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A Twenty-Five Year Review (1967-1991) of Epidemiological Profile and Trends of Selected Diseases

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A Twenty-Five Year Review (1967-1991)
of Epidemiological Profile
and Trends of Selected Diseases

Jesus Sarol

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EPIDEMIOLOGIC TRENDS OF SELECTED DISEASES
IN THE PHILIPPINES (1965-1990)

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JNS
MPM
JCB

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1. Introduction

Measurement of the disease experience of the population is a pre-requisite for sound planning and financing of health care services. We need to know how much health services are needed, by whom, where and when. These are determined by the trends of diseases that affect the greatest number in the population and their distributions according to characteristics of persons, place and time. Identifying the most cost-effective health programs depends on the measurement of the burden of these diseases on the population and the knowledge of the factors that have had the greatest impact on the incidence of these diseases.

In recent years, the financing of health services has taken a center stage in view of the limited resources that the government is confronted with. The issue is critical if the Philippines is to reach its goal of health for all in the not-so-distant future. A baseline studies package for health care financing reforms has therefore been initiated which includes this study of the trends of the epidemiologic profile of the population.

The key questions that this study tries to answer are the following:

1. What are the epidemiologic trends of selected leading diseases in the Philippines?
What are the trends of mortality rates of leading diseases?
Are there differences in the trends of mortality according to sex, age and locality?
What are the trends of morbidity rates of leading diseases?
Are there differences in the trends of morbidity according to sex, age and locality?
2. How do these epidemiologic trends relate to determinants of health?
3. How much burden do these diseases impose on the population?
4. What are some policies and programs that may have contributed to these trends?

2. Conceptual Framework

2.1 Measurement of the Health Status

The quantification of health has remained an ideal to be achieved. While more common definitions of health give it a positive meaning, measuring it in this way is quite difficult considering that one has to take several facets of health in the measurement. Thus, the measurement of health status is usually done in terms of disease occurrence and death as a consequence of the disease. There are at least two reasons for this. First, it is easier to count for events than to measure an elastic concept that health is. Secondly, more objective measurement in terms of disease occurrence can be made. To describe the health status of a population, morbidity and mortality rates are commonly used.

2.2 Epidemiologic Profile of a Population

The number of diseases that afflict human beings is too great to count. This makes it difficult to come up with a comprehensive epidemiologic profile of the population. Because resources required to take care of the health of the population are limited, it becomes necessary to focus on those diseases that affect the most number of individuals in the population.

Epidemiology is concerned with the identification of groups in the population with high rates of disease. There are many possible characteristics that can be used to identify these groups. However, the number of characteristics to be studied is limited by the availability on information on these and by the resources available for a study.

Age and sex are two characteristics of a person that have great influence on health status. Rates of disease vary between sexes and among different age groups. While biological factors may partially contribute to these differences, to a large extent, sex and age also determine the factors that a person is exposed to that would affect the probability of the occurrence of disease. Many of these factors can be altered, making it possible for disease occurrence and deaths to be prevented. The rates may also be influenced by the place where a person resides. Geographical variations in disease rates reflect the role of environment - physical, social, cultural, economic and political, on the health status of a community.

In this study, we considered data on selected disease-specific mortality and morbidity rates by age, sex and place as the primary indicators of health outcomes. These diseases represented the leading causes of morbidity and mortality in the Philippines. The availability of data on the rates of disease by age, by sex and by locality over the years made it possible to study the trend of diseases according to these variables.

2.3 Determinants of Health Outcomes

Major determinants of health and disease include the demographic characteristics of the population and its dynamics, physical environment, infectious agents, socioeconomic environment, medical care and public health. The roles of population dynamics, nutrition, environmental sanitation, health care utilization and socio-economic characteristics of the population are discussed below. This list certainly does not exhaust all possible determinants of health.

2.3.1. Population Profile and its Dynamics

The number and characteristics of a population are major determinants of health care requirements. Health problems vary according to age and sex. Age is one of the most important determinants of disease. Deaths from all causes and disease-specific mortality and morbidity show differential rates across varying age levels. Age-specific death rates are characterized by the usual J-shaped curve. This trend describes very high mortality rates among infants, decreasing up to young ages and then continuously increasing up to the older age groups. Morbidity rates also show wide variation according to age groups. The youngest age groups have higher morbidity rates from many communicable diseases while the degenerative diseases are more common in the older population. Sex differences in mortality and morbidity have also been observed. Mortality rates by sex show generally higher levels among males than females across all age groups. In terms of morbidity, the opposite has been reported in epidemiologic literature. However, this sex-differential varies greatly for specific diseases.

Changes in the composition of the population is a function of births, deaths, and migration. Among these, fertility is the most significant factor that influences the trends in population. The influence of mortality on demographic changes has been diminished. The diseases that have caused great burden on the population during the earlier centuries have largely been controlled.

2.3.2. Nutrition

Unfavorable health outcomes can be the result of poor nutrition. Undernutrition in children can lead to stunting and wasting, while in adults, it can result to loss of human vitality and efficiency. The detrimental effects of deficiencies in intake of vitamins and minerals are well known. The role of nutrition in health outcomes does not only result from insufficient intake of food items and products. Overnutrition can lead to obesity that has been associated with hypertension, hypercholesterolemia and diabetes. Excess in sodium (from salt) intake is associated with hypertension.

2.3.3. Physical Environment

Physical environment, which includes air quality, type of housing materials and topography has an effect on the health status. Air pollution has been associated with incidence of several

respiratory infections and malignancies. Type of housing materials determines the level of protection against adverse weather conditions. Topography may be responsible for the regional differences in diseases such as malaria, dengue, schistosomiasis and iodine deficiency diseases.

Environmental sanitation is also associated with many diseases whose agents thrive on poor environmental conditions. As examples, diarrheas, cholera, typhoid and infectious hepatitis are associated with non-availability of safe drinking water. Amoebiasis and several types of intestinal parasitism are related to poor waste disposal.

2.3.4. Socio-economic Factors

Socio-economic factors greatly affect health status. On the microlevel, they determine an individual's ability to provide himself with the requirements to maintain good health. On the macroenvironment, they determine the society's ability to provide the necessary services in the prevention and treatment of diseases. Better economic conditions are associated with better health conditions and more financial resources for the promotion of health.

Education is another determinant of health outcome. The knowledge of the risks of disease and control measures enables people to protect themselves. Education also increases support of the development of health-related technology and the passage of health-related legislation. Health education of the mothers has been largely responsible for the observed reduction in the occurrence of diseases and deaths in children, especially those that are amenable for inexpensive interventions.

The activities involved and the specific exposures differ by occupational groups. Several occupational-related exposures, such as unfavorable physical conditions (dust, heat, etc.), chemicals, noise levels, induced stress, can produce different health outcomes. Mesothelioma, lung and gastrointestinal cancers have been related to asbestos in industries. Lead poisoning among workers in the paint and battery repair industry is another example. The high incidence of stress among office workers is now widely recognized.

2.3.5. Other Social Factors

Other social determinants include life style and culture. The interrelationship of health and the behavior of individuals can be exemplified in a multitude of ways.

Cigarette smoking is major risk factor for several diseases, such as lung cancer, heart and vascular diseases. Alcohol consumption is associated with accidents and cirrhosis of the liver. Aggressive types of behavior is associated with higher incidence of heart disease and also with accidents. Another example related to nutrition is diet. Higher consumption of fatty foods are correlated with higher incidence of cardiovascular diseases and some forms of cancer.

Culture influences an individual's values that includes attitude towards health. Some cultural norms followed by groups of people may have health enhancing effects. For example, Seventh

Day Adventists follow a vegetarian lifestyle, which have resulted in lower incidence of heart diseases and some forms of cancers.

2.3.6. Health Care Utilization

Several examples of how health care utilization can affect disease occurrence and outcomes can be given. This century saw the eradication of small pox and in developed societies, virtual control of poliomyelitis, diphtheria and tetanus, through immunization programmes. Maternal and infant deaths have been reduced significantly by provision of prenatal care. Non-attendance at births by a trained personnel in developing countries is still a very important risk factor for infant mortality. Oral rehydration is a simple procedure that has significantly reduced mortality from diarrhea.

2.3.7. Medical Technology

Advances in medical technology have brought about the rapid decline in the incidence of diseases through immunization programs and in mortality from diseases through better treatment of cases. In developed countries where the rates in coronary heart disease mortality have been declining, part of this was attributed to specific medical interventions such as pre-hospital resuscitation, anti-hypertensive treatment, coronary care units and coronary surgery. However, this is related to health services utilization since the technology may be existing but is not accessible and affordable to the people who need these.

2.3.8. Government Policies and Programs

The general decline in the mortality and morbidity levels of many diseases has been attributed to wide scale public health policies and interventions. From 1965 to 1990, several structural changes in the organization and policies of the government have been undertaken to respond to the emerging health problems of the population.

2.4. Burden of Disease

Disease always bring a burden to individuals and society. The burden of disease may include pain, suffering and discomfort on the individual and grief and anguish among friends and relatives. The family also shoulders the burden of caring for the sick. To society, a sick person means loss of productivity and having to provide the support system for the treatment of the sick person.

There are several ways of measuring the burden of illness that consider the different aspects of disease. One measure considers the burden of disease in terms of potential days of life lost. This measures the years of life lost due to premature death. This measure is limited since it does not consider the burden of disease brought about by diseases of high morbidity but very

low mortality. Another measure incorporates lost of life due to disability from disease aside from that due to premature death. The economic costs of treatment for disease as well as accommodating a diseased person may also be used to determine the burden of disease.

3. Review of Literature

3.1. Trends in Health Outcomes

Reviews of trends in health status indicators of the Philippines have been reported in at least three publications. These are the Philippine Health Statistics published by the Department of Health, the Philippine Health Matters by Tan (1991) and the Health Sector Review by Herrin et al (1993).

The first is the annual Philippine Health Statistics by the Department of Health. This publication provided most of the data on trends reviewed by the other authors. Brief descriptions of the trends were incorporated in the reports. As of the end of this study, the latest publication was the 1990 Philippine Health Statistics.

Tan reviewed "old" and "new and emerging health problems." In the former, he included acute respiratory infections, chronic obstructive pulmonary diseases, diarrheal diseases, tuberculosis, malaria, schistosomiasis, iodine deficiency and sexually transmitted diseases. Among those in the latter group are cardiovascular diseases, accidents, occupational injuries, cancers, mental health problems and AIDS.

Herrin et al also reviewed four aspects of health outcomes: namely mortality, morbidity, nutritional status and disability. Infant mortality, life expectancies, regional differentials in mortality, leading causes, death rates by age and sex, and fetal and maternal mortality were covered under mortality trends. Discussions on morbidity covered leading causes, regional differences, morbidity by age and sex and HIV/AIDS, while dietary energy deficiency, growth deficits and micronutrient deficiency were discussed under nutritional status. Disability was also examined.

The following discourse on the trends of diseases and their determinants is derived mainly from these three sources.

3.1.1 National Mortality Trends 1965-1990

Mortality trends in the Philippines declined very slowly from 1965 to 1990 as compared to the significant improvements achieved before this period. Crude death rates decreased very gradually from 7.5 per 1000 population in 1965 to 5.1 per thousand in 1990. This decrease, however, was considerably slower when one notes that the crude death rate was as high as 15.1 per 1000 in 1946, almost 20 years before this period.

Reports on the trend for infant mortality rate are not consistent. Based on the reports of the Department of Health in the Philippine Health Statistics (PHS), infant mortality rates continue to decrease. The infant mortality rate went down from 65.8 per 1000 livebirths in 1966 to 24.3 per 1000 livebirths. The report by the National Statistical Coordinating Board (NSCB), on the other hand, shows a different picture. The infant mortality rate in 1990 based on the NSCB report is placed at 57 per 1000 livebirths, or 2.4 times the value from the PHS. The NSCB

report suggests an increase in infant mortality rate in the middle 1980's then decreased again in 1990.

Life expectancy at birth increased very slightly during this period. Life expectancy rose from 56.9 in 1966 to 64.4 in 1990. This improvement in life expectancy was noticeably slower compared to the rapid increase in this measure before the 1970's. Zablan (1983) attributed this slow improvement in life expectancy to the slackening of infant and childhood mortality after 1972.

While the Philippines has achieved significant reductions in mortality, Herrin et al (1993) noted that this does not compare well with the improvements observed in neighboring countries, some of which started with higher figures.

3.1.2. Review of Trends of Leading Diseases

As noted by Tan, the Philippines faced the same set of leading causes of morbidity and mortality in the last 25 years. The trends, however, for these leading causes have been diverse. Consequently, there have been some rearrangements in terms of their ranking in the national picture.

Overall, mortality rates from important communicable diseases have decreased even if morbidity rates continued to increase. Meanwhile, degenerative diseases slowly continued to rise in terms of both morbidity and mortality rates. Degenerative diseases have dislodged communicable diseases as the most important cause of mortality. Zablan (1978) had a similar observation when she noticed that the proportionate share of deaths from the leading infectious diseases has declined while that of the degenerative and non-infectious diseases has increased. Phoon (1991) noted that the transition in morbidity and mortality from largely communicable diseases to largely non-communicable diseases seems to have been effected in the developing countries in Asia.

The shift from communicable to degenerative diseases as the most important cause of death could be seen by observing the dynamic changes in the ranking of the mortality causes from 1960 to 1990. Among these important degenerative diseases were those of the cardiovascular system and malignant neoplasms, both of which were on the rise in terms mortality and morbidity rates. Heart diseases became the leading cause of death while vascular diseases ranked third in 1990. Malignant neoplasms occupied the fifth slot in terms of ranking. Another degenerative disease that made it to the top ten leading causes of death in 1990 was nephritis, nephrosis and nephrotic syndromes. Malnutrition, another non-communicable disease, remained an important cause of death. However, there was no data in 1990 to determine the position of malnutrition in the ranking of leading causes of mortality.

As previously cited, communicable diseases continued to haunt the public health picture of the country in spite of the improvements in mortality rates that were observed. In 1990, communicable diseases occupied the top five leading causes of morbidity in the country, with bronchitis, diarrheal diseases, influenza, pneumonia and tuberculosis leading in that order.

Pneumonia, tuberculosis, diarrheal diseases, septicemia and measles remained as leading causes of mortality, especially among the very young. Although the death rates from many of these diseases have declined, the morbidity rates, on the other hand, have been increasing. The increase was even very rapid for diarrheas and bronchitis. However, much of these increases can be attributed to improvements in the reporting of these diseases. What is noteworthy with the communicable disease profile is the elimination of some infectious diseases such as bronchitis and tetanus from the leading causes of mortality.

A very important cause of morbidity and mortality during the past 25 years was accidents. Accidents has consistently been a major cause of both morbidity and mortality throughout the years. The death rates from accidents had not been showing any significant decline from 1965 to 1990.

3.2. Determinants of Health Outcomes

The following sections discuss the role of population dynamics, nutrition, environment, health care utilization and socio-economic characteristics of the populations in the trends of diseases in the Philippines.

3.2.1 Population Composition

One determinant of the sex and age distribution is the fertility rate. The trends in fertility in the Philippines declined from 1980 to 1990. In 1980, the general fertility rate was 135.5 per 1000 women of reproductive age (15-44). This went down to 103.9 per 1000 women of reproductive age in 1990. However, Herrin et al (1991) noted that fertility levels in the Philippines have declined slowly. He attributed this slow decline to the very low acceptance of contraceptive methods. This implies greater need for health care for mothers and infants.

Zablan (1978) noted that the proportionate share of deaths from the leading infectious diseases has declined while that of the degenerative and non-infectious diseases has increased. She attributed this increasing share of deaths from non-communicable diseases to the aging of the population and the actual increases in age-specific mortality rates of the elderly population.

3.2.2 Nutrition

Another determinant of health is nutrition. While there are many ways by which food and nutrition can cause disease, the problem in the Philippines is centered mainly on adequacy of food intake. According to Herrin et al, the surveys made by the Food and Nutrition Research Institute (FNRI) revealed that the average of energy intake adequacy was only 87 percent in 1987 down from around 89 percent in 1978 and 1982. This was due to a low proportion of fat in the diet comprising only 15 percent of dietary intake from the ideal proportion of 20 to 25 percent.

Nutritional status is in itself also an indicator of the health status of an individual. Child malnutrition remains high in spite of improvements in its levels since 1987. The data from the 1989-1990 survey conducted by the FNRI revealed that among preschool children, 14 percent were underweight, 11.6 percent were stunted and 9.0 percent were wasted.

3.2.3 Environmental Sanitation

Herrin et al asserted that environmental sanitation remained poor for a large proportion of households. In 1987, less than 70 percent of households had access to safe water supply. Moreover, 94 percent of households in the National Capital Region have sanitary toilet facilities, 61 percent in Eastern Visayas, and only 51 percent in Central Mindanao. Tan reports that as of 1990, it was estimated that 67 percent of Filipino households have access to safe water and 72 percent have access to toilets. A recent study evaluating the International Drinking Water and Sanitation Decade in the Philippines showed that even in areas that were beneficiaries of projects under the water decade program, although 73 percent were connected to a municipal water system, only 10 percent had water supply for 6 to 12 hours a day.

3.2.4 Health Care Utilization Patterns

As reported by Herrin et al, in 1980, only 31 percent of reported deaths were medically attended. This figure improved to 41.3 percent in 1990. But still, a large percentage of deaths were not medically attended. Attendants at birth by medical trained personnel slightly increased from 1980 to 1990. The percentage rose from 54.3% in 1980 to 58.5% in 1990.

Other measures of health service utilization include prenatal care and post-natal care. Between 1981 and 1987, prenatal care rose from 73 percent to 82 percent while post-natal care coverage remained at around 45 percent.

3.2.5 Socio-economic Determinants

In terms of GNP, the Philippine economy experienced very slow growth from the 1980 to 1990. Both Tan and Herrin et al noted this phenomenon and related this to consequences to the health status of the country. From a growth rate of 4.96 percent in 1980, it went down to 0.04 percent in 1983. The Philippines then experienced negative growth rates in 1984 and 1985 after which the economy was seen to growing very slowly. In 1990, the per capita GNP was P1787, compared to P1914 in 1980.

This picture on per capita GNP may be reflected in poverty levels. In 1971, the poverty rate was 49 percent. This rate rose to 59 percent in 1985, and hovered around 50 percent in 1988.

Literacy rates remained quite low among females in 1980, according to the report of Herrin et al. Only 77 percent of females 25 years and above were literate, with differences in urban-rural existent.

The distribution of the population by occupation is another determinant of health status. Concepcion reported that professionals and white-collar workers had higher life expectancies than farmers. Tan found differential distributions of the age at death among occupational groups.

Herrin et al noted the slow structural transformation where many sectors in the country have remained in the agricultural section rather than moving to the industries.

3.3. Assessment of Burden of Disease

Two suggested measures of the burden of disease were used in this study, namely, the potential years of life lost (PYLL) and the days of healthy life lost (DHLL).

The first measure, PYLL, was recommended by Romeder and McWhinnie (1977). This measures the years of life lost due to premature death. This measure requires less information and is easy to compute. However, this measure puts less emphasis on those diseases that have high morbidity rates but low mortality rates.

The other measure of the burden of illness is in terms of days of healthy life lost. The concept of days of healthy life lost was developed by the Ghana Health Assessment Project Team (1981). It combines data on morbidity, mortality and disability. This measure partitions the total days of healthy life lost of a person to the following components: lost due to premature death, lost due disability prior to death, lost due to permanent disability and lost due to temporary disability. Compared to the PYLL, the data requirements of the DHLL are greater and are not readily available from routinely collected health data. Some conceptual problems also arise from the suggested calculation of days of healthy life lost, as reported in the Ghana study.

4. Research Methodology

4.1. Data Requirements

4.1.1 Mortality and Morbidity Data

The assessment of health status was based on the analysis of mortality and morbidity rates from selected diseases. The main criterion for the selection of diseases was the recognition of these diseases as major leading causes of morbidity and mortality. The availability of data for these disease rates was also a significant consideration. All data used for the analysis of epidemiologic trends were obtained from the annual Philippine Health Statistics (PHS) published by the Department of Health.

The diseases studied are shown in Table 1.

The following information on the major diseases were used for this study:

- a. Age and sex-specific death rates 1965, 1970, 1975, 1980, 1985, and 1990.
- b. Mortality rates from selected diseases, annual rates from 1965 to 1990.
- c. Morbidity rates from selected diseases, annual rates from 1965 to 1990.
- d. Age and sex specific mortality rates from selected diseases, 1965, 1970, 1975, 1980, 1985 and 1990.
- e. Age and sex specific morbidity rates from selected diseases, 1965, 1970, 1975, 1980, 1985, 1989¹.
- f. Regional mortality rates, annual rates 1980 -1990²
- g. Regional morbidity rates, annual rates 1980 - 1990²
- h. Provincial mortality and morbidity rates, 1990.

In most cases, the data used were as reported from the PHS reports. However, we noticed some changes in the composition of some of these major groups of diseases, such as diarrhea and bronchitis, through the years. We attempted to minimize the effect of these changes on the trends of the rates by coming up with similar definitions as much as possible for the grouping of the diseases in the different years. For instance, diseases reported under bronchitis included acute respiratory infections, bronchitis, emphysema and asthma. In 1990, the reported rates in bronchitis did not include chronic obstructive pulmonary diseases and allied conditions under which asthma and emphysema fall. We decided to lump them together since it was not possible to separate the available data on rates into these different disease entities under this group. However, this adjustment was only possible for mortality rates and not for morbidity rates. The effects of these differences in definition were considered in the discussion of trends of morbidity rates and to some extent, on mortality rates.

¹ The age and sex specific data for 1989 were used because of the absence of age and sex specific data in the 1990 Philippine Health Statistics.

² Data for some regions were mostly not available before 1980.

Table 2 shows the changes in the definitions/groupings found in the PHS for the different time periods.

4.1.2 Data on Health Determinants

Data on the following determinants of health were considered: population characteristics (in terms of size, growth, age and sex distribution, and density), literacy, urbanization, occupational distribution, economic indicators, environmental sanitation, lifestyle and utilization of medical services. The variables identified to represent these determinants and their sources are shown in Table 3. The basis for the inclusion of these variables again depended on their availability. Data for these indicators and the corresponding morbidity and mortality rates at the provincial level were used.

4.1.3 Data for Burden of Disease

Two measures of burden of disease were used in this study - potential years of life lost (Romeder and McWhinnie, 1977) and days of healthy life lost (Ghana Health Assessment Project Team, 1981).

The only data requirement for potential years of life lost (PYLL) was the age-specific number of deaths per disease. These were available from the PHS.

The computation of days of healthy life lost required data on incidence rates, proportion who die from the disease, proportion who are permanently disabled from disease, proportion who are temporarily disabled, the levels of disablement during the time of disability. Life expectancies at the time of death were also required.

4.1.3.1. Interviews of experts

Most of the data requirements for determining the burden of disease, such as the case fatality, proportions disabled, duration of disease and level of disablement, came from interviews of experts. These included consultants, researchers, epidemiologists and academicians who were involved in the study and treatment of the different diseases under consideration and who were willing to provide information on the different parameters for the burden of disease. The information obtained from these individuals were considered their expert opinion based on their personal experiences, and not necessarily based on empirical data. Many of them usually contributed information on more than one disease.

For some diseases, there were more than one expert interviewed. As expected, the information from different experts differed from each other. We resolved this through one or more of the following methods: a) comparing the responses with the data from PHS (whenever available and reasonable); b) consulting medical textbooks; c) comparing to the values from the Ghana study; d) taking the most common value or a value in between the values given. In the end, all

values that were used in the computation were mainly the decision of the principal investigators who assume sole responsibility for any unreasonable values that would be present in the data set.

4.1.3.2. Data on Incidence

For diseases of short duration such as diarrhea, bronchitis and other communicable diseases, the available morbidity rates were considered as incidence rates. For diseases that are of long duration, however, morbidity rates reflected both incidence and prevalence. Incidence rates have to be derived indirectly by dividing the mortality rates by the case-fatality rates. Mortality rates by cause of death were available in the PHS reports in all years. Case-fatality rates from the interviews were used for this.

For cancer, the incidence rates were obtained from the Philippine Cancer Society publication entitled "Cancer in the Philippines Vol. II (1993)" by Laudico, Esteban, Ngelangel et al. In particular, the incidence rates for Rizal were used. By doing so, it was assumed that the incidence rates in Rizal is a good estimate of the rates for the whole country.

4.1.3.3. Life Expectancies at the Time of Disease Onset

Estimates of life expectancies at the time of disease onset were obtained from the report of Cabigon and Fleiger (1993) entitled "Life Table Estimates: For the Philippines, Its Regions and Provinces, By Sex: 1970, 1980, 1990." Since separate estimates were provided for males and females in this document, the weighted average of the life expectancies was computed. Another thing is that life expectancies were not given for single years. For life expectancies of in-between years, say age 37, a linear interpolation was done using data for the two nearest ages for which life expectancies were available (that is, 35 and 40 in the example).

4.1.4 Information on Health Programs and Policies

Information on relevant health programs and policies were obtained by an intensive literature search from the records of several government agencies. These included the Department of Health, National Statistics Office, National Economic and Development Authority and the Department of the Budget and Management.

4.2. Data Analysis

4.2.1 Analysis of Trends

Trends of leading diseases from 1965 to 1990 were depicted using line graphs. Since the magnitude of the rates vary by disease, it was difficult to compare the trends among diseases.

In the analysis, we used correspondence analysis as an initial step in describing the trends of the mortality and morbidity rates. This is a multivariate technique wherein the rows and

columns in a two dimensional table are depicted as points in a graphical space. In this study, the rows represented disease categories, age and sex groups or regions, while the columns were the different years considered. Thus, a row represented the trend for a specific disease for the time periods considered. This row, denoting the trend of a specific disease is then represented as a point, based on the output of correspondence analysis. The points (diseases) that are near each other signify similar trends. These are contrasted from points (diseases) that are far from them. The objective in using correspondence analysis was to extract major similarities and differences among diseases. Since the diseases were tabulated against the year, the identification of distinct patterns according to time period was also extracted.

Differences in the trends of leading diseases by age, sex and region were also detected in the same manner.

4.2.2 Correlation of Health Determinants and Disease Rates

To correlate disease rates with health determinants, data on the provincial level for the indicators of identified health determinants and disease rates were used. The variables used as indicators of health determinants are shown in Table 3.

Simple correlation coefficients were computed for each disease rate against a specific variable representing a health determinant. The statistical significance of these correlations were determined.

Since multicollinearity was expected among the indicators of health determinants and among the disease rates, the method of canonical correlation analysis was also employed. This method obtains a linear combination among the indicators of health determinants and another linear combination among the disease rates such that the correlation between this pair of linear combinations is highest. The linear combinations in this pair are called the (first) canonical variables. Their correlation is called the (first) canonical correlation. The linear combinations are interpreted in the light of which of the original set of variables correlated with them. This method can extract more than one set of canonical variables and canonical correlations. The other extracted canonical correlations are of decreasing magnitude. An assessment of the statistical significance of these canonical variables is also made.

4.2.3 Burden of Disease

4.2.3.1 Computation of Potential Years of Life Lost

Age-specific number of deaths was used in the analysis. We used 70 years as the cut-off point. This meant that a person who died before this age had years of life lost equal to the difference between 70 years and the age at death of the individual. One who reached the age of 70 did not have years of life lost. Choosing a fixed end point such as 70 years simplified the computation of potential years of life lost. This procedure has been found to result in the same ranking of diseases compared to another method which used life expectancies. We did not follow the

recommendation of Romeder and McWhinnie to exclude from the computation deaths before 1 year. This was done so that we could compare the results of the PYLL and the DHLL.

The formula used for computing PYLL was as follows:

$$PYLL = \sum_{i=1}^n (70 - AD_i) (N_i)$$

where AD_i = average age at death of group i
 N_i = number of deaths in group i
and n = number of age groups

4.2.3.2 Computation of Days of Healthy Life Lost

The computation of days of life lost followed the method suggested in the Ghana study. Some modifications were made to account for the differences in the level of disablement experienced by those who are disabled prior to death from disease, those who do not die but are permanently disabled and those who are temporarily disabled. Separate estimates of these levels of disablement at different stages of the disease were used in the computation. The Ghana study used only one estimate for all these types of disablement.

The days of healthy life lost comprised of the losses due to premature death, losses due to disability prior to death, losses among survivors who are permanently (or chronically) disabled and losses due to temporary disablement. Each of these components is discussed below.

A specific disease sometimes causes the death of an individual. Thus, there are days of life lost due to premature death and due to disability prior to death. The losses due to premature death is obtained by obtaining the expected years of life at the time of death if the individual had not died. In equation, it is given by

$$A1 = (LE - (AD - AO)) * PD * 365 \text{ days}$$

where $A1$ = losses due to premature death

AO = average age at disease onset

AD = average age at death

LE = life expectancy at the average age of disease onset

PD = proportion of cases who die from disease, sometimes called case-fatality rates

The losses due to disability prior to death is given by

$$A2 = (AD - AO) * PDPD * LDPD * PD * 365 \text{ days}$$

where AO, AD and PD are as defined earlier

A2 = losses due to disability prior to death

PDPD = proportion who experience some form of disability prior to death from disease

LDPD = level of disablement of those with disability prior to death

The disease may not lead to death but may cause permanent (or chronic) disability. The losses due to permanent disability is computed as:

$$A3 = LE * PC * LDCD * 365 \text{ days}$$

where LE is as defined earlier

A3 = losses due to permanent disability (chronic disability)

PC = proportion who do not die of the disease but are permanently disabled (chronic disability)

LDCD = level of disablement among those permanently disabled

Finally, the disease may be temporary or just have an acute stage. The losses due to temporary disability is given by:

$$A4 = PT * LDTD * D$$

where A4 = losses due to temporary disability

PT = proportion with temporary disablement = $1 - PD - PC$

LDTD = level of disablement during temporary illness

D = duration of temporary illness in days

The days of healthy life lost per case is then computed by summing these four losses, that is

$$\text{DHLL per case} = A1 + A2 + A3 + A4$$

The DHLL for the community, measure in days of life lost per 100,000 person-years is obtained by multiplying the DHLL per case with the incidence of disease, that is

$$\text{DHLL per 100,000 person-years} = \text{DHLL per case} * I$$

where I = incidence per 100,000 person-years.

5. Results

5.1 Epidemiologic Trends

5.1.1 Trends of Death Rates by Age, Sex, and Region

The trends of death rates varied by age groups and by sex. These are shown in Figure 1. There was decreasing secular trend in the death rates from 1970 to 1980 among the younger age groups while the rates were increasing for the older age group. The death rates generally increased from 1980 to 1985 and then again decreased towards 1990.

The greatest absolute reduction in the death rates during this period was among infants. Based on the Philippine Health Statistics data, the death rate among infants decreased from 42.8 per 1000 population under 1 year in 1965 to 21.8 per 1000 population under 1 year. This was equivalent to a 49 percent reduction. Among 1-4 years of age, the death rate decreased from 9.9 per 1000 in 1965 to 3.6 per 1000 in 1990, or 63.6 per cent reduction. At the middle ages, the decline in the death rates were not as fast as in the youngest age groups. The death rates dropped from 1.7 per 1000 population in 1965 to 0.9 per 1000 in 1990 among the 5 to 19 year population. Among 20 to 49 years of age, the death rates decreased from 3.5 per 1000 in 1965 to 2.7 per 1000 in 1990.

The death rates among the older age groups increased from 1970 to 1985. Among 50 to 69 years of age, the death rate slightly increased from 12.6 per 1000 in 1970 to 14.2 per 1000 in 1985. In the 70 and above population, the death rates increased from 56.6 per 1000 in 1970 to 69.5 per 1000 in 1985. The death rates, however, then decreased in 1990. The death rates dropped to 12.7 per 1000 and 64.8 per 1000 for the 50-69 age group and the 70 and above age group, respectively.

As shown in Figure 1, the trends in the death rates were similar for both sexes for the younger age groups. Among infants, there were similar 49 percent reduction in the death rates from 1965 to 1990 among males and females. Among 1-4 years of age, the male death rates was reduced by 63.0 per cent (from 10.3 per 1000 in 1965 to 3.8 per 1000) while the female death rate decreased by 64.1 per cent (from 9.5 per 1000 in 1965 to 3.4 per 1000 in 1990). However, a different pattern in the rates were observed among older males compared to females. The death rates were continually decreasing among females 20-49 years, from 3.0 per 1000 in 1965 to 1.7 per 1000 in 1990, a reduction of 43.3 per cent. On the other hand, the death rates did not have the same downward trend for males in this age group. In 1965, the rate was 4.1 per 1000 male 20-49 years of age. This decreased to 3.8 per 1000 in 1990, or only 5.6 per cent reduction. At the older age groups, the rate of increase among the males was faster than the rate of increase among the females. The death rate rose from 14.8 per 1000 in 1965 to 16.5 per 1000 male 50-69 years of age. The female death rates decreased slightly from 10.4 per 1000 in 1965 to 9.1 per 1000 population aged 50-69 years in 1990 (12 percent reduction). In the 70 and above population, the death rates among males first decreased from 1965 to 1970. Then the rates increased from 57.6 per 1000 males and 55.6 per 1000 females in this age group, to 70.4 per 1000 and 60.0 per 1000 respectively. The percent increased among male 70 years and above was 22.3 percent while among females, the

increased was only 7.7 per cent.

Table 4 shows the death rates by region and by sex. Regions 9, 10, 11 and 12 had consistently lower death rates compared to the other regions. This may reflect the level of under reporting of deaths in these regions. However, in all regions, the trends do not differ widely among regions.

5.1.2 Disease-Specific Mortality and Morbidity Rates

Trends in mortality rates were easier to describe than that of morbidity rates. Mortality rates from many of the leading diseases could be described as either increasing or decreasing from 1965 to 1990. There were large reductions in the mortality rates from 1965 to 1990 from the following diseases: bronchitis, diarrhea, influenza, avitaminoses, tetanus, diphtheria, poliomyelitis and schistosomiasis. The mortality rates also declined for tuberculosis, malaria, pneumonia, accidents and nephrologic diseases although these declines were not as great as in the first group of diseases mentioned. On the other hand, the mortality rates from the degenerative diseases (heart diseases, vascular diseases and malignant neoplasms) increased from 1965 to 1990. Measles, infectious hepatitis, typhoid and paratyphoid fever and h-fever deaths also increased during this time period.

