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PROGRESS REPORT OF THE INTER-AMERICAN INVESTIGATION OF MORTALITY^(a)

The Inter-American Investigation of Mortality is a large collaborative research project established in 1962 to produce an accurate and comprehensive account of mortality in 12 widely separated cities. The Directing Council in 1961 considered the significance of a research program for the provision of mortality statistics, as comparable as possible, that would serve as a basis for epidemiological studies and would also influence the development of standards and assist in the improvement of the accuracy of medical statistics in the Americas. The Council¹ recommended that Member Governments give full support to the furtherance of this research program and that the Bureau assist the investigators to ensure that "these coordinated investigations provide comparable basic data and that the results of this research program are fully utilized in health services, in epidemiological studies, and in teaching in medical schools." A preliminary report² of the initiation of the research program with limited data from five cities was given to the Pan American Sanitary Conference in 1962. At this time in July 1964 the field work in the collection of data is in the final phase and the central processing and analysis of the data are underway.

The principal collaborators responsible for carrying out field work in accordance with the study design are as follows:

Bogota, Colombia: Dr. Luis E. Giraldo, Director, National Institute of Health, Ministry of Public Health.

Bristol, England: Professor R. C. Wofinden, Medical Officer of Health, City and County of Bristol, and Professor of Public Health, University of Bristol School of Medicine.

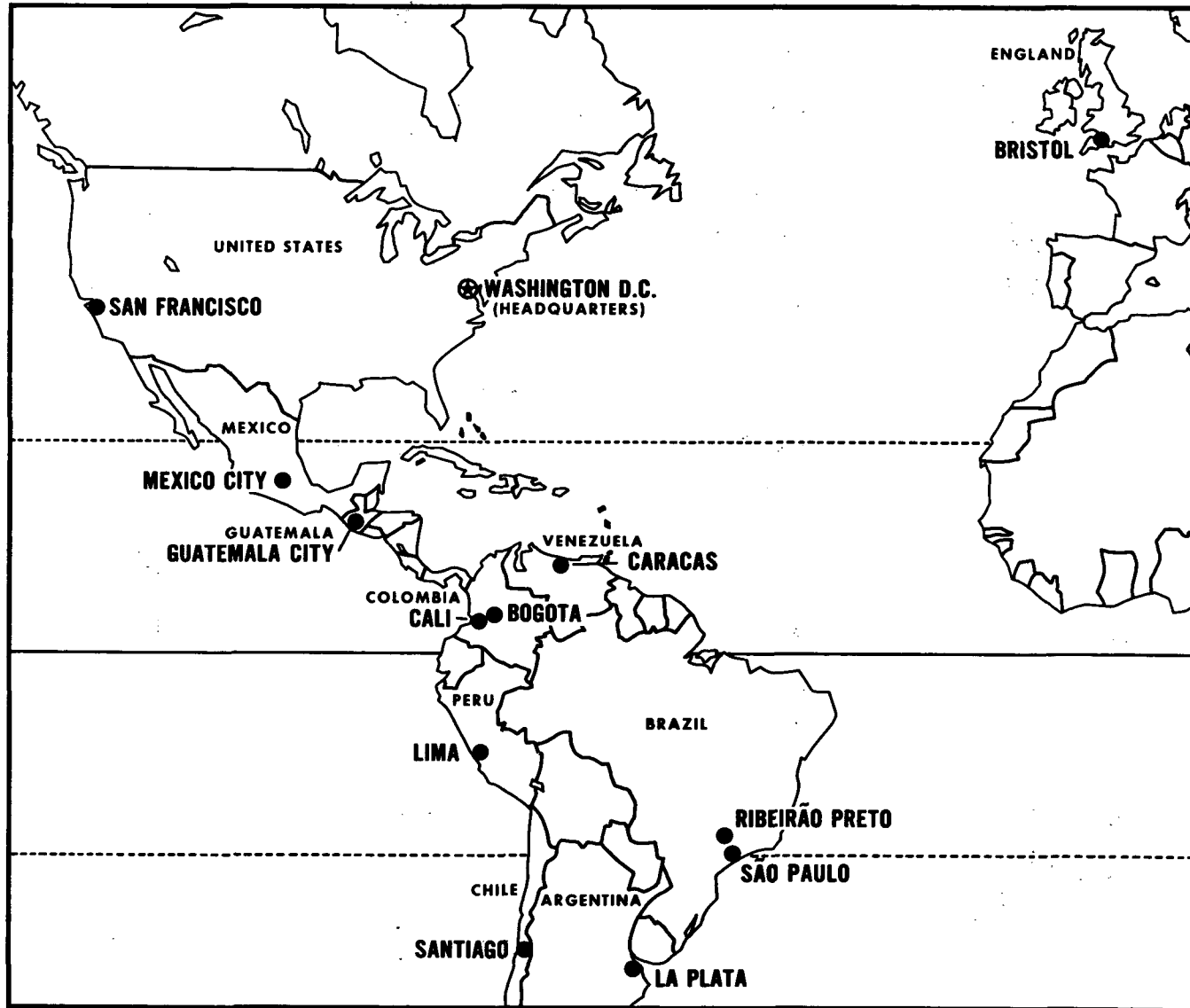
^(a) This research project was made possible by a research grant GM-08682 of the National Institute of General Medical Sciences, United States Public Health Service.

