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#1431

INTER-AMERICAN INVESTIGATION OF MORTALITY IN CHILDHOOD

Report for January 1-June 30, 1969
to the
Agency for International Development

During this six-month period, field work was carried on in all 13 projects in Latin America. Letter agreements for the last 12 months of the field work have been sent to the responsible authorities and are in the process of being signed. The original design of the Investigation called for a project in the United States to be funded from other sources. In January, a project was initiated in a six-county area around San Francisco, California, with a grant from the U.S. Children's Bureau. Another project is being developed in North America, in Canada. This will be a small project in the Province of Quebec. These additions to the Investigation will make possible valuable comparisons between areas and will contribute greatly to its usefulness.

Important activities with regard to the 13 projects included in the AID grant are described in this report.

Activities of Staff of Central Office

During January, two additional members, Miss Ann Dillon and Miss Linda Kerstetter, were added to the Gentral Office staff with responsibility for field activities with questionnaires and recording of births and deaths and for processing of data. Miss Dillon assisted the field staff in six projects in their procedures with collection of data in a seven week field trip from January to March and will visit the remaining seven projects in another field trip in August, 1969. Processing of data regarding deaths was begun from questionnaires received currently in the Central Office.

Dr. Serrano and/or Dr. Puffer visited all projects in this period in order to insure the inclusion of all births and deaths and diagnostic data of high quality. In these projects, 192 persons were employed as of December 1968. Of these, 87 are physicians and 55 are nurses or

social workers, who are demonstrating great interest in finding solutions to their serious problems.

Three national coordinating meetings were held in which principal collaborators, officials of the ministries of health and medical educators participated. The purpose of the meeting was to insure that the projects have strong support from these agencies and that the results of these community-centered research projects will be fully utilized for the improvement of programs. The dates of these meetings were as follows:

Kingston, Jamaica	January 31, 1969
Rio de Janeiro, Brazil	March 7, 1969
Buenos Aires, Argentina	March 10, 1969

These meetings resulted in several important actions. In Argentina, for example, two residents in pathology were assigned to assist with the project in San Juan.

Progress was made in the development of guidelines and procedures for classifying the underlying and associated causes of death. A section on multiple causes was distributed for addition to the Manual of Procedures. Dr. Darío Curiel, the medical referee, assisted as a temporary adviser for the two-week period, 13 to 27 of April. A contract has been prepared for his assistance in classifying causes of death currently.

During the field visits, data were tabulated and provisional death rates were calculated in each project in order to judge the completeness of birth and death files. On the basis of the rate in the United States as a standard, 10 deaths under one day of age per 1,000 live births, some deficiencies in deaths at this age were noted. Methods for obtaining knowledge of these live births and subsequent infant deaths are being established. The use of WHO definitions is being stressed, especially at meetings of midwives, obstetricians and hospital staffs.

Use of Results for Measles Vaccination Program

One of the first fields in which the results are being used in local programs is that of immunization against measles. In the first few months of the Investigation, high proportions of the deaths of children 6 months to 4 years of age in Recife and La Paz (49 per cent and 39 per cent respectively) were due to measles; consequently, measles vaccination programs were recommended. Vaccine can be obtained without cost from the Pan American Development Foundation and Pitman-Moore Drug Company, a division of Dow Chemical Company, has offered its

assistance. Programs are being proposed for Recife and La Paz with measles vaccine provided by Pitman-Moore. Fortunately the health officials in the State of São Paulo, Brazil have announced a state-wide vaccination program of children from 7 to 24 months of age.

The home visits for vaccination against measles will be used to discover infants and prepare records of live births previously not included in the files in Recife and Ribeirão Prêto.

Preliminary Results

In preparation for the Research Project Review of June 18, 1969 of the Agency for International Development, preliminary analyses were made of some of the data. For the detailed review, Summary of Project from Conception, the material was presented through a series of slides. For the open meeting at the State Department, selected data were shown under the heading, Preliminary Results. The written commentaries as well as the tables and graphs used in the presentations are given as an annex to this report.

Important knowledge and contributions are becoming evident at this stage of the Investigation in four medical fields. These are described briefly in the following paragraphs.

Perhaps the most important finding thus far is recognition of the seriousness of nutritional deficiency. In 72 per cent of the deaths of children 6 months to 4 years of age in the study area in Recife, nutritional deficiency was the underlying cause or associated cause of death; in La Paz, in 63 per cent, in Jamaica in 44 per cent, and in Santiago in 42 per cent. In Recife, of the 114 deaths with nutritional deficiency as the underlying or associated cause, 46 or 40 per cent were classed as protein malnutrition, kwashiorkor, while in Jamaica only 5 out of 46 or 11 per cent were kwashiorkor. Tabulations for the first six months were made from the samples of living children in three areas. In Recife, 64 per cent of the children had first, second or third degree malnutrition; in Jamaica 47 per cent and in São Paulo 36 per cent.

The reports presented at the Special Session of Perinatal Factors Affecting Human Development of the Advisory Committee on Medical Research of the Pan American Health Organization on June 10 and 11, 1969 indicate the consequences to the offspring of mothers with protein deficiency during pregnancy, that maternal deprivation of protein seems to affect the mental development of the offspring.

The second important result is evidence of the seriousness of some of the infectious diseases in young children in Latin America, particularly measles. This subject and the action being taken with regard to measles has already been described in this report.

The third relates to differences in patterns of mortality among the areas of the Investigation. For Santiago, Jamaica and Recife, the areas in which data have been analyzed, marked differences seem to exist in these patterns with a variety of causes involved. However, tabulation of data for additional months and for all the projects is advisable before conclusions may be drawn.

The study of congenital anomalies, the fourth finding stressed, is providing new information in this field. All anomalies known to be present at death are coded and classified in relation to the process of death. These provisional data raise many questions and point to needs for further data and research, for example, regarding the prevalence of Down's disease, cretinism, congenital heart anomalies, etc.

As planned and predicted, the Investigation is having a favorable impact in the improvement of standards in related fields in the areas and countries in which it is being conducted.

Second Grant Award

In May, 1969, the second award of a grant for the Investigation was signed. As a result, letter agreements were prepared for the field work for the final 12 months. The first agreements were for 15 months. The field work is planned for a period of 27 months and should be completed in November, 1970. The analysis of data is expected to take another year and should be finished by March, 1972.

Other

The enclosed paper, Initial Phases of the Inter-American Investigation of Mortality in Childhood, was released in January, 1969 and is being included in the English edition of the Boletín for 1968. As this paper was published in Spanish in the Boletín for August 1968, a progress report was published in the April 1969 issue as a Reseña (copy attached).

PAN AMERICAN HEALTH ORGANIZATION
Pan American Sanitary Bureau, Regional Office of the
WORLD HEALTH ORGANIZATION

Inter-American Investigation of Mortality in Childhood

RESEARCH PROJECT REVIEW,* JUNE 18, 1969
U.S. Agency for International Development

PRELIMINARY RESULTS

At this time, some of the preliminary results of the Inter-American Investigation of Mortality in Childhood are being used for improvement of local procedures; others illustrate problems to be solved currently and also are demonstrating the value of the data not only to the local groups but also to national health authorities and to the Pan American Health Organization.

I. NEW KNOWLEDGE

A. Nutritional Deficiency:

Perhaps the most important finding thus far is recognition of the seriousness of nutritional deficiency and the high proportion of deaths of children in which nutritional deficiency is the underlying or associated cause of death. In the past, official mortality statistics have failed to reveal the size of this problem. However, this Investigation as well as the adult study indicate clearly that additional information is available in hospital and autopsy records which, when combined with other data, makes possible a more precise definition of the underlying and associated causes of death.

Although 13 areas in Latin America are included in the Investigation, the preliminary data on nutritional deficiency will be shown today for 4 areas. The 13 areas are indicated on this map of the continent (Figure 1). The project in Jamaica (in the Caribbean), which includes Kingston and the rest of the Parish of St. Andrew; three sectors of Recife, located in the state of Pernambuco in northeast Brazil; the city of La Paz, a high altitude area in Bolivia; and Santiago in Chile are the areas included in this analysis for the first few months. Some preliminary findings will also be given for São Paulo in Brazil and for San Juan Province in Argentina. Although the grant provided only for areas in Latin America, the inclusion of an area in the United States was desired. Fortunately, the U.S. Children's Bureau is supporting a project in California comprising 6 counties in the Bay Area.

Figure 18 shows that in 72 per cent of the deaths in the study area in Recife nutritional deficiency was the underlying or associated cause of death; in La Paz in 63 per cent; in Jamaica in 44 per cent; and in Santiago in 42 per cent. On the basis of the underlying cause, only 11 per cent of the deaths in Recife were assigned to nutritional deficiency. In Recife,

*Presented by Ruth R. Puffer, Chief, Health Statistics Department

of the 114 deaths with nutritional deficiency as the underlying or associated cause, 46 (or 40 per cent) were classed as protein malnutrition, kwashiorkor, while in Jamaica only 5 out of 46 or 11 per cent were kwashiorkor (Figure 19).

In Recife where nutritional deficiency is so frequent there was practically no difference between its association with infectious diseases and with other causes of death. However, in Santiago a slight difference was noted - 56 per cent of deaths from infectious diseases were associated with nutritional deficiency whereas only 32 per cent of deaths from other causes had such association (Figure 20).

Tabulations regarding nutritional status have been made for the first 6 months from the samples of living children in Recife, Jamaica and São Paulo (Figures 21 and 22). In Recife, 64 per cent of the children had first, second or third degree malnutrition, in Jamaica 47 per cent, and in São Paulo 36 per cent. Only in Recife, however, was the proportion with third degree malnutrition very high - 6 per cent. An additional 19 per cent had second degree malnutrition or one-fourth had moderate or severe malnutrition.

The samples will provide considerable data regarding households in these 13 areas, such as environmental conditions and educational levels, and also detailed data regarding living children and their mothers. A wealth of information is being collected.

At the Special Session on Perinatal Factors Affecting Human Development of the Advisory Committee on Medical Research of the Organization held on June 10 and 11, 1969 data were presented on the effect of protein deprivation in the pregnant woman on growth and development and the intelligence quotient of the child. Winick stressed the tremendous public health implications of the research. These findings are new but are most important as they also indicate the seriousness of protein deficiency and the need for greater understanding of the factors responsible for optimal reproduction.

Our Investigation is contributing in the definition of the problem of nutritional deficiency, and there is no doubt that health programs in many areas of the world should give a very high priority to nutrition programs.

B. Mortality from Measles:

A second important result of our preliminary analyses is evidence of the seriousness of measles in Latin America in young children.

Figure 13 gives the high proportion of deaths due to measles of children 6 months through 4 years of age in Recife and in La Paz - almost half the deaths in Recife (49 per cent) and 39 per cent in La Paz.

A graph (Figure 15) shows the total number of deaths and those due to measles for four age groups in La Paz. Of 99 deaths of children one year of age in La Paz, 39 were due to measles.

An analysis of associated as well as underlying causes of death revealed that two-thirds of these deceased children in both areas had nutritional deficiency also as an associated cause of death - 69 per cent in Recife and 67 per cent in La Paz (Figure 14).