The differences in the mortality trends of diseases resulted in the rearrangement in the ranking of diseases. The past twenty-five years saw the ascension of cardiovascular diseases as the leading causes of mortality. However, communicable diseases remained important causes of mortality, especially among the younger ages.

A different picture was seen for morbidity rates. The results of our analysis suggested that the trends for many diseases during the period 1965 to 1990 can be described by looking into three time periods: 1965 to 1974, 1975 to 1983, and 1984 to 1990. Between 1965 and 1974, most of the diseases fluctuated around a certain level with no definite indication of increasing or decreasing trends. Avitaminoses and malaria were a few exceptions of diseases that showed distinctive increasing or decreasing trends during this time period. Then the rates significantly dropped in 1975 for many diseases. The rates were generally lower during the period between 1975 to 1983, compared to the levels immediately before and after this time period. The sudden drop in morbidity rates during this period was quite noticeable in tuberculosis, bronchitis, influenza, gonococcal infections, typhoid fever, whooping cough, tetanus, diphtheria and poliomyelitis. Then starting in 1984, sudden marked increases were observed for most of the communicable diseases such as pneumonia, tuberculosis, diarrhea, bronchitis, influenza, measles, malaria, varicella, typhoid fever, infectious hepatitis, h-fever and leprosy. Even the decline in whooping cough, tetanus, diphtheria and poliomyelitis slowed down during this period. Non-communicable disease also increased after 1984 although it was not of the same magnitude as the increases in the communicable diseases.

5.1.2.1 Pneumonia

Pneumonia was the leading cause of mortality from 1965 to 1989. The mortality rates from pneumonia was reduced by almost half, from 121.2 per 100,000 in 1965 to 66.4 per 100,000 in 1990. Pneumonia ranked as the second leading cause of mortality in 1990.

The morbidity rates from pneumonia was generally flat from 1965 to 1983. Then, as have been noted above, the morbidity rate increased from 237.5 per 100,000 in 1983 to 363.9 per 100,000 in 1984. The morbidity rates fluctuated from this time to 1990. It was ranked fourth in morbidity in 1990.

Figure 2.1 shows the mortality and morbidity trends in pneumonia from 1965 to 1990.

5.1.2.2 Tuberculosis

Tuberculosis was next to pneumonia as the leading cause of death in 1965. The death rates from tuberculosis also decreased from 83.4 per 100,000 in 1965 to 39.1 per 100,000 in 1990 (Figure 2.2). The reduction in the mortality rates was more than 50 percent. Tuberculosis was the fourth leading cause of mortality in 1990.

The morbidity rates were somewhat level from 1965 to 1976, exceeding 300 deaths per 100,000 population per year. Then it suddenly drop to 238.0 per 100,000 in 1977, where it stayed around this level for some time. The rates suddenly increased in 1984 to 285.5 per 100,000. The trend was increasing slightly until 1989, after which a sharp fall was seen in 1990. The morbidity rate in 1990 was 246.1 per 100,000.

5.1.2.3 Diarrheas

Diarrhea was another major cause of death in 1965. Its mortality rates fluctuated although a secular trend can be discerned from Figure 2.3. The rate in 1965 was 48.9 per 100,000. This significantly dropped to 10.3 per 100,000 in 1990.

Diarrhea remained a leading cause of mortality inspite of this reduction. This is due to the high incidence of this disease. No significant reductions in the rates occurred from 1965 to 1983. Then in 1984 the morbidity rates started increasing until 1990. In 1983 the morbidity rate was 529.2 per 100,000. This nearly doubled in 1984 to 1036.9 per 100,000. The rates continued to go up where in 1990, it was 1495.4 per 100,000. It was the second leading cause of morbidity in 1990.

5.1.2.4 Bronchitis

The reduction in the mortality was one of most significant changes that occurred from 1965 to 1990. In 1965, the rate was as high as 43.1 per 100,000. It was the fifth leading cause of

death during that year. After a continuous decline, the mortality have been drastically reduced to 1.6 per 100,000 in 1990 (Figure 2.4). It was no longer among the leading causes of mortality in 1990.

The morbidity rate is another picture. The morbidity rate in bronchitis started rapidly rising in the 1980's. From 427.3 per 100,000 in 1980, the rate increased to 1580.3 in 1990, more than three times the rate in 1980. Bronchitis ranked as the leading cause of morbidity in 1990.

5.1.2.5 Influenza

Influenza was another leading cause of morbidity in 1990. The trend in the morbidity from influenza showed a cyclical pattern of its incidence. The rates seemed to have gone down during the middle 1970's up to early 1980. Similar to other communicable diseases, the rates suddenly went up from 493.6 per 100,000 in 1983 to 853.0 per 100,000 in 1984. The rate seemed to be increasing from then on where it had the highest incidence in 1989 at 1287.6 per 100,000. Influenza was the third highest in morbidity rates, behind bronchitis and diarrhea. This trend can be seen from Figure 2.5.

The case fatality rate of influenza was low. The mortality rates in influenza was just 7.3 per 100,000 in 1965. There was a significant reduction in this rate where in 1990, it was only 1.0 per 100,000.

5.1.2.6 Measles

Measles was one of the leading causes of morbidity in 1990. The trend in this rate was similar to the other communicable diseases whose rates were increasing in the 1980's. The morbidity rate from measles was 56.7 per 100,000 in 1965. This was almost the same level in 1980 at 55.4 per 100,000. This rate increased to 142.8 per 100,000 in 1987 where it seemed to be going down. In 1990, the morbidity rate was 69.2 per 100,000 (Figure 2.6).

Measles was a communicable disease that was also one of the ten leading causes of mortality. The trends in mortality followed the pattern as in morbidity. The increase in mortality rates from measles started in 1980 where the rates was 10.7 per 100,000. This went up to 14.7 per 100,000 in 1981. The mortality rate fluctuated around this level from this year to 1990. There seemed to be a decreasing trend from 1987 onwards.

5.1.2.7 Avitaminoses

Avitaminoses was a major leading cause of death in 1965, where it caused the death in 49.9 persons per 100,000 population. The mortality rate has been reduced after a rapid decline from 1965 to 1970. The mortality rate then went up in the early 1970's before it continuously declined until 1982. The decline in the mortality rate from avitaminoses slowed down from this year. In 1990, the rate was 6.3 per 100,000. Figure 2.7 shows the trends in these rates.

Morbidity rates from avitaminoses were not available starting 1974. The morbidity rates were declining as in the mortality rates from 1965 to 1973.

5.1.2.8 Heart Diseases

The increase mortality rate in heart disease was alarming such that it became the leading cause of death in 1990, from being the fifth ranking in 1965. The mortality rates was flat from 1965 to 1970. Then the rates started increasing. From 34.0 per 100,000 in 1970, the rates went up to 74.4 per 100,000. This is more than a 100 percent increase in the rates since 1970.

Heart diseases were not notifiable before 1984. The available morbidity data showed increasing trend from 1984 to 1990. This is shown in Figure 2.8.

5.1.2.9 Vascular diseases

The mortality rates followed the same pattern as in heart diseases. An increasing trend from 1975 can be seen in Figure 2.9. The rate in 1975 was 31.8 per 100,000. This steadily increased to 54.2 per 100,000 in 1990. The rate in 1990 was almost twice as that in 1965, which was 27.9 per 100,000. In 1990, vascular diseases ranked as the third leading cause of death.

5.1.2.10 Malignant Neoplasms

The mortality rates from malignant neoplasms shows a continuously increasing trend, although gradually, since 1965. The mortality rate increased from 22.2 per 100,000 in 1965 to 35.4 per 100,000 in 1990 (Figure 2.10). It was the fifth leading cause of mortality in 1990.

The morbidity rates showed very gradually increasing trend from 1965 to 1976. Then it suddenly went up to 46.1 per 100,000 in 1977 from 30.7 per 100,000 in 1976. The rates still continued to steadily increase after this period. In 1990, the morbidity rate was 54.3 per 100,000.

5.1.2.11 Nephritis, Nephrosis and Nephrotic Syndromes

This group of degenerative diseases showed an initial decreasing trend from 1965 to 1975. The rates went down from 13.3 per 100,000 in 1965 to 8.0 per 100,000 in 1975 (Figure 2.11). There seemed to be neither a decreasing nor increasing trend for this disease from 1975 to 1990. However, with the decreasing trend in other leading causes of death, this group of diseases remained to be major causes of mortality in 1990.

5.1.2.12 Accidents

The mortality rates from accidents fluctuated greatly between 1970 and 1980. The rates increased from 24.8 per 100,000 in 1970 to 37.0 per 100,000 in 1972. This went down to 19.1 per 100,000 in 1975, before increasing again to 28.1 per 100,000 in 1978. The rates then went down again in 1982 to 11.5 per 100,000. After it rose to 19.6 per 100,000 in 1984, the rate stayed on this level until 1990. This can be seen in Figure 2.12.

5.1.2.13 Malaria

Malaria was the eighth leading cause of morbidity in 1990. Morbidity rates from malaria were fluctuating between 1970 to 1983 (Figure 2.13). Then in 1984, it abruptly went up from 79.7 per 100,000 to 105.9 per 100,000. This rate remained steady at this level until 1989. A sharp decrease can be seen in 1990 where the rate was 118.7 per 100,000.

Mortality rates for malaria were low. These seemed to have been flat after an initial decrease from 1965 to 1970.

5.1.2.14 Other Leading Causes of Morbidity

Figures 2.14 to 2.25 show the trends in morbidity and mortality from varicella, gonococcal infections, typhoid fever, schistosomiasis, infectious hepatitis, h-fever and leprosy. These diseases experienced a sudden increase in the rates between 1984 to 1990. Varicella was rapidly increasing during this time period. From a rate of 3.6 per 100,000 in 1983, this rapidly went up to 53.5 per 100,000 in 1990. Gonococcal infections increased from 13.0 per 100,000 in 1981 to 28.0 per 100,000 in 1982. The rates from gonococcal infections were decreasing until 1990, where the rate was down to 10.3 per 100,000. Typhoid fever suddenly increased from 10.4 per 100,000 in 1983 to 18.4 per 100,000 in 1984. The rates of morbidity has since remained at this level. The morbidity rates from schistosomiasis was rapidly between 1984 and 1989. The rates increased from 8.2 per 100,000 in 1984 to 17.9 per 100,000 in 1989. There was a marked decrease to 23.8 per 100,000 in 1990. Infectious hepatitis showed an increasing trend from 1965 to 1990. As in other communicable diseases, a sudden increase occurred between 1984 and 1985. The morbidity rate in 1985 was 28.8 per 100,000, compared to 18.4 per 100,000 in 1984. The morbidity rate from infectious hepatitis did not change much after this increase. H-fever was also increasing from 1980 to 1990. The rate rose from 1.3 per 100,000 in 1980 to 7.8 per 100,000 in 1990. Leprosy had an increasing trend from 1977 to 1985. The rate went from 1.1 per 100,000 in 1977 to 3.8 per 100,000 in 1985. A slight decrease occurred until 1988 where the rate was down to 2.8 per 100,000. Then it went up again to 7.0 per 100,000 in 1989. The rate in 1990 for leprosy was 4.6 per 100,000.

These diseases contributed significantly to the morbidity picture. The mortality from these diseases, however, were very low.

5.1.2.15 The Diseases Under the Expanded Programme for Immunization

The trends in this particular group of diseases were worth noting. For tetanus, whooping cough, diphtheria and poliomyelitis, there were significant declines that started almost simultaneously between 1975 and 1980. These declines were both in the mortality and morbidity trends. It was quite significant, specifically for tetanus, since it was a leading cause of death in the very young population. These diseases fall under the expanded programme for immunization which was a major component of the health services from the middle 1970's to present.

5.1.3 Disease Mortality and Morbidity Trends by Age Groups

5.1.3.1 Under 5 Years

The leading diseases among children under five during the period 1965 to 1990 were mostly communicable diseases. These include pneumonia, diarrheal diseases, bronchitis, avitaminoses, measles, heart diseases and septicemia. Some important diseases among the very young are also worth discussing because of the attention that had been placed on the control of these diseases. These are tetanus, tuberculosis, poliomyelitis, diphtheria and whooping cough.

For most of the important diseases, the mortality rates decreased from 1965 to 1990. However, morbidity rates increased for many of these diseases during the period.

The graphs in Figures 3 and 4 provide a picture of the following discussions on leading causes of morbidity among under 5 children.

5.1.3.1.1 Pneumonia

From 1965 to 1990, pneumonia was the most important cause of death among children 0-4 years. The death rates from pneumonia were more than 800 per 100,000 among infants and 200 per 100,000 among children 1-4 years until 1985. The rates decreased for pneumonia in 1990 to 516.1 and 153.2 per 100,000 respectively among infants and 1-4 year old children.

However, the rate of decline was not as great as the decline in the other important diseases affecting this age group. This could be attributed to the increasing trends in morbidity from pneumonia. The morbidity rate was 1538.4 and 631.0 per 100,000 respectively among infants and children 1-4 years. The rates increased to 3691.6 and 1150.9 per 100,000 in 1985, respectively. The rates further went up to 4005.0 per 100,000 for infants and 1245.6 per 100,000 for 1-4 year old children in 1989.

5.1.3.1.2 Diarrhea

Diarrhea was the second leading cause of death in 1990 with a rate of 47.3 per 100,000 children under 5 years. The rate among infants in 1990 was 109.9 per 100,000 while in 1-4 year old children, it was 30.2 per 100,000. The mortality rates from diarrhea had decreasing trend from 1965 to 1990. Similar to pneumonia, the decline in diarrheal mortality rates, however, had not been as great as that of bronchitis and avitaminoses.

Diarrheal cases were second only to bronchitis in terms of morbidity among children below 5 years. However, these diseases claimed more deaths in this age group than bronchitis during the period 1965 to 1990.

The morbidity rates from diarrhea showed an increasing trend. From 2513.3 per 100,000 infants in 1965, the rates increased to 9789.8 per 100,000 infants. Among children 1-4 years, the morbidity rates first decreased from 1755.9 per 100,000 in 1965 to 929.9 per 100,000 in 1980 and then increased rapidly to 3632.6 per 100,000 in 1989.

5.1.3.1.3 Measles

Measles was one of the few leading diseases among this age group that had not significantly decreased during the period 1965 to 1990. It was the third leading cause of mortality among children under 5 years in 1990. Taking only the 1-4 year age group, measles was the second leading cause of mortality in 1985 and 1990.

Mortality rates from measles were 40.4 per 100,000 infants and 30.8 per 100,000 1-4 year old children in 1965. The rates went up to 97.7 and 84.3 per 100,000 respectively in 1985. However, there was a decreasing trend from 1985 to 1990. In 1990, the mortality rates was 40.1 per 100,000 infants and 30.9 per 100,000 children 1-4 years.

The trend in morbidity followed a similar pattern from 1965 to 1985. The rates increased from 200.1 per 100,000 infants and 210.8 per 100,000 1-4 year old children in 1965 to 682.8 per 100,000 infants and 447.8 per 100,000 1-4 year old children in 1985. Unlike the trend in mortality, the morbidity rates did not go down after 1985. The rates in 1989 was 711.3 and 465.9 per 100,000 respectively for infants and 1-4 year old children.

5.1.3.1.4 Avitaminoses

Avitaminoses was second only to pneumonia as the second leading cause of death among infants in 1965 with a rate of 513.9 per 100,000. It was the fourth highest mortality rate (78.0 per 100,000) among 1-4 year old children during that year. The mortality rates even reached as high as 534.2 per 100,000 among infants in 1975. Deaths from avitaminoses had been reduced to 66.1 per 100,000 and 18.4 per 100,000 respectively for infants and children 1-4 years in 1990. It remained as one of the leading causes of mortality among infants.

Morbidity rates from avitaminoses were not available for 1975 up to 1989. It was the sixth leading cause of morbidity in 1965 and 1970 with 576.9 and 484.3 per 100,000 respectively for infants and 51.4 and 33.7 per 100,000 among children 1-4 years.

5.1.3.1.5 Septicemia

The trend for mortality from septicemia had been increasing since 1965 when it was not a major leading cause of death among this age group. The rates in 1965 were only 12.8 per 100,000 infants and 3.3 per 100,000 1-4 year old children. In 1990, these rates increased to 84.3 per 100,000 infants and 9.7 per 100,000 1-4 year old children. The decreasing trend in deaths from other leading diseases along with increasing mortality trend in septicemia had made latter a leading cause of mortality. Septicemia was the third leading cause of mortality among infants in 1990, behind pneumonia and diarrhea. Among children 1-4 years, the mortality rate from septicemia was the sixth highest in 1990.

5.1.3.1.6 Bronchitis

Bronchitis was the leading cause of morbidity among children below 5 years during the period 1965 to 1989. The rates were 5306.7 per 100,000 infants and 2349.1 per 100,000 1-4 year-old children in 1965. The morbidity rates increased to 7658.2 and 2553.5 per 100,000 respectively in 1970. No data on morbidity was available in 1974 and 1975 because it was not considered a notifiable disease during these years. From 3059.8 and 1234.7 per 100,000 infants and 1-4 year old children respectively in 1980, these went up to 12,392.7 per 100,000 infants and 4635.5 per 100,000 1-4 year-old children in 1989.

In terms of mortality, the rates for bronchitis were decreasing. In 1965, it ranked as the third leading cause of death behind pneumonia and avitaminoses among infants at 452.4 per 100,000. During the same year, it was also the third leading cause behind pneumonia and diarrhea among children 1-4 years old. The rate then among this age group was 139.4 per 100,000. Beginning in 1970, the rates decreased steadily in the two age groups up to 1990. In 1990, it only ranked sixth leading cause of death among infants and the fifth ranking among 1-4 year old children. The rates were 42.5 and 11.2 per 100,000 for infants and children 1-4 years in that order in 1990.

5.1.3.1.7 Heart Diseases

Heart diseases have slowly become a leading cause of death among infants. The mortality rates from 1965 to 1990 had been increasing. In 1965, the mortality rates was only 6.6 per 100,000 infants. This increased to 47.3 per 100,000 infants in 1990. It was the sixth leading cause of mortality among infants in 1990.

Morbidity rates from heart diseases by age group from 1965 to 1980 were not available. The morbidity rates were 109.4 per 100,000 infants and 23.2 per 100,000 1-4 year old children

in 1985. This rates increased to 134.1 per 100,000 and 33.7 per 100,000 respectively in 1989.

5.1.3.1.8 Tuberculosis

Tuberculosis was the seventh leading cause of mortality among infants and the sixth leading cause of death among 1-4 year children in 1965. The rate among infants and 1-4 year old children were 29.7 and 32.1 per 100,000 respectively in 1965. The rates have been significantly reduced to 1.6 per 100,000 infants and 1.3 per 100,000 1-4 year old children in 1990.

In terms of morbidity, the rates for tuberculosis have been increasing for this age group since 1980. From a rate of 69.5 per 100,000 infants in 1980, this went up to 187.1 per 100,000 in 1989. Among children 1-4 years, the morbidity rate increased from 54.7 per 100,000 in 1980 to 102.3 per 100,000 in 1989. Tuberculosis was the sixth leading cause of morbidity among this age group in 1989.

5.1.3.1.9 Influenza

Influenza was a leading cause of morbidity but not mortality among this age group. In 1965, the morbidity rates from influenza were 636.8 per 100,000 infants and 709.7 per 100,000 children 1-4 years. These rates went up to 1937.4 and 1149.1 per 100,000 respectively in 1970. After a decline in 1975, the morbidity rates rapidly went up to 4372.0 per 100,000 infants and 1616.2 per 100,000 1-4 year old children in 1989.

Although relatively low compared to other diseases, the mortality rates from influenza decreased significantly from 27.7 per 100,000 infants in 1965 to 3.0 per 100,000 infants in 1990. Among 1-4 year old children, the mortality rates decreased from 15.6 in 1965 to 0.7 per 100,000 in 1990.

5.1.3.1.10 Diseases under the Expanded Programme for Immunization

The following diseases were targeted for control under the Expanded Programme for Immunization: measles, tetanus, tuberculosis, pertussis, diphtheria and poliomyelitis. The trend for measles and tuberculosis had been discussed above. The trends of the other diseases under the EPI program, although not all leading causes of morbidity and mortality are worth discussing to provide an idea of the impact of this program. Figure 5 and 6 show the trends of mortality and morbidity rates for these diseases.

5.1.3.1.9.1 Tetanus

Tetanus used to be a major leading cause of death among infants. However, a marked fall in the mortality rates from tetanus among children under 5 years removed it from one of the major leading causes of death among this group. The mortality rate among infants was 182.3 per 100,000 in 1965. It was the fifth highest during that year. It had reduced significantly to 6.5 per 100,000 infants in 1980. In 1990, the mortality rate stood at 9.5 per 100,000 infants.

5.1.3.1.9.2 Pertussis

In 1965, pertussis or whooping cough ranked as the fifth leading cause of morbidity among children under five years, even higher than measles. The rates then were 288.8 per 100,000 infants and 191.1 per 100,000 children 1-4 years. The trend in morbidity had been decreasing since 1980 for this age group. From 385.7 per 100,000 infants in 1980, this decreased to 173.9 per 100,000 in 1989. Among children 1-4 years, the rates went down to 76.9 per 100,000 in 1990, from 177.5 per 100,000 in 1980.

Pertussis was a major contributor to the deaths among this age group since 1965. However, significant reductions have been observed for this disease. Pertussis was the cause of death in 4.4 per 100,000 infants and 1.2 per 100,000 children 1-4 years in 1965. The mortality rates from pertussis were reduced to 0.3 per 100,000 infants and 0.04 per 100,000 1-4 year old children in 1990.

5.1.3.1.9.3 Diphtheria

Diphtheria is a disease that affects mostly children in the youngest age group. The mortality rates from diphtheria decreased significantly from 1970 to 1990. In 1970, the mortality was 11.1 and 8.5 per 100,000 for infants and 1-4 year old children respectively. The rates in 1990 were only 0.9 per 100,000 infants and 1.0 per 100,000 children 1-4 years.

The decline in morbidity rates from diphtheria from 1970 to 1989 was not as remarkable as in mortality. The morbidity rates among infants decreased from 39.1 per 100,000 in 1970 to 18.5 per 100,000 in 1989. Among 1-4 year old children, the corresponding rates decreased from 21.8 to 10.8 per 100,000.

5.1.3.1.9.4 Poliomyelitis

Mortality from poliomyelitis had been very low since 1965. The mortality rates in 1965 among infants was 2.6 per 100,000 and among 1-4 years, was 2.2 per 100,000. The mortality rates in 1990 have been cut down to 0.06 per 100,000 infants and 0.01 per 100,000 1-4 year old children.

Morbidity rates also declined significantly. From a morbidity rate of 11.1 per 100,000 infants in 1970, this went down to 1.6 per 100,000 in 1989. Among 1-4 year old children, the morbidity rates decreased from 4.7 to 2.1 per 100,000 in 1970 and 1989 respectively.

5.1.3.2 5-14 Years

The population 5-14 years had similar health problems as the children under 5 years, although the rates were on a smaller scale. Compared to other age groups, this age range has the lowest rates in terms of mortality. The major diseases that affected the 5-14 year age group were pneumonia, bronchitis, influenza, diarrhea and avitaminoses. Trends of these diseases in the 5-14 age group were similar to those under 5 years, although the latter age group experienced greater declines during the period 1965 to 1990. The addition to this list of diseases is accidents. The rates of the 5-9 age group were usually higher than the 10-14 year age group. However this gap seemed to be closing in the 1990's.

There were no significant changes in the ranking of diseases according to morbidity, as the trends in the major diseases were similar. However, in terms of mortality, we see the rise of heart diseases as a leading cause of mortality, perhaps due to the reduction in the mortality from the major diseases.

The trends of the leading causes of mortality and morbidity in this age group are shown in Figures 7 and 8.

5.1.3.2.1 Pneumonia

Pneumonia was also the leading cause of death among the 5-14 year old population from 1965 to 1990. The mortality rate among this age group in 1965 was 40.5 per 100,000. This rate decreased to 20.2 per 100,000 in 1990.

On the other hand, the morbidity rates were increasing. The morbidity rate from pneumonia went up from 111.5 per 100,000 in 1965 to 235.3 per 100,000 in 1989. Pneumonia was the fourth leading cause of morbidity in this age group.

5.1.3.2.2 Accidents

Accidents was the second leading cause of mortality among the 10-14 year age group and ranked fourth among children 5-9 years in 1965. In 1990, the mortality rates were second in rank in both age groups.

The mortality rates from accidents in this age group showed an increasing trend from 1980 to 1990. The rates increased from 7.6 per 100,000 children 5-14 years in 1980 to 10.9 per 100,000 in 1990.

In terms of morbidity, the rates were 143.5 per 100,000 among the 5-14 year old population in 1989. This was up from 98.6 per 100,000 in 1985. It was the fourth highest morbidity rate in 1989.

5.1.3.2.3 Heart Diseases

The mortality rates from heart disease among 5-14 year old children fluctuated around 6.0 per 100,000 from 1965 to 1990. The rates in 1965 were 6.1 per 100,000 children 5-14 years. This rate decreased to 5.0 per 100,000 in 1980 and then increased again to 6.0 in 1990. Mortality rates from heart disease was the third highest in 1990 in the 5-14 year population.

5.1.3.2.3 Diarrhea

Diarrhea was the fourth leading cause of death among 5-14 year old children in 1990. It also ranked third behind bronchitis and influenza among the leading cause of morbidity in the 5-14 year old population.

The mortality rates had a decreasing trend. The rates went down from 34.0 per 100,000 in 1965 to 6.1 per 100,000 in 1990 among children 5-9 years and from 8.9 per 100,000 in 1965 to 2.3 per 100,000 in the 10-14 year age group. Combined, the mortality rate decreased from 22.4 per 100,000 5-14 children in 1965 to only 4.3 per 100,000 in 1990.

The morbidity rates from diarrhea increased from 356.5 per 100,000 in 1975 to 895.4 per 100,000 in 1989 in the 5-14 year old age group.

5.1.3.2.4 Avitaminoses

Avitaminoses was the fifth leading cause of mortality among the 5-14 year old population in 1965 with a rate of 9.8 per 100,000. The mortality rate decreased to 2.1 per 100,000 in 1990. It was still the fifth leading cause of mortality in this age group.

5.1.3.2.5 Tuberculosis

The mortality and morbidity rates for tuberculosis were at nearly the same levels for 5-9 and 10-14 age groups. In both age groups, the morbidity ranked fifth as the leading cause of morbidity in 1965. During that year, tuberculosis was the third leading cause of mortality among the 10-14 year group. It ranked next to avitaminoses as the leading cause of death among the 5-9 year old population.

The mortality rates from tuberculosis also was greatly reduced from 1965 to 1990. From a rate of 11.3 per 100,000 5-14 year children in 1965, the rates had decreased to 0.7 per 100,000 children in 1990.

The morbidity rates from tuberculosis was increasing from 1980 to 1989. From 44.8 per 100,000 children 5-14 years, the rates went up to 88.5 per 100,000 in 1989.

5.1.3.2.6 Bronchitis

Bronchitis was the leading cause of morbidity among the 5-9 year age group from 1965 to 1990. Among the 10-14 year group, this disease ranked third behind influenza and diarrhea.

The morbidity rates in bronchitis increased from 304.5 per 100,000 in 1980 to 1066.7 per 100,000 in 1989 in the 5-14 year old age group.

The mortality rates significantly decreased among the 5-14 year old from 11.3 per 100,000 in 1965 to 1.5 per 100,000 in 1990. A great part of this reduction was attributed to that of the 5-9 year age group.

5.1.3.2.7 Influenza

Among the 10-14 year old population, influenza was the leading cause of morbidity and was second only to bronchitis among the 5-9 year old population. Unlike bronchitis, there was small differences in morbidity rates from influenza between the 5-9 and 10-14 age groups.

The morbidity rates were increasing from 1980 to 1990. In 1980, the morbidity rate among the 5-14 year old population was 389.2 per 100,000. This increased to 1244.4 per 100,000 in 1989.

Mortality rates declined from 3.8 per 100,000 5-14 year old children in 1965 to 0.3 per 100,000 in 1990.

5.1.3.3 15-29 Years

The disease patterns in this age differed from those that afflicted the youngest age group. The leading diseases in the 15-29 years are similar those in the younger ages. However, the relative importance in these diseases differed, as well as the disease trends. The observed rapid declines in the mortality rates in the younger age groups were not present in this age group. Malaria also appeared as a leading cause of morbidity. Figures 9 and 10 show the trends of the important diseases that afflicted this age group.

5.1.3.3.1 Heart Diseases

Heart diseases stood out as the leading cause of death in this age group in 1990 at 17.4 per 100,000 population. The mortality rates had gradually been increasing since 1965. From a

rate of 12.3 per 100,000 in 1965, this rose to 16.3 per 100,000 in 1975. The mortality rates stayed at this level until 1989.

No data was available for the morbidity rates by age for heart diseases from 1965 to 1989. From available data for 1985 and 1989, the morbidity rates from heart diseases had been increasing. The morbidity rates from heart diseases increased from 34.5 per 100,000 in 1985 to 45.2 per 100,000 in 1989. It was not among the major causes of morbidity in this age group.

5.1.3.3.2 Accidents

Accidents was the second leading cause of death among this age group in 1965 and 1970. It claimed the lives of 25 for every 100,000 population of 15-29 years of age during these two years. The death rates suddenly dropped in 1975 to 10.5 per 100,000. The mortality rates stayed around this level until 1990 where the rate was slightly higher at 11.7 per 100,000. In 1990, the mortality rate was the second highest among this age group, slightly above tuberculosis.

In terms of morbidity, the rate was 222.2 per 100,000 in 1989. There was an increase from 156.5 per 100,000 in 1985. Accidents was the fourth leading cause of morbidity in 1989.

5.1.3.3.3 Tuberculosis

Tuberculosis was the leading cause of death among 15-29 years from 1965 until 1985. From 1975 to 1985, the mortality rate was decreasing slowly among 15-29 year old group. The mortality rate went down from 31.5 per 100,000 to 21.7 per 100,000 population of 15-29 years. There was a higher decline from 1985 to 1990. In 1990, the mortality declined to 11.5 per 100,000. Tuberculosis was only third highest in terms of mortality rates in 1990.

Morbidity rates were on the rise in this age group since 1980. From 116.6 per 100,000 population in 1980, the morbidity rate reached 184.4 per 100,000 in 1989. It was the sixth leading cause of morbidity for this age group.

5.1.3.3.4 Pneumonia

Unlike in the younger age groups, pneumonia was not as important as a cause of death and morbidity among the 15-29 year old population. Pneumonia ranked only as the fourth leading cause of death in 1990.

The mortality rate from pneumonia was seen to be decreasing relatively slow since 1970. The rates decreased from 16.3 per 100,000 in 1970 to 9.5 per 100,000 in 1990. The absolute decrease for this 20 year period was only 6.8 per 100,000.

The morbidity rates from pneumonia had an increasing trend from 1965 to 1989. The morbidity rate increased from 46.4 per 100,000 population in 1965 to 76.8 per 100,000 population in 1989.

5.1.3.3.5 Influenza

Influenza was the most important cause of morbidity among this age group. The trends in influenza is characterized by a cyclical pattern of increases and decreases. However, a rising secular trend in morbidity rates can be discerned.

The morbidity rate was 545.3 per 100,000 in 1965. This went down to 347.6 per 100,000 in 1980. From 1980, there was an increase to 670.3 per 100,000 in 1985 and to 1057.0 per 100,000 in 1989.

Mortality rates from influenza were very low. The trend in mortality was decreasing, from 2.8 per 100,000 in 1965 to 0.34 per 100,000 in 1990.

5.1.3.3.6 Diarrhea

As in other age group, diarrhea was among the leading causes of morbidity in this age group. It was next highest to influenza in terms of morbidity ranking.

Morbidity rates from diarrhea increased from 223.4 per 100,000 in 1980 to 609.9 per 100,000 in 1989 among the population aged 15-29 years. Mortality rates from diarrhea decreased from 5.0 per 100,000 in 1965 to 1.6 per 100,000 in 1990.

5.1.3.3.7 Bronchitis

Bronchitis followed influenza as the leading cause of morbidity. Similar to the younger age groups, the morbidity rates from bronchitis were increasing from 1980 to 1989. The rates increased from 160.2 per 100,000 in 1980 to 563.8 per 100,000 in 1989.

Bronchitis was not a major cause of death among this age group. Unlike the younger age groups, mortality rates from bronchitis did not show signs of decreasing trend. The rate in 1965 was 1.0 per 100,000 population. This increased to 2.4 per 100,000 population in 1985. In 1990, the mortality rate was 2.3 per 100,000 in this age group.

5.1.3.3.8 Malaria

Malaria was the fourth leading cause of morbidity in this age group in 1990. The morbidity rates from malaria was 90.7 per 100,000 in 1965. There was a sudden increase in 1985 to

263.5 per 100,000. The rate decreased slightly to 247.1 per 100,000 in 1989.

Mortality from malaria was insignificant. The rates was only 1.3 per 100,000 in 1989 in this population.

5.1.3.4 30-59 Years

At this age range, the degenerative diseases, such as heart diseases, vascular diseases and malignant neoplasms, began to dominate the ranking of diseases according to mortality rates. In terms of morbidity, tuberculosis was a bigger problem than bronchitis and diarrheas. The gap between the morbidity rates of the degenerative diseases and of the leading communicable diseases decreased significantly as age increased. The trends of the leading causes of morbidity and mortality among the 30-59 year old population are given in Figures 11 and 12.

5.1.3.4.1 Heart Diseases

In 1965, heart diseases occupied fourth place in the ranking of diseases according to mortality in this age group. Tuberculosis, malignant neoplasms and accidents were the leading causes of death during that year. The mortality rates from heart disease was 43.5 per 100,000 population of 30-59 years. The mortality rates from heart disease increased from this level to 81.2 per 100,000 population. It became the leading cause of mortality in 1990, after decreases in tuberculosis mortality were achieved while that of malignant neoplasms remained steady.

The morbidity rates for heart diseases were also on the rise. From 143.1 per 100,000 in 1985, this rate went up to 182.3 per 100,000 in this age group in 1989.