- Cali, Colombia: Dr. Pelayo Correa, Professor of Pathology and Chief, Department of Pathology, Faculty of Medicine, University of Valle.
- Caracas, Venezuela: Dr. Carlos Luis Gonzalez, Technical Adviser, Ministry of Health and Social Welfare, and Professor of Preventive Medicine, Vargas Medical School, University of Venezuela.
- Guatemala City, Guatemala: Dr. J. Romeo de Leon, Jr., Medical Officer, Epidemiology Branch, Division of Public Health, Institute of Nutrition of Central America and Panama (INCAP).
- La Plata, Argentina: Dr. Carlos Ferrero, Former Director of Biostatistics, Ministry of Public Health of the Province of Buenos Aires, and Head of the Department of Biostatistics, School of Public Health, University of Buenos Aires.
- Lima, Peru: Dr. Abelardo Temoche, Chief of Biostatistics, Ministry of Public Health, and Professor of Medical Statistics, San Marcos Medical School.
- Mexico City, Mexico: Dr. Miguel Angel Bravo Becherelle, Scientific Investigator, Laboratory of Epidemiology and Biostatistics, Institute of Health and Tropical Diseases.
- Ribeirao Preto, Brazil: Dr. Geraldo Garcia Duarte, Associate Professor of Hygiene of the Faculty of Medicine of Ribeirao Preto.
- San Francisco, California, U.S.A.: Dr. Ellis D. Sox, Director of Public Health, City and County of San Francisco.
- Santiago, Chile: Dr. Adela Legarreta, Professor of Biostatistics, School of Public Health, University of Chile.
- Sao Paulo, Brazil: Dr. Elza Berquo, Professor of Biostatistics, Department of Statistics, Faculty of Hygiene and Public Health, University of Sao Paulo.

These 12 cities, as may be seen in Figure 1, are widely separated with eight in South America, two in Middle America, one in the United States and one in England. Each principal collaborator directs a small staff consisting of at least one physician, one or two social workers or nurses and a secretary.

The study was planned to include the investigation of approximately 40,000 deaths of adults 15-74 years of age in a two year period. All deaths in this age period in a city or a sample of the deaths in a city would be investigated with interviews in the home and with physicians in attendance, and information would be obtained from hospital and autopsy

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records. As shown in Table 1 work was initiated in six cities in January 1962, two in March 1962, and one in May 1962. Delays were encountered in the remaining three with one starting in July 1962 and two in October 1962. In the original design 10 cities were to be included. Ribeirao Preto in the state of Sao Paulo, Brazil, was treated originally as part of the investigation in Sao Paulo but it has proved in practice more convenient to deal with Ribeirao Preto as a separate city. To provide material from English speaking populations, two English speaking cities, namely San Francisco, California and Bristol, England replaced the one originally included.

The numbers of deaths investigated or expected to be investigated before completion of the two-year period for each city are given in Table 1 with the estimated date of completion of the field work. Of the 43,300 questionnaires, approximately 29,900 will be in Spanish, 8,100 in English and 5,300 in Portuguese. As of July 1, 1964, the field work was roughly 90 per cent completed.

In accordance with the purpose of the investigation, standard procedures are maintained for the collection of data on each death. Likewise in the assignment of the cause of death uniform procedures are followed. Classification of deaths to the categories of the International Classification of Diseases is the responsibility of two medical referees, Dr. Dario Curiel and Dr. Percy Stocks, who work independently. With the exception of deaths in which only one cause was involved in the fatal sequence, they review the complete questionnaires and assign the category number of the Classification. This review and classification of each death is underway but will not be completed until the middle of 1965. Dr. G. W. Griffith is the epidemiologist in charge of this research project.

A report^{3/} of the events leading to this collaborative research project, its design, conduct and plans for analysis will be published in the near future in the Boletin of the Pan American Sanitary Bureau. At this time, a preliminary analysis of the data for four cities for the first year is presented to illustrate the kind of material which will be available from these 12 cities and the uses which can be made of the material. Completion of the processing of the questionnaires takes several months after the end of the year due in part to delays in reporting autopsy findings. For two of the four cities the age distributions of the populations based on the latest census are not available. Therefore estimates have been used for the age group 15-74 years. Consequently, the rates must be regarded as provisional and subject to revision when data relating to the population become available later this year. These will enable calculation of age adjusted rates taking into account rates within this age span. In considering the death rates in the tables it is advisable to remember that the population of La Plata, Argentina, is somewhat older with a higher proportion of the population in the 55-74 year age group than in the other cities. The population in Ribeirao Preto is small (111,000 in 1960) and thus the death rates are less stable. In