This finding of excessive mortality from measles in the Investigation was reported in the Special Meeting of Ministers of Health held in Buenos Aires in October 1968. I quote from the Final Report of the Meeting:

> "As in the case of poliomyelitis, the production of a modified live virus vaccine with considerable immunizing capacity has opened up the possibility of controlling measles. In some countries in the Americas as has been demonstrated by the Inter-American Investigation of Mortality in Childhood, measles is a major cause of death in children under five years of age and is aggravated by the generalized malnutrition of the population. . . .

RECOMMENDATION

> "1. That the Pan American Health Organization assist the Governments in the planning and conduct of national measles vaccination programs to protect the largest possible number of susceptible children under five years of age. . . . "

We recommended the introduction of vaccination against measles to our principal collaborators in November 1968, and in February 1969 encouraged the use of measles vaccine which could be obtained without cost from the Pan American Development Foundation here in Washington.

In April, three representatives from Pitman-Moore Drug Company, a division of Dow Chemical Company, visited the Organization expressing their interest in our recommendations on measles vaccination for the continent and offered their assistance. Figure 16 gives details on the proposed program in Recife, Brazil - 117,000 children from 8 months through 3 years of age (90 per cent of the children in that age range) would be vaccinated, with children in the three areas of the Investigation first. In addition, 36,000 children who reach 8 months of age would be vaccinated in the maintenance phase.

For this program, the state of Pernambuco will contribute $15,000, $7,000 is being provided by another source, and Pitman-Moore Division of Dow Chemical has been asked to supply 168,000 doses of vaccine. We have been informed that 40,000 doses have already been designated for this program. A similar proposal will be submitted for a program in La Paz.

When we were first told of deaths from measles in Recife, they stated that deaths occurred every year. Now that we have the reports for the year 1968, it is likely that 1968 was an epidemic year in a serious endemic situation, for many measles deaths have been occurring each year of young children.

In discussing plans for this measles vaccination program in Recife, we recommended to the health authorities that this campaign be used to find those births that are missing. In home visits to vaccinate the children, records are to be completed for all births that have occurred during the period of the study - partly for use in the maintenance phase but also for the complete file of births needed for our Investigation.

Fortunately the health officials in the state of São Paulo announced a statewide vaccination program on March 3, 1969 of children from 7 to 24 months of age. Also the collaborator in Ribierao Preto will use the vaccination program there to find births.

C. Various Patterns of Mortality:

The patterns of mortality in Santiago, Jamaica and Recife appear to be distinctly different. Data are available for underlying causes of death for the same age group, 6 months - 4 years, used for the presentation of findings regarding measles and nutritional deficiency and are shown in Figure 23. In Recife the infectious diseases were responsible for 69 per cent of the deaths. In Santiago, diarrhea, diseases of the respiratory system, diseases of the nervous system, congenital anomalies and external causes each contributed more than 10 per cent, and in Jamaica the two causes, diarrhea and nutritional deficiency, were reponsible for nearly half of the deaths.

On the basis of the combination of underlying and associated causes in Santiago, 59 per cent of the deceased children had respiratory diseases, 42 per cent nutritional deficiency, 31 per cent diarrhea and 30 per cent diseases of the nervous system. In Jamaica, in contrast, 57 per cent had diarrhea.

Figure 24 gives provisional data on underlying causes for deaths under 6 months of age for Santiago and Jamaica. In this period, perinatal causes were responsible for one-third of the deaths in Santiago but for one-half in Jamaica. In the 1965 Revision of the International Classification which has been used, the section for perinatal causes has been expanded and improved. The conditions in the mother and the child as underlying or associated causes are being analyzed. Diseases of the respiratory system were responsible for a high proportion of deaths in this age group in Santiago.

In general from these provisional tabulations for deaths under 5 years of age, the combined data from hospital and autopsy records and from other sources have shown a great variety of causes involved and marked differences in these areas. Several causes considered rare have been noted in the first 3 to 6 months. Tetanus caused four deaths in Jamaica, congenital cretinism caused three deaths in Santiago, and diseases of the nervous system (frequently meningitis) caused several deaths in these two areas. However, tabulations of data for additional months and for all the projects are advisable before conclusions may be drawn.

D. Study of Congenital Anomalies:

Congenital anomalies can be studied in this Investigation. Figure 25 shows that of the 420 deceased children in Santiago, 66 or 16 per cent had one or more congenital anomalies; in 40, the anomaly was the underlying cause of death, in 12 it was an associated cause, and in 14 the anomaly, although present, was unrelated to the cause of death. Nineteen of these deceased children had anomalies of the circulatory system and these were usually considered the underlying cause of death. The anomalies of the musculoskeletal system were usually an unrelated cause. These 66 children had 95 anomalies coded. (The maximum coded was 5 per child.)

Down's disease (mongolism) was reported as the major anomaly in deaths of 9 children. Another death included in this table was due to a congenital heart defect of a child with evidence of mongolism.

The proportion of deceased children with congenital anomalies was practically the same in Jamaica, 13 per cent, but the distribution by system involved differed. Four deceased children had Down's disease. One child had multiple anomalies due to the rubella syndrome.

These provisional data raise many questions and point to needs for further data and research regarding the prevalence of mongolism and cretinism, for example.

II. BREAKTHROUGHS

The next subject in the outline is breakthroughs. At this time perhaps it is best to consider our findings as contributions rather than breakthroughs. These contributions, which have just been given through the series of slides, are summarized as follows:

1. Recognition of the seriousness of nutritional deficiency as a health problem.

2. Rapid introduction of measles vaccination programs.

3. Development of methods of measuring nutritional deficiency and other causes of mortality by linking hospital, autopsy and other clinical data and analysis of associated as well as underlying causes.

4. Introduction of probability sampling in Latin America for knowledge of health problems.

5. Introduction of community centered research by medical schools.

III. EVIDENCE OF USABILITY OF RESULTS

A few examples will be described of the use of the results already made in several areas.

1. Action taken on measles vaccination program. This action has already been described. Other preventive programs are indicated such as for tetanus and diphtheria immunization. Action has been approved for a preventive program against tetanus in Jamaica.

2. Use of first results for improvement of vital statistics. To judge the accuracy of the data being collected, infant death rates were calculated for the first few months in each area. As a standard, the death rate under one day in the United States was used. This rate has remained at approximately 10 deaths per 1000 live births for 15 years.

As shown in Figure 9, in the project in Jamaica the death rate in the first day of life was 7.5 per 1000 live births, which is less than the rate of 10 in the United States. This indicates that further efforts are necessary to find all deaths in the first few hours of life. The rates for the other age groups are in excess of those in the United States. The large maternity hospital in Kingston has now changed procedures and introduced the WHO definitions of a live birth and a fetal death.

The denominator, live births, was estimated for the calculation of provisional death rates in these age groups. We do not have as yet the correct numbers of live births; additions are being made currently to the files.

In San Juan, Argentina (Figure 10) deaths in the first day of life were missing when the study started but now are being found. The Director of the Provincial Health Service, Dr. Martínez Colombres, also the principal collaborator, promulgated new regulations on birth and death registration. As a result of findings in hospitals, he issued a fine manual of Standards and Procedures for the Functioning of Hospital Registers of vital statistics.

In every project, the local staffs are searching for deaths which occur in the first day of life and are taking the necessary steps to have complete information for all births and deaths. Thus the improvement of vital statistics systems is already under way.

3. Use of results for national health planning. These results are being utilized in local and national health planning. One of the principal collaborators has already made use of the results in the plans for reform of health services under way in Brazil. The principal collaborator of this project was asked by the Minister of Health to elaborate a plan of Maternal and Child Health. This plan includes measures derived from the early results of the Investigation such as improvement of vital statistics and preventive campaigns against infectious diseases and nutritional deficiency.

Planners cannot be content with the poor quality of statistics of the past but must become aware of the value of research programs such as this for knowledge of the problems.

4. At the international level these results can reorient our health programs. The Pan American Health Organization is extending and broadening its nutrition program. The Special Session on Perinatal Factors Affecting Human Development of the Advisory Committee on Medical Research on June 10 and 11, 1969 made an outstanding contribution. However, the findings reported there of the effect of protein deprivation in the pregnant woman on development of the fetus or child including intelligence are new, and longitudinal research is recommended for greater understanding of the relationship.

5. Our Investigation will serve the World Health Organization and contribute to the Ninth Revision of the International Classification of Diseases. The results indicate the advisability of study of multiple causes and of the combination of hospital and autopsy data with that on the death certificate for knowledge of the underlying and associated causes of death.

IV. ADDITIONAL ACTIONS REQUIRED

Four types of actions required are listed in Figure 29.

A. Action is required for the registration of vital events by health authorities. Definite steps have been taken in Argentina and are needed in all areas and countries. Also the application of WHO definitions by all member states is important.

B. Improvement of the quality of medical records in hospitals and health centers is clearly indicated. The staff of consultants of the Organization in this field is being expanded and training programs are under way. But much more is needed at the national levels for programs to improve the hospital systems.

C. Each area needs the identification of its own health problems for planning of maternal and child health programs illustrated by the example of Recife already given. In addition to reference to national

health planning by the collaborator in Recife, a member of the team is using the university TV station to deliver educational programs, particularly for prevention of malnutrition and infectious diseases.

D. Pathological services are being extended in the study areas. For example, in Argentina, as a result of the meeting on March 10, 1969, two resident pathologists from the Medical School in Mendoza were assigned to assist in San Juan. Also in other areas pathologists are being obtained to provide services. But post-graduate centers need to contribute also by training pediatric pathologists.

In summary, this research program is directed to the immediate application of the findings as they unfold during the course of the Investigation. This project is having an important impact on developments in the Region.

PAN AMERICAN HEALTH ORGANIZATION
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Inter-American Investigation of Mortality in Childhood

RESEARCH PROJECT REVIEW; *JUNE 18, 1969
U.S. Agency for International Development

SUMMARY OF PROJECT FROM CONCEPTION

I. RATE OF PROGRESS

A. Background:

The Inter-American Investigation of Mortality, carried out under the auspices of the Pan American Health Organization in the years 1962-1967, clearly demonstrated the value of coordinated continental research. Each of the 12 cities included in the study appeared to have its distinct pattern of mortality in adult life (15-74 years of age). The Investigation indicated that additional information was available in hospital and autopsy records which, when combined with other data, made possible a more precise definition of the cause of death.

Mortality in infancy and early childhood is known to be responsible for excessive death rates in Latin American countries. Coordinated continental research was proposed in order to gain a greater understanding of the problems in infancy and early childhood, in both urban and rural areas in the Americas. The development of such coordinated research was one of the recommendations made by the collaborators who took part in the Investigation of Mortality in Adults.

The current Investigation was planned to take advantage of the methods and experience already gained in coordinated research and for collection of data regarding deaths of children under 5 years of age for a two-year period in selected areas. However, the study of nutritional, sociological and environmental factors seemed necessary as well as the inclusion of areas outside of the large cities. Also, it was considered advisable to analyze the associated as well as the underlying causes of death. To study and compare biologic and social differences in those who die in early childhood and in those who live in the same communities, data on living children under 5 years of age are being collected through probability sampling of households.