5.1.3.4.2 Vascular Diseases

In 1965, the mortality rates from vascular diseases was relatively low such that it did not ranked among the top five leading causes of mortality. The mortality rates from vascular diseases increased more rapidly than any other leading disease such that it became the second leading cause of death in 1990. The mortality rates was as low as 13.7 per 100,000 in 1965. The mortality rate reached 61.0 per 100,000 in 1990, an increase of 47.3 per 100,000 during the period.

5.1.3.4.3 Tuberculosis

Tuberculosis was the leading cause of death from 1965 to 1985 in this age group. The trend in mortality rates had been decreasing from 1965 to 1990. The mortality rate was 174.1 per 100,000 population of 30-59 years in 1965. This decreased to 100.2 per 100,000 in 1985.

A sudden drop to 60.4 per 100,000 was seen in 1990. This made tuberculosis third only behind heart and vascular diseases as the leading cause of mortality in 1990.

In terms of morbidity, however, tuberculosis placed ahead of bronchitis and diarrhea in 1989 ranking. It was second only to influenza as the leading cause of morbidity in this age group during this year. The morbidity rate in 1989 was 639.9 per 100,000 population, compared to 490.4 per 100,000 population in 1980. This was an increase of 149.5 per 100,000, equivalent to a 30 percent increase in morbidity in this period.

5.1.3.4.4 Malignant Neoplasms

Malignant neoplasms is another major degenerative disease that afflicted this age group. There was an increasing trend in mortality from malignant neoplasms from 1965 to 1980. The mortality rates from malignant neoplasms was 44.4 per 100,000 in 1965. This rose to 57.4 per 100,000 in 1980. There was a small increase in 1990, where the rate was 60.1 per 100,000.

Morbidity rates from malignant neoplasms similarly rose from 1965 to 1980. The morbidity rates increased from 44.4 per 100,000 in 1965 to 95.5 per 100,000 in 1980. The morbidity rates seemed to have decreased slightly from 1980 to 1989. In 1989, the morbidity rate was 91.0 per 100,000.

5.1.3.4.5 Pneumonia

Pneumonia was the fifth leading cause of death in this age group. The mortality rates from pneumonia had not changed significantly since 1975. From a rate of 26.0 per 100,000, this slightly decreased to 23.2 per 100,000 in 1990.

Morbidity rates from pneumonia had also not changed much since 1975. The morbidity rate was 78.5 per 100,000 in 1975. The rate in 1989 was 79.7 per 100,000.

5.1.3.4.6 Accidents

Accidents was ranked higher than pneumonia as the leading cause of death in 1965 among the population of 30-59 years old. The mortality rates from accidents had decreased significantly from 33.2 per 100,000 in 1965 to 12.6 per 100,000 in 1975. The mortality rates had stayed around this level up to 1989 where the rate was 15.0 per 100,000.

Accidents was also a leading cause of morbidity. Data was not available for 1980 and previous years. The morbidity rates were 209.4 per 100,000 and 282.6 per 100,000 in 1985 and 1989 respectively.

5.1.3.4.7 Influenza

As in the 15-29 age group, influenza was the leading cause of morbidity among the 30-59 years. The morbidity rates from influenza rose from 403.6 per 100,000 in 1980 to 1138.5 per 100,000 in 1989.

Influenza was not a major cause of death. The death rates from influenza in this age group was 0.9 per 100,000.

5.1.3.4.8 Bronchitis

Bronchitis ranked next to tuberculosis in terms of morbidity. An increasing trend in morbidity rates was observed from 1980 to 1990. The rates increased from 141.9 per 100,000 in 1980 to 557.8 per 100,000 in 1989.

In terms of mortality rates, bronchitis was ranked after accidents in 1990. The mortality rates increased very rapidly since 1965. The rate in 1965 was 1.6 per 100,000. This reached 11.8 per 100,000 in 1990.

5.1.3.4.9 Diarrhea

Diarrheal diseases were the fourth leading causes of morbidity among this age group in 1989. The trend in diarrheal morbidity rates was similar to bronchitis. The morbidity rate increased from 170.3 per 100,000 in 1980 to 420.9 per 100,000 in 1989.

Mortality from diarrheal diseases among this age group was very low. Diarrheal diseases caused the death of 3 persons per 100,000 population of 30-59 year old in 1989.

5.1.3.4.10 Malaria

Malaria was the fifth leading cause of morbidity among the 30-59 year old. The rates and trends were similar to that of the 15-29 age group. The morbidity rate was 90.9 per 100,000 in 1965. This rate decreased up to 1975. Then from a rate of 99.7 per 100,000 in 1980, there was an abrupt increase to 255.6 per 100,000 population of 30-59 years. The rate in 1989 was a little lower at 225.5 per 100,000.

Malaria was not an important cause of mortality. The mortality rate was 2.1 per 100,000 in 1990.

5.1.3.5 60 years and above

Heart diseases was the leading cause of both mortality and morbidity in this age group. Judging on the mortality data alone, vascular diseases would rank higher than pneumonia, influenza, bronchitis, and diarrhea. The trends of most of these major diseases were increasing, as shown in Figures 13 and 14.

5.1.3.5.1 Heart Diseases

Heart diseases was the most important health problem among this age group. The mortality rate was at 793.4 per 100,000 persons 60 years and above in 1990. Among those above 70 years, the rate was as high as 1430.6 per 100,000. The trend has been increasing since 1965. The rate in 1965 was 820.0 per 100,000 persons above 60 years. It declined to 518.8 per 100,000 in 1970, after which it has increased rapidly.

Heart diseases also ranked as the leading cause of morbidity in 1989. The morbidity rate was 1357.9 per 100,000 in 1985. This went up to 1584.0 per 100,000 in 1989.

5.1.3.5.2 Vascular diseases

Vascular diseases was also the second leading cause of mortality. The mortality rate in 1990 was 641.2 per 100,000 persons above 60 years. An increasing trend also describes the mortality rates from 1965 to 1990. In 1965, this rate was 145.6 per 100,000 population. The increase in the rates for vascular diseases was greater than that of heart diseases.

The mortality rates already exceeded the morbidity rates for other leading causes of morbidity such as influenza, bronchitis and diarrhea. It is safe to assume that the vascular diseases would rank higher in terms of morbidity rates than these diseases. The absence of data on morbidity prevented the investigators from describing the trends from 1965 to 1990.

5.1.3.5.3 Tuberculosis

Tuberculosis ranked next to heart diseases and vascular diseases as the leading cause of mortality among the population above 60 years in 1990. It was the leading cause of death among this age group in 1965 with a rate of 966.1 per 100,000 population. The rapid increasing in heart diseases and vascular diseases among this age group relegated it to its present ranking in terms of mortality. The mortality in 1990 was down to 478.0 per 100,000 persons above 60 years.

In the absence of morbidity data for vascular diseases, the morbidity rates from tuberculosis was second highest to heart diseases in 1990. The trend showed a decrease from 1965 to 1980. The rates for the respective years were 1844.4 per 100,000 and 1092.8 per 100,000. An increasing trend is noted after 1980. The rate in 1990 was 1459.1 per 100,000 population.

5.1.3.5.4 Pneumonia

Pneumonia was the fourth leading cause of mortality and the seventh leading for morbidity. Mortality and morbidity rates from pneumonia were increasing from 1965 to 1990. The mortality rate increased from 164.9 per 100,000 in 1965 to 300.3 per 100,000 in 1990. The morbidity rates also increased from 153.6 per 100,000 in 1965 to 513.0 per 100,000 in 1990.

5.1.3.5.5 Malignant Neoplasms

Malignant neoplasms had been a leading cause of mortality since 1965. The rate of mortality from malignant neoplasms was 211.0 per 100,000 in 1965. This rate increased to 281.4 per 100,000 persons 60 years and above in 1990. Malignant neoplasms ranked fifth as a leading cause of mortality among this age group.

In terms of morbidity, malignant neoplasms was increasing from 1965 to 1985. The morbidity rate was 211.0 per 100,000 in 1965. This went up to 555.4 per 100,000 in 1985. The rates slightly decreased in 1990 to 404.3 per 100,000.

5.1.3.5.6 Nephritis, Nephrosis and Nephrotic Syndromes

This group of diseases had contributed significant number of deaths in this age group from 1965 to 1990. The mortality from nephritis, nephrosis and nephrotic syndromes was 125.3 per 100,000 in 1965. It was the seventh leading cause of mortality during that time. The mortality rate from these diseases went down to 74.4 per 100,000 population. It was the sixth leading cause of deaths in 1990.

5.1.3.5.7 Influenza

Morbidity rates from influenza rates were increasing from 1980 to 1989. In 1980, the rate was 376.4 per 100,000. This went up to 1060.2 per 100,000 in 1989. Influenza was the third leading cause of morbidity in 1989.

Deaths due to influenza was insignificant. The mortality rate was at 7.0 per 100,000 persons above 60 years in 1989. The trend in mortality was decreasing.

5.1.3.5.8 Bronchitis

Bronchitis was another leading cause of morbidity in 1989 in this age range. The trend was increasing since 1980 for morbidity from bronchitis. The rates increased from 167.9 per 100,000 in 1980 to 653.1 per 100,000 in 1989.

Deaths from bronchitis among this age group were substantial. There were 132.4 deaths from bronchitis per 100,000 persons above 60 years in 1990.

5.1.3.5.9 Diarrhea

Morbidity rates from diarrheal diseases were almost at the same level as bronchitis. The morbidity rate was 611.8 per 100,000 in 1989. This was an absolute increase of 355.1 per 100,000 from the rate in 1980.

The mortality rate was at 23.2 per 100,000 in 1990. The death rates decreased from 40.0 per 100,000 in 1980.

5.1.4 Sex Differences in Mortality and Morbidity Trends

As indicated by the sex differences in the trend of age-specific death rates, differences in mortality and morbidity trends existed for some diseases. There were generally two pictures that described the sex differences in trends. For diseases with declining trends, the rate of decline in females was greater than that in males. For diseases with increasing trends, the rate of increase in females was less than that in males. Both pictures result in an over-all trend in death rates which favored the females over the males.

The differences in mortality trends was found among the middle age group. For this reason, we concentrated on the leading diseases that afflicted this age group. The male and female mortality trends were compared for the following diseases: heart diseases, vascular diseases, malignant neoplasms, tuberculosis, pneumonia, nephrologic diseases and accidents.

The trends of the leading causes of mortality and morbidity among the 20-69 population are shown in Figures 15 and 16. The graphs are separated for the 20-49 age group and the 50-69 age group.

5.1.4.1 Heart Diseases

Among the 20-49 years of age, there were differences in the mortality trends from heart diseases. From 1980 to 1990, there was an increasing mortality from heart diseases among males while the mortality rates for females remained at the similar levels as in 1980. The rate among 20-49 years increased from 39.7 per 100,000 in 1980 to 51.0 per 100,000 in 1990. Among females, the mortality rates increased by less than 1 per 100,000 from 1980 to 1990, compared to the 11.3 per 100,000 increment among the males. The rate among the 20-49 year population in 1980 was 28.3 per 100,000 which slightly increased to 29.1 per 100,000 in 1990.

In the 50-69 year population, there were similar trends for both sexes from 1965 to 1980.

After this year, the mortality rates among males rose faster than that of females. There was a 19.0 per cent increase among males from 263.3 per 100,000 in 1980 to 313.3 per 100,000. Among females, the mortality rates rose from 169.0 per 100,000 to 185.4 per 100,000 in the respective years. There was an increase of 9.7 percent.

There were no data for morbidity from 1965 to 1980. From available data for 1985 and 1990, there was seemingly a faster rate of increase among males than females in the 50-69 year age group. The morbidity rates among females in this age range rose from 294.1 per 100,000 in 1985 to 331.5 per 100,000 in 1990. The male rates rose by a significant magnitude, from 541.2 per 100,000 in 1985 to 708.6 per 100,000 in 1990.

The increases in the morbidity rates among the 20-49 years were of comparably similar magnitude in both sex groups. The 1985 morbidity rates from heart disease among males was 88.3 per 100,000. This rose by 23 percent to 108.3 per 100,000 population. The morbidity rates increased among females from 61.8 per 100,000 in 1985 to 78.6 per 100,000 in 1989. This was equivalent to an increase of 27 percent.

5.1.4.2 Vascular Diseases

As in heart diseases, there were sex difference in the mortality trends from vascular diseases. These differences could be traced to the rate of increase from 1975 to 1980 in the two groups. The mortality rates among males were from 21.2 per 100,000 in 1975 to 28.5 per 100,000 in 1980, among the 20-49 age group. The morbidity rate for females of the same age range rose from were 12.9 per 100,000 to 14.1 per 100,000 for the corresponding years.

A similar pattern was observed among the 50-69 age group. The rates increased from 154.3 per 100,000 in 1975 to 248.8 per 100,000 in 1980 among the males. Among female, the rates increased from 93.5 per 100,000 in 1975 to 140.6 per 100,000 in 1980. The increase during these years was 94.5 per 100,000 among males, compared to 47.1 per 100,000 among females.

5.1.4.3 Malignant Neoplasms

The trends of mortality rates from malignant neoplasms was more rapidly increasing from 1965 to 1985 among the males compared to females. Among the 20-49 years of age, the mortality rate in the male population rose from 19.9 per 100,000 in 1965 to 27.2 per 100,000 in 1985. This was an increase of 26.8 percent. Among females 20-49 years, there was a smaller increase of 13.0 percent, from 25.2 per 100,000 in 1965 to 23.4 per 100,000 in 1985. The mortality rate among the male 20-49 years decreased slightly to 26.9 per 100,000 in 1990, while it continued to rise among the female counterpart to 25.2 per 100,000 in 1990. Among the 50-69 years, the mortality among males markedly increased from 128.3 per 100,000 in 1965 to 195.3 per 100,000 in 1990, or a 52.3 per cent increase. Among the female 50-69 years, the increase was only 29.6 per cent for the same period, from 110.8 per 100,000 in

1965 to 143.7 per 100,000 in 1990.

Both sexes showed similar patterns in the trends of morbidity rates. Rapid increases in the morbidity rates occurred from 1975 to 1980 then followed a decline in 1985 and then again increasing to 1989. The only difference in the trends of morbidity rates was the slightly faster decline from 1980 to 1985 among females in 50-69 age group, compared to the decline among the corresponding male group. The rates in females fell by 115.8 per 100,000 population of 50-69 years, while that of males declined by 81.8 per 100,000.

5.1.4.4 Accidents

The trend of mortality rates from accidents was quite different between sexes from 1965 to 1990. There was a steeper decline in accident deaths from 1965 to 1975 among the males for both 20-49 and 50-69 age groups compared to the decline in females. The male rates for those aged 20-49 years decreased from 54.1 per 100,000 in 1965 to 18.5 per 100,000 in 1975. The females of the same age had a decrease from 9.5 per 100,000 to 5.5 per 100,000 in the respective years. These figures correspond to a 66 per cent decrease in the males and 42 per cent in females. The male rates fluctuated quite significantly from 1980 to 1989 while the rates were steady among females.

In terms of morbidity, there was higher increase among males than among females from 1985 to 1989. The increase in the males in this age group was 119.7 per 100,000 (315.5 per 100,000 in 1985 to 435.2 per 100,000 in 1989), compared to 70.8 per 100,000 among females (253.1 per 100,000 in 1985 to 323.9 per 100,000 in 1989). In the 20-49 age group, the increase among males was 85.1 per 100,000 population, from 230.6 per 100,000 in 1985 to 315.7 per 100,000 in 1989. The female morbidity rates increased from 156.7 per 100,000 in 1985 to 215.4 per 100,000, or an increase of 58.7 per 100,000.

5.1.4.5 Pneumonia

Mortality rates from pneumonia was generally on the decline among the 20-49 age group. The rates of decline was greatest between 1970 and 1980. There seemed to be a slightly faster decline among female in this age group. The rate among females decreased from 20.0 per 100,000 in 1980 to 12.6 per 100,000 in 1980. The relative decrease among female 20-49 years of age was 37 percent. Among the males in this age category, the mortality rates for the two years noted were 24.4 per 100,000 and 18.1 per 100,000 respectively, a decrease by 26%.

The trend for female mortality rates from pneumonia showed a greater decline than males among ages 10 and above. At the younger ages, the rates for males declined a little greater than that of the females.

Among the 50-69 years, there were also differences by sex in the rates of change. The mortality rates from the males show an increasing trend from 1975 to 1990. Among the female counterpart, the rates increased from 1975 to 1985 and then decreased in 1990. The rates among females were 63.8 per 100,000 in 1975, 67.7 per 100,000 in 1985 and 60.6 per 100,000 in 1990. The rates among the males increased from 77.7 per 100,000 in 1975 to 97.8 per 100,000 in 1990.

In terms of morbidity, the trends differed by sex. Among males, there was a sudden increase in the morbidity rates in the 20-69 age group that occurred between 1980 and 1985. The rates in the 20-49 age group increased from 74.3 per 100,000 in 1980 to 91.1 per 100,000 in 1985 and from 137.9 per 100,000 in 1980 to 228.4 per 100,000 in 1985. This increase was not evident among the female counterparts.

5.1.4.6 Tuberculosis

The mortality trends from tuberculosis also differed by sex. There was a faster decline in the mortality rates among the females from 1965 to 1975. The rates dropped by 44 percent (96.3 per 100,000 in 1965 to 54.3 per 100,000 in 1975) and 38 percent (346.1 per 100,000 in 1965 to 215.3 per 100,000 in 1975) respectively in the 29-49 and 50-69 female age groups. The corresponding decreases among the males were only 21 percent (104.3 per 100,000 to 82.4 per 100,000) and 14 percent (413.3 per 100,000 to 355.7 per 100,000) respectively for the 20-49 and 50-69 age groups during the same time period. The trend after 1975 looked similar for the sex groups.

The trend in morbidity rates were dissimilar for 50-69 age group, but only slightly in the 20-49 age group. The morbidity rates declined from 1,377.4 per 100,000 in 1965 to 1,040.8 per 100,000 in 1975 in the female 50-69 years of age. There were only slight decreases in the rates (from 1,331.7 per 100,000 in 1965 to 1,263.9 per 100,000 in 1975) in the corresponding male age group. The increase in the rates from 1985 to 1989 also to be faster in the 50-69 year old males than in the 50-69 year old females. There was a 20 percent increase in the males (1182.5 per 100,000 to 1423.5 per 100,000) compared to 10 percent in females (963.3 per 100,000 to 1057.8 per 100,000) from 1985 to 1990. In the 20-49 age group, the females started with higher morbidity rates (520.4 per 100,000) than the males (457.4 per 100,000) in 1965. The rates were nearly equal in 1975 and 1980, indicating greater decreases among the females. Then both rates increased from 1980 to 1985 where the male group ending up with a higher rate at 326.5 per 100,000 compared to 301.6 per 100,000 in the females. There were the same increases in the rates from 1985 to 1990 for both sexes in the 20-49 age group.

5.1.4.7 Influenza

Morbidity rates from influenza were seen to be increasing from 1980 to 1989. There seemed to be slightly greater increases in the females than in the males. The rates among females

increased from 410.6 per 100,000 and 431.4 per 100,000, respectively, in the 20-49 and 50-69 age groups in 1980 to 1228.5 per 100,000 population of 20-49 years and 1382.0 per 100,000 population of 50-69 years in 1989. This compared to the increase from 336.3 per 100,000 male 20-49 years and 385.1 per 100,000 male 50-69 years in 1980 to 893.9 per 100,000 and 1124.2 per 100,000 respectively in 1989. The differences between the 1980 and 1989 morbidity rates were 817.9 per 100,000 and 950.6 per 100,000 respectively for 20-49 and 50-69 female age groups. Among the males, the corresponding increases were only 557.6 per 100,000 and 739.1 per 100,000 respectively.

5.1.4.8 Bronchitis

The bronchitis morbidity rates rose by a higher magnitude among the females than among males in the two age groups considered from 1980 to 1989. During this period, the rates increased by 566.9 per 100,000 (from 162.1 per 100,000 to 729.0 per 100,000) among 20-49 year old females compared to the 302.9 per 100,000 increase in males (from 438.0 per 100,000 to 135.1 per 100,000). Among the 50-69 years of age, the female morbidity rates increased from 174.6 per 100,000 in 1980 to 826.0 per 100,000 in 1989 or an increment of 651.4 per 100,000 population. Among the corresponding male age group, the morbidity rates increased by 333.4 per 100,000, from 160.5 per 100,000 in 1980 to 493.9 per 100,000 in 1989.

5.1.4.9 Diarrhea

The male had greater increases morbidity rates from diarrheal diseases compared to females from 1980 to 1989. The morbidity rates among male 20-49 years increased from 251.7 per 100,000 in 1980 to 704.7 per 100,000 in 1989. This compared to the increase from 165.1 per 100,000 in 1980 to 373.1 per 100,000 in 1989 among the female counterpart. Among 50-69 years, the diarrheal morbidity rates increased by 520.5 per 100,000 among males, from 236.2 per 100,000 in 1980 to 756.7 per 100,000 in 1989. The corresponding increase in females was only 121.1 per 100,000, from 164.9 per 100,000 in 1980 to 286.0 per 100,000 in 1989.

5.1.4.10 Malaria

Malaria morbidity was seen to have abrupt increases from 1980 to 1985. There was a higher increase among males in both groups during this time interval. The male morbidity rates increased from 112.0 per 100,000 in 1980 to 291.3 per 100,000 in 1985 among 20-49 years of age. In the female 20-49 year age group, the rates increased from 100.1 per 100,000 in 1980 to 259.7 per 100,000 in 1985. Among the 50-69 years of age, the morbidity rates in males increased by 207.1 per 100,000 (from 100.2 per 100,000 in 1980 to 307.3 per 100,000 in 1985), compared to the 161.8 per 100,000 increase in females (from 85.2 per 100,000 in 1980 to 247.0 per 100,000 in 1985). There was a decrease in the morbidity rates from 1985 to 1989. These decreases were of similar magnitude in the sex groups.

5.1.5 Regional Trends

Morbidity and mortality rates by region from 1980 to 1990 only of notifiable diseases were used to describe the trends of these diseases. Because of this, the regional trends of vascular diseases were not discussed because vascular diseases were not notifiable. Heart diseases also did not figure in the morbidity rates for 1980 because it was not notifiable during that time.

Wide variation existed among the mortality and morbidity rates by region. These, however, evidently reflected different degrees of accuracy and completeness of the reporting of these diseases on different years. For instance, the mortality rates of the leading diseases in Region 12 were below 30% of the rates in NCR (Tables 16 and 17). These problems precluded direct comparisons of the rates across regions unless the differences among these rates were so glaring, as in the cases of malaria and schistosomiasis. Description of the trends of diseases was also limited by this problem. At best, what could be done was to describe leading diseases by regions and to compare differences in the ranking of the leading diseases. For each region, the leading causes of mortality and the corresponding rates are given in Tables 5 to 17, while corresponding information on morbidity rates is shown in Tables 18 to 30.

In general, the leading causes of mortality for the Philippines were the same for each region. Heart diseases, pneumonia and tuberculosis were the leading causes of mortality. There were differences in the ranking of these diseases. Heart disease was the leading cause of mortality in NCR and Regions 1, 3, 4, 11 and 12 in 1990. Pneumonia remained as the leading cause of death in Regions 2, 5, 6, 7, 8, 9 and 10 during the same year. In the absence of data for vascular diseases, tuberculosis was the third leading cause of mortality among the regions, except for NCR and Regions 3, 7, where it was replaced by malignant neoplasms. After these four leading causes of mortality, we saw wide variability setting in as to which diseases would be more important than the others. Here, we saw the emergence of malaria as major cause of mortality in Region 2.

In terms of morbidity, the major diseases in the regions were the same for the whole country. These include influenza, bronchitis and diarrhea. As in the mortality rates, there were considerable variation among regions on which diseases came next. These differences reflected problems specific for some regions. Malaria ranked highly among causes of morbidity in Regions 2, 4, 9, 10, and 11. Schistosomiasis was a leading cause of morbidity in Regions 8, 9, 10, and 11. Gonococcal infections were particularly high in Region 3.

5.2 Correlation of Health Determinants to Health Outcomes

Statistically significant correlations were found among the health determinants and the rates of disease. The degree of these significant associations, however, ranged only from weak to moderate. The diseases that are correlated with each health determinant are enumerated below. The correlation coefficients of the variables are enclosed in parenthesis ().

5.2.1 Demographic Characteristics

Disease mortality and morbidity rates were correlated with several population characteristics. These included the age and sex composition of the population, average household size, population density, growth rates and urbanization.

Older populations, as indicated by a higher proportion of 65 years and above, were associated with higher mortality rates from malignant neoplasms (0.60), heart diseases (0.59), influenza (0.48), pneumonia (0.44), tuberculosis (0.39) and h-fever (0.35). These populations also had higher morbidity rates from malignant neoplasms (0.64) and h-fever (0.32). Mortality rates from malignant neoplasms and heart disease were also higher in populations with high proportion of 15-64 year old men and women. The correlation coefficients for these diseases and the percentage of 15-64 year old were 0.36 and 0.35, respectively. On the other hand, populations with higher percentages of under 5 children had higher morbidity rates from influenza (0.30), malaria (0.29) and varicella (0.25).

Sex ratio was weakly correlated with mortality rates from tetanus (0.26) and schistosomiasis (0.37) among provinces that reporting cases of these diseases. The higher the number of males to females, the higher the mortality rates from tetanus and schistosomiasis. Morbidity rates from schistosomiasis were likewise observed to be higher among provinces with higher growth sex ratio.

Average household size was inversely associated with mortality rates from malignant neoplasms (-0.37) and heart diseases (-0.29). Morbidity rates from malignant neoplasms were likewise negatively correlated with the average size of household.

Population density had a direct association with morbidity from malignant neoplasms (0.25) and diphtheria morbidity (0.56) and mortality (0.49).

Higher percentage growth rate was associated with lower mortality rates from pneumonia (-0.51), tuberculosis (-0.42), influenza (-0.41), and with lower morbidity rates from bronchitis (-0.36), malignant neoplasms (-0.34) and tuberculosis (-0.25).

The degree of urbanization of the province was negatively correlated with the mortality rate from bronchitis (-0.38) and with the morbidity rates from influenza (-0.29), diarrhea (-0.28), and measles (-0.25).

5.2.2 Literacy rates

Higher literacy rates were associated with higher mortality from heart diseases (0.60), tuberculosis (0.44) and malignant neoplasms (0.35). This was also related in same fashion as morbidity from malignant neoplasms, with a correlation coefficient of -0.52). More diseases negatively correlated with literacy rate. These include morbidity rates from diarrhea (-0.52), influenza (-0.47), measles (-0.40), malaria (-0.35), bronchitis (-0.34), varicella (-0.32) and

tetanus (-0.29).

5.2.3 Occupation

The indicators of occupation used in the correlations were the percentages in agricultural and tertiary industries. These percentages correlated positively with some diseases as given below.

The percentage in agricultural occupation had a moderately positive relationship with malaria morbidity (0.49) and mortality (0.42). Weak positive associations with tetanus morbidity (0.33) and mortality (0.32), measles morbidity (0.32) and influenza morbidity (0.29) was also derived.

The percentage in tertiary industries, on the other hand, was correlated with mortality rates from heart disease (0.38), tuberculosis (0.34) and malignant neoplasms (0.30). This percentage also positively correlated with morbidity rates from malignant neoplasms (0.31).

5.2.4 Fertility

Average age at marriage and average number of children were used as indicators of fertility. Higher age at marriage meant a delay in reproduction, thus lower fertility. Higher average age at marriage was moderately associated with higher morbidity and mortality rates from malignant neoplasms (0.66 and 0.58, respectively) and heart disease mortality (0.59). It was also positively correlated with tuberculosis mortality (0.40), h-fever mortality (0.44) and morbidity (0.40), influenza mortality (0.32) and leprosy morbidity (0.27). Negative correlations were found for malaria morbidity (-0.47) and mortality (-0.40), schistosomiasis morbidity (-0.36) and mortality (-0.34), influenza morbidity (-0.32), and tetanus morbidity (-0.26) and mortality (-0.25).

Average number of children was positively correlated with mortality rates from influenza (0.44), measles (0.37), pneumonia (0.34) and bronchitis (0.30). Morbidity rates from tuberculosis and pneumonia were also positively associated (0.30 and 0.29, respectively).

5.2.5 Socio-economic Status Indicators

Indicator of socio-economic status used was the percentage of households with television. This was found to be associated with several diseases.

The percentage of household with television positively correlated with mortality rates from heart disease (0.33) and malignant neoplasms (0.29). It was negatively correlated with pneumonia morbidity (-0.33), tuberculosis morbidity (-0.31) and mortality (-0.30), influenza (morbidity: -0.35 and mortality: -0.30), bronchitis (morbidity: -0.30 and mortality: -0.31), measles (morbidity: -0.27 and mortality: -0.30), malaria (morbidity: -0.34 and mortality: -0.33), tetanus (morbidity: -0.33 and

mortality:-0.30) and diarrhea (morbidity:-0.26).

5.2.6 Environmental Sanitation

The percentage of households with potable water was positively correlated with mortality from heart diseases (0.45) and malignant neoplasms (0.37). It was likewise correlated with morbidity from malignant neoplasms (0.37). It was negatively correlated with influenza morbidity (-0.32), malaria morbidity (-0.25) and mortality (-0.30) and tetanus morbidity (-0.27).

The percentage of households with sanitary toilets were correlated with the same set of diseases rates as in the percentage with potable water. The correlations for heart disease mortality, malignant neoplasm mortality and morbidity were 0.51, 0.40 and 0.46, respectively. The correlations were -0.37 for influenza morbidity, -0.40 for measles morbidity and -0.27 for malaria morbidity. In addition, the percentage of households with sanitary toilets positively correlated with h-fever morbidity (0.27) and mortality (0.31) and with leprosy morbidity (0.26).

The percentage of households who burn their garbage was negatively associated with morbidity from diarrhea (-0.31), measles (-0.37), pneumonia (-0.35), diphtheria (-0.45), varicella (-0.30), h-fever (-0.45) and leprosy (-0.51). It was positively correlated with mortality from heart diseases (0.26).

5.2.7 Type of Housing

Type of housing determines the level of protection of individuals from adverse environmental conditions. The indicator used was percentage of households with strong roof materials. Higher percentages of households with strong roof materials was associated with lower morbidity rates from tuberculosis (-0.36) and tetanus (-0.27). Similarly, it was correlated with mortality from diarrhea (-0.27), measles (-0.32), malaria (-0.33) and bronchitis (-0.32). This indicator, however, positively correlated with mortality rates from heart diseases (0.30), malignant neoplasms (0.25) and accidents (0.29).

5.2.8 Life Style

Per capita tobacco consumption negatively correlated with morbidity rates from malignant neoplasms (-0.27) and mortality rates from measles (-0.38). The relationship with malignant neoplasms could be attributed to under reporting of cases in areas where tobacco consumption were not low. Alcohol consumption negatively correlated with heart disease mortality (-0.27) but positively correlated with schistosomiasis mortality (0.44).

5.2.9 Health Care Utilization

Per capita medical care expenditures did not significantly correlated with diseases rates.

Moderately strong associations was found for the percentage of medically attended births and heart diseases mortality (0.58) and malignant neoplasms morbidity (0.56) and mortality (0.50). H-fever mortality was also correlated with the percentage of medically attended births (0.37). Negative correlations with diarrhea mortality (-0.27), measles mortality (-0.34), malaria morbidity (-0.31) and mortality (-0.37) and influenza morbidity (-.30) were derived.

As for medically attended deaths, only mortality from pneumonia was found to significantly correlated. The higher the percentage of medically attended deaths, the lower the mortality rates from pneumonia (-0.38).

5.2.10 Canonical Correlation Analysis

Results of the canonical correlation analysis pointed to only one statistically significant pair of canonical variables. For the set of morbidity and mortality rates, the first canonical variable was positively correlated to mortality rates from malignant neoplasms, heart disease, tuberculosis and pneumonia and also to morbidity rate from malignant neoplasms. On the side of the health determinants, the canonical variable correlated strongly with the proportion aged 65 and above and average age at marriage of female population. It was also positively correlated with literacy rate, percentage in tertiary industries, proportion with potable water, proportion with sanitary toilet, and percent of deaths medically attended. This pair of canonical variables can be described as the correlation of aging population, industrialization and improved reporting with degenerative diseases and other leading diseases of an aging population. The other pairs of canonical variables were no longer statistically significant. Moreover, further inspection showed that these canonical variables were not as easily interpretable as the first one.

5.3 Burden of Disease

5.3.1 Potential Years of Life Lost

The list of leading diseases in terms of potential years of life lost have not changed that much from 1970 to 1990. However, drastic changes in the picture was seen from the ranking of these diseases according to this parameter (Figure 19). These changes corresponded to changes in the epidemiologic profile of the Philippine population.

In 1970, the top five diseases that caused the heaviest burden in terms of PYLL to Philippine society were communicable diseases. These included pneumonia, diarrhea, bronchitis, tuberculosis and avitaminoses. The burden from these diseases were significantly reduced from 1970 to 1990. This could be attributed to the great reductions in the mortality of the younger populations in which these diseases had their greatest impact. At the same time during this

period, the burden from the degenerative diseases such as heart disease and vascular diseases increased. This was due to the increasing morbidity and mortality from these diseases. Malignant neoplasms and accidents, which did not significantly change, slowly inched their way up in the ranking of these diseases, as the burden from communicable diseases were being reduced. The trends of the burden of leading illnesses in terms of potential years of life lost follows.

Pneumonia was consistently the leading disease that contributed the biggest burden to Philippine society in terms of premature deaths. The burden of disease from pneumonia, however, was decreasing. The computed PYLL for pneumonia in 1970 was 2,528,828 years. This slightly went down to 2,456,181 years in 1980. From 1980 to 1990, there was a significant reduction in the burden of disease from pneumonia. The PYLL decreased to 1,711,348 years. This was a 32 per cent reduction in terms of PYLL. However, the burden from pneumonia was still too high compared to the burden of other diseases such that, in spite of its decline, it had remained on top of the list.