TABLE 1

Status of Projects in Cities Included in the
Inter-American Investigation of Mortality

City	Population (census or estimates)	Sampling of deaths	Two-year periods	Number of deaths(a)	Completion date
Bogota	1,329,230	2 in 5	Jan.1962-Dec.1963	3,900	July 1964*
Bristol	436,440	3 in 4	Oct.1962-Sep.1964	4,200	Jan. 1965*
Cali	693,120	All	May 1962-Apr.1964	3,700	July 1964*
Caracas	1,101,147	1 in 2	Jan.1962-Dec.1963	3,000	April 1964
Guatemala City	397,861	All	Mar.1962-Feb.1964	3,500	Oct. 1964*
La Plata	330,310	All	Jan.1962-Dec.1963	3,600	July 1964*
Lima	1,652,229	1 in 2	Jan.1962-Dec.1963	4,100	Sep. 1964*
Mexico City	2,908,222	1 in 5	Mar.1962-Feb.1964	4,000	Aug. 1964*
Ribeirao Preto	111,419	All	Jan.1962-Dec.1963	1,100	Feb. 1964
San Francisco	740,316	1 in 3	Oct.1962-Sep.1964	3,900	Mar. 1965*
Santiago	1,699,711	1 in 5	Jul.1962-Jun.1964	4,100	Nov. 1964*
Sao Paulo	3,882,523	1 in 6	Jan.1962-Dec.1963	4,200	July 1964*

(a) Approximate number.

* Expected date.

spite of these necessary reservations this preliminary analysis is useful in exploring this phase of the investigation and it indicates the type of analyses that are possible and the uses of the data.

Provisional death rates calculated for causes grouped according to the B List of the International Classification of Diseases are provided in Table 2. Greater detail is given in Tables 3 and 4 using the A List to show the death rates by various causes of cardiovascular diseases and sites of malignant neoplasms. Tables 5, 6 and 7 provide data similar to those in Tables 2, 3 and 4 with death rates by sex.

In the adult age group under study, 15-74 years, the two principal causes of death are malignant neoplasms (categories 140-205) and diseases of the heart (categories 400-443). These two principal causes account for nearly half of the deaths. In three of the cities the leading cause was malignant neoplasms while in the fourth, diseases of the heart had first place. However, comparison of these crude provisional death rates indicates that there are marked differences in causes even for these four cities in South America.

The first cause of death given in Table 2, tuberculosis, was found to have death rates varying from 10.3 to 29.3 per 100,000 population in these cities in this adult age group. The mortality from syphilis and other infective and parasitic diseases was relatively small with one exception - namely Chagas' disease in Ribeirao Preto. The classification of the cardiopathy attributed to Chagas' disease noted in Ribeirao Preto was a cause of considerable concern to the medical referees. Although originally the referees planned to assign such deaths to the stated form of heart diseases with a second code for Chagas' disease, this method of handling the assignment did not prove feasible. The unique manifestations of the cardiopathy were such that no existing category for heart diseases appeared suitable. Thus, after further study of the problem the referees agreed to assign them to Chagas' disease (121 in the Section of Infective and Parasitic Diseases) with a fourth digit to distinguish deaths with the heart affected from other forms of Chagas' disease. In the first year in Ribeirao Preto, all but 6 per cent of the deaths from Chagas' disease were due to Chagas' cardiopathy and in the other cities all deaths classified as Chagas' disease had heart involvement.

^{3/}In Ribeirao Preto, as has been pointed out in a previous publication^{2/}, the mortality from diseases of the heart including Chagas' cardiopathy is excessive in young adult life which is evidence of an unusual hazard in that area. Thus deaths assigned to this category are shown separately.

Death rates from cardiovascular diseases are given in detail for eleven groups in Table 3. The total rates varied from 149.5 in Caracas to the high rate of 323.8 per 100,000 population in Ribeirao Preto. Over one-fourth of the high death rate in Ribeirao Preto is attributed to Chagas' disease. However, excluding Chagas' cardiopathies the rate still appears

TABLE 2

Provisional Death Rates per 100,000 Population for Groups of Causes on Final Classification, for Adults 15-74 Years of Age, Four Cities in the Inter-American Investigation of Mortality - 1962