In each area selected for study, 1,300 to 4,000 deaths will be investigated during the two years. Similar information, which includes pregnancy histories, condition of the infant at birth, breast feeding, growth and development and environmental conditions, is being collected monthly for living children through samples of households in each of 24 consecutive months. In all, data will be collected on over 30,000 deaths and 20,000 living children under 5 years of age. This Investigation is far more ambitious than the previous study of mortality in adult life.

*Presented by Ruth R. Puffer, Chief, Health Statistics Department

The proposal for the Investigation was submitted by the Organization to the U.S. Agency for International Development in January 1966, and a grant for the planning phase was awarded the following July.

After the exploration of possible areas and collaborators, the 13 areas shown in Figure 1 were selected.

Jamaica	Kingston and the rest of the parish of St. Andrew
Mexico	city of Monterrey
El Salvador	city of San Salvador and 3 villages
Colombia	Cali (one in two deaths) and small community of Florida Cartagena Medellín (one in three deaths)
Bolivia	La Paz and small community of Viacha
Chile	Santiago (one in five sample changed to one in three) and four rural sectors
Argentina	Province of San Juan and 7 Departments of the Province of El Chaco in northern part of Argentina
Brazil	Recife (three sectors) city of São Paulo (1 in 4.25 sample) Ribeirão Prêto and 6 villages

Although the grant provided only for areas in Latin America, the inclusion of an area in the U.S. was desired. Fortunately the U.S. Children's Bureau is supporting a project in California comprising 6 counties in the Bay Area. Also, a small project is being planned in the Province of Quebec in Canada by the new Medical School of the University of Sherbrooke.

B. Timetables:

In considering the rate of progress of the Investigation, knowledge of the timetables is advisable. Figure 2 gives the divisions of the entire project from July 1966 through March 1972. This includes an extended planning phase and the operation of the Investigation proper.

Figure 3 gives the detail of the planning phase, which is an important feature of coordinated research. A small Working Group of potential collaborators for pilot testing reviewed draft questionnaires for the investigation of deaths and of samples in October 1966. Pilot testing was carried on in 5 areas in Latin America and in North Carolina in the U.S. in 1967 and 1968.

As soon as the grant for the Investigation was awarded in March 1968, a conference of principal collaborators for the 13 areas was held in Cali, Colombia for definitive plans for the conduct of the study. Training of medical interviewers was also carried out in Ribeirão Prêto, Brazil.

In preparation for the field work, probability samples were designed, personnel were selected and trained, agreements with Ministers of Health and Deans of Medical Schools were signed, and procedures for obtaining births and deaths were developed.

A second planning conference in October 1968 was valuable for discussion and solution of problems encountered and development of procedures with diagnostic information and designation of methods of selecting underlying and associated causes of death.

The Manual of Procedures was distributed in May 1968 with an additional section on multiple causes in March 1969.

The timetable of the Investigation is shown in Figure 4 with field work scheduled from May 1968 to November 1970. In the Central Office, the material is being processed and analyzed, which will probably take until March 1972, the termination date of the grant.

Figure 5 shows the months of initiation and of operation of each of the 13 projects. The first project to begin operation was in Jamaica in May 1968 - only two months after the grant was awarded - with the selection and training of personnel in that month. Data will be collected in the following 24 months, and two months are allowed for completion of all questionnaires. Seven projects started in June 1968, two in July, two in August and one in September. The entire project was delayed approximately 6 months from the original proposal for initiation of work on January 1, 1968 (due to unavoidable delay in the signing of the award of grant).

During this period of time, each death to be included in the Investigation, known from official or non-official sources, is investigated. The first three pages of the questionnaires are completed by a nurse or social worker in the home. A physician obtains the medical data from hospitals, health centers, private physicians, families and autopsies.

The large number of field personnel employed in these 13 projects is shown in Figure 6 - in all, 192 in December 1968: 87 physicians, including the principal collaborators, pediatricians, pathologists and obstetricians; 55 nurses and social workers; and 50 others, including statisticians and secretaries. The principal collaborators who are in charge of these teams are physicians who hold positions of responsibility, as dean of a medical school (Cartagena), professors of preventive

medicine, pediatrics and statistics and a director of a Provincial Health Department. All except the last one are members of Faculties of Schools of Medicine or Public Health. These physicians are demonstrating a tremendous interest in the many problems encountered in studying mortality in childhood and in the use of sampling as a tool in this research.

Methods of coordination of the projects at continental, national, and local levels have been developed (Figure 7). At the continental level, conferences have been valuable in bringing together the principal collaborators for joint development of methods of procedures. Central Office and field staff of the Organization assist with coordination.

National coordination has been important in bringing together principal collaborators, officials of the Ministries of Health, and medical educators. Meetings were held in Colombia, Jamaica, Brazil, and Argentina in which great interest was expressed in supporting the Investigation and in using the results as soon as they become available. The Investigation is being discussed at meetings of Public Health and Medical Associations. For example, Dr. Serrano participated in an active discussion of the project at a meeting of the Public Health Association of Colombia last December.

Committees are serving for local coordination in many areas. Also, weekly staff conferences are held in which specialists review the medical data on the questionnaires and determine the underlying and associated causes of death.

In addition to the types of coordination just described, technical assistance is rendered to the field projects by consultants and staff, as shown in Figure 8.

Eighteen visits were made for the development of sampling by four consultants: Martin Frankel, a member of the Institute for Social Research of the University of Michigan, and others with similar training in sampling of that university.

Also there were 7 visits for improvement of medical records in hospitals, 11 visits in the interest of complete data on births and deaths (this means establishing procedures to find every birth and death that occurs in the area), and 27 visits in relation to the medical aspects and general conduct of the projects.

II. IDENTIFIABLE RESULTS

At this time, we are able to give you some preliminary results from the analysis of data for the first few months. You will appreciate that these data are provisional and are being used principally for improvement of local procedures. However, the analyses illustrate problems

to be solved currently and also demonstrate the value of the data, not only to the local groups but also to national health authorities and to the Organization.

A. Determination of Death Rate and Birth Rate:

First of all the problem of obtaining complete files of births and deaths will be presented.

Death rates for the United States are serving as standards for comparison with those obtained in the projects. Particular emphasis is placed on the death rate under 1 day of age which in the United States has remained at approximately 10 deaths per 1,000 live births for 15 years. The rates for the United States by age groups under 5 years of age are shown in Figure 9.

In the project in Jamaica, the death rate in the first day of life is 7.5 per 1,000 live births, which is less than the rate of 10 in the United States (Figure 9). This indicates that further efforts are necessary to find all deaths in the first day of life. The rates for the other age groups are in excess of those in the United States. The large maternity hospital in Kingston has now changed procedures and introduced the WHO definitions of a live birth and a fetal death.

The denominator, live births, was estimated for the calculation of these provisional infant death rates. We do not have as yet the correct numbers of live births; additions are being made currently to the files from non-official as well as official records.

In San Juan, Argentina (Figure 10), deaths in the first day of life were missing when the study started but are now being found. The director of the Provincial Health Service, Dr. Martínez Colombres, also the principal collaborator, promulgated new regulations on birth and death registration. As a result of findings in hospitals, he issued a fine manual of Standards and Procedures for the Functioning of Hospital Registers of vital statistics.

In Brazil (Figure 11), excellent field work in Recife in the three sectors of the city (Beberibe, Encruzilhada, and Casa Amarela) resulted in a rate of 10 in the first day of life and in São Paulo in a rate of 12. Intensive efforts are being exerted to find all deaths in the first day of life. Unfortunately, death rates in Recife after the neonatal period are excessive, and the causes for this will be shown later.

In addition to the problems of registration of infant deaths, the development of a complete birth file is difficult. In Recife, through daily visits by nurses to hospitals and midwives, cards have been prepared currently for live births. The first analyses in Recife for

6 months (Figure 12) showed 6,600 births with 6,300 in hospitals and 300 at home. The estimated birth rate was 33 per 1,000 population. Using the data collected in the sample of living children, the estimated birth rate was higher, namely 41, and 24 per cent of the births had been delivered at home. Also, of deaths in the study, 23 per cent of the births occurred at home. The excellent nurse in charge was very upset when she saw this table. However, new approaches are being used to find the rest of the births which occurred in homes.

Thus because of the problem of the correct denominator (all live births), death rates have not been calculated for the remaining analyses to be presented here.

B. Mortality from Measles:

Now we will return to the causes of the excessive mortality in Recife. In the second month of the study, August 1968, the local staff were most concerned because so many deaths were occurring, almost twice as many as expected.

On investigation they soon learned to their surprise that these excess deaths were due to measles. They brought preliminary data to the meeting of collaborators in Caracas in October. The Collaborator from La Paz, Dr. Mendizábal, immediately reported a similar situation in his project in Bolivia.

Figure 13 gives the high proportion of deaths due to measles of children 6 months through 4 years of age in Recife and in La Paz - almost half the deaths in Recife (49 per cent) and 39 per cent in La Paz.

The graph, Figure 15, shows the total number of deaths and those due to measles for four age groups in La Paz. Of 99 deaths of children one year of age in La Paz, 39 were due to measles.

An analysis of associated as well as underlying causes of death revealed that two-thirds of these deceased children in both areas had nutritional deficiency also as an associated cause of death - 69 per cent in Recife and 67 per cent in La Paz (Figure 14).

This finding of excessive mortality from measles in the Investigation was reported in the Special Meeting of Ministers of Health held in Buenos Aires in October 1968. The Final Report of the Meeting contains the following and I quote from the Report:

"As in the case of poliomyelitis, the production of a modified live virus vaccine with considerable immunizing capacity has opened up the possibility of controlling measles. In some countries in the Americas, as has been demonstrated by the Inter-American Investigation of Mortality in Childhood, measles is a

major cause of death in children under five years of age and is aggravated by the generalized malnutrition of the population. The large-scale use of measles vaccine makes it possible to interrupt the epidemic outbreaks which occur every two or three years. The seriousness of respiratory complications, in particular laryngitis and pneumonia, and of encephalitic complications has become apparent. The more undernourished the children, the greater the lethality of measles.

"It is hoped that vaccine production will be increased and the unit cost reduced, so that a larger proportion of susceptible persons in each country can be covered.

RECOMMENDATIONS

"1. That the Pan American Health Organization assist the Governments in the planning and conduct of national measles vaccination programs to protect the largest possible number of susceptible children under five years of age.

"2. That the Pan American Sanitary Bureau promote the production of measles vaccine so as to reduce its cost and thereby permit the routine use of this vaccine to protect susceptible persons."

The reduction of cases of measles in the United States was one of the 4 important evidences of progress reported by Dr. Stewart, Surgeon-General of the U.S. Public Health Service, to that meeting. Chile has been using measles vaccine since 1963; a definite reduction in cases and deaths from measles was shown in Facts on Health Progress. Vaccine diluted to one-third has been used in Peru with success.

We recommended the introduction of vaccination against measles to our principal collaborators in November 1968. In February 1969 we again wrote to them to encourage the use of measles vaccine which could be obtained without cost from the Pan American Development Foundation here in Washington.

Dr. Serrano, Miss Dillon and I visited the projects in February and March of this year. Considerable publicity was given to our meeting in Rio de Janeiro with officials of the Ministry of Health and leaders in medical education. Headlines stressed mortality from measles and undernutrition. Dr. Figueira requested measles vaccine from the Pan American Development Foundation for use in Recife.