Significant reduction on the burden from diarrhea occurred between 1980 to 1990. The reduction in PYLL was 62 percent (from 910,046 to 342,600 years) during this period. From its position as second highest in 1970, diarrhea dropped to the fifth in the ranking in 1990.

Bronchitis was a major disease burden in 1970, contributing 675,763 potential years of life lost. In 1980, the burden from bronchitis had been drastically reduced to 179,862 years. This amounted to a 73 percent reduction. The burden from bronchitis was reduced further from 1980 to 1990 to only 55,715 years. All in all, there had been a 92 per cent reduction in the burden of pneumonia from 1970 to 1990. Bronchitis ranked outside of the top ten leading diseases in terms of PYLL, a significant drop from its position as third nationwide.

The burden from tuberculosis in 1970 was 616,332 potential years of life lost. This went down to 516,018 years in 1980 and further to 363,895 years in 1990. Its decrease was not as great as that of diarrhea and bronchitis. Tuberculosis occupied a higher position in 1990 than these two diseases.

Avitaminoses was next to tuberculosis in terms of disease burden with 458,502 PYLL in 1970. This was reduced to 197,787 PYLL in 1990, or a 57 percent reduction. Avitaminoses ranked as the ninth leading disease in terms of PYLL in 1990.

After becoming the leading cause of death in 1990, heart diseases became next highest to pneumonia in terms of PYLL. Pneumonia occupied a higher position than heart diseases in terms of PYLL because the former causes more deaths among the younger population while the latter had more impact the older population. Heart diseases contributed 214,214 potential years of life lost to the burden of the population in 1970. This rose to 640,287 PYLL in 1990, almost three times that in 1970.

The potential years of life lost from malignant neoplasms first decreased from 352,714 years in 1970 to 270,085 years in 1980. This went up to slightly a higher level than that in 1970 at

364,826 years. Malignant neoplasms became the fourth ranking disease in terms of PYLL in 1990.

Along with heart diseases, the burden of illness from vascular diseases also increased. The PYLL from vascular diseases increased from 75,282 years in 1980 to 333,476 years in 1990. This was a 343 percent increase in the potential years of life lost. This percentage increase was larger than that in heart diseases.

The trend in the burden from accidents was similar to that of neoplasms. There was a decrease from 389,728 years in 1970 to 217,210 years in 1980. This went up in 1990 to 330,340 years. Accidents ranked seventh in terms of PYLL in 1990, one rank below its position in 1970.

The trend in measles differed from the other diseases. The PYLL from measles increased from 111,461 years in 1970 to 347,096 years in 1980. This then decreased in 1990 to 230,541 years.

The potential years of life lost from septicemia was on the rise from 1970 to 1990. This figure rose from 45,636 years in 1970 to 147,554 years in 1990. This corresponded to a 223 per cent increase in PYLL.

Another degenerative disease that also placed a significant burden to the population was nephritis, nephrosis and nephrotic syndromes. This contributed to 86,316 potential years of life lost in 1970. This slightly increased to 92,933 years in 1990.

5.3.2 Days of Healthy Life Lost

In terms of days of healthy life lost (DHLL), a different ranking of the diseases compared to that using potential years of life lost was obtained. The diseases that were on top of the list were characterized by diseases which had very high morbidity rates and early average at onset. Thus, we see the leading communicable diseases such as pneumonia, bronchitis and tuberculosis. The leading degenerative diseases also ranked high. This is due to rising morbidity rates of these diseases and at the same time, high case fatality and disablement these diseases bring on sick individuals.

As in potential years of life lost, pneumonia came up with the highest days of healthy life lost with 1,865,162 days per 100,000 person-years. Similar to diarrhea, pneumonia also a high incidence and at the same time, has a very early average age at onset. There was also a relatively high case fatality rate from pneumonia.

Bronchitis ranked very highly in terms of DHLL, unlike in PYLL where it did not figure among the leading causes of burden. The burden from bronchitis was computed at 1,528,119 days per 100,000 person-years. The high DHLL for bronchitis can be attributed to the very high incidence of bronchitis. A substantial proportion of these cases later developed into a chronic disability.

Tuberculosis was next to bronchitis. The DHLL from tuberculosis was 888,583 days per 100,000 person-years. Tuberculosis had a high incidence rate and relatively high case fatality rate. The proportion with chronic disability due to tuberculosis was also significant.

The days of healthy life lost from heart diseases was 555,936 days. Heart diseases had rising incidence rates. Case fatality and chronic disability rates were also high. The DHLL for heart diseases was based only on a subset of heart diseases. However, most of the cases of heart disease would be accounted for by these categories. At the same time, hypertension should have only included those which had heart involvement. Thus, it is not expected to drastically change the ranking of heart diseases in terms of DHLL.

Diarrhea came up with the next highest days of healthy life lost at 368,013 days per 100,000 persons per year. This ranking can be attributed to the high incidence of diarrhea in the population. At the same time, it afflicts mostly the youngest age group. The case fatality among cases was quite substantial considering the very high incidence.

Malnutrition imposed a heavy burden on the population with 241,045 days of healthy life lost per 100,000 population. There was a relatively high computed incidence of protein energy malnutrition (PEM) which afflicted the younger population. Data on PEM obtained for the computation of DHLL focused mainly of the severe and moderate cases. Thus, the case fatality rate for PEM was great. Diabetes mellitus also brought in a significant amount of burden on the population. This disease had a very high proportion of cases going into chronic stage, who then experienced a high level of disablement. The burden of disease due to malnutrition was still underestimated since other forms of malnutrition have not been included here.

The burden from vascular diseases was underestimated. Here, stroke was the only disease that fell under this group of diseases. A proportion of hypertensive cases should have been classified here since these cases may not have heart involvement. The computed DHLL for stroke was 183,306 days. Still, this ranked high enough among the list of diseases in terms of DHLL. Stroke had a relatively high incidence. A substantial proportion of cases die from stroke while a big proportion experience permanent disability.

Septicemia also contributed a considerable burden on the population with 150,397 days of healthy life lost per 100,000 person-years. There was a substantial number of cases of septicemia, for which there is a high case fatality.

The days of healthy life lost from influenza was 82,401 days per 100,000 person-years. Influenza exerts a considerable burden on the population due to its high incidence. Most of the days of healthy life lost is contributed by temporary disablement. Influenza has a very low case fatality rate and no chronic disability resulting from it.

Accidents contributed 81,164 days of healthy life lost per 100,000 person-years. The average age at onset of accidents was low. There is a considerable amount of cases who become permanently disabled from accidents, with a substantial level of disablement. This is mainly responsible for the high DHLL due to accidents.

Malignant neoplasms carried a heavy burden due to its high case fatality rates aside from the growing incidence of cancer. The DHLL computed for malignant neoplasms was only 72,742 days per 100,000 person-years. This is grossly underestimated since only the most common cancer sites were considered. These common cancers would account for a little over half of cancer of all sites. Thus, with the inclusion of other cancers, the DHLL for malignant neoplasms would be expected to substantially increase.

Malaria also had a high incidence rates. Since many malarial cases experience recurring episodes of fever, it was considered a permanent disability. However, the level of disablement was set as low computed as the number of days in a year that one person was disabled from the recurring episode. This resulted in a DHLL of 46,194 days per 100,000 person-years.

Other diseases such as leprosy, schistosomiasis, typhoid fever and tetanus also contributed to a considerable amount of burden to the population.

5.4 Health and Health -Related Policies and Programs (1965-1990)

5.4.1 General Policies and Programs

5.4.1.1 The Health Sector

If one is to consider health in a broad perspective the production of health is a function both at the individual/household level and the society's general health care provision. Thus, the health sector encompasses the broad range of agencies that cater or are concerned with the provision of preventive which include food, water, sanitation, shelter services as well as curative and rehabilitative health care programs. Police, justice and education programs that promote health are also included in this sector.

However, for the purpose of this study, the health sector was limited to the Department of Health and only to the extent possible, that is, information availability due to time constraint were other policies and programs included.

5.4.1.2 The Health Care Delivery System

In this section, the various reorganization of the Department of Health is discussed in line with the view that the manner or system of health care delivery affects in one way or another the pattern of morbidity and mortality in terms of how service are delivered.

The decentralization of health care services, for instance, are thought to affect or enhance the promotion of health in terms of making health planning and decision - making with respect to health closer to the people or target population.

The health care delivery system has undergone several reorganization purposely to meet or respond to the increasing health requirements of the increasing population. These reorganization programs were also in line with the policy of streamlining the government bureaucracy for a more efficient and effective service.

The major structural changes were those made in 1958, 1972, 1982, 1986 and 1991.

- 1) Reorganization of 1954. Following Republic Act 1082 otherwise known as the Reorganization Act of 1954, Executive Order 288 was signed on February 20, 1958 decentralizing health and medical services through the creation of eight regional offices and rural health units in each municipality. Regional directors were assigned to head the regional health offices. They were tasked to administer, direct, coordinate and supervise all preventive and curative health services and activities in the region except those specifically reserved to line authority.
- 2) Reorganization of 1972. Known as the Integrated Reorganization Plan of 1972, this gave more meaning to decentralization as the powers of the regional directors were clearly defined. These included, among others, 1) the implementation of laws, policies, rules

and regulations which the agency is tasked to carry out; 2) implementation of agency programs in the field; 3) approval of appointments, promotions, transfers, all reinstatements of personnel as well as investigation and decisions on administrative complaints; 4) preparation and submission of budget proposals, funds disbursements authorization and administration of the budget control machinery in the region; and 5) negotiation of contracts for services, supplies, materials and equipment involving amounts not exceeding P50,000. The reorganization of 1972 also placed various hospitals, rural health units and sanitarium in the provinces under the administrative direction, supervision and control of the Provincial Health Offices. In 1974, with an IBRD loan package, the health service delivery system in the rural areas was strengthened with the hiring and training of over 5000 midwives. Dubbed as the Restructured Health Service Delivery System (RHSDS) these midwives were posted to man the barangay health stations and be the frontliners in the delivery of health care. They are to be assisted by the barangay health workers chosen from the community.

- 3) Reorganization of 1982. Recognizing the need to integrate preventive and curative services, Executive Order No. 851 was signed on December 2, 1982 mainly focusing on this purpose. The Provincial Health Office and the Provincial Hospital were merged to create the Integrated Provincial Health Office removing the dividing line between public health people and clinicians. The IPHO exercised supervision and control over district hospitals which in turn supervised and controlled RHUs and other specialized health units in the area. The RHU was made an extension of the out-patient department of the district hospital while the BHS an extension of the RHU. The province likewise became the center for program administration and financial planning and management. Area-based planning was done instead of the vertical program-based. A system of direct budget releases to the province and from the province to the district was established, giving greater flexibility in resource use. The reorganization of 1982 also decentralized and integrated at the provincial level the vertical health programs such as malaria, tuberculosis, schistosomiasis, etc.
- 4) Reorganization of 1986. Executive Order 119 issued on January 31, 1987 mandated a new organizational structure for the DOH. The organizational reforms introduced under the EO were basically supportive of the concepts of integration and decentralization. The District Health Office was strengthened to bring about closer supervision of the implementation of health activities and to be more responsive to the health needs of the community.

5.4.2 Medicare Program

This program is being discussed as it is related to financial accessibility of curative care which may affect the level of mortality.

The Medicare Program, a compulsory health insurance scheme was established by Republic Act 6111 in August 1969 and implemented on January 2, 1972 with the creation of the Philippine

Medical Care Commission. As a government agency, the PMCC is supervised administratively by the DOH.

The Medicare Program is being implemented in an evolutionary manner with Program I initially covering public and private employees and their dependents but now includes also retirees and self-employed and Program II covering the informal sector. The Social Security System (SSS) serves the needs of private sector employees while the Government Service Insurance System (GSIS) attends to state employees. Program II is still to be implemented pending studies on policy and operating issues.

As a policy, Program I provides only in-patient benefits with maximum peso allowances for each type of hospital service and hospital category (room, board, medical and operating rooms, use for primary, secondary or tertiary hospital. The type of illness determine professional compensation with specialists receiving more than general practitioners according to a relative value scale. Medical expenses in excess of the benefits paid by Medicare are shouldered by the patient.

Program I benefits are financed through a payroll tax with each employee contributing 2.5% of his salary base which is matched by the employer. Beyond the salary base ceiling, contributions are the same regardless of salary.

In accordance with the Medicare law, members contributions are collected, managed and disbursed by the SSS for private sector employees and the GSIS for the government employees. Each system is allowed to charge against its health insurance fund all benefit payments and operating expenses incurred in implementing the Medicare program provided the charges do not exceed 12% of the contributions and investment earnings.

5.4.3 The Generics Act of 1988

This Act is also being discussed as it affects curative care which influences the level of mortality.

In 1985, about 33 percent of total private expenditures for health were spent on drugs. A major reduction in health care expenditures due to drugs might be made by controlling unnecessary use of drugs and controlling the price of drugs through greater price competition.

The Generics Act of 1986 was promulgated to promote as part of the government's overall National Drug Policy generic terminology in the importation, manufacture, distribution, marketing, advertising and promotion, prescription and dispensing of essential drugs. It was enacted in view of the rising costs of drugs and medicine which were beyond the means of poor and low-income Filipinos. With the Generics Act, the people are given a choice as to which drug to buy unlike in the past wherein they have no choice but to buy the drug or medicine the physician prescribes. This Act was considered to be a great stride towards the promotion of low cost curative care through the reduction in the cost of essential drugs.

5.4.4 The 1987 Constitutional Mandate for Health Service Provision

A milestone for health and social development of the Filipino people are the constitutional provisions in the 1987 Constitution. Article II Section 9 of the 1987 Constitution states that the State shall promote a just and dynamic social order that will ensure the prosperity and independence of the nation and free the people from poverty through policies that provide adequate social services, promote full employment, a rising standard of living and an improved quality of life for all. Article XIII Section I says that, "The Congress shall give highest priority to the enactment of measures that protect and enhance the right of all the people to human dignity, reduce social, economic and political inequalities and remove cultural inequities by equitably diffusing wealth and political power for the common good." It further states that "to this end, the State shall regulate the acquisition, ownership, use and disposition of property and its increments."

Indeed the 1987 Constitution of the Philippines guarantees social development or the development of the individual in his totality with the various provisions on social justice and human rights, labor, agrarian, and natural resources reform, urban land reform and housing, education, arts, and culture, the family, women and people's organizations. With respect to health, which may be considered the ultimate indicator of development, health being defined as not only the absence of disease or physical infirmities but also the complete mental, emotional and spiritual well-being of man, the Constitution in Section 15 Article II states that, "the State shall protect and promote the right to health of the people and instill health consciousness among them." Further, in Section II of Article XIII, it says, "the State shall adopt an integrated and comprehensive approach to health and other social services available to the people at affordable cost. There shall be priority for the needs of the underprivileged sick, elderly, disabled, women and children. The State shall endeavor to provide free medical care to paupers: Section 12 of the same article states that, "the State shall establish and maintain an effective food and drug regulatory system and undertake appropriate health needs and problems." Section 13 provides for the establishment of a "special agency for disabled persons for their integration into the mainstream of society."

5.4.5 Health Policy Pronouncements in National Development Plans

The 1987 Constitutional provisions are given support in the 1987-1992 and 1993-1998 development plans of the Philippines. The 1987-1992 Plan, for instance, have the following goals: 1) alleviation of poverty 2) generation of more productive employment; 3) promotion of equity and social justice; and 4) the attainment of sustainable economic growth. Under the section social development as a policy, the Plan states: "The government is committed to increase the access of the people, particularly the urban and rural poor to basic services . . . In addition the government shall increasingly strengthen capabilities at the local level by encouraging local communities to organize and identify their own needs and tap indigenous resources toward the resolution of community problems." In health, "community-based health services will be strengthened through the continued adoption of the primary health care approach. . . Local health and nutrition planning will be strengthened in accordance with institutionalization of a system of efficient health and nutrition planning, implementation,

monitoring and evaluation.

Even before the 1987 Constitution, however, social development has been a goal mentioned as early as the Fiscal Year 1959-1960 and Year 1961 - 1962 Plan. It says, "the purpose of economic development is social welfare. Economic progress only gains meaning as such progress enables the people to lead a fuller and more satisfying life. The program of social development assumes that the provision of social services is largely a governmental function and embraces action in the areas of education, health, manpower utilization and labor welfare, social welfare, community development and public management."

Health is essential to growth and welfare. Even when people have an adequate physical environment, progress is possible only if they have the health with which to effect and enjoy material gains. Poor health presents formidable roadblocks to economic and social progress. Recognizing that manpower development is a key to increasing productivity - a healthy worker is generally an efficient worker, the plan seeks to improve the general health and physical well-being of the population. Generally, the activities were directed towards prevention and cure of contagious and infectious diseases; intensification of health education; improvement of nutrition and environmental sanitation including provision of potable water supply; providing efficient public health personnel; and promotion of medical and public health research including improvement in the collection, analysis and reporting of vital statistics considered important in the assessment of health conditions. For health infrastructure this, include the expansion of facilities such as hospitals and rural health units.

5.4.6 Population and Family Planning Policy

The population and family planning policy of the government started in 1969 when the Commission on Population was created. Free choice of contraceptives including natural family planning is promoted. The adoption of the population and family planning policy was promulgated not only to control the rapid rise of population but also as part of the maternal and child health program of the government's Department of health. For it has been confirmed that multi-parity lead not only to the decline of the health of the mother but also to low birth-weight babies. Thus, the population and family planning policy has very strong influence on maternal deaths and infant and child mortality due to avitaminosis.

5.4.7 Nutrition Program

This has direct impact on the level of morbidity and mortality due to avitaminosis. The nutrition program gained impetus with the creation of the National Nutrition Council and the fielding of barangay nutrition scholars and establishments of malwards. School feeding, however, has started wayback with the Department of Education's schoolfeeding programs. Recently, the promotion of breastfeeding with rooming-in and baby-friendly hospitals has a great effect on reducing the level of infant and child mortality. Similarly, micro nutrient supplementation will have a great effect on the level and trend of avitaminosis.

Nutrition is important not only for children but for mothers as well as with the effect of maternal nutrition on the fetus and infant. The outcome of pregnancy and survival of the infant through childhood and adolescence is also due to this intergenerational role of nutrition. Programs for pregnant and lactation mothers is, therefore, also include in the nutrition program.

5.4.8 Primary Health Care

Primary health care as an approach to Health-for-All adopted by the Alma-Ata Conference in 1978 became an official policy of the Government of the Philippines when Letter of Instruction (LOI) 949 was issued by President Marcos in October 1979. This specified that the Department of Health "provide the leadership in the promotion of primary health care in the country as well as promote close coordination with the appropriate ministries through the National Primary Care Committee. "Through this committee, relationship of existing health and health-related agencies were supposed to be developed or strengthened. The aim was to forge strong program linkages among government and non-government efforts in PHC at the barangay, municipal, provincial, regional and national level.

The primary health care concept implemented by the government utilized the "partnership approach" which has four fundamental elements referred to as the pillars of PHC. These are: 1) active community participation and involvement rather than the health system as providers and community as passive receivers of health care; 2) intersectoral collaboration between government and private agencies, among various types of health workers and among other community workers; 3) development and use of appropriate technology to meet local health needs, specifically, the provision of susceptible households and communities with a ready supply of low-cost but effective remedies for diarrheal diseases, respiratory infections and other endemic diseases; and 4) development of support mechanisms to sustain PHC implementation.

5.4.9 The Integrated Water Supply Programme

In 1980, the United Nations launched the International Drinking Water Supply and Sanitation Decade (IDWSSD). Its goal was providing all people with safe and adequate water supplies and sanitary facilities. In support of this campaign, the Philippines formulated a 20-year Integrated Water Supply Programme. This became the basis for the development of the Rural Water Supply and Sanitation Master Plan (RWSSMP) and the Water Supply, Sewerage and Sanitation Master Plan of the Philippines (WSSSMP). One major project that was implemented prior to 1990 was the First Rural Water Supply and Sanitation Project (FRWSSP, 1984-1989). This was aimed to provide effective utilization of resources in the development of rural water supply and sanitation through formation and registration of Rural Waterworks and Sanitation Associations (RWSA).

While not directly under the Department of Health, the program can generate significant impact on health status of the beneficiaries of the program, specifically, in relation to control and prevention of water-borne and water-related diseases.

5.4.10 Control of Acute Respiratory Infections (ARI)

The Control of Acute Respiratory Infections (ARI) program was launched with Bohol province as the pilot area. This program taught midwives stationed at the Barangay Health Stations (BHS) to detect and treat moderately-severe ARI cases by using prescribed oral antibiotics combined with home management. From expensive hospital-based treatment involving physicians, nurses and the use of sophisticated diagnostic tests, e.g. x-rays and expensive drugs (intravenous penicillin), less expensive BHS-based (complemented with home management) treatment was used. Detection of rapid breathing and chest indrawing were the simple diagnostic procedures used with less expensive oral antibiotic.

5.4.11 Control of Diarrheal Disease Program

The control of diarrheal diseases is a major component of the maternal and child program. The Department of Health intensified efforts to promote techniques of diarrhea control. A major component of this program was the widespread distribution of Oresol packets for treatment of diarrhea. This simple intervention was aimed primarily at reducing the case fatality rates from diarrhea.

5.4.12 The Expanded Program on Immunization

The Expanded Immunization Program of the WHO was launched in the middle of 1976. It was aimed to reduce the rates of morbidity and mortality from immunizable diseases such as diphtheria, pertussis, tetanus, tuberculosis, poliomyelitis and measles by increasing the coverage of fully immunized children. The program first started with the administration of BCG and DTP in 1977. It became nationwide in 1979 along with OPV. Tetanus toxoid immunization was added later and in 1980, it was implemented on a nationwide scale. Measles vaccination only began in 1992. The immunization of children has since been integrated into the health care delivery service of the Department of Health.

5.4.13 National Tuberculosis Control Program

The adoption of the short course chemotherapy (SCC) for the treatment of TB cases started in 1986. This was in response to the high drop-out rate resulting from the use of streptomycin injections and the long period of treatment required by the Standard Regimen. The SCC requires a treatment period of only 6 months or only half that of the Standard Regimen, and all the drugs used are to be taken orally and hence, can be self-administered at home.

5.4.14 Malaria and Schistosomiasis Control Program

One of the governments move in the control of malaria and schistosomiasis was the decentralization and integration of the field services with the Intergrated Provincial Health Office and Regional Health Office. This move involved putting added responsibility on the Provincial Health Offices which already have limited personnel, laboratory facilities and resources necessary to carry these out.

In 1985, the schistosomiasis program also adopted a change in its strategy, from vector control to disease reduction through mass treatment with an effective drug.

6. Discussion

6.1 Reporting of Data

As the purpose of reviewing data from the Philippine Health Statistics and other related sources is to arrive at a useful description of the patterns of disease, any interpretation of trends in the epidemiology of selected diseases from 1965 to 1990 would have to consider the adequacy of reporting. As such, it is worthwhile to mention the significant progress of the country's health information system network. The accomplishments of disease reporting and surveillance have contributed to the large understanding of health resource allocation and of the need for a dynamic interaction between both central and local branches of government that are tasked with the delivery of health care.

However, as the appreciation of health statistics for health policy formulation has been realized functionally only recently with the emphasis on instituting a national health information system, government health executives and health economists alike would have to acknowledge the inherent deficiencies of reporting.

Several problems regarding the quality of data were observed while reviewing the available data used for this study. Foremost is the under reporting of cases that was much more significant during the earlier part of the period studied. This can be gleaned from the wide discrepancy in the reported rates of diseases between regions that cannot be solely accounted for by the geographical differences that would affect the incidence of the diseases. Improved reporting could also explain the sudden increases in the rates that were observed in certain time periods, notably after 1985. Nonetheless, these differences may be partially attributable to changes in some socio-demographic characteristics of the population.

Disease entities such as acute respiratory infections and heart diseases varied between time periods and the resulting confusion brought about by the lumping of certain related conditions also presented as a problem. Actual definitions of diseases had considerably been altered to adjust for the developments in the understanding of the different diseases. Moreover, for purposes of data reporting, these had been denoted to represent a large group of disease conditions. For example, acute respiratory infections (ARI), chronic obstructive pulmonary diseases and asthma would all be gathered under bronchitis. Thus, trends for mortality and morbidity rates from the Philippine Health Statistics for these specific diseases could not be easily extracted. It is unfortunate though that these rates could not be used specifically in the computations for burden of disease using days of healthy life lost (DHLL). The chosen experts who were asked to provide rates on the diseases within their field of specialization were inclined to provide information on more precise disease conditions that would otherwise be grouped under generic representations used in data reporting.

The lag time in the reporting was also considered to be a major limitation. The ability to collect and gather essential and relevant information had definitely been limited by inadequate communications between and insufficient infrastructure of the central and peripheral offices of the Department of Health and the National Statistics and Census Office. At the time of the writing of this monograph, the lag condition of the Philippine Health Statistics was for 1990.

Thus, the trends for some diseases noted to be responsive to their corresponding control programs could not be readily extrapolated.

In rare occasions, errors in the computation of the rates of the reported diseases were detected. The basic reporting of the number of cases made it possible though to detect these errors. This would somehow further put into question the reliability of the data.

Apart from the inadequacies of existing data, a greater problem in the determination of burden of disease using the days of healthy life lost (DHLL) was the absence of the required information from existing sources. The investigators are not aware of any publication from where most of the required data can be obtained. Thus, the investigators resorted to the interview of experts in their respective disease specialties. With regards to the data from the experts, many of them did not feel comfortable giving out estimates for the required inputs. They had not been used to calculating for themselves case fatalities, percentage disabled, and the level of disablement. Perhaps they also realize that one's experiential bias always comes into the picture. The bias was clearly evident from the wide discrepancies in the estimates they provided for the same disease. In the absence of any useful data, the investigators believe that this exercise is still worthwhile in providing initial estimates of the burden of disease to be used for planning purposes. As a recommendation for generating the data requirements, a consensus from many experts would definitely yield a more comfortable estimate of the burden of disease. A meeting of these experts should be held where each expert's estimate can be immediately evaluated by the others and to terminate only when a consensus is reached.

Nevertheless, the facility of interpreting the data from the past 25 years would have to be balanced with apparent limitations in generalizing meaningful explanations from these data. This would be reflected as a cautious translation of interpretations of epidemiologic trends into points of concern and in-depth discussion for those involved in health policy formulation. This would thus allow for a better acceptance of the shortcomings of data reporting alongside its intended potential benefits of providing appropriate and useful information.

6.2 Mortality Rates

6.2.1 Over-all Death Rates

There was an observable continuous decline in the crude death rates in the Philippines from 1965 to 1990. However, this was not evident across all age groups. Death rates among the younger population decreased while that of the older population actually increased, particularly between 1970 and 1985. The over-all reduction in death rate may be attributed to the proportionally greater decline in death rates in the younger age groups. This reduction was far greater than the increases in the death rates among the older population. With this trend, life expectancies may be interpreted as increasing during the 25-year period studied.

As the epidemiologic trends for the different diseases were observed, it was quite evident that the major focus of the control programs that were initiated during the periods covered by the study was generally the increase in the survival rates of the younger population. However the

betterment in child survival by way of reduced mortality rates among the young may still be partially attributable to the effect of improvements in reporting, particularly when the measure of mortality utilizes livebirths as denominator. Accordingly, it seemed that the problems attendant to diseases of the older age groups have only been recently addressed. An increasing scope for the consideration of degenerative diseases among the older age groups in health planning and health policy formulation may eventually be emphasized.

The difference in the mortality trends between males and females, especially at the middle ages was also observed. This difference could be traced to the trends in mortality from cardiovascular diseases and malignant neoplasms, where the middle aged males had faster increasing rates compared to the females. In terms of tuberculosis mortality, the rates for women were declining more rapidly than males. This could be attributed to the greater number of risk factors for these diseases that the males are exposed to. This could be an indirect effect of the improvements in the maternal and child health program. Greater attention on women's health could have been the result of the health education received by mothers under this program. As for policy implications of these differences in trends by sex, there does not seem to be a serious need to address this specifically since programs for the prevention of cardiovascular diseases and cancers and occupational health programs are now being launched. The success of these programs is expected to bring about greater reductions in mortality among males than females.

6.2.2 Mortality Trends

6.2.2.1 Decreasing Mortality Trends

Generally, mortality rates for the leading communicable diseases were seen to decrease especially among the younger age groups. Case fatality rates for pneumonia, tuberculosis, bronchitis, avitaminoses and diarrhea among children had significantly been reduced. Likewise, drastic reductions in mortality due to lower morbidity arising from diphtheria, whooping cough tetanus and poliomyelitis were noted. These diseases began to decrease in the 1970's even before the inception of most disease control programs.

Although this may have been due to widespread improvement in socioeconomic conditions, the attention given to early diagnosis and improved case finding, better referral systems and subsequent management and treatment would essentially be the main reason to account for these observed reductions in deaths among the young. This would primarily depend apparently on how the Department of Health would be deemed to have been effective in the implementation of its different disease control programs such as those for ARI and diarrhea. Moreover, by also adopting and integrating a Primary Health Care (PHC) approach into these programs, not only the government but scores of non-government organizations and their community-based health programs have contributed to the need to address effective disease control in the community.

The implementation of the PHC approach in 1980 targeted respiratory infections, among other diseases, for the provision of low cost but effective remedies to susceptible households and communities. As the increase in actual cases may have reflected improvements in reporting, the

ARI program helped teach midwives in the Barangay Health Stations (BHS) to detect moderately-severe ARI cases. By simply observing for rapid breathing and chest indrawing, employing costly diagnostic procedures such as chest X-rays were avoided. Cases were then treated by using prescribed oral antibiotics combined with home management instead of expensive hospital-based treatment involving physicians and nurses and intravenous antibiotics. Thus, the reason for the decline in deaths arising from ARI may be understood in the light of how less costly BHS-based health care coupled with appropriate home management were more accepted and utilized.

The National Control of Diarrheal Diseases Program (NCDDP) meanwhile intensified efforts to improve techniques of diarrhea control through improved management. This was accomplished by the extensive use of the WHO-recommended protocol for dehydration and supported by the production and mass promotion of oral rehydration salts (Oresol). While morbidity rates continued to increase after the NCDDP began in 1980, case fatality rate decreased.

As mentioned, deaths from diphtheria, whooping cough, tetanus and polio were initiated by an actual decline in cases. Being immunizable diseases, the observed trends for these diseases would convey the successes of the Expanded Program on Immunization (EPI). Marked reductions in the mortality and morbidity rates of these diseases were observed in the 1970's when the implementation of EPI just began.

In contrast to the decrease in the rates for the other immunizable diseases, mortality rates from measles rose until 1985. However, rates have gone down since then as it was only in the early 1980's that measles was integrated in EPI. Given some allowance for greater implementation; better coverage and the proper administration of booster doses, the impact of measles immunization may likely be more noticeable during the period beyond the scope of this study.

Among the older population, the continuous decline in tuberculosis mortality has been observed. This may be attributed to the introduction in 1986 of the short course chemotherapy regimen (SCC) which minimized difficulties of compliance with streptomycin injections and the long period of treatment required by the standard regimen. SCC requires only 6 months of treatment with oral anti-TB drugs only and can be self-administered at home.

6.2.2.2 Increasing Mortality Trends

As case fatality rates were observed to decrease among the communicable diseases, the leading degenerative diseases, such as cardiovascular diseases and malignant neoplasms, are steadily on the rise. Because these diseases have been found to be associated with more developed societies, these are considered to be attributable to the adoption of potentially unhealthy lifestyles and harmful habits. Dietary fat, smoking and alcohol drinking are the most readily accepted among risk factors in the theorized causation of heart disease, vascular disease and cancer.

It may also be likely that a growing population has increasingly been affected by better survival from communicable diseases that has resulted in an increased life expectancy. This then would

have eventually allowed for the gradual appearance of these degenerative diseases which were previously and inadvertently masked by the greater number of deaths due to pneumonia, tuberculosis and other infectious diseases in the early years covered by the study. A natural recourse for the development and progress of natural organ deterioration and/or the occurrence of mutations and carcinogenesis may be taken to ascribe for the rise in these most common of non-communicable diseases.

Furthermore, it is only recently that programs that deal with the causes of these diseases have been introduced. The anti-smoking education campaigns (i.e. "Yosi Kadiri") and the "Pusong Pinoy - Bantay Presyon" programs as well as the Philippine Cancer Control Program of the health department have only been recently launched. Though these also incorporate a comprehensive PHC approach that integrates hospital and community health services, the impact of these programs may have yet to be felt. Epidemiologic trends may eventually follow that of developed countries where reductions in mortality rates from these diseases have been associated with decreasing prevalence of risk factors.

Mortality rates for nephrologic diseases, though not increasing, have remained to be a leading cause of mortality. While the specific causes of these diseases have yet to be fully understood, this observation of an apparent constant rate can be attributed to how urinary tract infections are effectively treated and controlled. The elucidation of the causes for other nephrologic diseases such as those arising from nephrolithiasis and autoimmune types of disease would be warranted.

Accidents are among the leading causes of death in the middle age groups. The fluctuation in the mortality rates from accidents among the male population seemed to coincide with changes in the peace and order problems in the country. The increasing rates after 1985 could also be attributed to the greater attention given to occupational health programs. Hazards in the work place would have to be prevented through the introduction and implementation of these programs. The increasing urbanization in many areas of the country might also have been responsible for this rise in rates. Greater urbanization leads to more risk factors for accidents such as vehicular traffic and more carefree lifestyle.

6.3 Morbidity Rates

As was previously stated, among the younger age groups, cases arising from the immunizable diseases such as tetanus and polio have radically decreased. This is predominantly due to the accomplishments of the EPI. In contrast however, generally, increasing morbidity trends were apparent for the other communicable diseases among the young and degenerative diseases among the older population.

While the mortality trends from pneumonia, bronchitis diarrhea and tuberculosis have been declining, morbidity rates for these have continued to increase. This might be attributed to improved reporting as in the case of diarrhea and ARI (inclusive of bronchitis, pneumonia and influenza). As part of objectives of the control programs called for greater awareness of these diseases, greater recognition and thus better reporting occurred coinciding with the implementation of PHC. Lay reporting of symptoms was also introduced to enable midwives and

barangay health workers to code for existing symptoms which could also serve as the basis for diagnosis.

