology laboratories in the countries, to establish policies on the use of antibiotics by hospitals, to identify national laboratories that have the capacity to determine resistance to antibiotics, and to create an information and communication network on sensitivity and resistance to antibiotics.

17. To include the parameter of Prevention and Control of Hospital Infections on a regular basis in meetings, workshops, and other activities related to local health systems and the quality of medical care, given the important relationship that it has to these programs.

(*Source:* Health Services Development Program, PAHO.)

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