In April, three representatives from Pitman-Moore Drug Company, a division of Dow Chemical Company, visited the Organization expressing their interest in our recommendations on measles vaccination for the

continent and offered their assistance. Figure 16 gives details on the proposed program in Recife, Brazil - 117,000 children from 8 months through 3 years of age (90 per cent of the children in that age range) would be vaccinated, with children in the three areas of the Investigation first, namely in Beberibe, Encruzilhada, and Casa Amarela. In addition, 36,000 children who reach 8 months of age would be vaccinated in the maintenance phase in Recife.

For this program, the state of Pernambuco will contribute $15,000, $7,000 is being provided by another source, and Pitman-Moore Division of Dow Chemical has been asked to supply 168,000 doses of vaccine. Dr. Serrano has been informed unofficially that 40,000 doses have already been designated for this program. A similar proposal will be submitted to Pitman-Moore for a program in La Paz.

When we were first told of deaths from measles in Recife, they stated that deaths occurred every year. Now that we have the official reports for the year 1968, it is likely that 1968 was an epidemic year in a serious endemic situation, for many measles deaths have been occurring each year of young children.

In discussing plans for this measles vaccination program in Recife, we recommended to the health authorities that this campaign be used to find those births that are missing. Dr. Eliane of the Pernambuco Department of Health supported this introduction of measles vaccination in conjunction with visits to the homes to find births. In home visits to vaccinate the children, records are to be completed for all births that have occurred during the period of the study - partly for use in the maintenance phase but also for the complete file of births needed for our Investigation.

Fortunately the health officials in the state of São Paulo announced a state-wide vaccination program on March 3, 1969 of children from 7 months to 24 months of age (Figure 17). Also the collaborator in Ribeirão Prêto will use the vaccination program there to find births.

C. Nutritional Deficiency:

Dr. Serrano has been classifying the underlying and associated causes of death on the questionnaires from these areas and provisional data will be shown in a few slides to illustrate the kinds of results we will obtain. This presentation of results is for the same age group as that used in the tabulation of deaths from measles, 6 months through 4 years of age.

In the study area of Recife, in 72 per cent of the deaths nutritional deficiency was the underlying or associated cause of death; in La Paz in 63 per cent; in Jamaica in 44 per cent; and in Santiago in 42 per

cent (Figure 18). On the basis of the underlying cause, only 11 per cent of the deaths in Recife were assigned to nutritional deficiency. In Recife, of the 114 deaths with nutritional deficiency as the underlying or associated cause, 46 (or 40 per cent) were classed as protein malnutrition, kwashiorkor. In Jamaica only 5 of 46 deaths or 11 per cent were kwashiorkor (Figure 19).

In Recife where nutritional deficiency is so frequent there was practically no difference between its association with infectious diseases and with other causes of death. However, in Santiago a slight difference was noted - 56 per cent of deaths from infectious diseases were associated with nutritional deficiency whereas only 32 per cent of deaths from other causes had such association (Figure 20).

Tabulations regarding nutritional status have been made for the first 6 months from the samples of living children in Recife, Jamaica and São Paulo (Figures 21 and 22). In Recife 64 per cent of the children had first, second or third degree malnutrition, in Jamaica 47 per cent, and in São Paulo 36 per cent. Only in Recife, however, was the proportion with third degree malnutrition very high - 6 per cent. An additional 19 per cent had second degree malnutrition or one-fourth had moderate or severe malnutrition.

The samples will provide considerable data regarding households in these 13 areas, such as environmental conditions and educational levels, and also detailed data regarding living children under 5 years and their mothers. A wealth of information is being collected which could not be analyzed for this meeting.

The sampling frame is also being used for additional research projects, such as a prospective study of vital events and abortions in 2,500 families in Cali, Colombia, a detailed study of the children under 5 years of age by a medical nutritionist in Sao Paulo, and a study of medical care of these children in Santiago.

D. Patterns of Mortality:

Data are also available for underlying causes of death for the same age group, 6 months - 4 years, used in the presentation of findings regarding measles and nutritional deficiency. The patterns of mortality in these three cities were distinctly different (Figure 23). In Recife the infectious diseases were responsible for 69 per cent of the deaths. In Santiago, diarrhea, diseases of the respiratory system, diseases of the nervous system, congenital anomalies and external causes each contributed more than 10 per cent, and in Jamaica diarrhea and nutritional deficiency were responsible for nearly half of the deaths.

On the basis of the combination of underlying and associated causes in Santiago, 59 per cent of the deceased children had respiratory diseases, 42 per cent nutritional deficiency, 31 per cent diarrhea and 30 per cent diseases of the nervous system. In Jamaica in contrast 57 per cent had diarrhea.

Figure 24 gives provisional data on underlying causes for deaths under 6 months of age for Santiago and Jamaica. In this period, perinatal causes were responsible for one-third of the deaths in Santiago and for one-half in Jamaica. In the 1965 Revision of the International Classification which has been used, the section for perinatal causes has been expanded and improved. The conditions in the mother and the child as underlying or associated causes are being analyzed. Diseases of the respiratory system were responsible for a high proportion of deaths in this age group in Santiago.

In general from these provisional tabulations for deaths under 5 years of age, the combined data from hospital and autopsy records and from other sources have shown a great variety of causes involved and marked differences in these areas.

Several causes considered rare have been noted in the first 3 to 6 months: tetanus caused 4 deaths in Jamaica, congenital cretinism caused 3 deaths in Santiago, and diseases of the nervous system (frequently meningitis) caused several deaths in these two areas. However, tabulations of data for additional months and for all of the projects are advisable before conclusions may be drawn.

In Jamaica, a country-wide preventive program against tetanus neonatorum is being planned.

E. Congenital Anomalies:

Congenital anomalies can be studied in this Investigation. Figure 25 shows that of the 420 deceased children in Santiago, 66 or 16 per cent had one or more congenital anomalies; in 40, the anomaly was the underlying cause of death, in 12 it was an associated cause, and in 14 the anomaly, although present, was unrelated to the cause of death. Nineteen of these deceased children had anomalies of the circulatory system and these were usually considered the underlying cause of death. The anomalies of the musculoskeletal system were usually an unrelated cause. These 66 children had 95 anomalies coded. (The maximum coded was 5 per child.) Down's disease (mongolism) was reported as the major anomaly in deaths of 9 children. Another death included in this table was due to congenital heart defect of a child with evidence of mongolism.

The proportion of deceased children with congenital anomalies was practically the same in Jamaica, 13 per cent, but the distribution by system involved differed. Four deceased children had Down's disease. One child had multiple anomalies due to the rubella syndrome.

These provisional data raise many questions and point to needs for further data and research regarding the prevalence of mongolism and cretinism, for example.

The quality of the data on causes, underlying and associated, depends in part on the number and quality of post-mortem examinations. Figure 26 shows the percentage of deaths reported with autopsies in the first months of the Investigation. For the 3 areas used in this analysis, the percentages were high, 34 per cent in Recife, 20 per cent in Santiago, and 50 per cent in Jamaica. In the local and national meetings, emphasis has been placed on the need for continuing efforts to improve the number and quality of autopsies. In El Salvador, Medellín, San Juan and El Chaco, pathologists have been assigned to perform autopsies in the deaths in the Investigation.

Actually, in Argentina, one of the results of the national meeting on March 10 was assignment of two residents in pathology from the University of El Cuyo to San Juan (Figure 27).

III. PROJECTED GOALS

These preliminary findings as well as the programs being developed in the 13 field projects have indicated important goals for action at local, national and international levels. These goals are outlined in Figure 28.

A. The improvement of maternal and child health, especially the nutritional component, stands out as essential. Likewise the vital statistics systems need improvement and modernization, both for more complete knowledge of the specific problems and for better definition of problems such as nutritional deficiency through study of multiple causes. These programs and community centered research can be important contributors to medical education. The medical profession must give leadership in these fields. Medical students in developing countries should be involved through knowledge of their own problems and the means of solving them.

B. Effective preventive programs can be introduced, such as measles vaccination and tetanus and diphtheria immunization. Breast feeding should be stressed, and the provision of protein should be made for the pregnant woman and her child for optimal growth and development and for prevention of unsatisfactory physical conditions conducive to infection and probably to lowered I.Q.

C. These results will be utilized in local and national planning. One of the principal collaborators has already made use of the results in the plans for the reform of health services under way in Brazil. The principal collaborator of this project was asked by the Minister of Health to elaborate a plan of Maternal and Child Health. This plan includes measures derived from the early results of the Investigation, such as improvement of vital statistics and preventive campaigns against infectious diseases and nutritional deficiency.

Planners should not be content with the poor quality of statistics of the past but should become aware of the importance of greater understanding of the problems through such research programs as this.

D. At the international level these results can reorient our health programs as well as those of other agencies. The Pan American Health Organization is extending and broadening its nutrition program. The Special Session on Perinatal Factors Affecting Human Development of the Advisory Committee on Medical Research on June 10 and 11, 1969, made an outstanding contribution. However, the findings reported there of the effect of protein deprivation in the pregnant woman on the fetus or child are new, and longitudinal research is indicated for greater understanding of the relationships.

Our Investigation will serve the World Health Organization and contribute to the Ninth Revision of the International Classification of Diseases. The results indicate the usefulness of this study of multiple causes and of the combination of hospital and autopsy data with that on the death certificate for knowledge of the underlying and associated causes of death.

IV. IMPORTANT ISSUES AND PROBLEMS REVEALED

There are five distinct fields in which problems are revealed:

1. Registration of all vital events
2. Improvement of quality of medical records
3. Development of preventive services in community programs
4. Extension and improvement of pathological services
5. Modernization of mortality statistics and research on classification of multiple causes and their use in planning

In summary, this research program is directed to the immediate application of the findings as they unfold during the course of the Investigation. This project is having an important impact on development in the Region.