Although EPI has greatly reduced morbidity and mortality rates among the immunizable diseases, measles immunization has not been seen to effectively reduce morbidity arising from the disease. A rapid increase in the number of cases was even observed in the 1980's and this may indicate a need for continued aggressive vaccination campaign for the disease to increase coverage and improve the administration of booster doses.

For the non-communicable diseases, reasons for the increases in morbidity have already been given in the discussion of increasing mortality trend.

6.4 Regional Differences

This study had used data on regional rates for a shorter period. This may have been the reason why, unlike the national figures, there were no major distinct patterns in terms of regional morbidity and mortality rates that could be extracted from the data. For the observed differences in rates by region, this could be attributed more to the levels of the accuracy and completeness in the reporting of diseases.

Ignoring the actual magnitude of the rates, the regions shared the same major health problems. Heart disease, pneumonia and tuberculosis were alternating in terms of the ranking by region of the mortality rates. For morbidity, diarrhea and bronchitis were the leading causes of morbidity.

In spite of these discrepancies in the reporting, it was clear that some diseases were more prevalent in some regions than in others. These included malaria, schistosomiasis and gonorrhoeal diseases. These differences could be explained by distinct features of the topography of the specific regions and the presence of a unique social structure in the community.

6.5 Health Determinants and Outcomes

From the results of the correlation analysis, the major determinants of the disease rates that could explain the current trends of these diseases could be reduced to the age distribution of the population, the level of industrialization, and the degree of accuracy and completeness of reporting.

Having a higher proportion in the older age groups positively correlated with mortality rates from heart disease, malignant neoplasms, tuberculosis and pneumonia. Clearly, the first two are degenerative diseases which are more commonly seen in the older population. Tuberculosis and pneumonia mortality rates are also high in the older populations.

The level of industrialization was also positively associated with the diseases above. Greater industrialization fosters the proliferation of non-healthy lifestyles, which are promoters of heart

diseases and malignant neoplasms. The positive correlation with tuberculosis and pneumonia rates may have been due to the increasing exposures to agents of these diseases among the working population and overcrowding that often results from greater industrialization.

The association between the completeness of reporting and the disease rates from degenerative diseases is apparent. In the absence of an effective program to control these degenerative diseases, the levels continued to increase while improvements in the reporting were taking place. Thus, a better reporting province would have higher disease rates.

Completeness of the reporting may also explain the absence of associations between the leading communicable diseases and the socio-economic determinants that were expected. Better socio-economic status was associated with better reporting. It is possible that while improvements in the socio-economic status are reducing the actual number of cases of communicable diseases, this is offset by the improvements in the level of reporting of diseases. Thus, the reported rates may not be correlating that well with the actual number of persons with disease.

6.6 Burden of Disease

In both measures of burden of disease, we see that more emphasis is given to diseases that produces a bigger number of deaths at the early ages. However, DHLL was also considered the morbidity rates while the PYLL did not. This difference resulted in a different ranking of diseases in terms of disease burden based on these two measures.

Pneumonia was the major leading cause of burden in the population using both measures. This disease was characterized by high mortality rates among the young, while at the same time, was a leading cause of death at almost all age groups.

Heart disease followed pneumonia in terms of PYLL. The other degenerative diseases such as malignant neoplasms and vascular diseases also ranked high. This is mostly due to the increasing mortality rates from these diseases. With the observed trend, these diseases would continue to impose a great burden of the population in terms of PYLL. Their ranking would stay at the higher levels while those of communicable diseases continue to drop. From 1970 to 1990, we saw the decline in the ranking of the communicable diseases in terms of PYLL. This can be attributed to the specific programs already discussed that dealt more on the reduction on deaths than the reduction in cases.

On the other hand, the major communicable diseases ranked highly in terms of DHLL. This could be explained by the higher morbidity rates of communicable diseases occurring at the young age group. Bronchitis followed pneumonia in terms of DHLL even though the mortality rates were very low. Tuberculosis and diarrhea also figured prominently among the major diseases in terms of DHLL. Because of the increasing trends in the morbidity rates from these communicable diseases, the burden of disease from these diseases is expected to increase.

In terms of DHLL, the degenerative diseases did not ranked that high for a following reasons. There was an incomplete list of diseases under heart diseases, vascular diseases and malignant

neoplasms. The computed DHLL only included a subset of the broad disease categories. Thus, DHLL for heart diseases was severely underestimated.

In our analysis of the burden of disease using DHLL, while we realize the limitations from the sources of the required information, the ranking of diseases would seem to be unaffected if moderate departures from the actual values were instead used. Thus, if our concern is only on the relative importance of each disease with another, then the DHLL can provide us with reliable answers. However, if the estimation of actual burden of disease is necessary, then the required inputs must be first be reliable.

A methodological problem arose with the use for DHLL for this study. For some diseases, the distribution of the number of cases by age was not unimodal. The case-fatality rates and the different measures for disability would then differ depending on the age of onset chosen. Thus, the choice of a single age group greatly influences the resulting the burden of disease. A suggestion is to perform age-specific computations of DHLL and then later on aggregated. This would be similar to the computation of PYLL.

7. Impact on Health Care Requirement

This section will briefly discuss the impact on health care requirement in terms of human resources, facilities and financing of the various trends in morbidity and mortality.

7.1 Human Resources

In terms of human resources, the morbidity and mortality trend shows that public health professionals will continue to be needed to address the public health problems posed by such diseases as diarrhea, tuberculosis, acute respiratory infections, malaria and the immunizable diseases such as measles. At the same time, specialists such as cardiologists, oncologists and nephrologists are needed for the rising cardiovascular, cancer and kidney cases. As for these diseases, many of the on-going health programs have focused on the prevention of these diseases through the promotion of healthy behaviors. Thus, a greater need in health educators is seen. This can be brought about by the development of health educators and/or by the incorporation of health education in the curriculum of health related courses such as medicine, nursing, public health, etc.

While the production of health human resources is essentially unplanned, policies and programs should be developed to give incentives for the education, training and retention of the health professional geared towards addressing the epidemiological profiles and trends. A situational analysis on health human resources made by the Department of Health states that there are no reliable and accurate data on many aspects of health human resources. The only reliable data are the number and location of schools, the number of graduates and licensed professionals and the employees of the DOH. Information on the number of the different types of health personnel who are alive and practicing in the country, their locations and what they are actually doing, together with other pertinent data are not available. This is vital for a comprehensive and rational planning of health human resource development responsive to the needs of the country.

7.2 Facilities

With the rising cases of heart and kidney diseases, the establishment of the Heart Center and Kidney Center and may now be said to be worth the monies spent on them. However, strong referral systems should be made so that those in the provinces could avail of the facilities of these two centers. Further, the costs of admission in these hospitals should be studied so that their services can be made accessible to the low income population.

Meanwhile, the facilities in the rural areas should be improved. The hospitals should really be developed as centers of wellness and encouraged to undertake primary health care activities. Strong relationship between the hospitals and rural health units should be established communities and non-governmental organizations should be encouraged to set-up and managed their own health programs and facilities. This is also in line with decentralization and participatory development.

7.3 Financing

The epidemiological profiles and trends require huge financing especially if we are to consider the costly non-communicable disease patterns. For one thing, the salaries and fees of the professionals should be such that they should be encouraged to practice and stay in the country. The maintenance of equipment and facilities will also require huge outlays. In view of the costly management of the non-communicable diseases, the insurance system both government and private, should be further developed. Data on health expenditures show that the private health insurance system accounts for only one percent while the MEDICARE program covers only about 38 percent of the population and support values have ranged from only 32 percent to a peak of 49 percent in 1989.

Meanwhile, community financing still has ample room for development. Especially in the management of the public health problems where the primary health care approach can be utilized. "Botika sa Barangay" or "Botika Binhi's" should be established where members can avail of drugs and medicines at discounted prices. Community participation can also be maximized for environmental sanitation for diarrhea and vector control for malaria. In case of tuberculosis, a research has also shown that people's organizations can be relied upon for monitoring and surveillance activities. Midwives and barangay health workers can also be trained and utilized for simple diagnostic procedures as the AZR program has shown. Community financing may yet be the answer to devolution's limited resources especially if primary health care will be promoted, community financing is not only a method of generating resources but also a way to make people have a feeling of owning their health care programs and services thus making them truly responsible for health production in their localities. The state should, therefore, encourage and give support to these programs.

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Table 1. Selected leading diseases for this study

Pneumonia	Diphtheria
Diarrhea	Varicella
Tuberculosis	H-fever
Bronchitis	Poliomyelitis
Whooping cough	Leprosy
Influenza	Schistosomiasis
Measles	Gonococcal infections
Tetanus	Diseases of the heart
Avitaminoses	Diseases of the vascular system
Infectious hepatitis	Malignant neoplasms
Septicemia	Nephritis, nephrosis and nephrologic diseases
Malaria	Accidents
Typhoid and paratyphoid fever	

Table 2. Grouping of diseases considered for age and sex specific mortality data, 1965 to 1990

Disease	1965 and 1970	1975	1980 to 1990
Pneumonia	Lobar pneumonia Broncho-pneumonia Primary typical pneumonia Pneumonia, other and unspecified Pneumonia of the newborn	Viral pneumonia Other pneumonias	Pneumonia
Diarrhea	Bacillary dysentery Amoebiasis Dysentery, all forms Food poisoning Gastroenteritis and colitis Diarrhea of the newborn	Bacillary dysentery and amoebiasis Enteritis and other diarrheal diseases	Shigellosis and amoebiasis Other food poisoning Other intestinal infectious diseases Diarrheas
Tuberculosis	Tuberculosis of the respiratory system Tuberculosis of the meninges and central nervous system Tuberculosis of the intestines, peritoneum and mesenteric glands Tuberculosis of the bones and joints	Tuberculosis of the respiratory system Tuberculosis of the meninges, and central nervous system Tuberculosis of the intestines, peritoneum and mesenteric glands Tuberculosis of the bones and joints Other tuberculosis, including late effects	Tuberculosis of the respiratory system Tuberculosis of the meninges and CNS Other tuberculosis, including late effects
Bronchitis	Acute respiratory infections Acute bronchitis Bronchitis, chronic and unqualified	Acute respiratory infections Bronchitis, emphysema and asthma	Acute respiratory infections Acute bronchitis and bronchiolitis Chronic obstructive pulmonary disease and allied conditions
Avitaminoses	Beriberi Other avitaminoses and deficiency states	Avitaminoses	Kwashiorkor Nutritional marasmus Other protein calorie malnutrition Other nutritional deficiencies

continuation

Diseases of the heart	Rheumatic fever with heart involvement Chronic rheumatic heart disease Arteriosclerotic and degenerative heart disease Other diseases of the heart Hypertensive heart disease	Acute rheumatic heart fever Chronic rheumatic heart disease Hypertension with heart involvement Ischaemic heart disease Other forms of heart diseases	Acute rheumatic fever Chronic rheumatic heart disease Hypertension with heart involvement Acute myocardial infarction Other forms of ischaemic heart disease Diseases of the pulmonary circulation and other forms of heart disease
Diseases of the vascular system	Other vascular lesions affecting CNS Rheumatic fever without mention of heart involvement Chorea Other hypertensive disease General arteriosclerosis Peripheral vascular disease Other diseases of the arteries Other diseases of the circulatory system	Hypertension without heart involvement Cerebrovascular disease Diseases of the arteries, arterioles, and capillaries Venous thrombosis and embolism Other diseases of the circulatory system	Hypertension without heart involvement Cerebrovascular disease Atherosclerosis Other diseases of the arteries, arterioles and capillaries
Malignant neoplasms	All sites Leukemia and aleukemia Lymphosarcoma and other neoplasms of hematopietic tissues	All sites Leukemia Other neoplasms of lymphatic and hematopietic tissue	All sites Leukemia
Nephritis, nephrosis and nephrotic syndrome	Acute nephritis Chronic, other and unspecified nephrosis	Acute nephritis Other nephritis and nephrosis	Nephritis, nephrosis and nephrotic syndromes

continuation

<p>Accidents</p>	<p>Railway accidents Motor vehicle accidents Aircraft accidents Accidental poisoning Accidental falls Accident caused by fire and explosion of combustible material Accident caused by hot substance, corrosive, liquid, steam and radiation Accident caused by firearm Accidental drowning and submersion All other accidental causes</p>	<p>Motor vehicle accidents Other transport accidents Accidental poisoning Accidental falls Accident caused by fires Accidental drowning and submersion Accidents caused by firearm missiles Accidents mainly of industrial type All other accidents</p>	<p>Railway accidents Motor vehicle traffic accidents Water and transport accidents Air and space transport accidents Other transport accidents Accidental poisoning, all kinds Accidents caused by fires and flames Accidents due to natural and environmental Accidents caused by submersion, suffocation and foreign bodies All other accidents including adverse effects in therapeutic use of drug medicaments and other biological substances, and late effects of accidental injury</p>
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Table 3. Indicators Used to Represent Health Determinants

<ul style="list-style-type: none"> + Average annual growth rate (in percent) + Sex ratio + Average household size + Proportion urban + Population density (per sq meter) + Proportion in age group 0-4 + Proportion in age group 15-64 + Proportion in age group 65 and over + Literacy rate + Percentage in agricultural occupation + Percentage in tertiary industries + Average age at marriage of female population + Average number of children born to women 15-49 years old 	<ul style="list-style-type: none"> + Proportion of household with potable water + Proportion of household with sanitary toilet facility + Proportion of household with television + Proportion of occupied housing with strong roof materials * Alcohol beverage consumption per household * Tobacco consumption per household * Medical care per household # Percent of deaths medically attended # Percent of births attended by physician, nurse or trained midwife
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Source: + Census Facts and Figures, National Statistics Office, May 1993, Manila
 * 1991 Family Income and Expenditure Survey, Integrated Survey of Household. Bulletin Series No. 72. National Statistics Office, November 1993, Manila
 # Philippine Health Statistics, Department of Health

Table 4. Death Rates by Region and by Sex, 1980-1990

Region	1980			1981			1982			1983			1984			1985		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
N.C.R.	8.64	5.51	7.10	8.47	5.38	6.93	8.51	5.64	7.10	8.34	4.80	7.00	7.92	5.34	6.60	8.31	5.71	7.00
Region 1	8.21	6.38	7.30	8.09	6.59	7.34	8.36	6.56	7.50	8.42	6.64	7.50	8.68	6.51	7.60	8.73	6.82	7.80
Region 2	8.06	5.70	6.90	7.89	5.53	6.72	7.75	5.45	6.60	7.84	5.42	6.60	7.31	5.16	6.20	6.97	4.99	6.00
Region 3	6.62	4.94	5.90	6.52	4.85	5.69	6.55	4.88	5.70	6.69	5.07	5.90	6.43	4.71	5.60	7.04	5.10	6.10
Region 4	7.36	4.92	6.10	7.15	5.21	6.18	7.32	5.20	6.30	7.57	5.27	6.40	7.06	4.94	6.00	7.37	5.25	6.30
Region 5	8.28	6.04	7.20	8.07	6.51	7.29	8.25	6.03	7.10	8.45	6.21	7.30	7.55	5.42	6.50	7.64	5.58	6.60
Region 6	6.77	5.73	6.90	7.85	5.38	6.62	7.87	5.57	6.70	8.18	5.78	7.00	7.71	5.21	6.50	8.08	5.71	6.90
Region 7	7.93	6.22	7.10	7.83	6.02	6.92	7.46	5.84	6.70	8.62	6.54	7.60	7.49	5.81	6.70	7.57	6.07	6.80
Region 8	8.03	5.56	6.80	7.89	5.18	6.54	7.72	5.42	6.60	7.54	5.19	6.40	7.17	4.96	6.10	7.44	5.27	6.40
Region 9	4.77	2.73	3.80	4.61	1.51	3.07	3.68	2.23	3.00	4.56	2.76	3.70	4.32	2.62	3.50	4.73	2.81	3.80
Region 10	6.46	4.29	5.40	6.29	4.55	5.43	6.61	4.37	5.50	6.85	4.51	5.70	6.56	4.04	5.30	6.60	4.30	5.50
Region 11	5.80	3.53	4.70	5.55	3.98	4.77	5.69	3.59	4.60	6.11	3.70	4.90	5.90	3.29	4.60	5.60	3.37	4.50
Region 12	3.49	2.03	2.80	3.27	2.71	2.99	3.67	2.32	3.00	4.02	2.39	3.20	4.01	2.25	3.10	4.38	2.24	3.10

Region	1986			1987			1988			1989			1990		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
N.C.R.	7.54	4.91	6.20	8.33	5.69	7.00	7.85	5.34	6.60	7.74	5.33	6.50	7.20	5.03	6.10
Region 1	8.17	6.51	7.30	8.04	6.11	7.10	7.56	5.96	6.70	8.14	6.49	7.30	7.52	5.94	6.70
Region 2	7.31	5.00	6.20	6.76	4.75	5.80	6.68	4.49	5.60	6.50	4.39	5.50	6.14	4.25	5.20
Region 3	6.62	4.71	5.70	6.38	4.63	5.50	6.45	4.70	5.60	6.14	4.51	5.30	5.88	4.16	5.00
Region 4	7.44	5.16	6.30	7.39	5.24	6.30	7.51	5.23	6.40	6.98	4.93	6.00	6.28	4.38	5.30
Region 5	7.78	5.63	6.70	8.32	6.16	7.20	6.89	5.13	6.00	6.85	5.09	6.00	6.41	4.64	5.50
Region 6	7.31	5.09	6.20	7.34	5.03	6.20	6.80	4.55	5.70	7.10	4.72	5.90	6.70	4.58	5.60
Region 7	7.47	5.03	6.70	7.27	5.80	6.50	7.02	5.46	6.20	6.80	5.27	6.00	6.71	5.29	6.00
Region 8	6.82	4.69	5.80	6.72	4.86	5.80	6.19	4.44	5.30	6.23	4.51	5.40	5.75	4.11	4.90
Region 9	4.42	2.70	3.60	4.05	2.48	3.30	3.97	2.38	3.20	4.00	2.39	3.20	3.91	2.38	3.10
Region 10	6.42	4.30	5.40	5.82	3.90	4.90	5.45	3.59	4.50	5.34	3.42	4.40	5.27	3.33	4.30
Region 11	5.65	3.43	4.50	5.47	3.33	4.40	5.17	3.06	4.10	5.03	3.09	4.10	4.74	2.87	3.80
Region 12	3.60	2.11	2.90	3.40	1.98	2.70	3.21	1.83	2.50	3.08	1.80	2.40	2.42	1.28	1.90

5. Ten Leading Causes of Mortality in Region I, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	104.70	PNEUMONIA	130.70	HEART DISEASES	100.8
2	TUBERCULOSIS	63.20	HEART DISEASES	82.70	PNEUMONIA	97.0
3	MALIGNANT NEOPLASMS	34.70	TUBERCULOSIS	60.90	TUBERCULOSIS	44.8
4	DIARRHEA	26.60	MALIGNANT NEOPLASMS	39.10	MALIGNANT NEOPLASMS	42.9
5	INFLUENZA	10.70	ACCIDENTS	26.60	ACCIDENTS	27.4
6	MEASLES	8.00	DIARRHEA	22.30	DIARRHEA	8.9
7	BRONCHITIS	6.70	MEASLES	14.20	MEASLES	5.1
8	TYPHOID FEVER	2.60	INFLUENZA	9.30	TYPHOID FEVER	3.8
9	TETANUS	2.40	BRONCHITIS	6.10	INFLUENZA	3.5
10	HEPATITIS	2.10	TYPHOID FEVER	3.40	BRONCHITIS	2.9

Table 6. Ten Leading Causes of Mortality in Region II, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	99.20	PNEUMONIA	87.10	PNEUMONIA	75.90
2	TUBERCULOSIS	41.70	HEART DISEASES	48.20	HEART DISEASES	67.10
3	DIARRHEA	32.50	TUBERCULOSIS	43.20	TUBERCULOSIS	31.00
4	MALARIA	19.40	ACCIDENTS	28.80	ACCIDENTS	29.40
5	MALIGNANT NEOPLASMS	18.00	MALIGNANT NEOPLASMS	19.30	MALIGNANT NEOPLASMS	23.90
6	BRONCHITIS	12.00	DIARRHEA	18.10	DIARRHEA	15.80
7	MEASLES	5.20	MEASLES	14.80	MALARIA	7.50
8	INFLUENZA	2.90	MALARIA	13.60	MEASLES	6.50
9	TETANUS	2.70	BRONCHITIS	6.90	BRONCHITIS	3.30
10	HEPATITIS	2.70	TETANUS	2.40	TETANUS	2.90

Table 7. Ten Leading Causes of Mortality in Region III, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	78.20	PNEUMONIA	79.90	HEART DISEASES	95.80
2	TUBERCULOSIS	61.00	HEART DISEASES	77.50	PNEUMONIA	47.00
3	MALIGNANT NEOPLASMS	39.40	TUBERCULOSIS	63.80	MALIGNANT NEOPLASMS	42.00
4	DIARRHEA	20.20	MALIGNANT NEOPLASMS	44.50	TUBERCULOSIS	41.10
5	MEASLES	8.80	ACCIDENTS	21.30	ACCIDENTS	22.50
6	BRONCHITIS	2.90	DIARRHEA	16.20	DIARRHEA	6.90
7	INFLUENZA	1.50	MEASLES	10.70	MEASLES	2.50
8	HEPATITIS	1.30	BRONCHITIS	2.80	HEPATITIS	1.20
9	MALARIA	1.20	MALARIA	1.20	TYPHOID FEVER	0.80
10	TETANUS	0.80	TETANUS	1.10	TETANUS	0.70

Table 8. Ten Leading Causes of Mortality in Region IV, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	76.70	PNEUMONIA	85.70	HEART DISEASES	85.70
2	TUBERCULOSIS	63.80	HEART DISEASES	78.30	PNEUMONIA	56.50
3	MALIGNANT NEOPLASMS	33.70	TUBERCULOSIS	59.80	TUBERCULOSIS	40.30
4	DIARRHEA	31.60	MALIGNANT NEOPLASMS	35.50	MALIGNANT NEOPLASMS	36.80
5	MEASLES	9.40	DIARRHEA	23.70	ACCIDENTS	18.40
6	BRONCHITIS	5.30	ACCIDENTS	19.30	DIARRHEA	12.30
7	MALARIA	3.30	MEASLES	14.70	MEASLES	5.80
8	INFLUENZA	2.70	BRONCHITIS	4.20	MALARIA	3.00
9	HEPATITIS	1.80	MALARIA	2.80	BRONCHITIS	2.20
10	TETANUS	1.40	INFLUENZA	1.90	HEPATITIS	1.40

Table 9. Ten Leading Causes of Mortality in Region V, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	136.10	PNEUMONIA	127.00	PNEUMONIA	79.60
2	TUBERCULOSIS	83.00	TUBERCULOSIS	77.30	HEART DISEASES	78.20
3	DIARRHEA	34.00	HEART DISEASES	63.20	TUBERCULOSIS	55.00
4	MALIGNANT NEOPLASMS	20.70	MALIGNANT NEOPLASMS	22.20	MALIGNANT NEOPLASMS	24.70
5	MEASLES	14.50	DIARRHEA	21.10	ACCIDENTS	19.90
6	BRONCHITIS	8.70	MEASLES	19.70	DIARRHEA	12.30
7	INFLUENZA	4.60	ACCIDENTS	19.00	MEASLES	6.50
8	TETANUS	1.90	BRONCHITIS	6.80	BRONCHITIS	3.10
9	TYPHOID FEVER	1.40	INFLUENZA	2.30	TETANUS	2.20
10	HEPATITIS	1.20	TETANUS	1.90	TYPHOID FEVER	1.70

Table 10. Ten Leading Causes of Mortality in Region VI, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	116.10	PNEUMONIA	113.10	PNEUMONIA	77.00
2	TUBERCULOSIS	87.10	TUBERCULOSIS	87.10	HEART DISEASES	66.80
3	MALIGNANT NEOPLASMS	35.30	HEART DISEASES	67.70	TUBERCULOSIS	57.10
4	DIARRHEA	34.00	MALIGNANT NEOPLASMS	33.30	MALIGNANT NEOPLASMS	38.80
5	MEASLES	17.30	DIARRHEA	26.80	ACCIDENTS	19.50
6	INFLUENZA	8.10	MEASLES	17.70	DIARRHEA	11.70
7	BRONCHITIS	7.20	ACCIDENTS	17.30	MEASLES	3.70
8	TETANUS	3.10	INFLUENZA	7.00	TYPHOID FEVER	2.60
9	HEPATITIS	1.70	BRONCHITIS	4.60	INFLUENZA	2.40
10	TYPHOID FEVER	1.40	TYPHOID FEVER	3.90	TETANUS	2.10

Table 11. Ten Leading Causes of Mortality in Region VII, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	108.80	PNEUMONIA	108.70	PNEUMONIA	87.2
2	TUBERCULOSIS	52.80	HEART DISEASES	95.10	HEART DISEASES	83.7
3	MALIGNANT NEOPLASMS	48.60	TUBERCULOSIS	49.50	MALIGNANT NEOPLASMS	52.4
4	DIARRHEA	25.40	MALIGNANT NEOPLASMS	46.90	TUBERCULOSIS	32.5
5	MEASLES	7.70	DIARRHEA	21.30	ACCIDENTS	19.4
6	INFLUENZA	7.30	ACCIDENTS	17.30	DIARRHEA	11.4
7	BRONCHITIS	7.10	MEASLES	12.10	MEASLES	7.30
8	TETANUS	3.10	BRONCHITIS	3.20	TYPHOID FEVER	2.00
9	HEPATITIS	1.10	INFLUENZA	3.20	BRONCHITIS	1.70
10	TYPHOID FEVER	1.10	TYPHOID FEVER	2.30	TETANUS	1.40

Table 12. Ten Leading Causes of Mortality in Region VIII, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	131.80	PNEUMONIA	132.80	PNEUMONIA	99.10
2	TUBERCULOSIS	73.20	TUBERCULOSIS	63.50	HEART DISEASES	59.90
3	DIARRHEA	37.50	HEART DISEASES	57.40	TUBERCULOSIS	39.70
4	MALIGNANT NEOPLASMS	24.40	DIARRHEA	26.40	MALIGNANT NEOPLASMS	26.70
5	MEASLES	12.60	MALIGNANT NEOPLASMS	24.20	ACCIDENTS	18.90
6	BRONCHITIS	11.40	MEASLES	20.20	DIARRHEA	9.50
7	SCHISTOSOMIASIS	8.90	ACCIDENTS	17.50	MEASLES	8.90
8	INFLUENZA	6.50	SCHISTOSOMIASIS	6.00	BRONCHITIS	3.00
9	TETANUS	1.80	BRONCHITIS	5.70	SCHISTOSOMIASIS	3.00
10	HEPATITIS	1.80	INFLUENZA	4.10	INFLUENZA	2.90

Table 13. Ten Leading Causes of Mortality in Region IX, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	52.10	PNEUMONIA	54.00	PNEUMONIA	42.90
2	TUBERCULOSIS	27.80	TUBERCULOSIS	31.90	HEART DISEASES	34.50
3	DIARRHEA	23.60	HEART DISEASES	26.00	TUBERCULOSIS	19.50
4	MALIGNANT NEOPLASMS	15.90	DIARRHEA	18.10	MALIGNANT NEOPLASMS	17.70
5	MEASLES	10.50	MALIGNANT NEOPLASMS	16.20	ACCIDENTS	12.90
6	MALARIA	5.10	ACCIDENTS	11.20	DIARRHEA	11.50
7	BRONCHITIS	4.60	MEASLES	7.60	MEASLES	5.60
8	TETANUS	1.70	MALARIA	6.10	MALARIA	3.00
9	TYPHOID FEVER	1.20	TETANUS	2.50	TETANUS	2.50
10	HEPATITIS	1.00	BRONCHITIS	2.40	TYPHOID FEVER	2.20

Table 14. Ten Leading Causes of Mortality in Region X, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	88.00	PNEUMONIA	92.40	PNEUMONIA	62.70
2	TUBERCULOSIS	44.00	HEART DISEASES	42.60	HEART DISEASES	57.00
3	DIARRHEA	30.80	TUBERCULOSIS	37.60	TUBERCULOSIS	29.10
4	MALIGNANT NEOPLASMS	25.80	DIARRHEA	29.30	MALIGNANT NEOPLASMS	26.60
5	MEASLES	9.90	MALIGNANT NEOPLASMS	24.70	ACCIDENTS	18.90
6	BRONCHITIS	9.80	ACCIDENTS	20.40	DIARRHEA	11.50
7	INFLUENZA	3.30	MEASLES	13.60	MEASLES	4.00
8	TETANUS	2.40	BRONCHITIS	3.20	MALARIA	3.40
9	HEPATITIS	2.10	MALARIA	3.10	TETANUS	2.30
10	SCHISTOSOMIASIS	2.10	TETANUS	2.20	HEPATITIS	2.00

Table 15. Ten Leading Causes of Mortality in Region XI, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	56.60	PNEUMONIA	56.00	HEART DISEASES	48.20
2	TUBERCULOSIS	35.50	HEART DISEASES	36.20	PNEUMONIA	46.90
3	DIARRHEA	28.30	TUBERCULOSIS	32.30	TUBERCULOSIS	25.40
4	MALIGNANT NEOPLASMS	24.20	MALIGNANT NEOPLASMS	20.80	MALIGNANT NEOPLASMS	25.00
5	MEASLES	11.30	DIARRHEA	18.50	ACCIDENTS	18.40
6	BRONCHITIS	3.30	ACCIDENTS	17.00	DIARRHEA	10.20
7	MALARIA	2.80	MEASLES	14.50	MEASLES	6.30
8	TETANUS	2.40	MALARIA	3.70	MALARIA	2.10
9	HEPATITIS	1.80	TETANUS	2.30	HEPATITIS	1.80
10	SCHISTOSOMIASIS	1.60	BRONCHITIS	2.30	TYPHOID FEVER	1.80

Table 16. Ten Leading Causes of Mortality in Region XII, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	28.80	PNEUMONIA	38.80	HEART DISEASES	19.60
2	TUBERCULOSIS	25.40	TUBERCULOSIS	25.80	TUBERCULOSIS	18.70
3	DIARRHEA	18.20	HEART DISEASES	17.80	PNEUMONIA	17.30
4	MALIGNANT NEOPLASMS	10.40	DIARRHEA	16.50	MALIGNANT NEOPLASMS	10.00
5	MEASLES	5.10	ACCIDENTS	14.30	ACCIDENTS	8.60
6	BRONCHITIS	2.30	MALIGNANT NEOPLASMS	12.60	DIARRHEA	5.00
7	TETANUS	2.10	MEASLES	7.90	MEASLES	3.10
8	MALARIA	2.00	BRONCHITIS	3.30	TYPHOID FEVER	1.90
9	TYPHOID FEVER	1.60	TETANUS	1.90	TETANUS	1.30
10	HEPATITIS	0.70	MALARIA	1.90	HEPATITIS	0.90

Table 17. Ten Leading Causes of Mortality in N.C.R., 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	PNEUMONIA	110.80	PNEUMONIA	117.20	HEART DISEASES	107.0
2	TUBERCULOSIS	69.40	HEART DISEASES	92.00	PNEUMONIA	82.4
3	MALIGNANT NEOPLASMS	56.60	TUBERCULOSIS	64.70	MALIGNANT NEOPLASMS	54.3
4	DIARRHEA	22.40	MALIGNANT NEOPLASMS	50.60	TUBERCULOSIS	46.6
5	MEASLES	13.50	MEASLES	18.50	ACCIDENTS	11.9
6	DIPHTHERIA	2.80	DIARRHEA	16.30	DIARRHEA	9.4
7	HEPATITIS	2.30	ACCIDENTS	12.70	MEASLES	8.3
8	TETANUS	2.00	T.B. MENINGITIS	2.00	HEPATITIS	1.9
9	BRONCHITIS	1.60	TYPHOID FEVER	1.90	TETANUS	1.5
10	TYPHOID FEVER	1.30	TETANUS	1.70	TYPHOID FEVER	1.4

Table 18. Ten Leading Causes of Morbidity in Region I, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	INFLUENZA	578.90	BRONCHITIS	1192.40	DIARRHEA	1056.20
2	BRONCHITIS	511.90	DIARRHEA	1092.40	BRONCHITIS	897.90
3	DIARRHEA	509.40	INFLUENZA	1004.40	INFLUENZA	477.80
4	TUBERCULOSIS	277.20	PNEUMONIA	414.70	PNEUMONIA	255.40
5	PNEUMONIA	266.30	TUBERCULOSIS	283.20	TUBERCULOSIS	200.20
6	MALARIA	66.10	ACCIDENTS	186.00	HEART DISEASE	162.90
7	MEASLES	64.80	HEART DISEASE	180.90	ACCIDENTS	84.80
8	MALIGNANT NEOPLASMS	47.20	MEASLES	118.10	MALIGNANT NEOPLASMS	73.50
9	WHOOPING COUGH	42.30	MALARIA	85.50	MEASLES	54.80
10	HEPATITIS	24.20	TYPHOID FEVER	50.60	TYPHOID FEVER	51.30

Table 19. Ten Leading Causes of Morbidity in Region II, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	BRONCHITIS	517.40	BRONCHITIS	1249.80	BRONCHITIS	2983.90
2	INFLUENZA	459.10	INFLUENZA	1089.00	DIARRHEA	2427.10
3	DIARRHEA	449.20	DIARRHEA	1021.50	INFLUENZA	1773.30
4	MALARIA	379.90	MALARIA	988.10	ACCIDENTS	918.30
5	PNEUMONIA	127.70	PNEUMONIA	329.30	MALARIA	699.00
6	TUBERCULOSIS	120.10	TUBERCULOSIS	174.60	PNEUMONIA	691.50
7	MALIGNANT NEOPLASMS	32.00	ACCIDENTS	142.00	TUBERCULOSIS	299.40
8	MEASLES	29.20	MEASLES	112.00	HEART DISEASE	259.30
9	TETANUS	10.10	HEART DISEASES	109.00	MEASLES	68.40
10	HEPATITIS	8.80	HEPATITIS	26.70	VARICELLA	64.00