Cause Groups - B List of International Classification of Diseases	Caracas	La Plata	Ribeirao Preto	Sao Paulo
Total	439.5	717.7	701.2	524.2
Tuberculosis, all forms (001-019)	12.5	10.3	29.3	20.9
Syphilis and its sequelae (020-029)	6.0	5.5	3.0	2.8
Chagas' disease (121)	2.8	0.7	95.2	5.0
Other infective and parasitic diseases (Remainder 001-138)	6.4	6.8	10.5	8.8
Malignant neoplasms, including neoplasms of lymphatic and hematopoietic tissues (140-205)	103.5	202.3	132.8	99.4
Benign neoplasms and neoplasms of unspecified nature (210-239)	2.8	2.0	5.8	3.0
Diabetes mellitus (260)	14.9	25.0	12.9	17.9
Anemias (290-293)	0.3	1.5	-	0.8
Vascular lesions affecting central nervous system (330-334)	32.3	82.0	94.3	61.8
Diseases of the heart (400-443)	99.5	167.3	126.2	139.9
Hypertension without mention of heart (444-447)	1.8	18.7	2.0	5.8
Influenza and pneumonia (480-493)	5.5	4.3	13.0	6.4
Bronchitis (500-502)	3.1	13.1	4.1	13.3
Ulcer of stomach and duodenum (540, 541)	3.2	7.0	2.6	4.8
Appendicitis (550-553)	1.0	0.4	1.8	0.9
Intestinal obstruction and hernia (560, 561, 570)	4.8	7.0	4.3	4.5
Gastritis, enteritis, etc. (543, 571, 572)	3.6	3.1	3.4	3.1
Cirrhosis of liver (581)	10.7	18.4	7.5	12.5
Nephritis and nephrosis (590-594)	8.2	3.9	12.4	6.5
Hyperplasia of prostate (610)	2.0	3.7	-	1.6
Deliveries and complications of pregnancy, childbirth and puerperium (640-689)	8.3	5.2	3.8	5.5
Congenital malformations (750-759)	1.8	2.5	1.4	1.6
Motor vehicle accidents (E810-E835)	12.1	16.6	10.9	10.5
All other accidents (E800-E802, E840-E962)	14.6	11.0	27.8	20.7
Suicide and self-inflicted injury (E963, E970-E979)	12.3	15.0	9.1	13.9
Homicide and operations of war (E964, E965, E980-E999)	24.9	6.6	6.8	5.9
All other diseases (Residual)	37.7	59.3	75.4	35.6
Ill-defined and unknown causes (780-795)	2.9	18.4	5.0	10.8

TABLE 3

Provisional Death Rates per 100,000 Population for Cardiovascular Diseases on Final Classification, for Adults 15-74 Years of Age, Four Cities in the Inter-American Investigation of Mortality - 1962

Cause Groups - A List of International Classification of Diseases	Caracas	La Plata	Ribeirao Preto	Sao Paulo
Total - Cardiovascular diseases	149.5	286.5	323.8	221.6
Cardiovascular syphilis (022, 023)	6.0	3.4	1.6	2.6
Chagas' cardiopathy (part of 121)	2.8	0.7	89.9	5.0
Vascular diseases affecting central nervous system (330-334)	32.3	82.0	94.3	61.8
Rheumatic fever and chronic rheumatic heart disease (400-416)	4.2	12.2	13.0	14.1
Arteriosclerotic and degenerative heart disease (420-422)	74.5	109.8	53.6	71.8
Other diseases of heart (430-434)	9.3	14.3	18.1	18.3
Hypertension with heart disease (440-443)	11.4	31.0	41.4	35.7
Hypertension without mention of heart (444-447)	1.8	18.7	2.0	5.8
Diseases of the arteries (450-456)	5.1	12.5	6.4	5.0
Other diseases of the circulatory system (460-468)	0.6	0.6	3.5	0.6
Congenital malformations of circulatory system (754)	1.5	1.3	-	0.9

TABLE 4

Provisional Death Rates per 100,000 Population for Malignant Neoplasms on Final Classification, for Adults 15-74 Years of Age, Four Cities in the Inter-American Investigation of Mortality - 1962

Sites - A List of International Classification of Diseases	Caracas	La Plata	Ribeirao Preto	Sao Paulo
Total - Malignant neoplasms including neoplasms of lymphatic and hematopoietic tissues (140-205)	103.5	202.3	132.8	99.4
Malignant neoplasm of buccal cavity and pharynx (140-148)	3.4	3.7	4.1	2.0
Malignant neoplasm of esophagus (150)	2.3	9.4	5.4	4.9
Malignant neoplasm of stomach (151)	16.9	25.3	37.8	22.8
Malignant neoplasm of intestine, except rectum (152, 153)	1.8	14.6	6.8	3.7
Malignant neoplasm of rectum (154)	1.6	6.9	1.4	2.6
Malignant neoplasm of larynx (161)	1.3	5.1	9.8	2.9
Malignant neoplasm of trachea, bronchus and lung not specified as secondary (162, 163)	13.3	44.2	9.2	9.3
Malignant neoplasm of breast (170)	7.0	12.5	6.8	7.4
Malignant neoplasm of cervix uteri (171)	11.1	5.7	6.8	5.7
Malignant neoplasm of corpus uteri (172)	1.6	4.0	5.4	1.1
Malignant neoplasm of other and unspecified parts of uterus (173, 174)	-	-	-	0.9
Malignant neoplasm of prostate (177)	4.1	5.7	1.4	1.8
Malignant neoplasm of bladder (181.0)	1.6	10.2	2.7	1.1
Malignant neoplasm of skin (190, 191)	1.9	0.9	1.4	1.7
Malignant neoplasm of bone and connective tissue (196, 197)	1.0	0.8	2.0	1.7
Malignant neoplasm of other specified sites (155, 157, 160, 175, 176.0,.1,.7,.8, 178, 179.0,.1,.7,.8, 180, 181.7, .8, 192-195)	17.5	34.0	18.9	14.3
Malignant neoplasm of unspecified sites (156, 158, 159, 164, 165, 176.9, 179.9, 198, 199)	6.9	7.4	2.1	7.0
Leukemia and aleukemia (204)	5.1	4.9	5.4	3.3
Lymphosarcoma and other neoplasms of lymphatic and hematopoietic system (200-203, 205)	5.1	6.7	5.4	5.2