PAN AMERICAN HEALTH ORGANIZATION
Pan American Sanitary Bureau, Regional Office of the
WORLD HEALTH ORGANIZATION

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CABLE ADDRESS: OFSANPAN

IN REPLY REFER TO:

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INTER-AMERICAN INVESTIGATION OF MORTALITY IN CHILDHOOD RESEARCH PROJECT REVIEW

Outline of Material Prepared for

United States Agency for International Development

June 18, 1969

FIGURE 1

INTER-AMERICAN INVESTIGATION OF MORTALITY IN CHILDHOOD
LOCATION OF PROJECTS

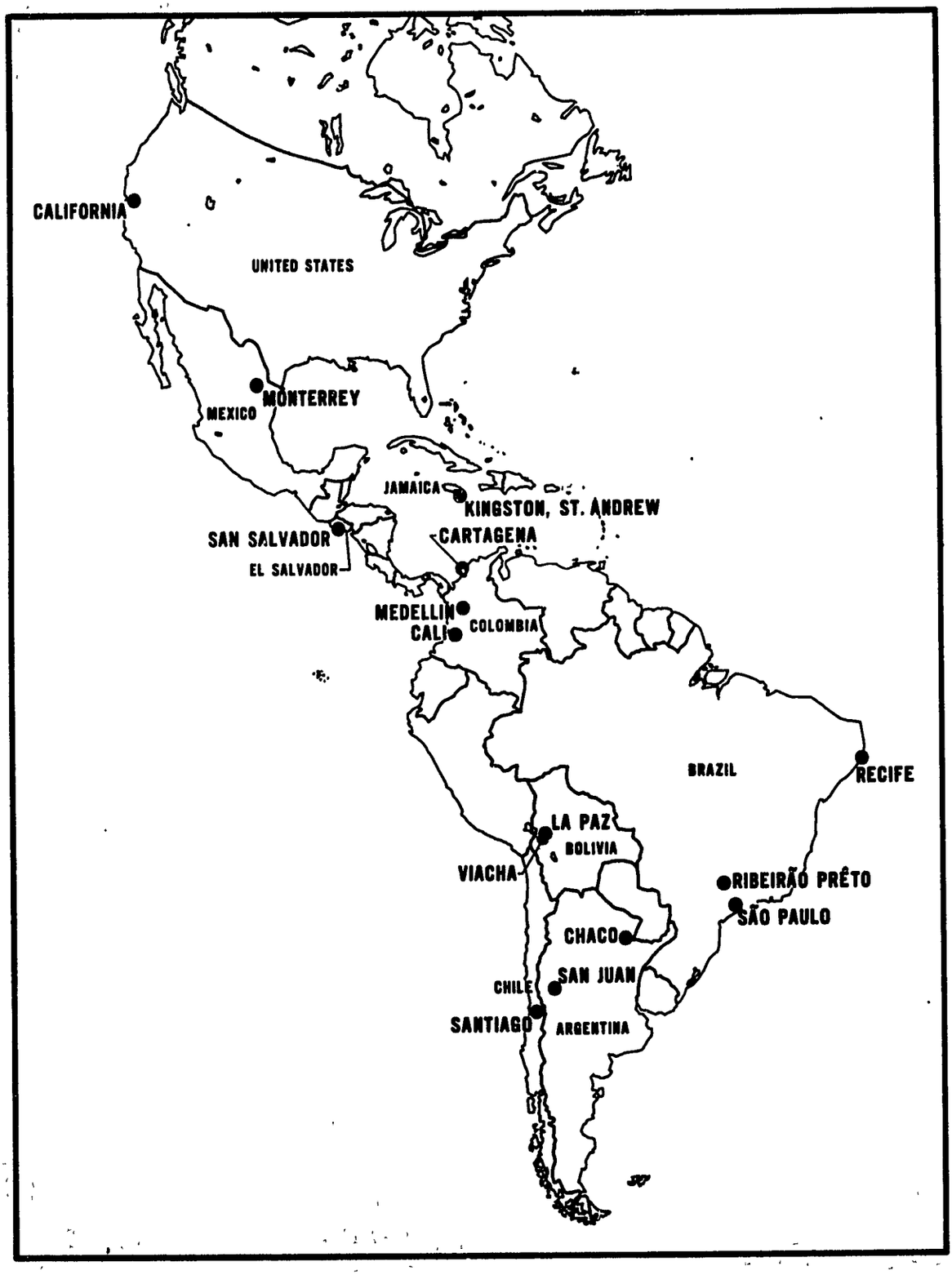


FIGURE 2

Inter-American Investigation of Mortality in Childhood

TIMETABLE OF ACTIVITIES, JULY 1966 - MARCH 1972

BACKGROUND

Investigation of Mortality in Adults	1961 - 1967
Proposal for Planning	January 1966
Award of Grant	July 1966

PLANNING PHASE

Pilot Testing	January 1967 - June 1968
Proposal for Operation	July 1967
Award of Grant	March 1968

INVESTIGATION

Thirteen Projects, Field Work	May 1968 - November 1970
Central Processing and Analysis	October 1968 - March 1972
Reports of Investigation	September 1970 - March 1972

FIGURE 3

Inter-American Investigation of Mortality in Childhood

TIMETABLE OF PLANNING PHASE

Preliminary Working Group . . . . . 17-20 October 1966

Pilot Testing . . . . . January 1967 - June 1968

Second Working Group . . . . . 4-8 December 1967

Planning Conference of Principal Collaborators, Cali, Colombia . . . . . 25-29 March 1968

Meeting of Medical Interviewers Ribeirão Prêto, Brazil . . . . . 3-9 April 1968

Preparatory Field Work . . . . . May 1968 - October 1968

- Design of Probability Sample
- Selection and Training of Personnel
- Actions for Agreements
- Procedures with Births and Deaths

Second Planning Conference for Principal Collaborators, Caracas, Venezuela . . . . . 6-10 October 1968

Manual of Procedures

- Initial Distribution . . . . . May 1968
- Section for Multiple Causes . . . . . March 1969

FIGURE 4

Inter-American Investigation of Mortality in Childhood

TIMETABLE OF INVESTIGATION

THIRTEEN FIELD PROJECTS

Dates of Initiation . . . . . May - September 1968

Field Work . . . . . 27 months

- Deaths for two years
- Births for two years
- Samples of households for 24 months

Dates of Termination . . . . . July - November 1970

CENTRAL OFFICE

Processing and Analysis . . . . . October 1968 - March 1972

Preliminary Reports . . . . . September 1969

- Multiple causes
- Reports on each project
- Preliminary findings on nutrition

Reports for First Year . . . . . September 1970

Reports of Investigation . . . . . September 1970 - March 1972

FIGURE 5

Inter-American Investigation of Mortality in Childhood

MONTHS OF INITIATION AND OF OPERATION OF THIRTEEN PROJECTS, MAY 1968-NOVEMBER 1970

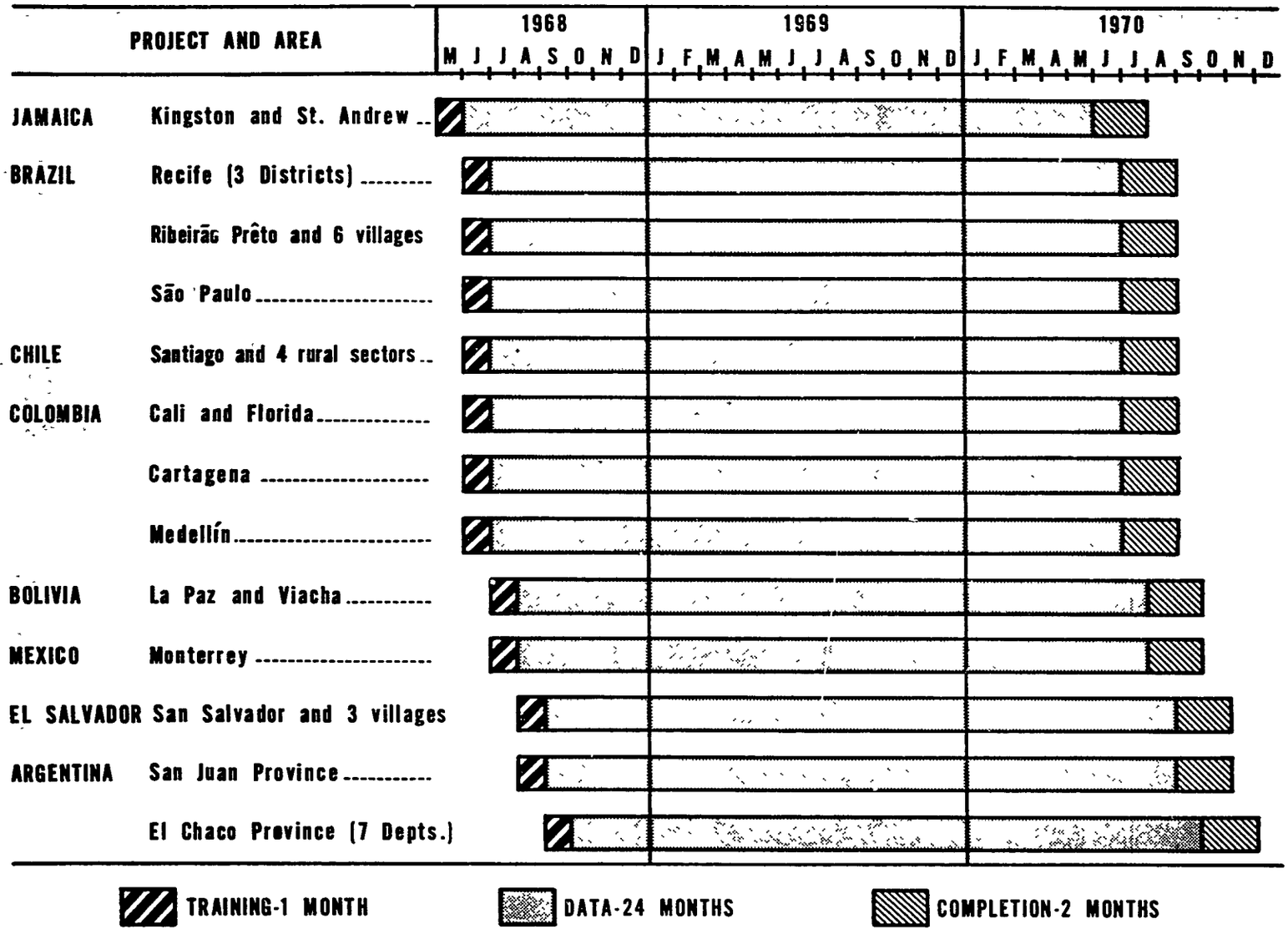


FIGURE 6

Inter-American Investigation of Mortality in Childhood

FIELD PERSONNEL IN PROJECTS, DECEMBER 1968

Project		Total Personnel	Physicians	Nurses, Social Workers	Other
All Projects		192	87	55	50
Argentina	El Chaco	12	4	4	4
	San Juan	10	7	2	1
Bolivia	La Paz	15	10	3	2
Brazil	Recife	21	5	10	6
	Ribeirão Prêto	19	6	5	8
	São Paulo	19	8	4	7
Chile	Santiago	16	8	4	4
Colombia	Cali	12	8	2	2
	Cartagena	13	7	4	2
	Medellín	17	8	3	6
El Salvador	San Salvador	10	4	3	3
Jamaica	Kingston	14	7	4	3
México	Monterrey	14	5	7	2

FIGURE 7

Inter-American Investigation of Mortality in Childhood

LEVELS OF COORDINATION

CONTINENTAL

Conferences of Principal Collaborators

Project Visits by Consultants and Staff

Standard Procedures
- Manual
- Routine Memoranda

NATIONAL

Conferences of Health Authorities and Medical Educators

Colombia	22 July 1968
Jamaica	31 January 1969
Brazil	7 March 1969
Argentina	10 March 1969