Table 20. Ten Leading Causes of Morbidity in Region III, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	INFLUENZA	687.90	DIARRHEA	1051.60	DIARRHEA	1792.80
2	BRONCHITIS	640.90	BRONCHITIS	813.70	BRONCHITIS	1286.90
3	DIARRHEA	492.90	INFLUENZA	688.60	INFLUENZA	420.50
4	TUBERCULOSIS	260.70	PNEUMONIA	292.90	ACCIDENTS	359.20
5	PNEUMONIA	201.00	TUBERCULOSIS	247.40	HEART DISEASE	243.30
6	GONOCOCCAL INF.	70.70	HEART DISEASE	180.30	PNEUMONIA	199.50
7	WHOOPING COUGH	63.20	ACCIDENTS	141.10	TUBERCULOSIS	167.20
8	MEASLES	54.80	GONOCOCCAL INF.	138.70	MALIGNANT NEOPLASMS	59.60
9	MALIGNANT NEOPLASMS	54.00	MEASLES	93.40	MEASLES	52.60
10	MALARIA	26.70	MALARIA	69.00	VARICELLA	43.00

Table 21. Ten Leading Causes of Morbidity in Region IV, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	INFLUENZA	370.40	DIARRHEA	694.20	DIARRHEA	1055.20
2	DIARRHEA	331.60	BRONCHITIS	555.70	INFLUENZA	658.50
3	BRONCHITIS	269.40	INFLUENZA	442.00	BRONCHITIS	645.10
4	TUBERCULOSIS	219.20	MALARIA	389.50	TUBERCULOSIS	243.20
5	MALARIA	213.60	PNEUMONIA	231.40	MALARIA	232.70
6	PNEUMONIA	130.70	TUBERCULOSIS	205.30	HEART DISEASE	202.20
7	MALIGNANT NEOPLASMS	47.90	HEART DISEASE	144.20	PNEUMONIA	162.80
8	MEASLES	45.60	ACCIDENTS	134.70	ACCIDENTS	160.30
9	WHOOPING COUGH	21.00	MEASLES	86.70	MALIGNANT NEOPLASMS	48.40
10	HEPATITIS	9.90	MALIGNANT NEOPLASMS	46.70	VARICELLA	41.40

Table 22. Ten Leading Causes of Morbidity in Region V, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	DIARRHEA	284.60	BRONCHITIS	1190.50	BRONCHITIS	2218.90
2	INFLUENZA	252.90	INFLUENZA	839.90	INFLUENZA	1524.60
3	PNEUMONIA	238.60	DIARRHEA	830.60	DIARRHEA	1431.90
4	BRONCHITIS	230.10	TUBERCULOSIS	394.50	PNEUMONIA	667.30
5	TUBERCULOSIS	219.80	PNEUMONIA	315.10	TUBERCULOSIS	437.70
6	MALIGNANT NEOPLASMS	34.90	HEART DISEASES	135.40	HEART DISEASE	159.00
7	MEASLES	29.10	ACCIDENTS	132.80	MEASLES	93.40
8	WHOOPING COUGH	21.60	MEASLES	86.70	VARICELLA	81.20
9	HEPATITIS	7.10	MALARIA	65.40	ACCIDENTS	77.00
10	TYPHOID FEVER	6.10	WHOOPING COUGH	53.10	MALARIA	52.40

Table 23. Ten Leading Causes of Morbidity in Region VI, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	BRONCHITIS	486.20	BRONCHITIS	793.10	BRONCHITIS	1556.10
2	INFLUENZA	312.90	DIARRHEA	694.50	DIARRHEA	1070.90
3	DIARRHEA	272.40	INFLUENZA	587.00	INFLUENZA	788.40
4	TUBERCULOSIS	249.50	TUBERCULOSIS	286.50	TUBERCULOSIS	309.80
5	PNEUMONIA	213.50	PNEUMONIA	217.90	PNEUMONIA	283.10
6	MALIGNANT NEOPLASMS	80.00	ACCIDENTS	212.50	ACCIDENTS	223.70
7	MEASLES	56.70	HEART DISEASES	111.10	HEART DISEASES	109.00
8	WHOOPING COUGH	20.60	MEASLES	77.90	MALIGNANT NEOPLASMS	58.20
9	HEPATITIS	16.20	TYPHOID FEVER	40.20	VARICELLA	50.10
10	TETANUS	5.40	MALIGNANT NEOPLASMS	37.60	TYPHOID FEVER	48.40

Table 24. Ten Leading Causes of Morbidity in Region VII, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	BRONCHITIS	319.70	BRONCHITIS	978.90	DIARRHEA	1962
2	PNEUMONIA	292.20	DIARRHEA	883.30	BRONCHITIS	931
3	DIARRHEA	284.60	INFLUENZA	419.00	INFLUENZA	596
4	INFLUENZA	171.40	PNEUMONIA	293.00	PNEUMONIA	419
5	TUBERCULOSIS	146.80	TUBERCULOSIS	214.40	TUBERCULOSIS	245
6	MALIGNANT NEOPLASMS	70.90	ACCIDENTS	177.70	ACCIDENTS	200
7	MEASLES	30.40	HEART DISEASE	136.20	HEART DISEASES	165
8	WHOOPING COUGH	20.30	MEASLES	89.50	MALIGNANT NEOPLASMS	73
9	GONOCOCCAL INF.	12.80	MALIGNANT NEOPLASMS	72.20	MEASLES	62
10	HEPATITIS	10.30	GONOCOCCAL INF.	27.10	VARICELLA	30

Table 25. Ten Leading Causes of Morbidity in Region VIII, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	DIARRHEA	597.20	DIARRHEA	1219.10	BRONCHITIS	2628.20
2	INFLUENZA	368.90	BRONCHITIS	1135.00	DIARRHEA	2005.70
3	PNEUMONIA	355.50	INFLUENZA	716.10	INFLUENZA	1040.80
4	TUBERCULOSIS	296.60	PNEUMONIA	422.10	PNEUMONIA	798.10
5	BRONCHITIS	240.80	TUBERCULOSIS	331.20	ACCIDENTS	352.50
6	WHOOPING COUGH	109.00	ACCIDENTS	242.50	TUBERCULOSIS	330.80
7	MEASLES	63.40	MEASLES	190.30	HEART DISEASE	168.90
8	MALIGNANT NEOPLASMS	48.50	SCHISTOSOMIASIS	186.70	SCHISTOSOMIASIS	132.00
9	SCHISTOSOMIASIS	20.20	HEART DISEASES	120.20	MEASLES	124.30
10	MALARIA	15.50	WHOOPING COUGH	85.90	VARICELLA	41.20

Table 26. Ten Leading Causes of Morbidity in Region IX, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	DIARRHEA	480.80	INFLUENZA	1986.90	DIARRHEA	2875.30
2	INFLUENZA	467.80	DIARRHEA	1387.70	BRONCHITIS	2788.80
3	MALARIA	354.10	BRONCHITIS	1316.60	INFLUENZA	2258.20
4	BRONCHITIS	335.80	MALARIA	1210.00	PNEUMONIA	576.00
5	PNEUMONIA	228.30	PNEUMONIA	492.30	TUBERCULOSIS	268.40
6	TUBERCULOSIS	223.90	ACCIDENTS	378.00	ACCIDENTS	228.10
7	MEASLES	69.20	TUBERCULOSIS	315.90	MALARIA	99.20
8	MALIGNANT NEOPLASMS	42.50	MEASLES	189.90	SCHISTOSOMIASIS	98.30
9	HEPATITIS	42.20	WHOOPING COUGH	56.80	VARICELLA	79.80
10	WHOOPING COUGH	30.40	HEART DISEASE	49.90	MEASLES	62.60

Table 27. Ten Leading Causes of Morbidity in Region X, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	INFLUENZA	780.10	BRONCHITIS	1980.30	BRONCHITIS	2767.90
2	BRONCHITIS	762.60	INFLUENZA	1657.80	INFLUENZA	1431.00
3	DIARRHEA	546.50	DIARRHEA	1420.50	DIARRHEA	1348.50
4	PNEUMONIA	353.00	PNEUMONIA	704.90	PNEUMONIA	473.40
5	TUBERCULOSIS	252.50	TUBERCULOSIS	287.60	MALARIA	348.70
6	MALIGNANT NEOPLASMS	97.70	MALARIA	247.30	TUBERCULOSIS	250.60
7	WHOOPING COUGH	64.60	ACCIDENTS	186.90	ACCIDENTS	177.60
8	MEASLES	56.50	MEASLES	130.50	HEART DISEASES	132.60
9	SCHISTOSOMIASIS	47.50	HEART DISEASES	71.80	MEASLES	97.40
10	MALARIA	40.10	WHOOPING COUGH	60.50	VARICELLA	60.40

Table 28. Ten Leading Causes of Morbidity in Region XI, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	BRONCHITIS	545.10	BRONCHITIS	1791.70	BRONCHITIS	2719.60
2	DIARRHEA	406.90	DIARRHEA	1468.30	DIARRHEA	1399.10
3	INFLUENZA	300.00	INFLUENZA	1072.90	INFLUENZA	968.20
4	TUBERCULOSIS	251.00	PNEUMONIA	594.20	PNEUMONIA	441.50
5	PNEUMONIA	250.30	MALARIA	362.20	ACCIDENTS	202.80
6	MALARIA	56.40	TUBERCULOSIS	312.10	MALARIA	189.00
7	MALIGNANT NEOPLASMS	52.00	ACCIDENTS	227.20	TUBERCULOSIS	172.10
8	WHOOPING COUGH	47.50	MEASLES	136.60	SCHISTOSOMIASIS	85.80
9	MEASLES	37.20	HEART DISEASES	80.70	HEART DISEASES	83.60
10	HEPATITIS	23.90	GONOCOCCAL INF.	53.80	VARICELLA	79.90

Table 29. Ten Leading Causes of Morbidity in Region XII, 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	INFLUENZA	736.50	BRONCHITIS	1962.70	DIARRHEA	2564.50
2	DIARRHEA	637.70	INFLUENZA	1852.30	BRONCHITIS	1734.90
3	BRONCHITIS	453.70	DIARRHEA	1755.10	INFLUENZA	1377.20
4	TUBERCULOSIS	312.80	PNEUMONIA	848.90	PNEUMONIA	490.30
5	PNEUMONIA	303.40	TUBERCULOSIS	589.60	TUBERCULOSIS	242.80
6	WHOOPING COUGH	103.80	ACCIDENTS	285.50	ACCIDENTS	138.10
7	MALARIA	71.00	MEASLES	217.90	VARICELLA	109.60
8	MEASLES	52.60	WHOOPING COUGH	142.30	MEASLES	96.70
9	MALIGNANT NEOPLASMS	40.80	HEART DISEASE	101.80	MALARIA	91.60
10	HEPATITIS	21.60	MALARIA	100.80	HEART DISEASES	84.10

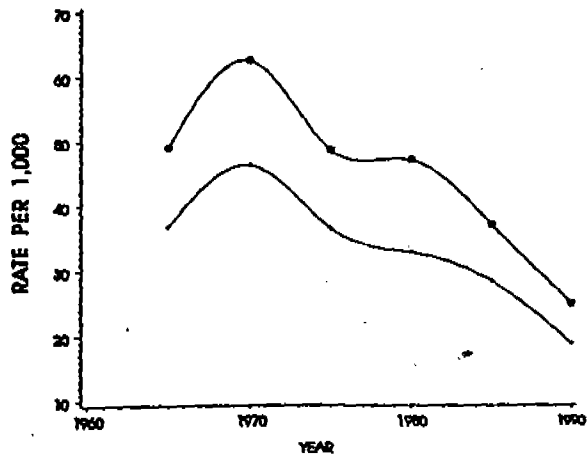
Table 30. Ten Leading Causes of Morbidity in N.C.R., 1980, 1985 & 1990.

Rank	1980		1985		1990	
	Disease	Rate	Disease	Rate	Disease	Rate
1	BRONCHITIS	367.00	BRONCHITIS	593.70	BRONCHITIS	470.1
2	DIARRHEA	332.30	DIARRHEA	267.00	DIARRHEA	391.4
3	PNEUMONIA	288.50	PNEUMONIA	265.90	PNEUMONIA	230.8
4	INFLUENZA	263.60	TUBERCULOSIS	184.70	HEART DISEASES	182.5
5	TUBERCULOSIS	210.50	INFLUENZA	154.50	TUBERCULOSIS	165.8
6	MEASLES	101.60	HEART DISEASES	151.60	INFLUENZA	132.3
7	MALIGNANT NEOPLASMS	93.60	MEASLES	98.40	MALIGNANT NEOPLASMS	96.0
8	HEPATITIS	32.40	MALIGNANT NEOPLASMS	74.10	MEASLES	66.6
9	WHOOPING COUGH	30.10	ACCIDENTS	68.60	ACCIDENTS	62.9
10	GONOCOCCAL INF.	26.90	HEPATITIS	34.70	VARICELLA	28.2

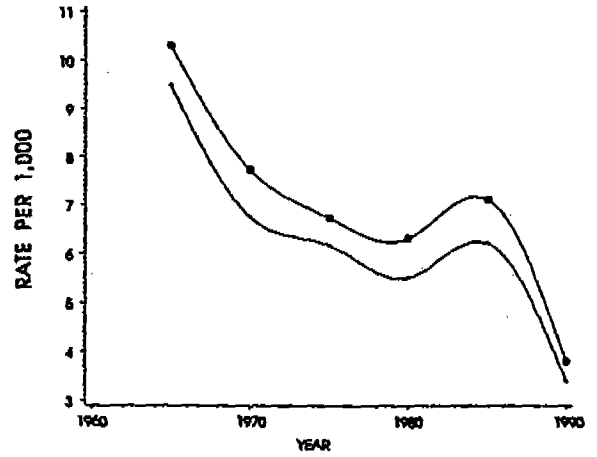
**Table 31 . Computed Days of Healthy Life Lost Per Case and
Per 100,000 Person-Years**

Disease	DHLL per case	Incidence per 100,000 popn	DHLL per 100,000 popn
Pneumonia	4905.0	380.3	1865162.1
Bronchitis	967.0	1580.3	1528118.5
Tuberculosis	3611.0	246.1	888582.6
Heart Diseases			555935.5
Hypertension	5290.7	53.5	283051.1
Acute Myocardial Infarction	3900.3	50.2	195874.6
Other forms of IHD	2606.5	29.3	76447.6
Rheumatic Heart Disease	5622.3	0.1	562.2
Diarrhea	246.1	1495.4	368012.6
Malnutrition			241044.6
Protein Energy Malnutrition	2479.2	63.0	156186.5
Diabetes Mellitus	2828.6	30.0	84858.1
Stroke	3900.1	47.0	183306.1
Septicemia	5599.3	26.9	150396.9
Influenza	93.9	878.0	82400.7
Accidents	376.6	215.5	81163.8
Malignant Neoplasms			72741.7
Lung cancer	6347.7	5.9	37387.7
Breast Cancer	7602.4	3.3	24707.8
Cervical cancer	8514.2	0.8	6385.6
Liver cancer	10555.0	0.1	1066.1
Leukemia	14520.6	0.2	3194.5
Measles	767.8	69.2	53122.1
Malaria	389.3	118.7	46194.5
Leprosy	8461.9	4.6	38586.2
Schistosomiasis	1329.7	23.8	31672.3
Typhoid fever	860.6	34.0	29260.4
Tetanus	4178.8	4.0	16715.2
H-fever	1199.3	7.8	9342.7
Hepatitis A	205.8	23.7	4877.1
Pertussis	322.3	6.7	2146.6
Filariasis	1545.7	0.5	711.0
Varicella	12.3	53.5	655.6
Poliomyelitis	1487.6	0.2	238.0

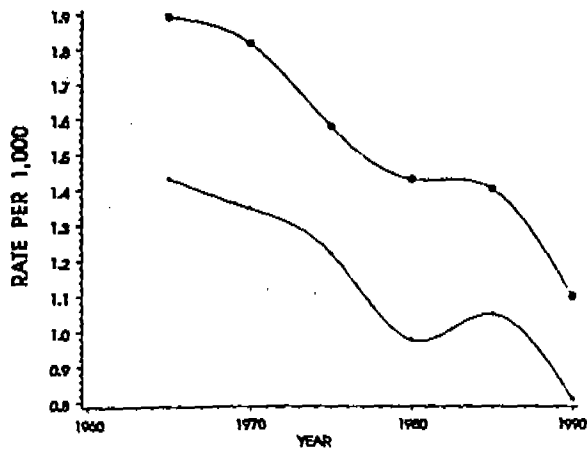
FIGURE 1. AGE AND SEX SPECIFIC DEATH RATES, 1965-1990



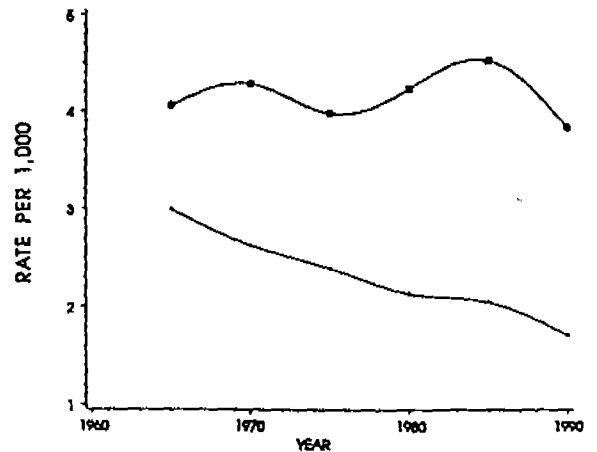
UNDER 1 YEAR



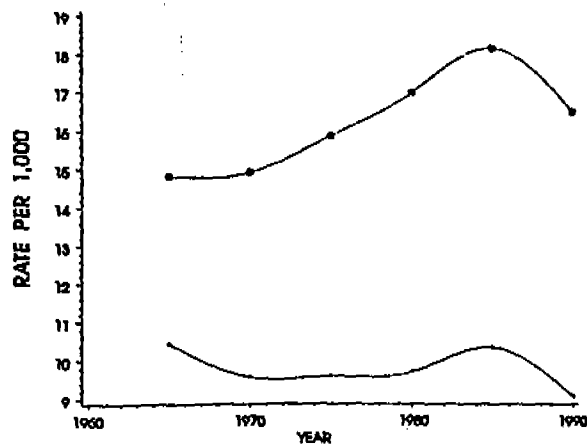
1 - 4 YEARS



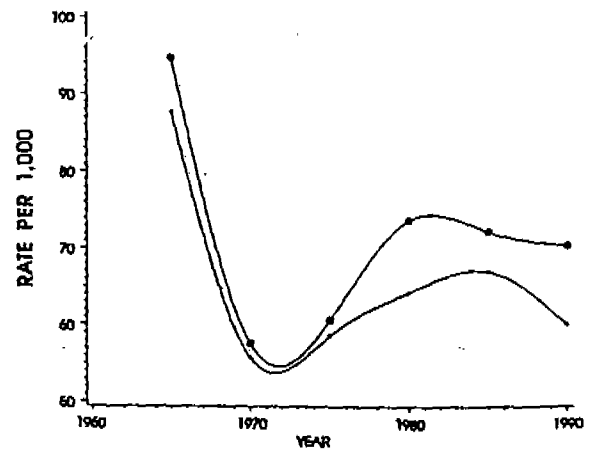
5 - 19 YEARS



20 - 49 YEARS



50 - 69 YEARS



70 YEARS AND ABOVE

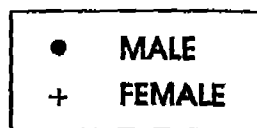
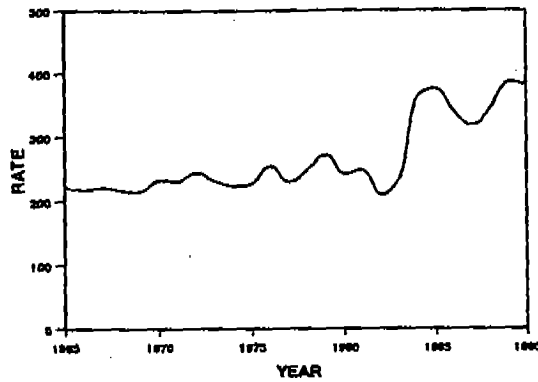


FIGURE 2. TRENDS OF MORTALITY AND MORBIDITY OF LEADING DISEASES (RATE PER 100,000 POPULATION) 1965-1990

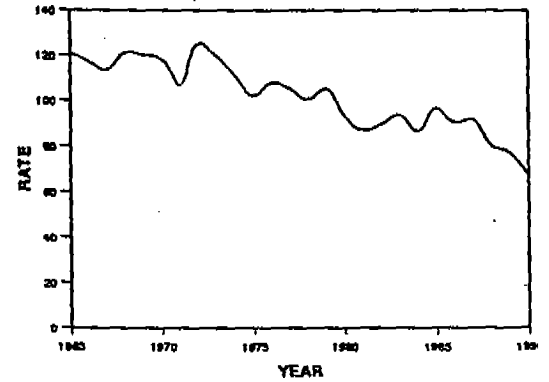
SOURCE: Philippine Health Statistics, Department of Health

2.1 PNEUMONIA

MORBIDITY

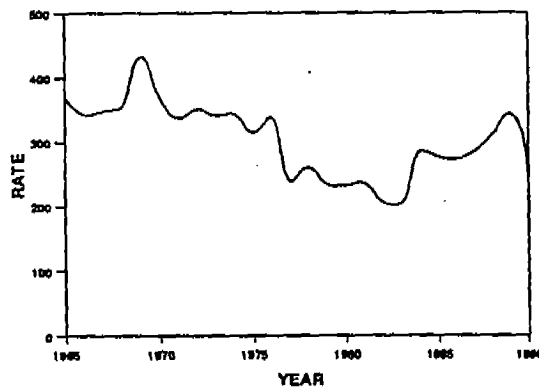


MORTALITY

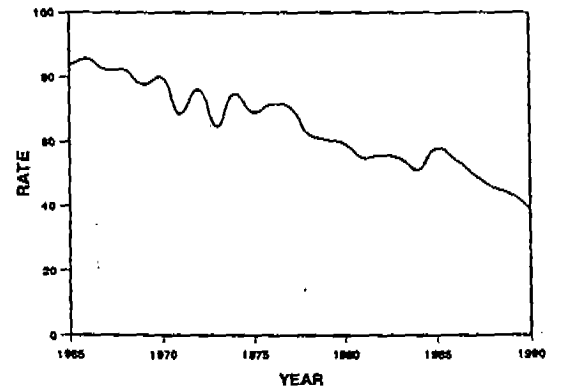


2.2 TUBERCULOSIS

MORBIDITY

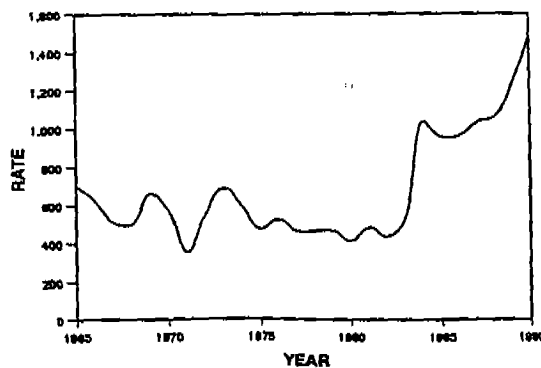


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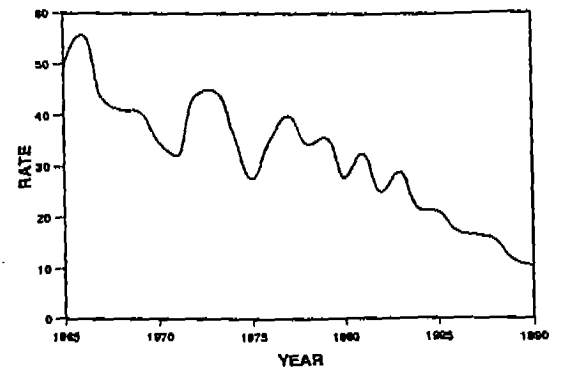


2.3 DIARRHEA

MORBIDITY

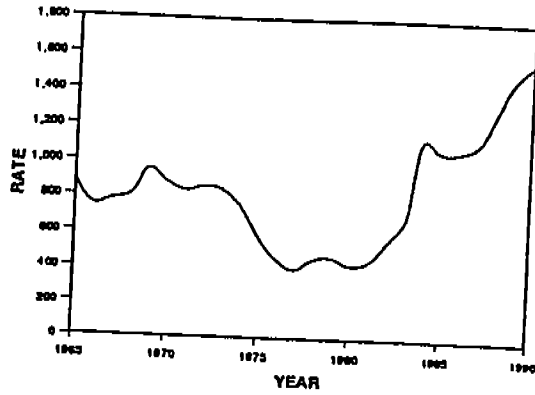


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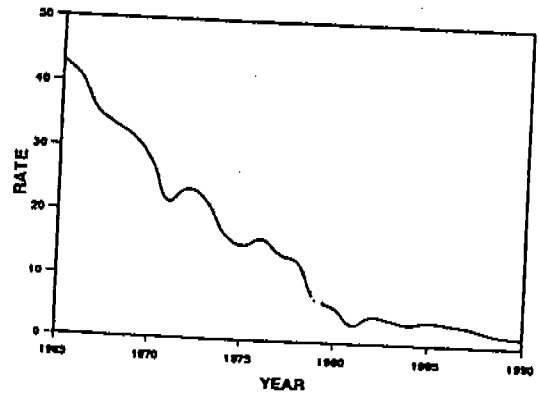