TABLE 5

Provisional Death Rates per 100,000 Population for Groups of Causes on Final Classification, for Males and Females, 15-74 Years of Age, Four Cities in the Inter-American Investigation of Mortality - 1962

Cause Groups - B List of International Classification of Diseases	Males				Females			
	Caracas	La Plata	Ribeirao Preto	Sao Paulo	Caracas	La Plata	Ribeirao Preto	Sao Paulo
Total	481.0	970.8	908.8	618.2	398.4	474.8	515.0	433.5
Tuberculosis, all forms (001-019)	16.7	12.0	50.0	31.4	8.2	8.7	10.8	10.8
Syphilis and its sequelae (020-029)	10.6	9.3	5.6	4.7	1.3	1.7	0.5	1.0
Chagas' disease (121)	3.3	0.7	117.0	4.4	2.3	0.8	45.8	5.7
Other infective and parasitic diseases (Remainder 001-138)	8.8	9.6	33.9	9.8	3.9	4.1	21.9	7.8
Malignant neoplasms, including neoplasms of lymphatic and hematopoietic tissues (140-205)	94.5	267.2	186.4	103.2	112.9	139.8	84.9	95.7
Benign neoplasms and neoplasms of unspecified nature (210-239)	2.9	2.2	6.3	3.2	2.8	1.8	5.4	2.8
Diabetes mellitus (260)	11.4	27.2	10.6	15.8	18.5	23.7	14.9	19.8
Anemias (290-293)	0.5	-	-	0.2	0.2	3.0	-	1.5
Vascular lesions affecting central nervous system (330-334)	26.4	104.9	107.3	71.0	38.4	59.9	82.6	52.9
Diseases of the heart (400-443)	112.1	222.7	137.8	160.3	86.5	114.0	115.7	120.2
Hypertension without mention of heart (444-447)	2.3	16.8	2.9	7.8	1.4	20.5	1.3	3.8
Influenza and pneumonia (480-493)	5.7	6.6	10.9	7.3	5.3	2.1	14.9	5.5
Bronchitis (500-502)	3.7	25.8	8.6	20.7	2.4	1.0	-	6.1
Ulcer of stomach and duodenum (540,541)	4.5	11.6	4.3	7.3	1.9	2.5	1.0	2.4
Appendicitis (550-553)	1.2	0.8	0.9	1.2	0.8	-	2.6	0.5
Intestinal obstruction and hernia (560, 561, 570)	1.7	6.9	4.0	3.8	7.8	7.1	4.6	5.2

TABLE 5 (Cont.)

Provisional Death Rates per 100,000 Population for Groups of Causes on Final Classification, for Males and Females, 15-74 Years of Age, Four Cities in the Inter-American Investigation of Mortality - 1962

Cause Groups - B List of International Classification of Diseases	Males				Females			
	Caracas	La Plata	Ribeirao Preto	Sao Paulo	Caracas	La Plata	Ribeirao Preto	Sao Paulo
Continued.-								
Gastritis, enteritis, etc. (543, 571, 572)	3.3	0.6	2.0	2.3	4.0	5.6	4.6	3.9
Cirrhosis of liver (581)	18.1	32.1	11.5	22.9	3.0	5.2	3.9	2.3
Nephritis and nephrosis (590-594)	9.7	3.1	15.8	5.2	6.8	4.6	9.3	7.7
Hyperplasia of prostate (610)	3.9	7.6	-	3.3	-	-	-	-
Deliveries and complications of pregnancy, childbirth and puerperium (640-689)	-	-	-	-	16.9	10.2	7.2	10.8
Congenital malformations (750-759)	0.5	4.4	2.9	1.7	3.1	0.8	-	1.4
Motor vehicle accidents (E810-E835)	18.8	28.9	20.1	17.3	5.2	4.8	2.6	3.9
All other accidents (E800-E802, E840-E962)	21.2	19.8	46.6	32.7	7.9	2.5	11.1	9.0
Suicide and self-inflicted injury (E963, E970-E979)	15.8	23.1	10.6	18.4	8.6	7.1	7.7	9.5
Homicide and operations of war (E964, E965, E980-E999)	45.9	11.7	14.4	9.6	3.2	1.6	-	2.2
All other diseases (Residual)	32.1	84.7	92.6	44.2	43.2	34.9	57.4	27.5
Ill-defined and unknown causes (780-795)	4.2	30.5	5.8	12.4	1.6	6.8	4.4	9.2