Other Conferences 1969

Meetings of Public Health and Medical Associations

LOCAL

Meetings of Coordination Committees
Meetings of Medical Groups
Staff Conferences

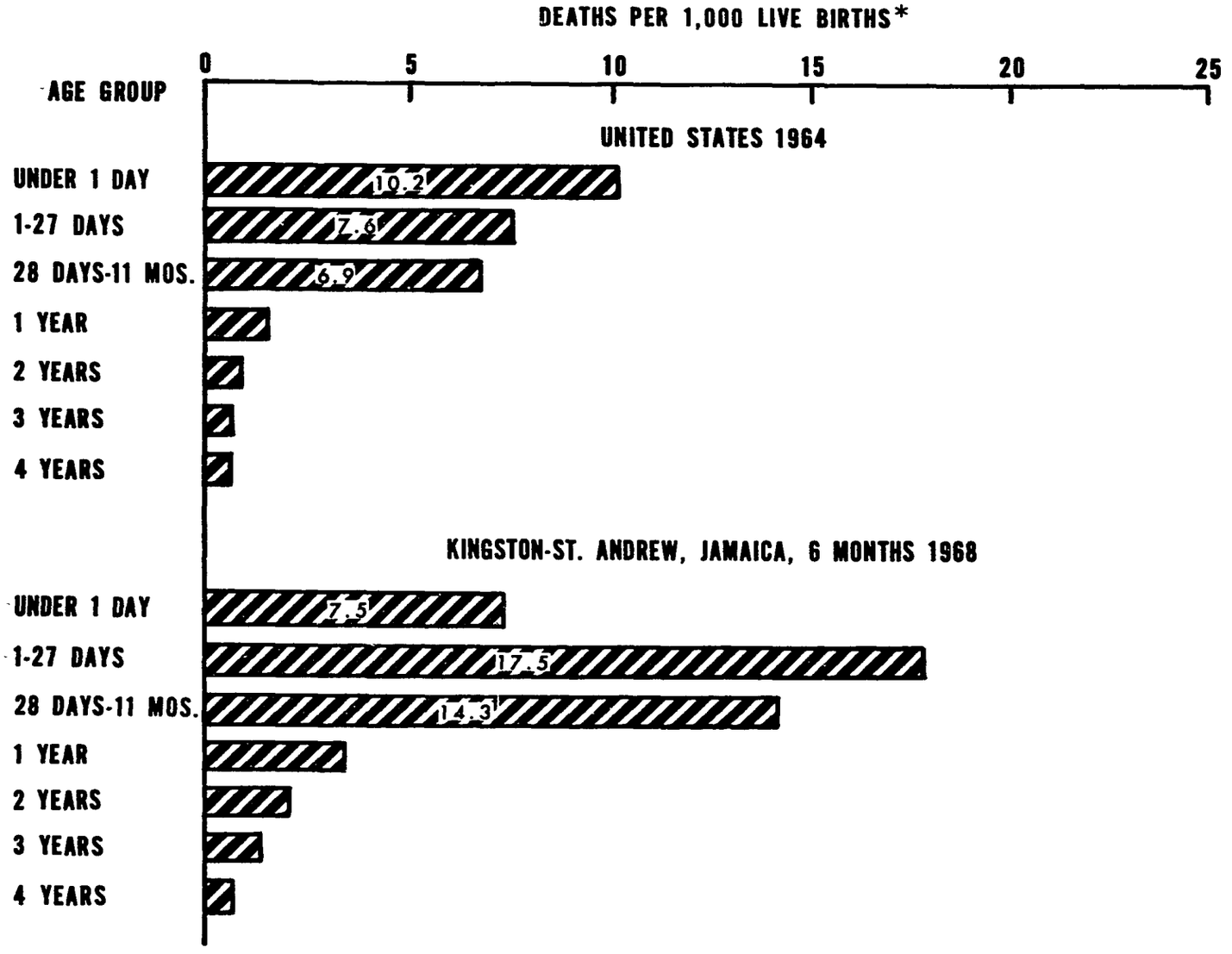
FIGURE 8

TECHNICAL ASSISTANCE TO FIELD PROJECTS,
AS OF MARCH 1969

Activities	Consultants and Staff	Visits
Sampling Procedures	4	18
Hospitals, Medical Records	4	7*
Collection of Data on Births and Deaths . . .	1	11
General Planning and Medical Aspects . . .	2	27
Total	11	63

* Includes 3 courses in 1968.

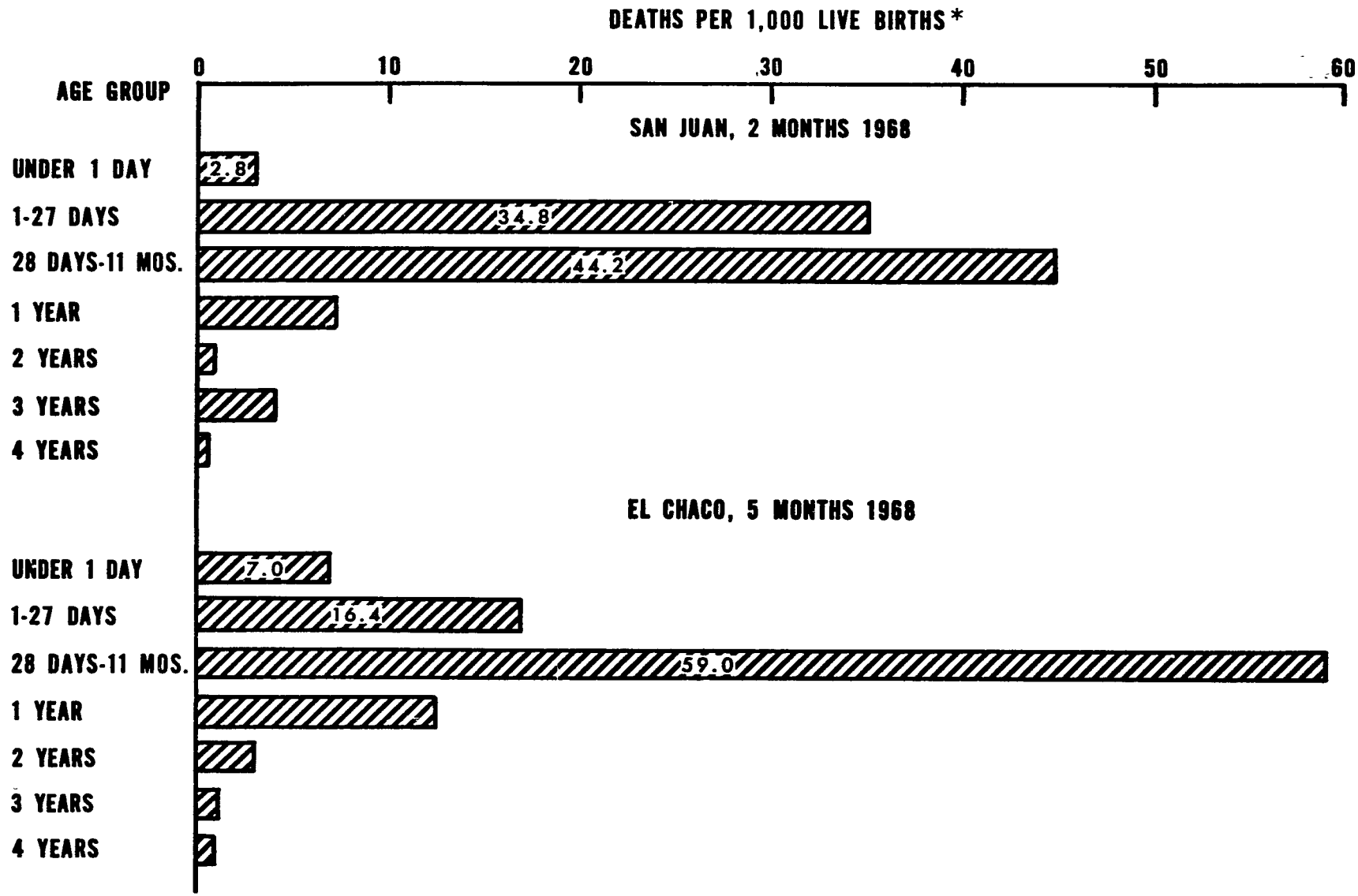
FIGURE 9 **PROVISIONAL DEATH RATES BY AGE GROUP UNDER FIVE YEARS IN UNITED STATES AND JAMAICA**



*FOR AGES 1-4 YEARS PER 1,000 POPULATION

FIGURE 10

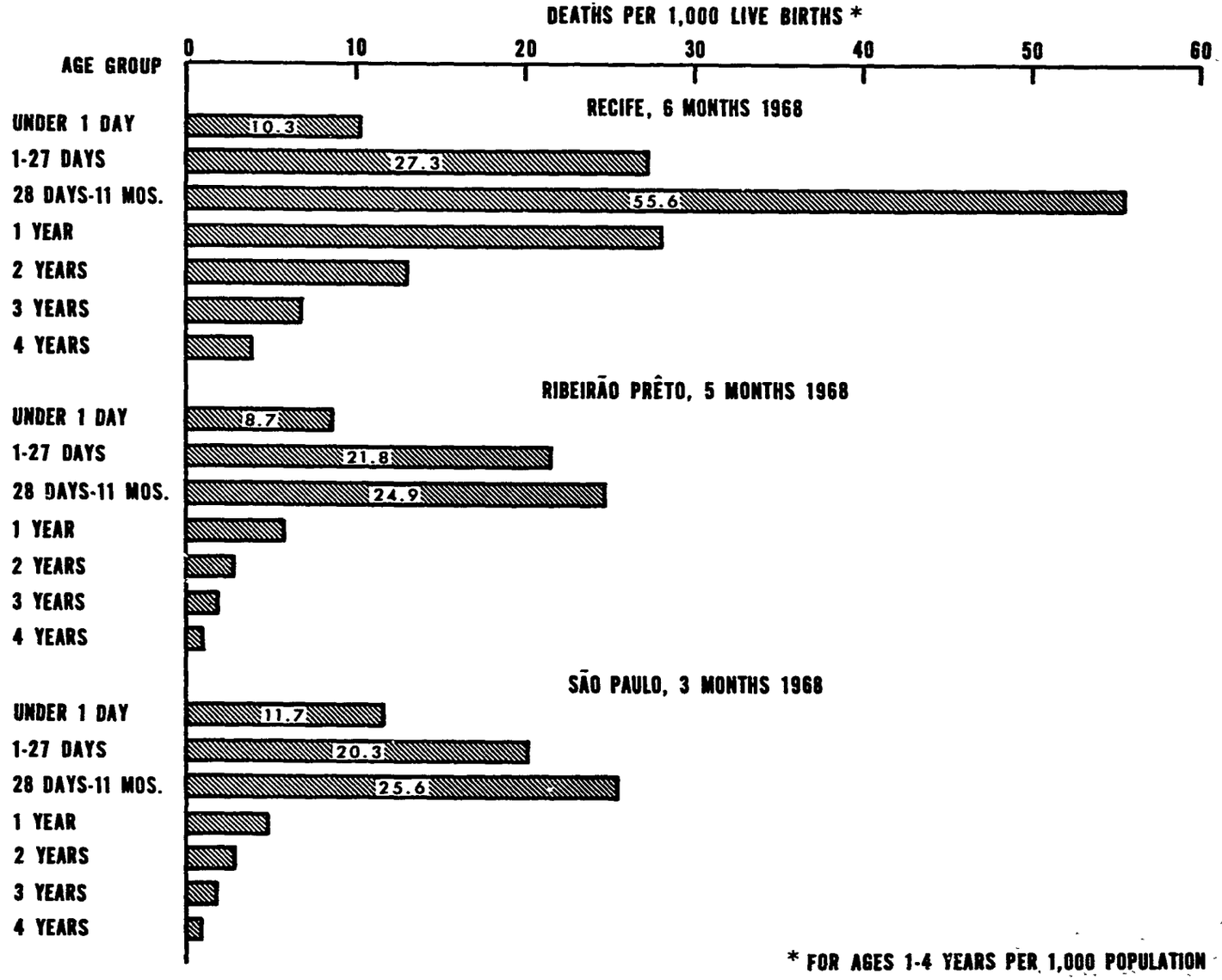
PROVISIONAL DEATH RATES BY AGE GROUP UNDER FIVE YEARS IN SAN JUAN AND EL CHACO, ARGENTINA