2.4 BRONCHITIS

MORBIDITY

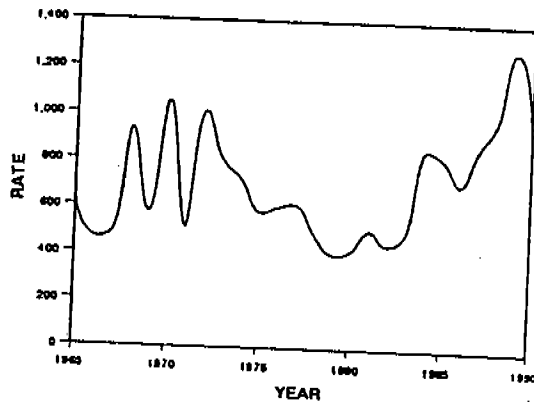


MORTALITY

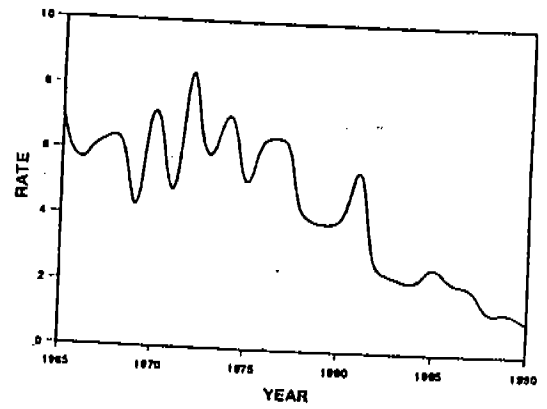


2.5 INFLUENZA

MORBIDITY

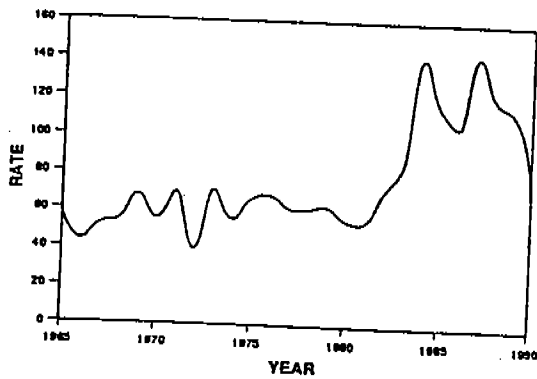


MORTALITY

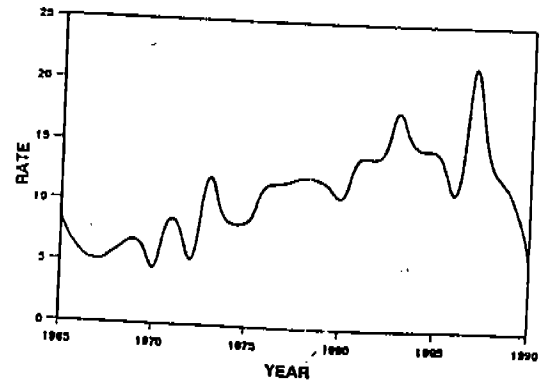


2.6 MEASLES

MORBIDITY

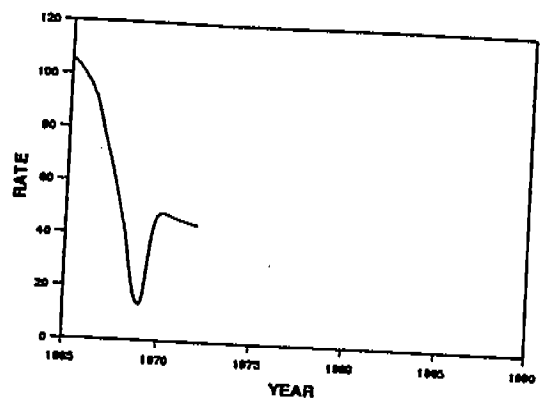


MORTALITY

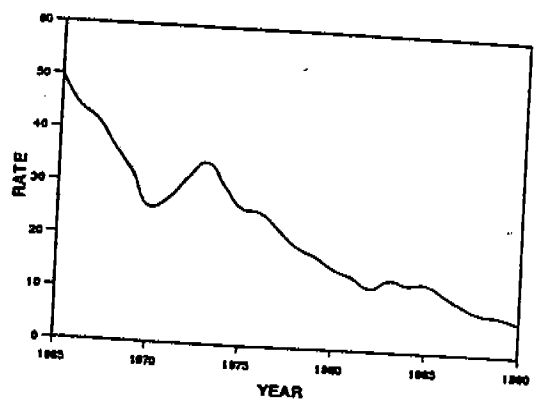


2.7 AVITAMINOSES

MORBIDITY

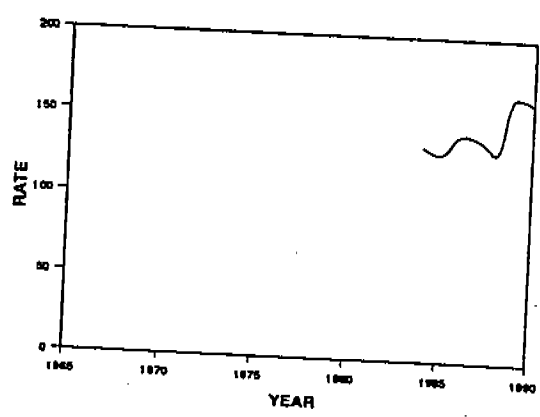


MORTALITY

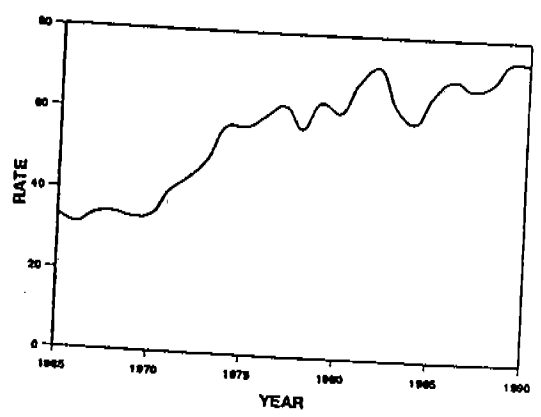


2.8 HEART DISEASE

MORBIDITY

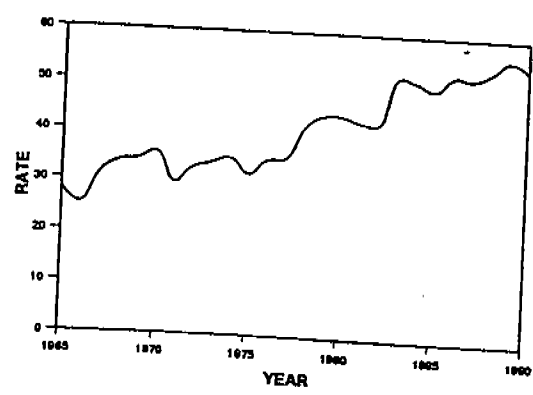


MORTALITY



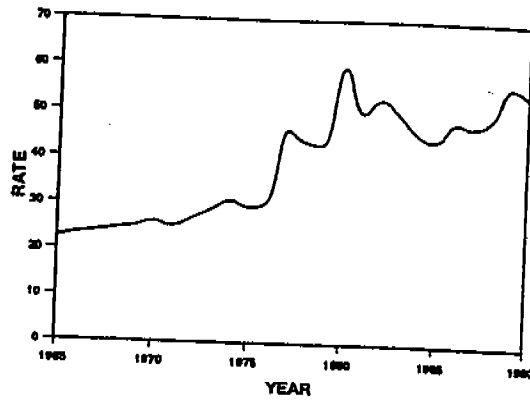
2.9 VASCULAR DISEASES

MORTALITY

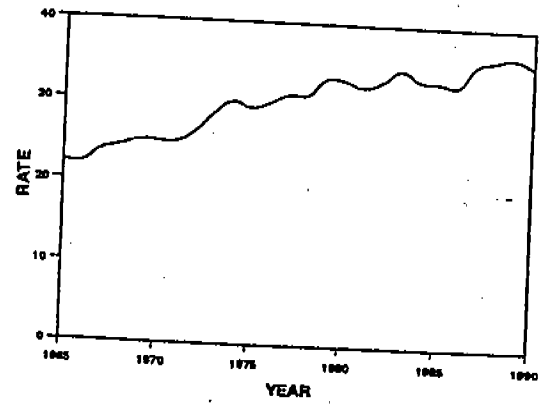


2.10 MALIGNANT NEOPLASMS

MORBIDITY

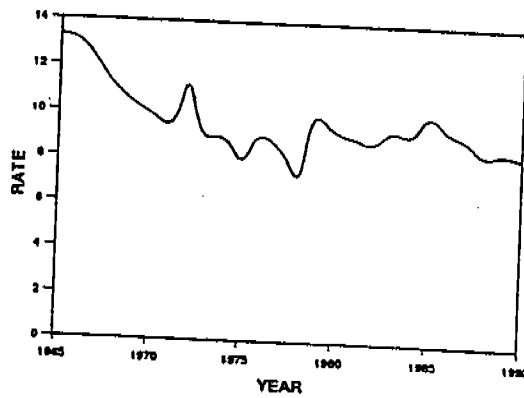


MORTALITY



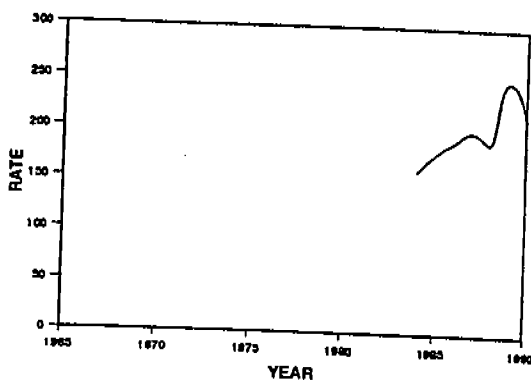
2.11 NEPHROLOGIC DISEASES

MORTALITY

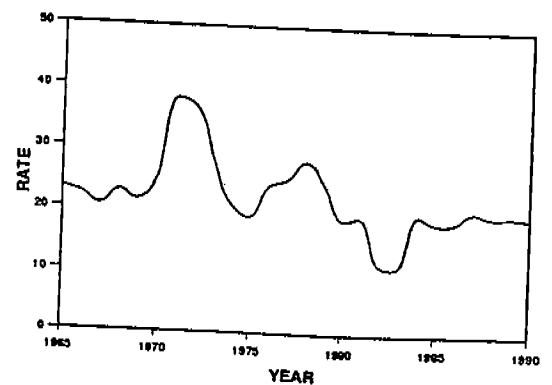


2.12 ACCIDENTS

MORBIDITY

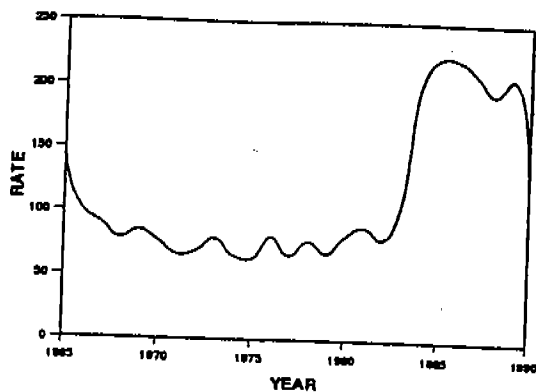


MORTALITY

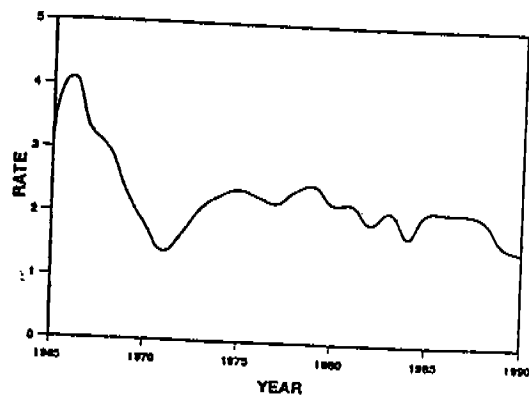


2.13 MALARIA

MORBIDITY

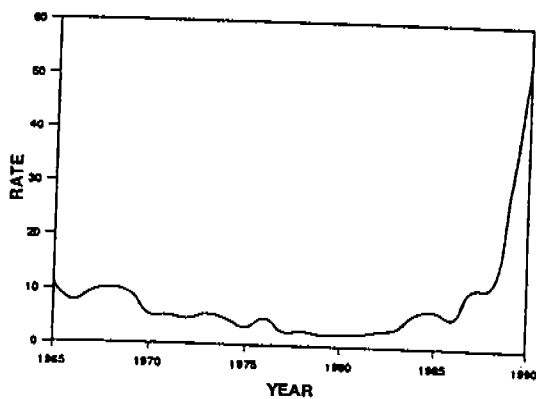


MORTALITY

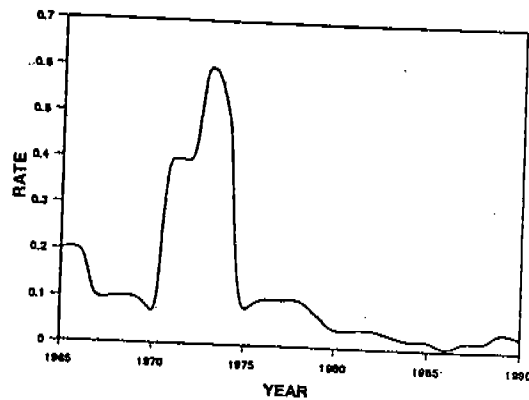


2.14 VARICELLA

MORBIDITY

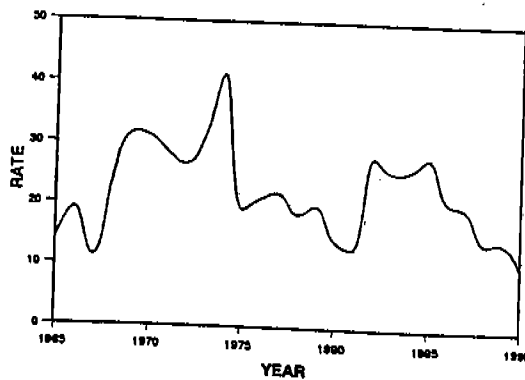


MORTALITY



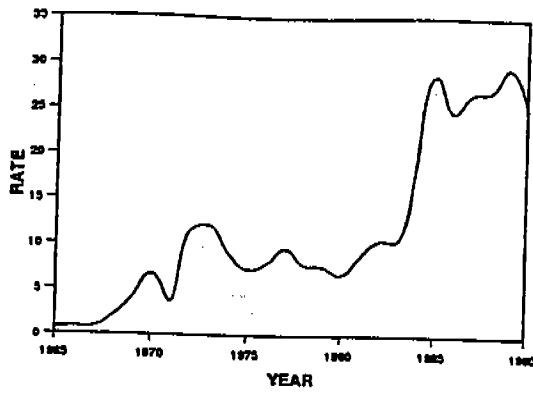
2.15 GONOCOCCAL INFECTIONS

MORBIDITY

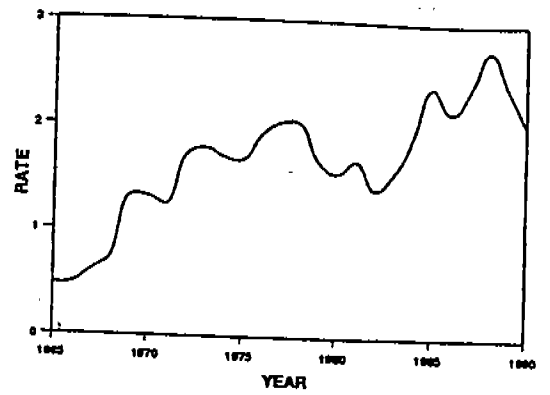


2.16 TYPHOID FEVER

MORBIDITY

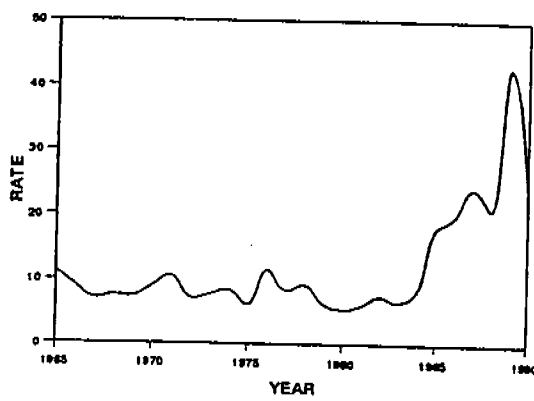


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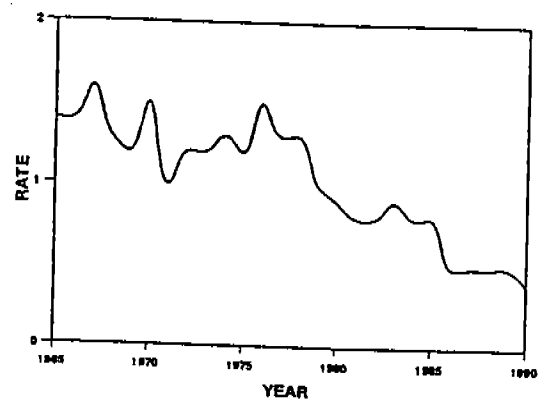


2.17 SCHISTOSOMIASIS

MORBIDITY

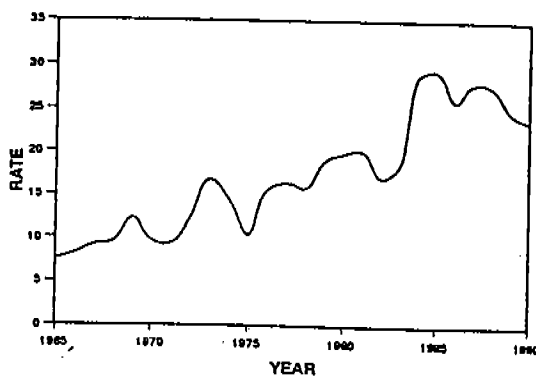


MORTALITY

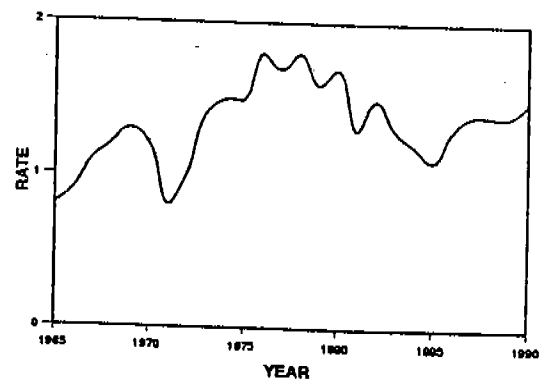


2.18 INFECTIOUS HEPATITIS

MORBIDITY

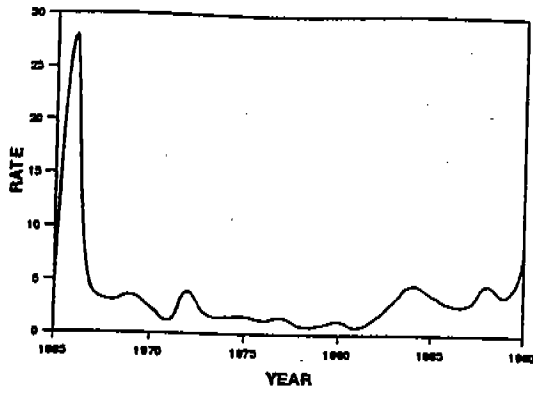


MORTALITY

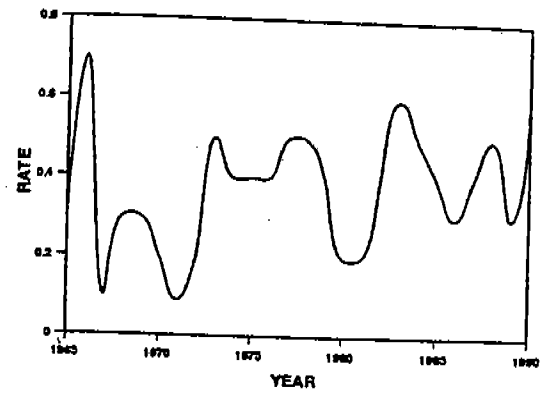


2.19 H-FEVER

MORBIDITY

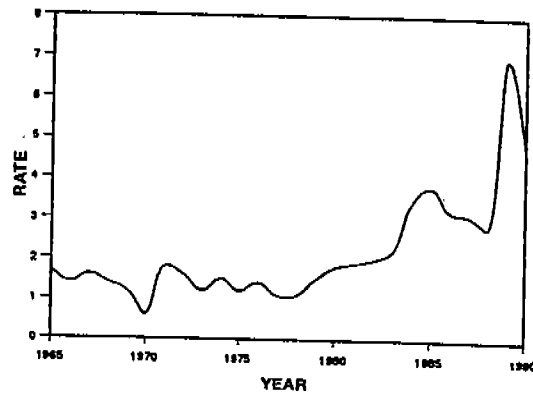


MORTALITY



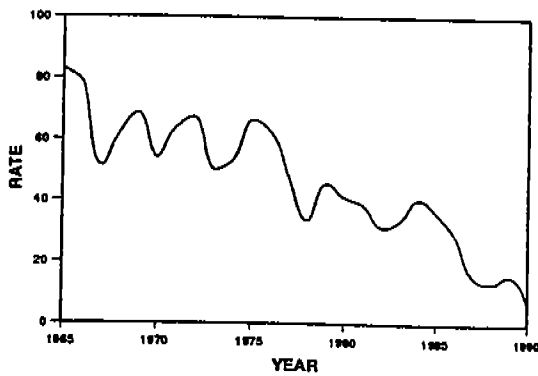
2.20 LEPROSY

MORBIDITY

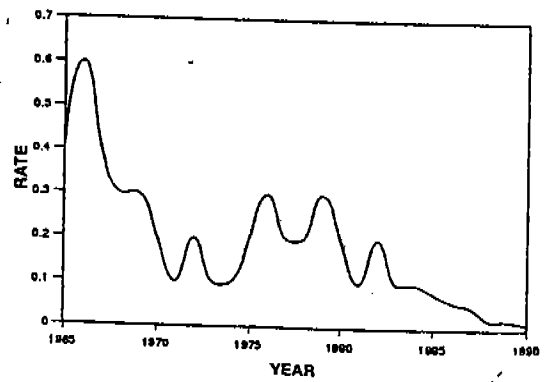


2.21 WHOOPING COUGH

MORBIDITY

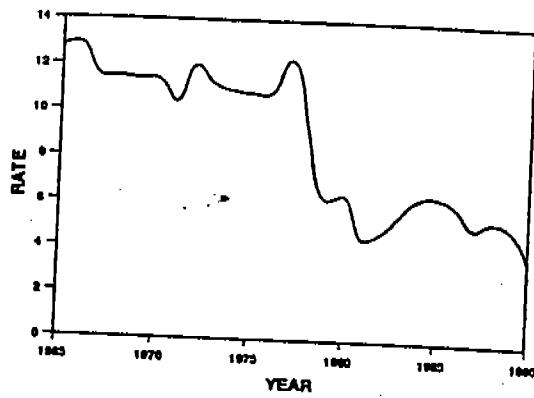


MORTALITY

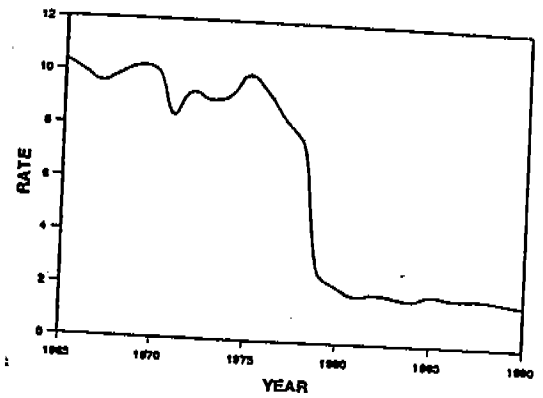


2.22 TETANUS

MORBIDITY

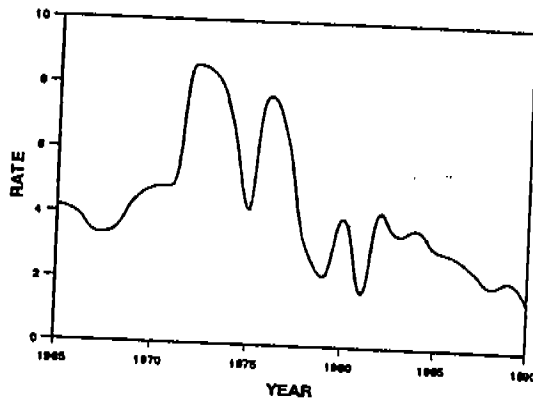


MORTALITY

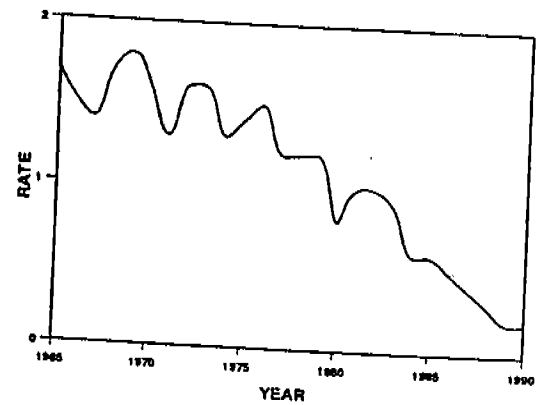


2.23 DIPHTHERIA

MORBIDITY

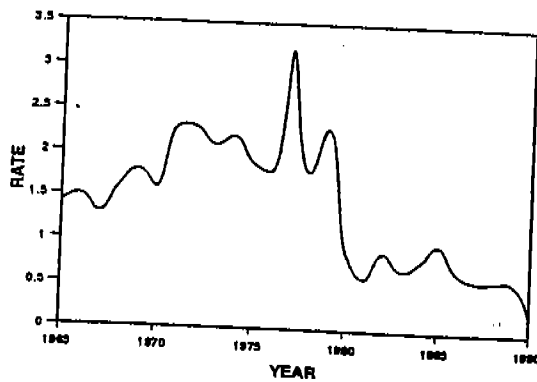


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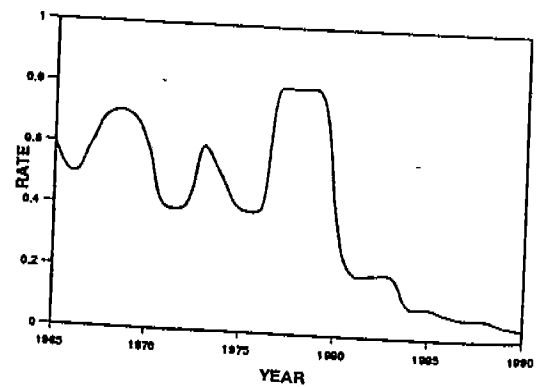


2.24 POLIOMYELITIS

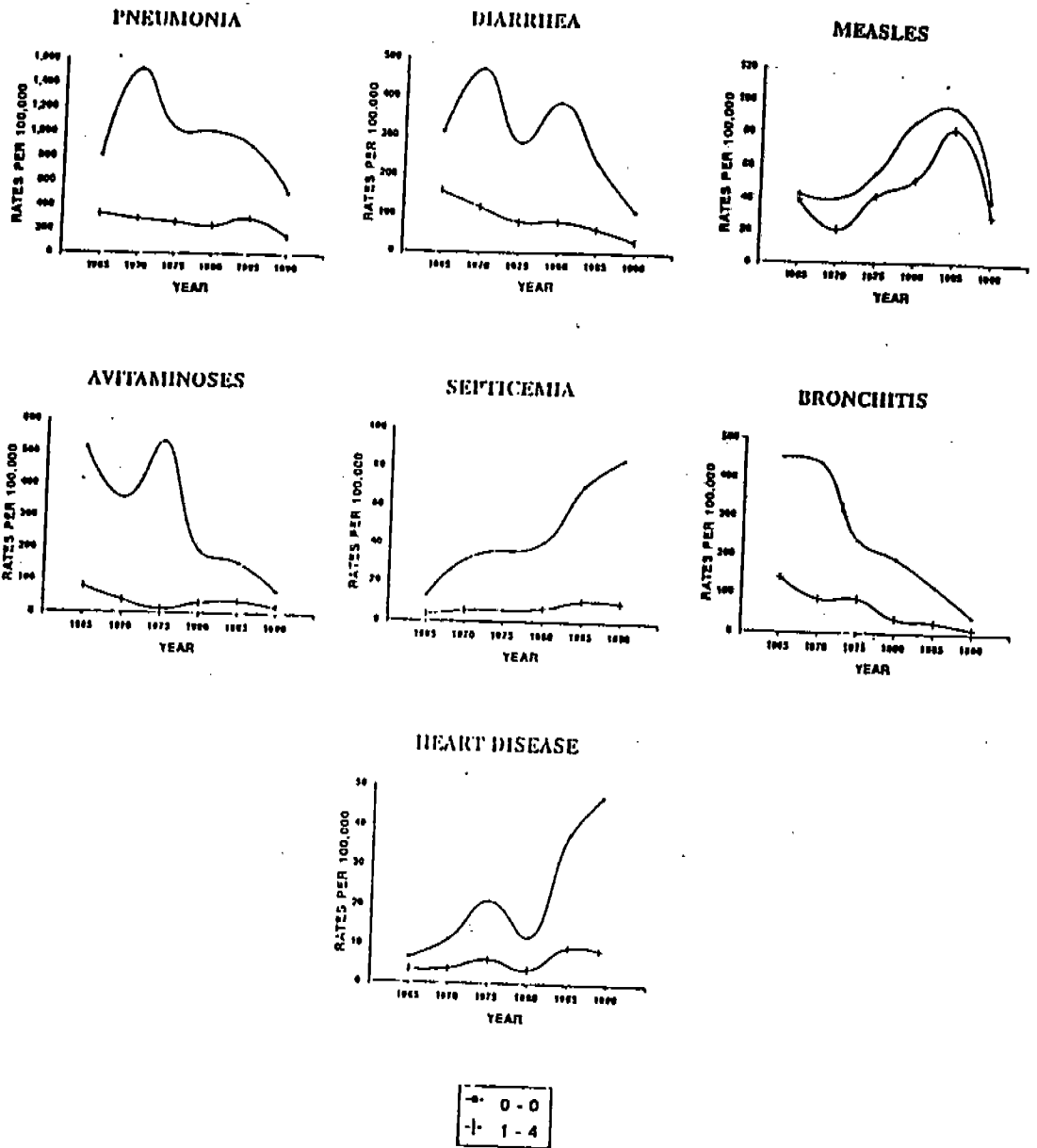
MORBIDITY



MORTALITY

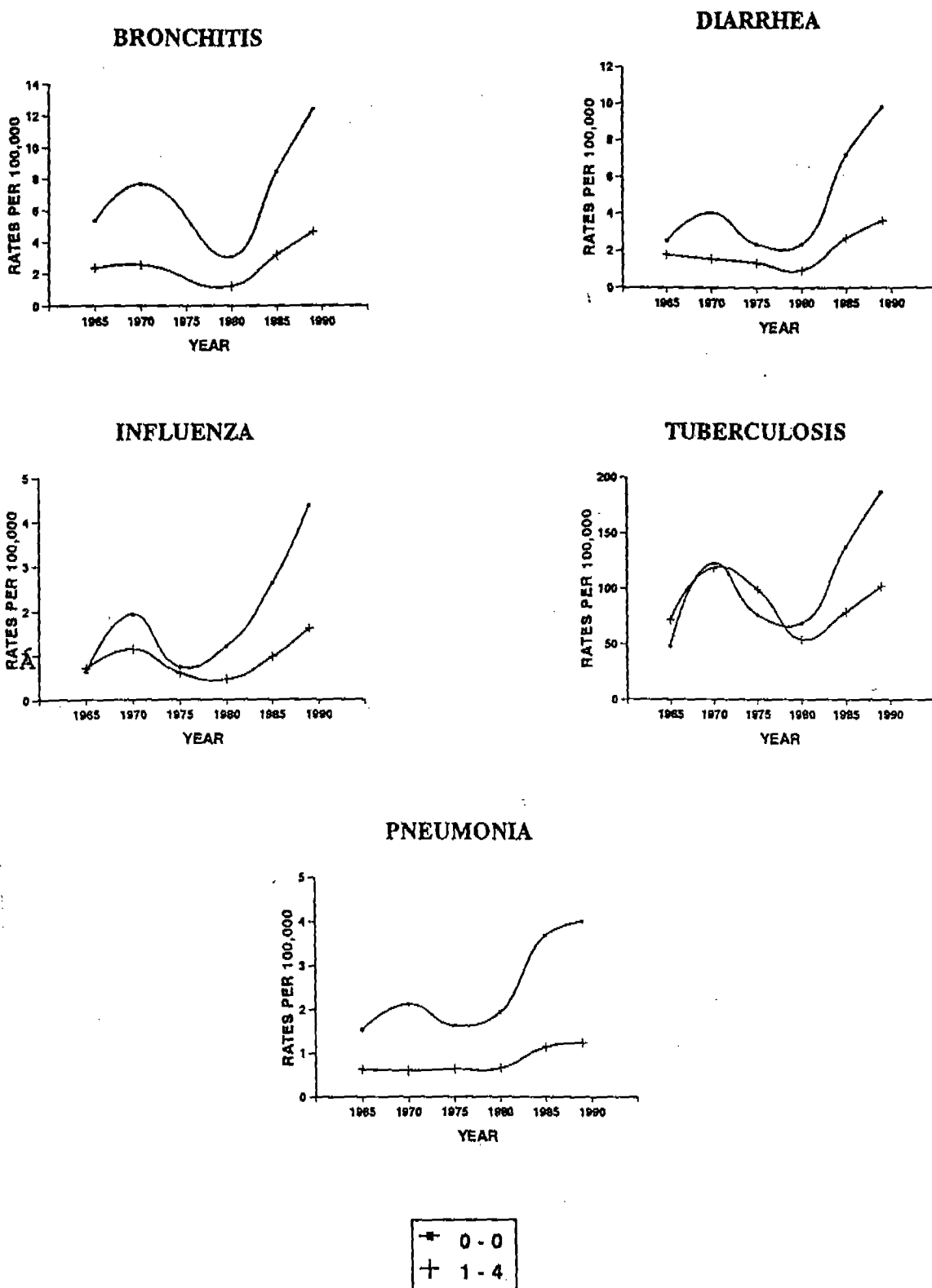


**FIGURE 3. LEADING CAUSES OF MORTALITY AMONG 0-4 YEARS
1965-1990**



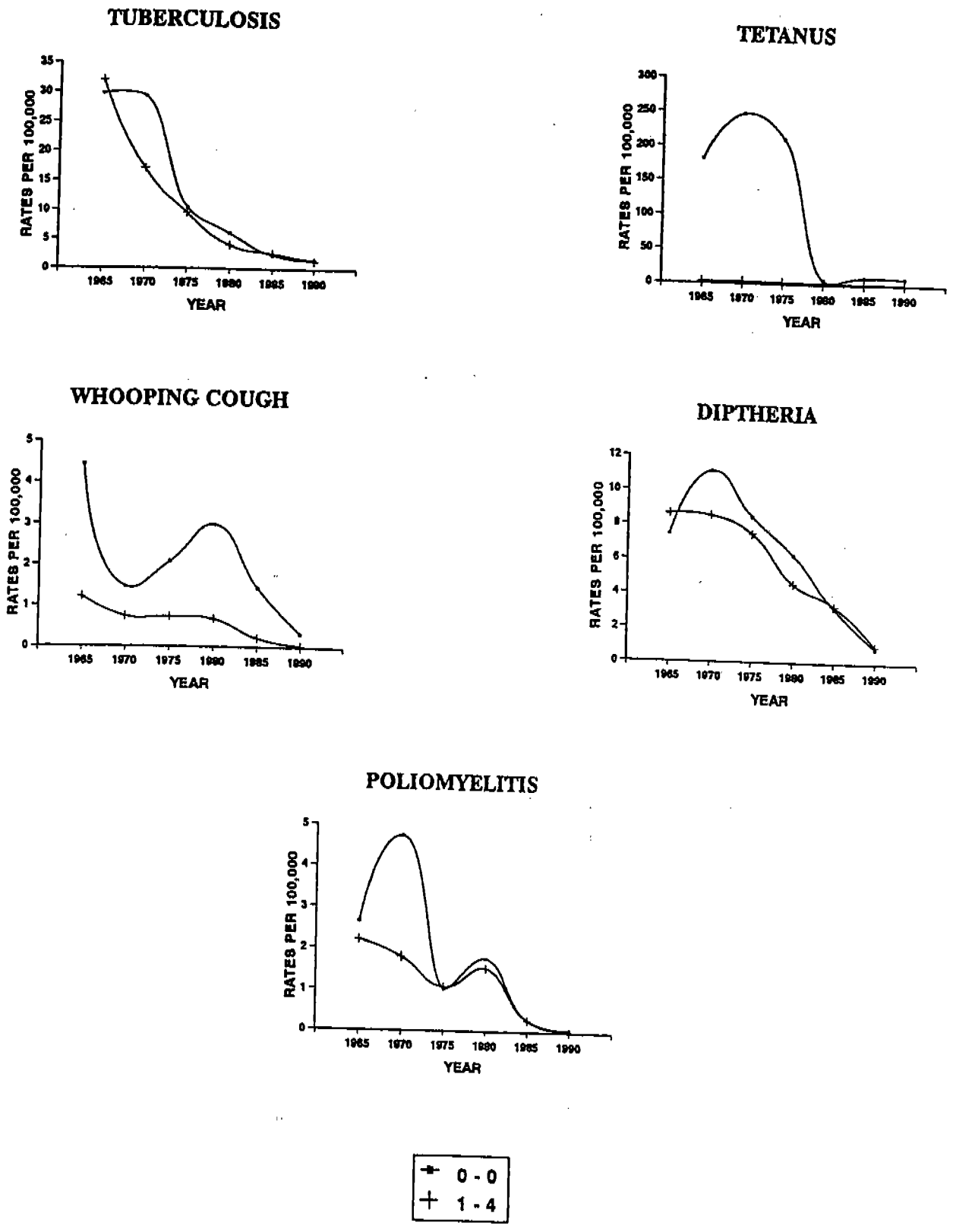
Source: Philippine Health Statistics, Department of Health

**FIGURE 4. LEADING CAUSES OF MORBIDITY AMONG 0-4 YEAR:
1965-1989**



Source: Philippine Health Statistics, Department of Health

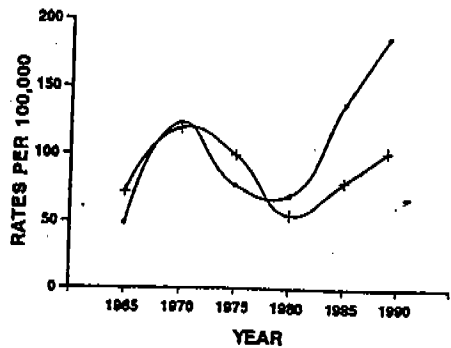
**FIGURE 5. MORTALITY TRENDS OF EPI DISEASES AMONG 0-4 YEARS
1965-1990**



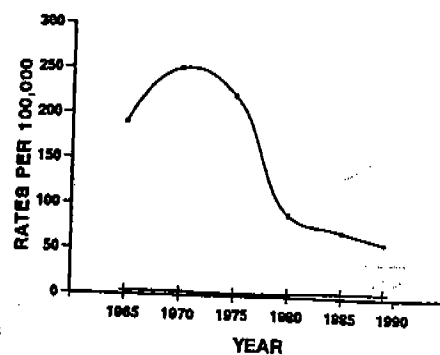
Source: Philippine Health Statistics, Department of Health.