TABLE 6

Provisional Death Rates per 100,000 Population for Cardiovascular Diseases on Final Classification, for Males and Females, 15-74 Years of Age, Four Cities in the Inter-American Investigation of Mortality - 1962

Cause Groups - A List of International Classification of Diseases	Males				Females			
	Caracas	La Plata	Ribeirao Preto	Sao Paulo	Caracas	La Plata	Ribeirao Preto	Sao Paulo
Total - Cardiovascular diseases	158.9	376.7	397.1	256.8	138.9	200.1	258.5	187.3
Cardiovascular syphilis (022, 023)	10.3	6.0	2.9	4.5	1.1	1.0	0.5	0.7
Chagas' cardiopathy (part of 121)	3.3	0.7	133.5	4.4	2.3	0.8	50.9	5.7
Vascular diseases affecting central nervous system (330-334)	26.4	104.9	107.3	71.0	38.4	59.9	82.6	52.9
Rheumatic fever and chronic rheumatic heart disease (400-416)	1.9	10.2	11.8	12.8	6.5	14.1	14.1	15.4
Arteriosclerotic and degenerative heart disease (420-422)	91.8	160.6	61.3	98.6	56.7	60.9	46.8	45.9
Other diseases of heart (430-434)	9.4	19.6	11.5	18.5	9.2	9.3	23.9	18.1
Hypertension with heart disease (440-443)	8.9	32.4	53.2	30.4	14.0	29.7	30.9	40.8
Hypertension without mention of heart (444-447)	2.3	16.8	2.9	7.8	1.4	20.5	1.3	3.8
Diseases of the arteries (450-456)	4.5	21.8	8.1	7.5	5.3	3.7	4.9	2.5
Other diseases of the circulatory system (460-468)	0.1	1.0	4.6	0.7	1.1	0.2	2.6	0.4
Congenital malformations of circulatory system (754)	-	2.7	-	0.6	2.9	-	-	1.1

TABLE 7

Provisional Death Rates per 100,000 Population for Malignant Neoplasms
on Final Classification, for Males and Females, 15-74 Years of Age,
Four Cities in the Inter-American Investigation of Mortality - 1962

Sites - A List of International Classification of Diseases	Males				Females			
	Caracas	La Plata	Ribeirac Preto	Sao Paulo	Caracas	La Plata	Ribeirac Preto	Sao Paulo
Total - Malignant neoplasms including neoplasms of lymphatic and hema- topoietic tissues (140-205)	94.5	267.2	186.4	103.2	112.9	139.8	84.9	96.9
Malignant neoplasm of buccal cavity and pharynx (140-148)	2.5	5.1	5.6	2.9	4.4	2.4	2.6	1.1
Malignant neoplasm of esophagus (150)	2.1	14.9	8.6	7.0	2.6	4.2	2.6	2.8
Malignant neoplasm of stomach (151)	21.1	33.6	62.7	29.0	12.6	17.3	15.4	16.8
Malignant neoplasm of intestine, except rectum (152, 153)	1.4	13.9	8.6	2.9	2.3	15.2	5.1	4.5
Malignant neoplasm of rectum (154)	-	11.6	-	3.0	3.2	2.4	2.6	2.2
Malignant neoplasm of larynx (161)	2.5	9.9	21.0	5.9	-	0.6	-	-
Malignant neoplasm of trachea, bronchus and lung not specified as secondary (162, 163)	22.4	85.2	13.8	15.1	4.0	4.8	5.1	4.8
Malignant neoplasm of breast (170)	-	-	-	-	14.2	24.6	12.9	14.5
Malignant neoplasm of cervix uteri (171)	-	-	-	-	22.5	11.3	12.9	11.2
Malignant neoplasm of corpus uteri (172)	-	-	-	-	3.2	7.9	10.3	2.2
Malignant neoplasm of other and uns- pecified parts of uterus (173, 174)	-	-	-	-	-	-	-	1.7
Malignant neoplasm of prostate (177)	8.1	11.7	2.9	3.6	-	-	-	-
Malignant neoplasm of bladder (181.0)	2.5	20.0	5.8	1.7	0.6	0.8	-	0.6
Malignant neoplasm of skin (190, 191)	1.2	1.8	2.9	2.9	2.6	-	-	0.6
Malignant neoplasm of bone and con- nective tissue (196, 197)	-	0.8	4.3	0.6	1.9	0.8	-	2.8
Other specified malignant neoplasms (155, 157,160,175,176.0,.1,.7,.8,178,179.0,.1, .7,.8,180,181.7,.8,192-195)	13.0	33.3	31.5	11.7	21.9	34.9	7.7	16.9
Malignant neoplasms of unspecified sites (156, 158, 159, 164, 165, 176.9, 179.9, 198, 199)	5.3	11.2	4.3	6.6	8.4	3.7	-	7.5
Leukemia and aleukemia (204)	5.0	5.0	5.8	4.3	5.1	4.8	5.1	2.2
Lymphosarcoma and other neoplasms of lymphatic and hematopoietic system (200-203, 205)	7.4	9.3	8.6	6.0	3.4	4.1	2.6	4.5

to be high. The relatively high rate in La Plata is due in part to the older population. The variation in death rates from vascular lesions affecting the central nervous system was great, from 32.3 in Caracas to 94.3 per 100,000 population in Ribeirao Preto. The death rates from chronic rheumatic heart diseases including rheumatic fever were of approximately the same size in three of the cities and three times the rate in Caracas.