*FOR AGES 1-4 YEARS PER 1,000 POPULATION

FIGURE 11

PROVISIONAL DEATH RATES BY AGE GROUP UNDER FIVE YEARS IN RECIFE, RIBEIRÃO PRÊTO AND SÃO PAULO, BRAZIL



* FOR AGES 1-4 YEARS PER 1,000 POPULATION

FIGURE 12

Inter-American Investigation of Mortality in Childhood

EXAMPLE OF USE OF PROVISIONAL DATA FROM THREE SOURCES REGARDING BIRTHS AND BIRTH RATE IN ONE AREA

Place of Birth	Births in Study File		Births in Sample Households		Deaths in Study File	
	Number	Per cent	Number	Per cent	Number	Per cent
Total	6,626	100	62	100	683	100
Hospital	6,326	95	47	76	523	77
Home	300	5	15	24	160	23
Birth Rate per 1,000 pop.	33.4		41.1			

FIGURE 13

Inter-American Investigation of Mortality in Childhood

PROVISIONAL

TOTAL DEATHS STUDIED AND DEATHS DUE TO MEASLES BY AGE GROUP, CHILDREN 6 MONTHS-4 YEARS OF AGE, RECIFE AND LA PAZ, 1968

Age Group	Recife			La Paz		
	Total Deaths	Due to Measles		Total Deaths	Due to Measles	
		Number	Per cent		Number	Per cent
Total	158	78	49	230	90	39
6-11 months	52	22	42	62	17	27
1 year	61	37	61	99	39	39
2 years	28	12	43	37	14	38
3 & 4 years	17	7	41	32	20	62

FIGURE 14

PROVISIONAL

FREQUENCY OF MALNUTRITION ASSOCIATED WITH DEATHS FROM MEASLES, CHILDREN 6 MONTHS-4 YEARS OF AGE, RECIFE AND LA PAZ, 1968

Area	Measles Deaths	With Malnutrition	
		Deaths	Per cent
Recife	78	54	69
La Paz	90	60	67

FIGURE 15

INTER-AMERICAN INVESTIGATION OF MORTALITY IN CHILDHOOD

PROVISIONAL

TOTAL DEATHS AND DEATHS DUE TO MEASLES FOR FOUR AGE GROUPS,
CHILDREN 6 MONTHS - 4 YEARS OF AGE, LA PAZ, BOLIVIA, 1968

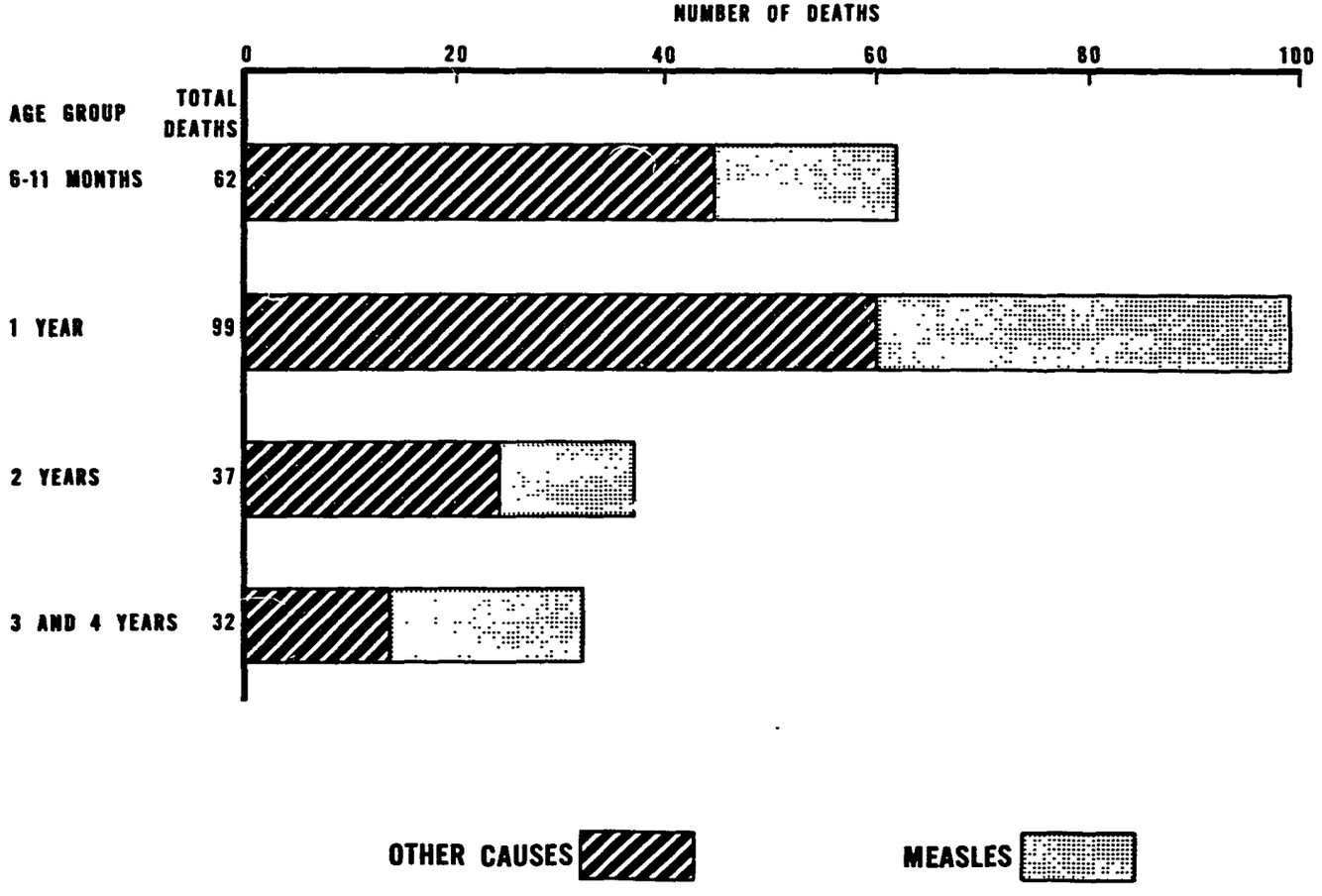


FIGURE 16

Inter-American Investigation of Mortality in Childhood

PROPOSED IMMUNIZATION PROGRAM AGAINST MEASLES RECIFE, BRAZIL, 1969-1970

AIM

Immunization of 90 per cent of children 8 months-3 years of age in city of Recife

EXPECTED VOLUME

Attack phase	117,000	children
Maintenance phase.....	36,000	children
Total	153,000	

TIME TABLE

Initial 11 months in area of Mortality Investigation
Following 10 months in remainder of city

COLLABORATORS

1. Health Department of State of Pernambuco
   NCr. $69,000 or U. S. $15,000

2. Local Team of Investigation
   NCr. $28,000 or U. S. $7,000

3. Pitman-Moore Division of Dow Chemical Co.
   168,000 doses of vaccine

4. Pan American Health Organization
   Technical assistance
   Analysis of data for evaluation of program

FIGURE 17

Clipping from Estado de São Paulo

Ribeirão Prêto, Brazil

DELEGACIA DE SAUDE DE RIB. PRETO
COMUNICADO AS IMPRENSAS

Vacina contra o Sarampo

Desde o dia 3 do corrente o Centro de Saúde de Ribeirão Preto, bem como as outras Unidades Sanitárias da região, estão municiadas para a aplicação gratuita da vacina contra o SARAMPO.

Deverão ser obedecidas as seguintes instruções:

1 — A aplicação só será feita nas crianças entre 7 mêses e 24 mêses de idade, que ainda não tiveram sarampo;

2 — Os pais ou responsáveis devem procurar trazer as crianças em grupos de, pelo menos, duas, para evitar espera, porque, sendo a vacina de alto custo e o frasco contendo duas doses, não será aberto para aplicação de uma so dose.

3 — Basta uma única aplicação para que a criança fique imunizada.

Ribeirão Prêto, 3—3—69.

Assinado:

Dr. ROBERTO TARANTO

Delegado de Saúde.

FIGURE 18

Inter-American Investigation of Mortality in Childhood

PROVISIONAL

FREQUENCY OF NUTRITIONAL DEFICIENCY AS UNDERLYING OR ASSOCIATED CAUSE AMONG DEATHS OF CHILDREN 6 MONTHS -4 YEARS OF AGE IN FOUR AREAS

Area	Total Deaths Studied	Nutritional Deficiency			
		Underlying cause	Associated cause	Total	
				Number	Per cent
Recife	158	18	96	114	72
La Paz	230	11	135	146	63
Jamaica	105	15	32	46*	44
Santiago	116	8	42	49*	42

*Includes one death with two types of nutritional deficiency, one the underlying cause and one an associated cause

FIGURE 19

PROVISIONAL

NUMBER OF DEATHS WITH NUTRITIONAL DEFICIENCY REPORTED AS UNDERLYING OR ASSOCIATED CAUSE OF DEATH, BY TYPE OF DEFICIENCY , AGE GROUP 6 MONTHS-4 YEARS OF AGE, JAMAICA AND RECIFE, 1968

Type of Deficiency	Jamaica			Recife		
	Total	Underlying	Associated	Total	Underlying	Associated
Total	46*	15	32	114	18	96
Avitaminoses	1	1	-	-	-	-
Protein malnutrition	5	4	1	46	13	33
Nutritional marasmus	13	9	4	31	5	26
Other nutritional deficiency	28	1	27	37	-	37

*Includes one death with two types of nutritional deficiency, one the underlying cause (scurvy) and the other an associated cause(marasmus).

FIGURE 20

Inter-American Investigation of Mortality in Childhood

PROVISIONAL

FREQUENCY OF MALNUTRITION ASSOCIATED WITH DEATHS OF CHILDREN 6 MONTHS-4 YEARS OF AGE BY UNDERLYING CAUSE OF DEATH RECIFE AND SANTIAGO

Underlying Cause	Recife			Santiago		
	Total Deaths	With Malnutrition		Total Deaths	With Malnutrition	
		Number	Per cent		Number	Per cent
All Causes	158	114	72	116	49	42
Nutritional deficiency	18	18	100	8	8	100
Infectious diseases	109	78	72	27	15	56
Other causes	31	18	58	81	26	32

FIGURE 21

PROVISIONAL DATA

NUTRITIONAL STATUS OF CHILDREN UNDER FIVE YEARS OF AGE FROM SAMPLE OF HOUSEHOLDS IN THREE AREAS, 1968

Nutritional Status	São Paulo		Kingston[1]		Recife[2]	
	Number	Per cent	Number	Per cent	Number	Per cent
Children in Sample	305	99.9	556	100.0	494	100.0
Normal	194	63.6	293	52.7	177	35.8
Malnutrition						
Grade I	91	29.8	203	36.5	191	38.7
Grade II	19	6.2	58	10.4	95	19.2
Grade III	1	0.3	2	0.4	31	6.3

1. Includes rural St. Andrew
2. Three Districts: Beberibe, Casa Amarela, Encruzilhada

FIGURE 22

PROVISIONAL

PERCENTAGES OF CHILDREN UNDER FIVE YEARS OF AGE IN SAMPLES OF THREE AREAS WITH I, II AND III DEGREE MALNUTRITION, SIX MONTHS 1968

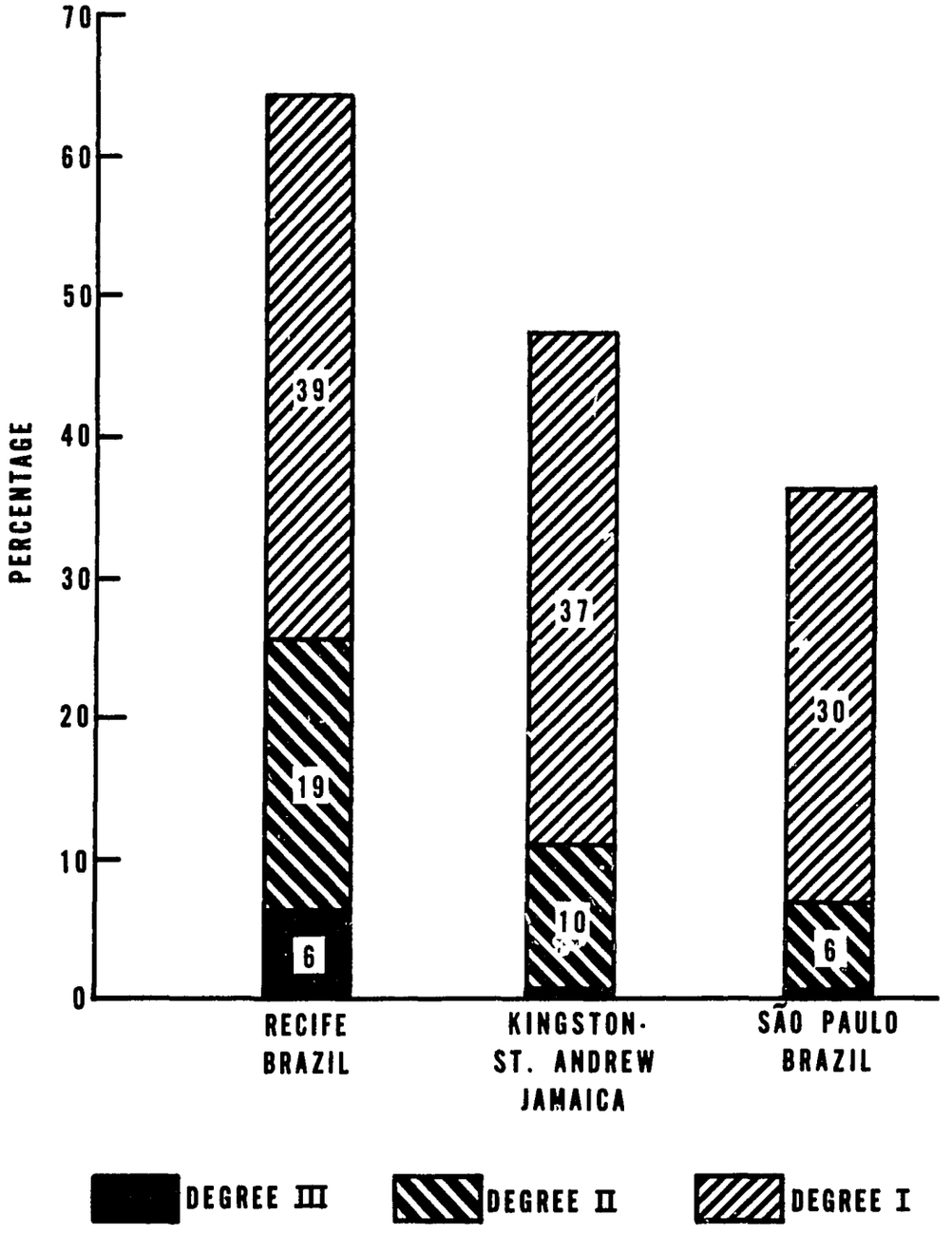


FIGURE 23

Inter-American Investigation of Mortality in Childhood

PROVISIONAL

DISTRIBUTION OF DEATHS OF CHILDREN 6 MONTHS - 4 YEARS OF AGE BY UNDERLYING CAUSE OF DEATH RECIFE, SANTIAGO AND JAMAICA

Underlying Cause	Recife		Santiago		Jamaica	
	Number	Per cent	Number	Per cent	Number	Per cent
All causes	158	100.1	116	100.1	105	100.1
Diarrhea	19	12.0	22	19.0	35	33.3
Measles	78	49.4	1	0.9	1	1.0
Other infectious diseases	12	7.6	4	3.4	5	4.8
Nutritional deficiency	18	11.4	8	6.9	15	14.3
Dis. of respiratory system	15	9.5	22	19.0	9	8.6
Dis. of nervous system	1	0.6	17	14.7	9	8.6
Congenital malformations	2	1.3	15	12.9	10	9.5
External causes	2	1.3	16	13.8	10	9.5
Other causes	11	7.0	11	9.5	11	10.5

FIGURE 24

PROVISIONAL

UNDERLYING CAUSES OF DEATH OF CHILDREN UNDER 6 MONTHS OF AGE, SANTIAGO AND JAMAICA

Underlying Cause of Death	Santiago	Jamaica
All causes	304	232
Diarrhea	54	40
Tetanus	-	4
Septicemia	4	13
Chagas' disease	1	-
Other infectious diseases	4	2
Leukemia	-	1
Cretinism, congenital	2	-
Nutritional deficiency	9	6
Dis. of nervous system	7	3
Dis. of respiratory system	72	11
Dis. of digestive system	1	4
Congenital anomalies	23	19
Perinatal causes	101	119
Sudden death	8	3
External causes	11	5
Other causes	7	2

FIGURE 25

Inter-American Investigation of Mortality in Childhood

PROVISIONAL

NUMBER OF DECEASED CHILDREN UNDER FIVE YEARS OF AGE WITH CONGENITAL ANOMALIES, STUDY OF 420 DEATHS IN SANTIAGO

System with Major Anomaly		Number of Children	Relationship to Cause of Death		
			Underlying cause	Associated cause	Unrelated
All Systems		66	40	12	14
Central nervous system and eye	740-744	15	11	2	2
Circulatory system	746,747	19	15	3	1
Respiratory system	748	-	-	-	-
Digestive system	550,551,749-751	9	6	2	1
Genito-urinary system	752,753	-	-	-	-
Musculoskeletal system	754-756	11	1	-	10
Down's disease	759.3	9	4	5	-
Cretinism of congenital origin	243	3	3	-	-

Of 420 deceased children, 66 or 16 percent had one or more congenital anomalies

FIGURE 26

Inter-American Investigation of Mortality in Childhood

PROVISIONAL

PERCENTAGE OF DEATHS REPORTED WITH AUTOPSIES BY PROJECT, 1968

Project		Percentage	Comment
Argentina	El Chaco	10	Increase from 0 to 10 per cent in year
	San Juan	Low	Two residents in pathology assigned from Medical School in March, 1969
Bolivia	La Paz	3	
Brazil	Recife	34	
	Ribeirão Preto	14	
	São Paulo	19	
Chile	Santiago	20	
Colombia	Cali	15-20	Increase planned February 1969
	Cartagena	47	
	Medellín	2	Recent increase in personnel in Pathology Department of Medical School
El Salvador	San Salvador	Low	Pathologist assigned in January 1969 to perform 2 per day
Jamaica	Kingston	50	
Mexico	Monterrey	3	

FIGURE 27

LA RAZON, Buenos Aires, Domingo 16 de marzo de 1969

Una Asamblea Aconseja la Formación de Más Patólogos y Pediatras

LA Asociación de Facultades de Medicina de la República Argentina informó que en la asamblea efectuada para tratar la investigación interamericana de la mortalidad infantil se aprobaron las siguientes recomendaciones. "1) La designación de un comité de apoyo a la Investigación Interamericana de Mortalidad Infantil integrado por representantes de la Asociación de Facultades de Medicina de la República Argentina y la Secretaría de Estado de Salud Pública, entre cuyos objetivos se encuentran: a) canalizar la colaboración de las facultades de Medicina de las Universidades de Cuyo y Nordeste hacia las investigaciones que se realizan en sus respectivas áreas de influencia: San Juan y Chaco; b) canalizar la colaboración de la secretaría de Estado de Salud Pública y los organismos de Salud Provincial y Municipal en forma de asistencia técnica y material; c) interesar a las autoridades en el mejoramiento de los sistemas de registro de los hechos vitales (nacimientos, defunciones, etc.). 2) Divulgar los resultados de la investigación para conocimiento de los organismos de Salud, Educación, Planificación y Gubernamentales en general con el objeto de que sean utilizados en el área de sus actividades específicas. 3) Que la Asociación de Facultades de Medicina utilice los resultados de la investigación para el reajuste de los programas de enseñanza pediátrica, en el contenido del Programa de Desarrollo de la Enseñanza de la Pediatría que está llevando a cabo. 4) Los resultados obtenidos hasta el momento inducen a insistir en la necesidad de promover la formación de patólogos en general y en pediatría en particular. En este terreno se hace necesaria la colaboración de las facultades de Medicina de Cuyo y Nordeste mediante las cátedras, servicios y residentes en patología para solucionar los problemas que presenta la investigación en sus respectivas áreas de influencia. 5) Que se tomen en cuenta los resultados de la investigación en los programas de educación médica para graduados en obstetricia y pediatría".

As a direct result of this meeting, two residents in pathology from the University of El Cuyo (Mendoza) have been assigned to San Juan.

FIGURE 28

Inter-American Investigation of Mortality in Childhood

PROJECTED GOALS

A. Operational Goals

1. Improvement of Maternal and Child Health
2. Improvement of Vital Statistics
3. Incorporation in Medical Education and Training Programs

B. Installation of Effective Preventive Programs

Examples:

Measles, Tetanus
Nutrition Education, Breast Feeding

C. Utilization of Results of Investigation Locally and Nationally

D. Collateral Action at International Level

1. In Planning for Health Promotion, Nutrition, Medical Education and Statistics
2. Contribution of Multiple Causes to WHO Ninth Revision of International Classification of Diseases

FIGURE 29

Inter-American Investigation of Mortality in Childhood

IMPORTANT ISSUES AND PROBLEMS

1. Registration of Vital Events
2. Quality of Medical Records and Hospital Statistics
3. Insufficient Preventive Community Programs
4. Improvement of Pathological Work in Quality and Quantity
5. Classification of Multiple Causes

ADDITIONAL ACTIONS REQUIRED

A. Action on Registration of Vital Events by Health Authorities

B. Improvement of Procedures of Medical Records at the National Level
   1. Through Institutions: for example, Social Security
   2. Consultant Services to Hospital Systems
   3. Training Programs

C. Identification of Problems for Planning of Maternal and Child Health Programs

   Example - Recife

D. Extension of Pathological Services
   1. Through Association of Faculties of Medicine
   2. Through Post-Graduate Centers