One of the purposes of the investigation was to obtain information regarding arteriosclerotic heart disease in Latin America. Data available in the past for countries had indicated relatively low rates^{4/}. The death rates in these four cities varied from 53.6 in Ribeirao Preto to 109.8 per 100,000 in La Plata. The percentages of these deaths classified as arteriosclerotic and degenerative heart disease (categories 420-422) were 50 per cent for Caracas, 38 per cent for La Plata, 17 per cent for Ribeirao Preto and 33 per cent for Sao Paulo, Brazil. Similar data from other cities are needed for comparison by age groups. However, for the United States for the three years 1958-1960 over 60 per cent of the deaths due to cardiovascular diseases in adults 15-74 years of age were classified as arteriosclerotic and degenerative heart diseases. Hypertension with heart disease accounted for relatively high death rates in three cities (31.0 to 41.4 per 100,000 population). Thus in spite of standardized procedures of collection and assignment of causes of death the variation in these groups of cardiovascular diseases is great. Although comparisons of death rates by age group may clarify the interpretation it is likely that age adjusted death rates will continue to vary, indicating that there are differences requiring further study to determine the factors responsible.

The provisional death rates from malignant neoplasms for three of the cities, Caracas, Ribeirao Preto and Sao Paulo, were of similar size; the death rate for La Plata was approximately twice the rates of Caracas and Sao Paulo. As with cardiovascular diseases some of the excess is due to the older population in La Plata, Argentina. However, the highest death rate for cancer of a specific site was noted in La Plata, that for cancer of the trachea, bronchus and lung (Table 4). The rate of 44.2 per 100,000 population was over three and four times the rates in the other three cities. In La Plata also the death rate from cancer of the bladder was high and much higher than in the other cities. High death rates were noted from cancer of the stomach in Ribeirao Preto, La Plata and Sao Paulo. The differences in these death rates from cancer by site for males and females are large as can be seen in Table 7. The death rates from cancer of the lung and bladder in males in La Plata were very high. The death rate for cancer of the cervix in females in Caracas was approximately twice the rates in other cities. These death rates reveal that there is considerable variation in death rates from malignant neoplasms in these four cities.

In addition to these variations in death rates from cardiovascular diseases and malignant neoplasms there are other differences of interest (Tables 2 and 5). The death rates from bronchitis of 13.1 and 13.3 per

100,000 population in La Plata and Sao Paulo were over three times the rates in the other two cities with much higher rates in males than in females. Cirrhosis of the liver appeared to have a high death rate in La Plata. External causes, including accidents, suicides and homicides, were responsible for death rates which varied from 49.2 to 63.9 per 100,000 population. The death rates were much higher in males than in females for each of the divisions of external causes, namely, motor vehicle accidents, other accidents, suicides and homicides.

The additional information obtained through interviews of physicians, hospital records, laboratory findings and autopsy reports has resulted in many changes in the assignments from those on the original death certificates generally to more specific categories. However, it is encouraging to report that the investigation has confirmed that official data show in general reasonably accurately the situation for many of the principal groups of causes of death in these four cities. This is in part attributed to the compensating effect of changes in assignments. One of the planned analyses is for a detailed study of the number and types of changes from the original assignments in relation to the final assignments. At this time a few illustrations of the original and final assignments are given to indicate the products of the investigation and the importance of using the results for the improvement of mortality statistics to serve for epidemiological research as well as for health programs.

One of the groups of causes of major concern is that of maternal deaths, namely deaths resulting from deliveries and complications of pregnancy, childbirth and the puerperium (categories 640-689). For this important group the additional information resulted in the final assignment of 61 deaths while there were 44 on the original certificates (a 39 per cent increase). An increase of 38-43 per cent was noted in the four cities indicating that complete reporting of the complications of pregnancy, childbirth and the puerperium for the correct ascertainment of maternal deaths will require additional efforts.

Another noteworthy observation was the over-reporting of influenza and pneumonia. While 117 deaths were classified originally to categories 480-493, the additional information and final review showed only 60 which gave a 49 per cent reduction. A decrease of this order occurred in all four cities.

Although the total number of malignant neoplasms as a group changed only slightly (a 3 per cent increase for the total of four cities), deaths assigned to cancer of the cervix increased from 41 to 74 which gave an 80 per cent increase. Many of the deaths formerly in the group of cancer of other and unspecified parts of the uterus (172-174) could be properly coded to cancer of the cervix as the result of the information obtained.

The group of deaths due to cardiovascular diseases received many changes as a result of this investigation with the same type of change in each city. The original and final classifications are given in Table 8 for cardiovascular diseases to point out some of the results of additional information and standard classification of causes by medical referees. The number of deaths assigned to arteriosclerotic and degenerative heart diseases (categories 420-422) decreased by 11 per cent. This group which includes deaths due to coronary heart disease is of major concern. It is of considerable interest that a reduction resulted. The results in the English speaking cities are eagerly awaited to note the effects of this investigation and review in cities in England and the United States which have high death rates from this cause. In the two groups, rheumatic heart disease and hypertension with heart disease, increases of 26 and 60 per cent were noted.

These cities are all medical centers with medical schools and with adequate hospital facilities. Table 9 provides information regarding the number of hospital deaths and also the types of autopsies performed. The percentages of deaths which occurred in hospitals varied from 42 to 58. These percentages are of the size expected in cities with sufficient hospital beds. In addition 28 per cent of those dying elsewhere had been in the hospital during the last year of life. The percentages of deaths with autopsies for three cities were 20, 29 and 30 which indicated that considerable evidence was available from autopsies. A previous analysis^{3/} indicated that of the deaths with autopsies changes were recorded in 40 per cent of the assignments and major changes in 25 per cent. Thus the importance of having complete autopsies performed and the results used in ascertaining the underlying cause of death is clear.

Since the completion of the subsequent laboratory studies connected with autopsies may take some time, it is important that a method be established of transmitting such reports to supplement the data available to the physician at the time of death. Similarly for the patient who has been hospitalized, either at the time of death or before death, pertinent information should be made available so that the final assignment will be as specific and accurate as possible. Because of the need for the official death certificates within 72 hours after death, a method could well be established for a supplemental medical record with additional data for use in making or revising assignments. To improve the quality of mortality statistics and to develop standard international procedures for geographic studies of diseases efforts could be directed to methods of providing additional medical data for accurate classification of the underlying cause of death.

In summary, the Inter-American Investigation of Mortality has followed the original design. The field work in eight of the collaborating cities should be completed by September 1, 1964 and in the remaining four by April, 1965.

TABLE 8

Original and Final Classification of Deaths due to Cardiovascular Diseases with Percentage Changes, for Adults 15-74 Years of Age, Four Cities Combined in the Inter-American Investigation of Mortality - 1962

Cause Groups - A List of International Classification of Diseases	Original	Final	Changes	
			Number	Per cent
Total - Cardiovascular Diseases	2,272	2,189	- 83	- 4
Cardiovascular syphilis (022, 023)	30	37	+ 7	+ 23
Chagas' disease (121) ^(a)	100	98	- 2	- 2
Vascular lesions affecting central nervous system (330-334)	573	592	+ 19	+ 3
Rheumatic fever and chronic rheumatic heart disease (400-416)	81	102	+ 21	+ 26
Arteriosclerotic and degenerative heart disease (420-422)	899	799	-100	- 11
Other diseases of heart (430-434)	191	143	- 48	- 25
Hypertension with heart disease (440-443)	168	269	+101	+ 60
Hypertension without mention of heart (444-447)	100	61	- 39	- 39
Diseases of the arteries (450-456)	92	69	- 23	- 25
Other diseases of the circulatory system (460-468)	29	8	- 21	- 72
Congenital malformations of circulatory system (754)	9	11	+ 2	+ 22

(a) All of these are Chagas' cardiopathy except for 6 per cent in Ribeirao Preto.

TABLE 9

Provisional Number and Percentages of Deaths Occurring
in Hospitals and with Autopsies in Four Cities
in the Inter-American Investigation of Mortality - 1962

Place of death and type of autopsy	Caracas		La Plata		Ribeirao Preto		Sao Paulo	
	Number*	Per cent	Number	Per cent	Number	Per cent	Number*	Per cent
Total deaths	1,387	100	1,773	100	516	100	1,848	100
In hospitals	810	58	753	42	256	50	767	42
With autopsies	419	30	147	8	148	29	373	20
Medico-legal	203	15	46	3	25	5	185	10
Hospital	216	16	101	6	123	24	188	10

*Provisional figures, for incomplete year.

A provisional analysis of death rates in four cities for the first year illustrates the type of results which will be obtained. In general, these provisional death rates for adults 15-74 years of age indicate that there are variations in malignant neoplasms by site, in types of cardiovascular diseases and in other causes of mortality that warrant further investigation. As an example, causes of the exceedingly high death rates from cancers of the lung and bladder in males in La Plata, Argentina, could be explored.

Sufficient additional information has been obtained through interviews of physicians, and through laboratory and autopsy findings to indicate the value of establishing methods of supplementing official death certificates with such additional data which may not be available to the certifying physician at the time of death. Mortality statistics can serve an increasingly important role in research and health programs if steps are taken now to build soundly for the future.

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