**FIGURE 6. MORBIDITY TRENDS OF EPI DISEASES AMONG 0-4 YEARS
1965-1989**

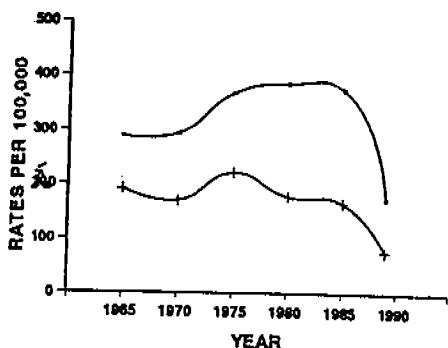
TUBERCULOSIS



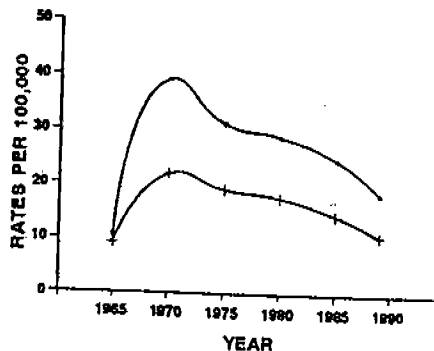
TETANUS



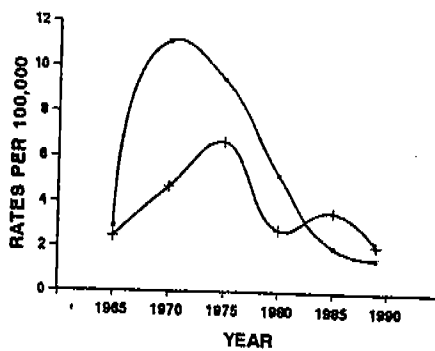
WHOOPING COUGH



DIPHTHERIA



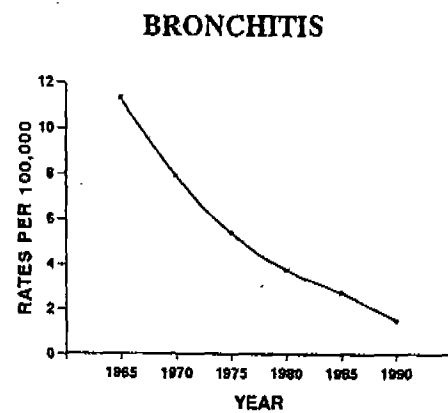
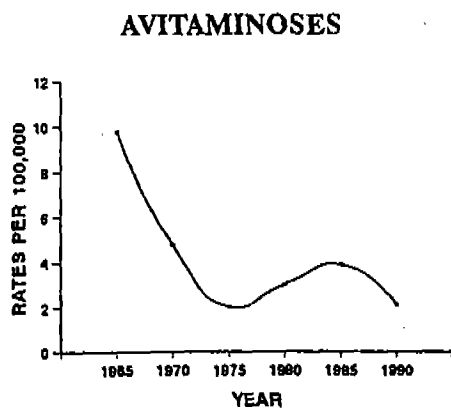
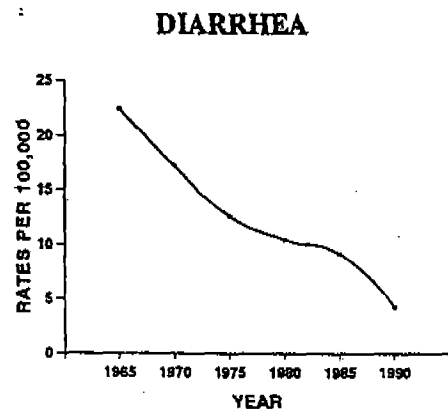
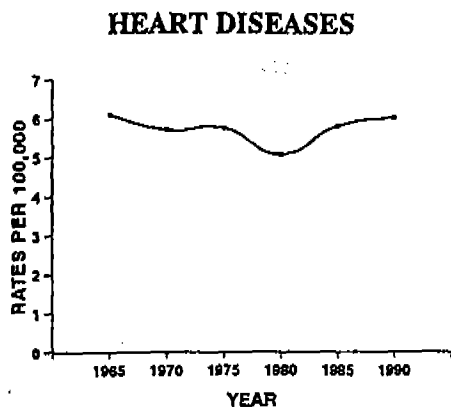
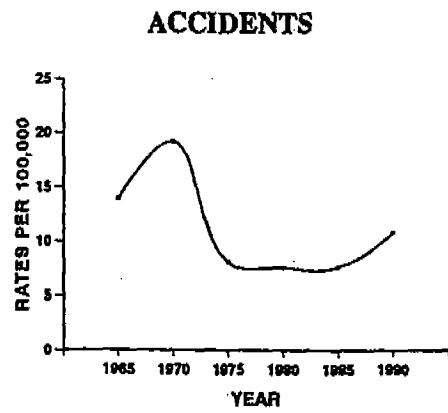
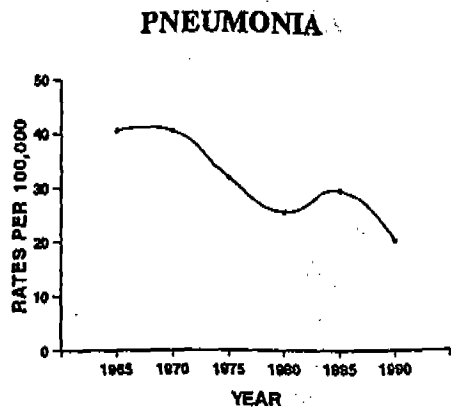
POLIOMYELITIS



■ 0-0
 + 1-4

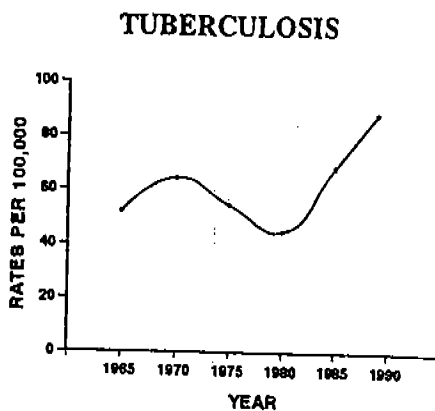
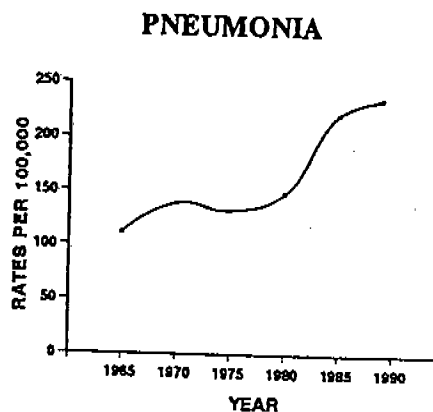
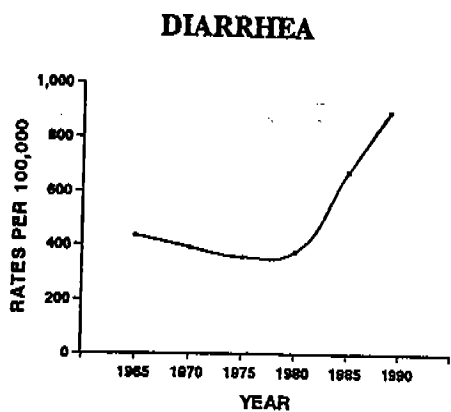
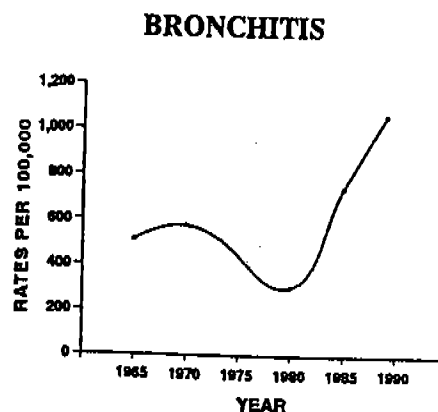
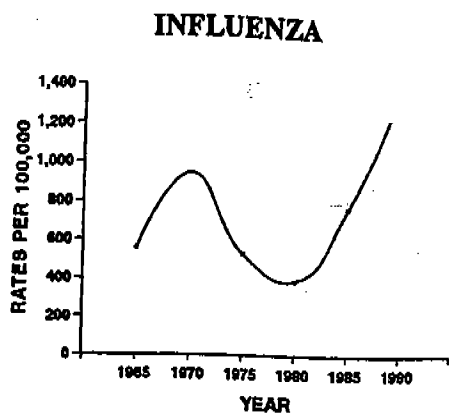
Source: Philippine Health Statistics, Department of Health

**FIGURE 7. LEADING CAUSES OF MORTALITY AMONG 5-14 YEARS
1965-1990**



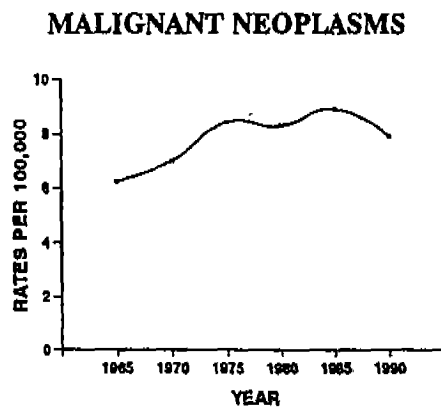
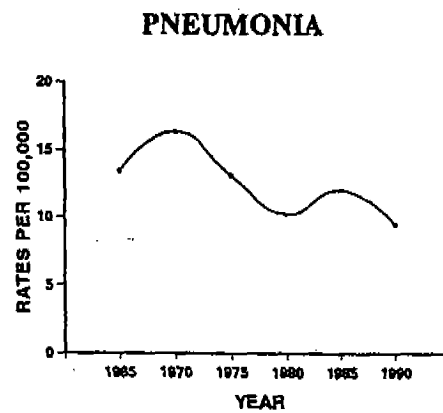
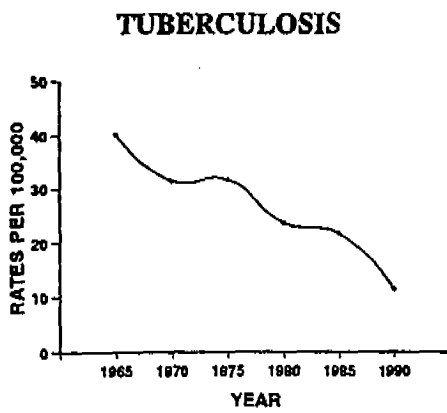
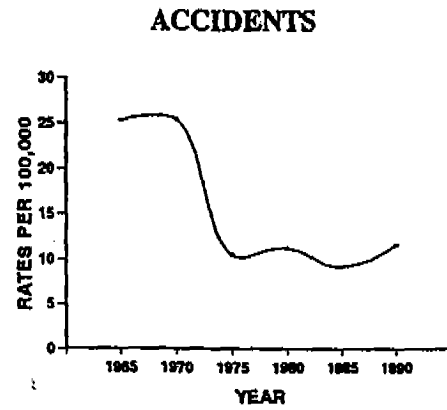
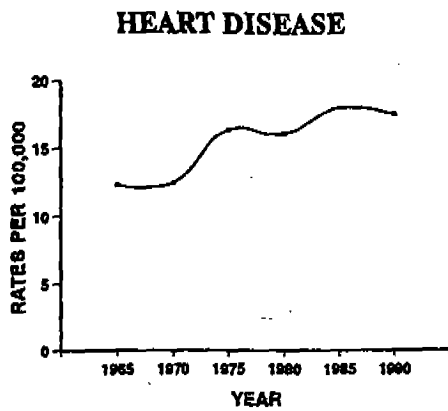
Source: Philippine Health Statistics, Department of Health

**FIGURE 8. LEADING CAUSES OF MORBIDITY AMONG 5-14 YEARS
1965-1989**



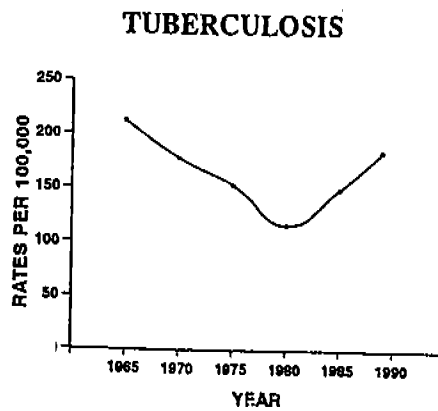
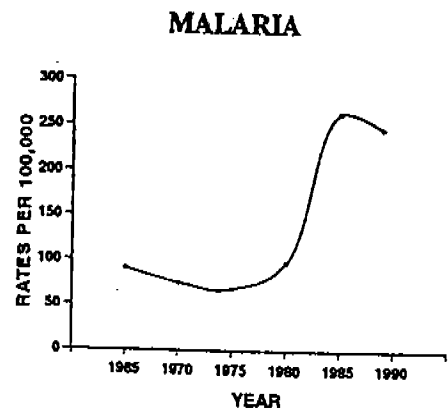
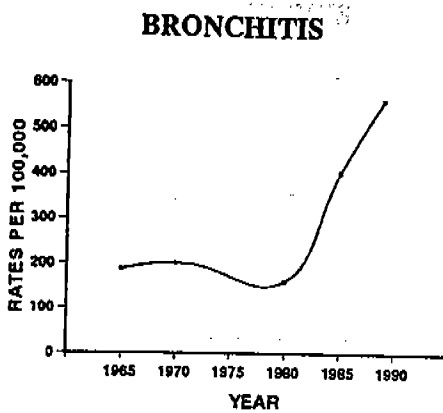
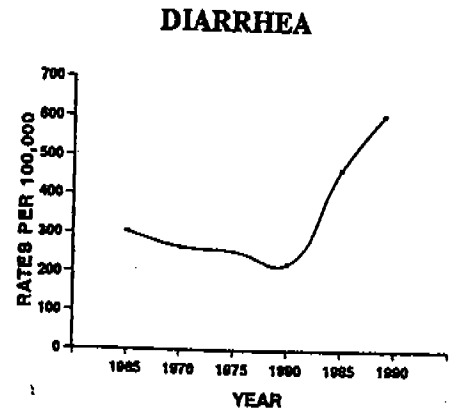
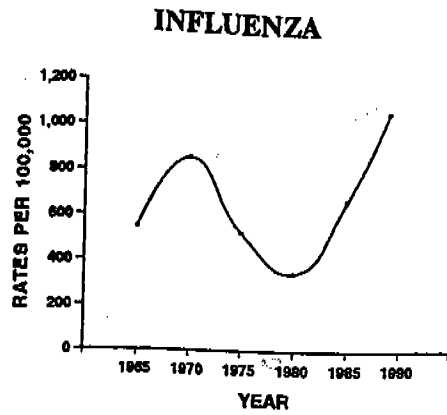
Source: *Philippine Health Statistics, Department of Health*

**FIGURE 9. LEADING CAUSES OF MORTALITY AMONG 15-29 YEARS
1965-1990**



Source: Philippine Health Statistics, Department of Health

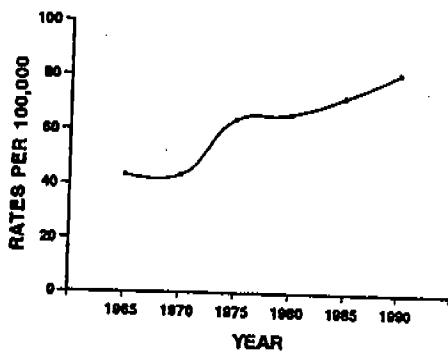
**FIGURE 10. LEADING CAUSES OF MORBIDITY AMONG 15-29 YEARS
1965-1989**



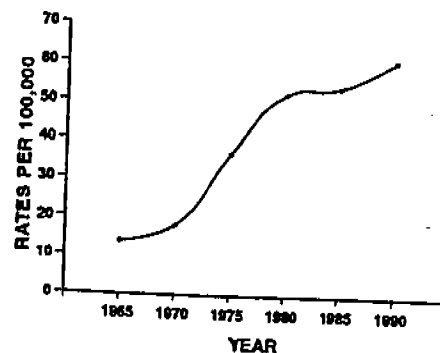
Source: *Philippine Health Statistics, Department of Health*

**FIGURE 11. LEADING CAUSES OF MORTALITY AMONG 30-59 YEAR
1965-1990**

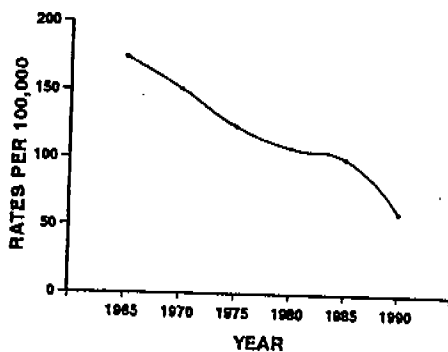
HEART DISEASES



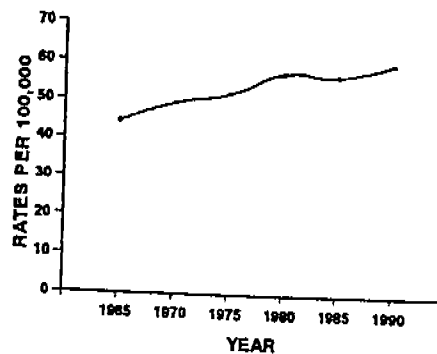
VASCULAR



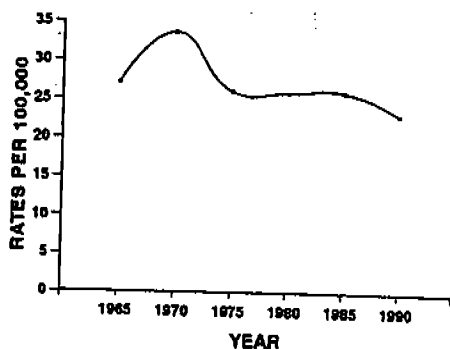
TUBERCULOSIS



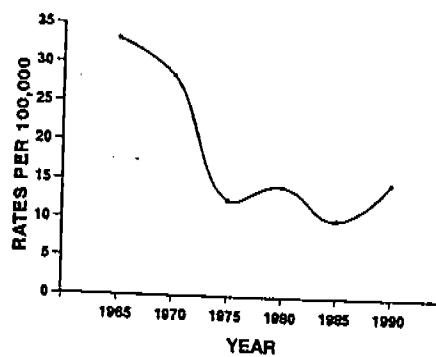
MALIGNANT NEOPLASMS



PNEUMONIA

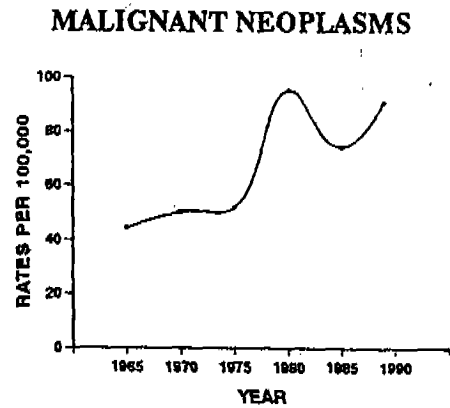
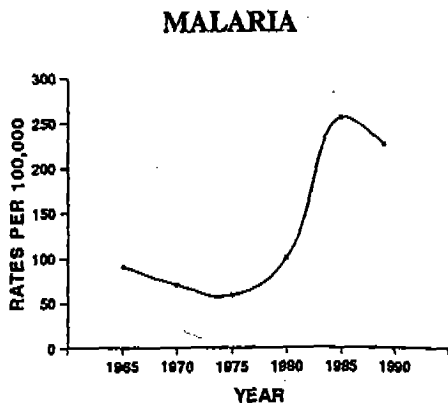
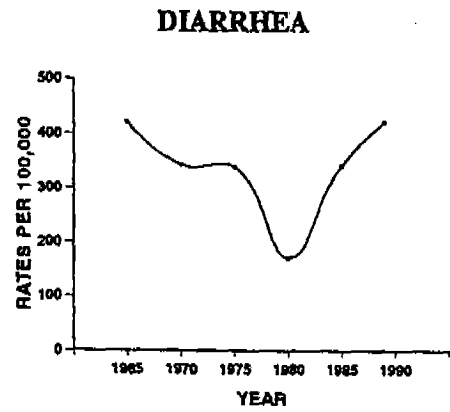
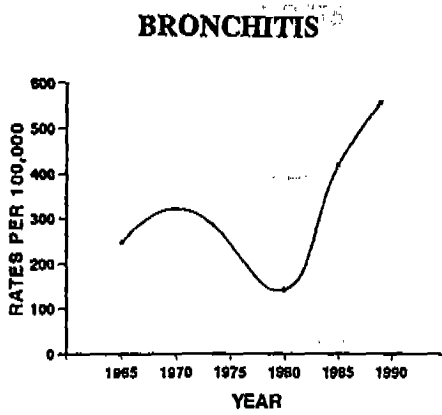
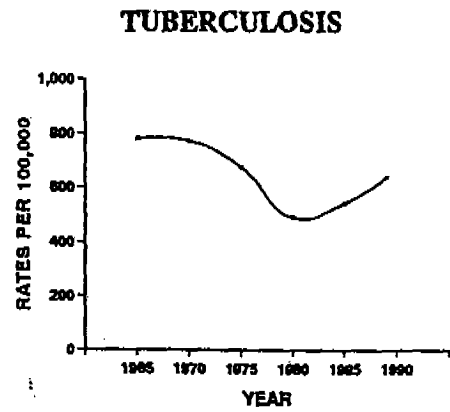
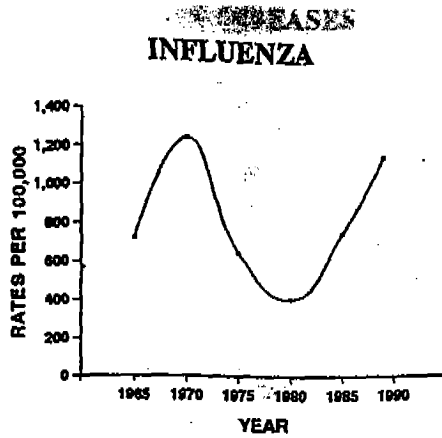


ACCIDENTS



Source: Philippine Health Statistics, Department of H

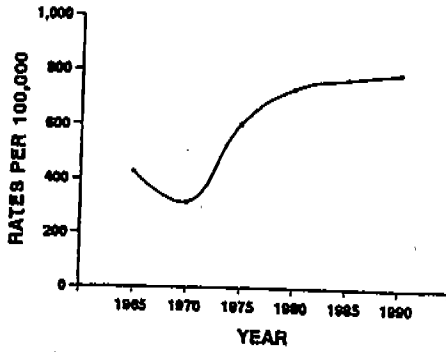
**FIGURE 12. LEADING CAUSES OF MORBIDITY AMONG 30-59 YEARS
1965-1989**



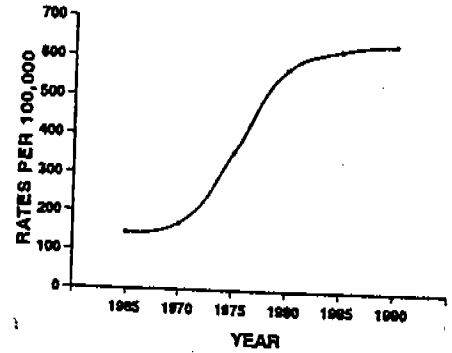
Source: Philippine Health Statistics, Department of Health

**FIGURE 13. LEADING CAUSES OF MORTALITY AMONG 60 YEARS AND ABOVE
1965-1990**

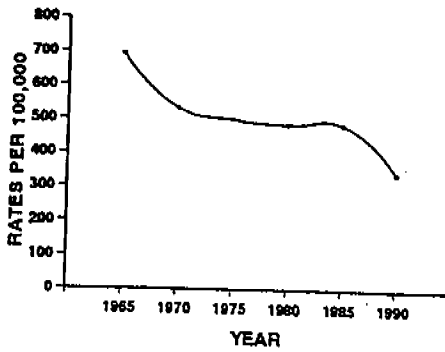
HEART DISEASES



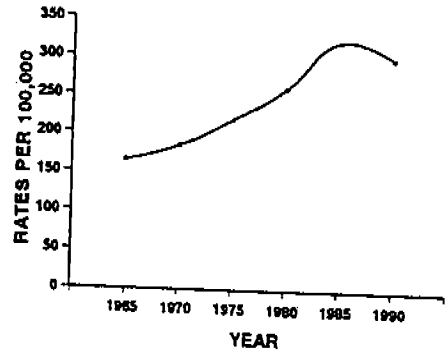
VASCULAR DISEASES



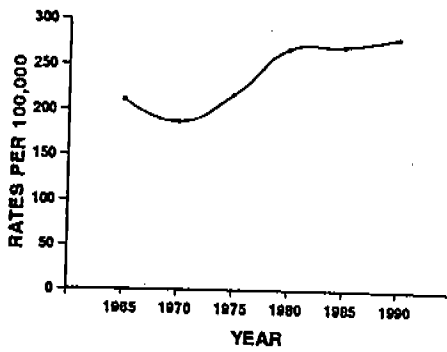
TUBERCULOSIS



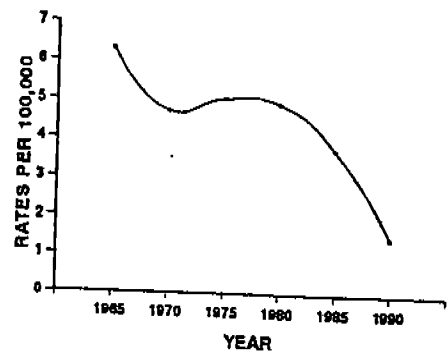
PNEUMONIA



MALIGNANT NEOPLASMS

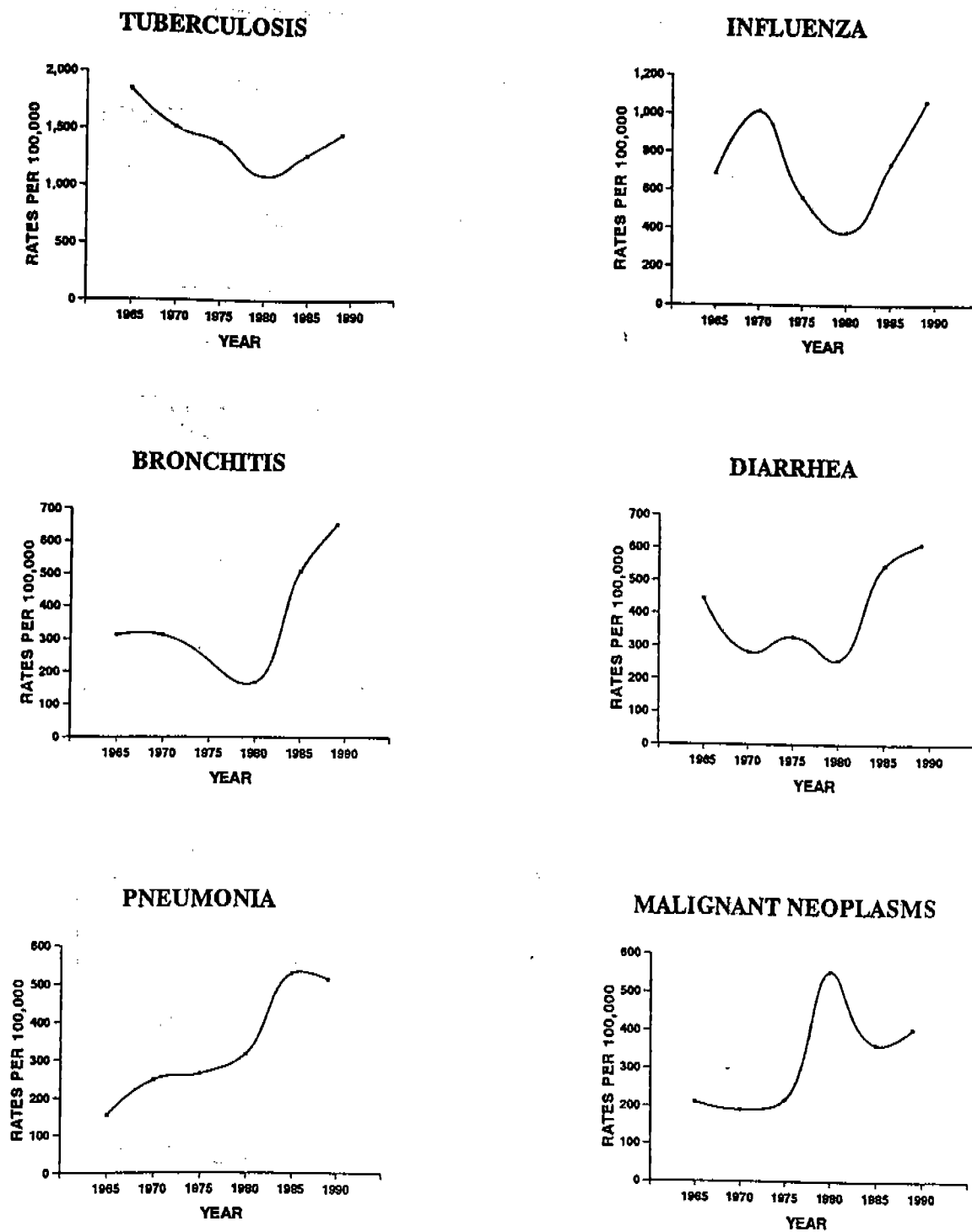


NEPHROLOGIC DISEASES



Source: Philippine Health Statistics, Department of Health

**FIGURE 14. LEADING CAUSES OF MORBIDITY AMONG 60 YEARS AND ABOVE
1965-1989**



Source: *Philippine Health Statistics, Department of Health*

**Figure 15. Mortality Rates for Selected Diseases Among 20 - 49 Years, By Sex
1965 - 1990**

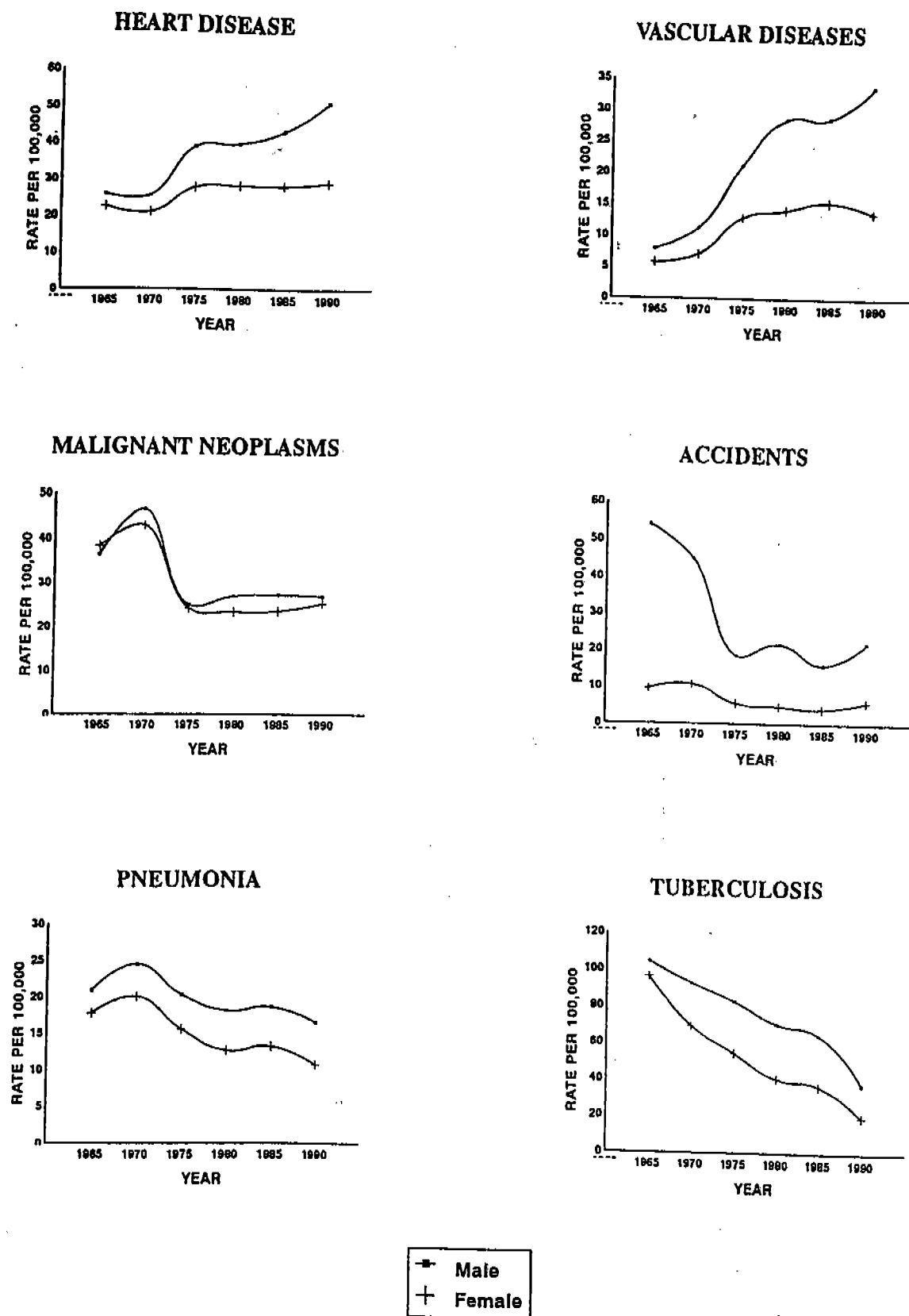


Figure 16. Morbidity Rates for Selected Diseases Among 20 - 49 Years, By 1965 - 1989

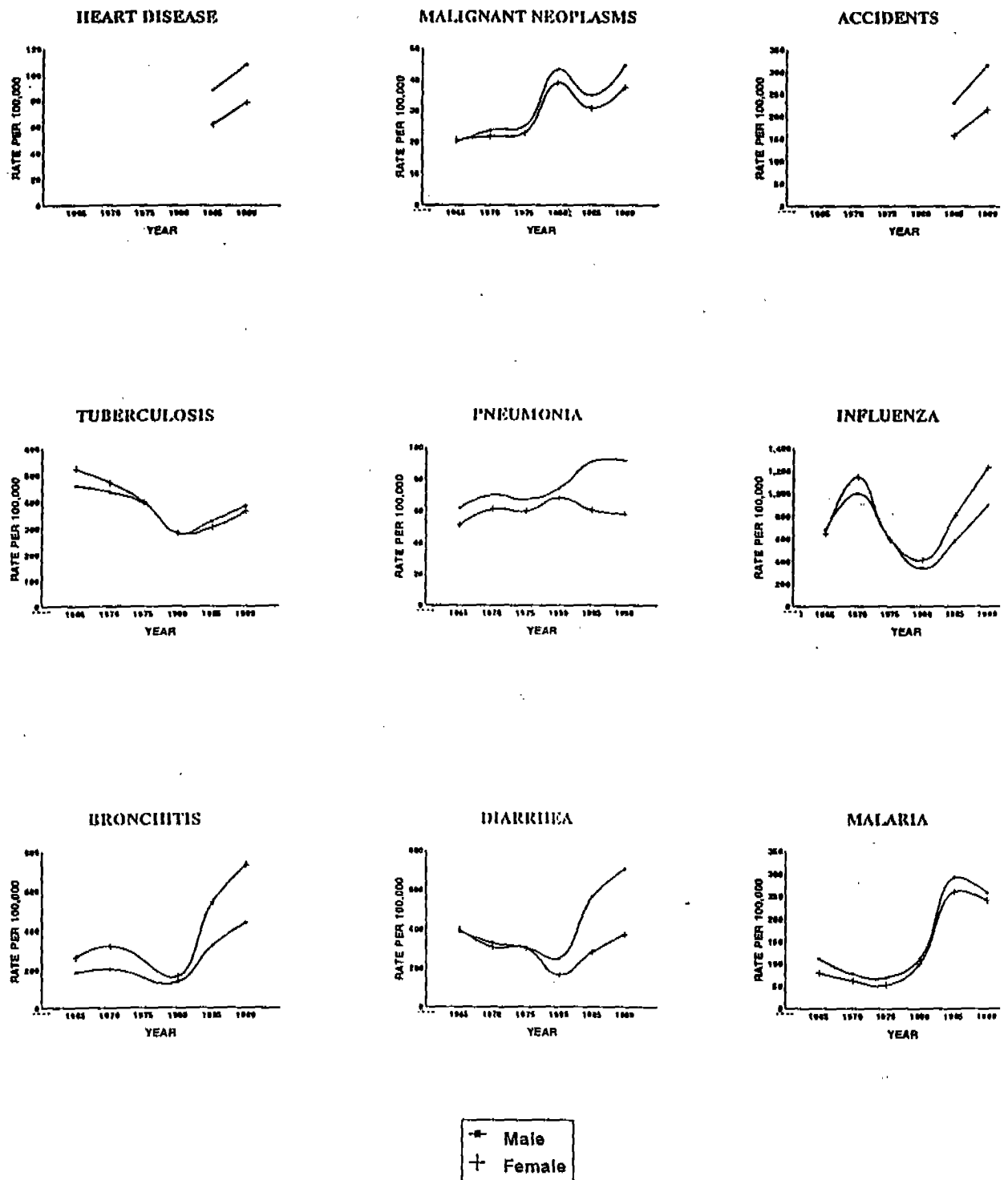
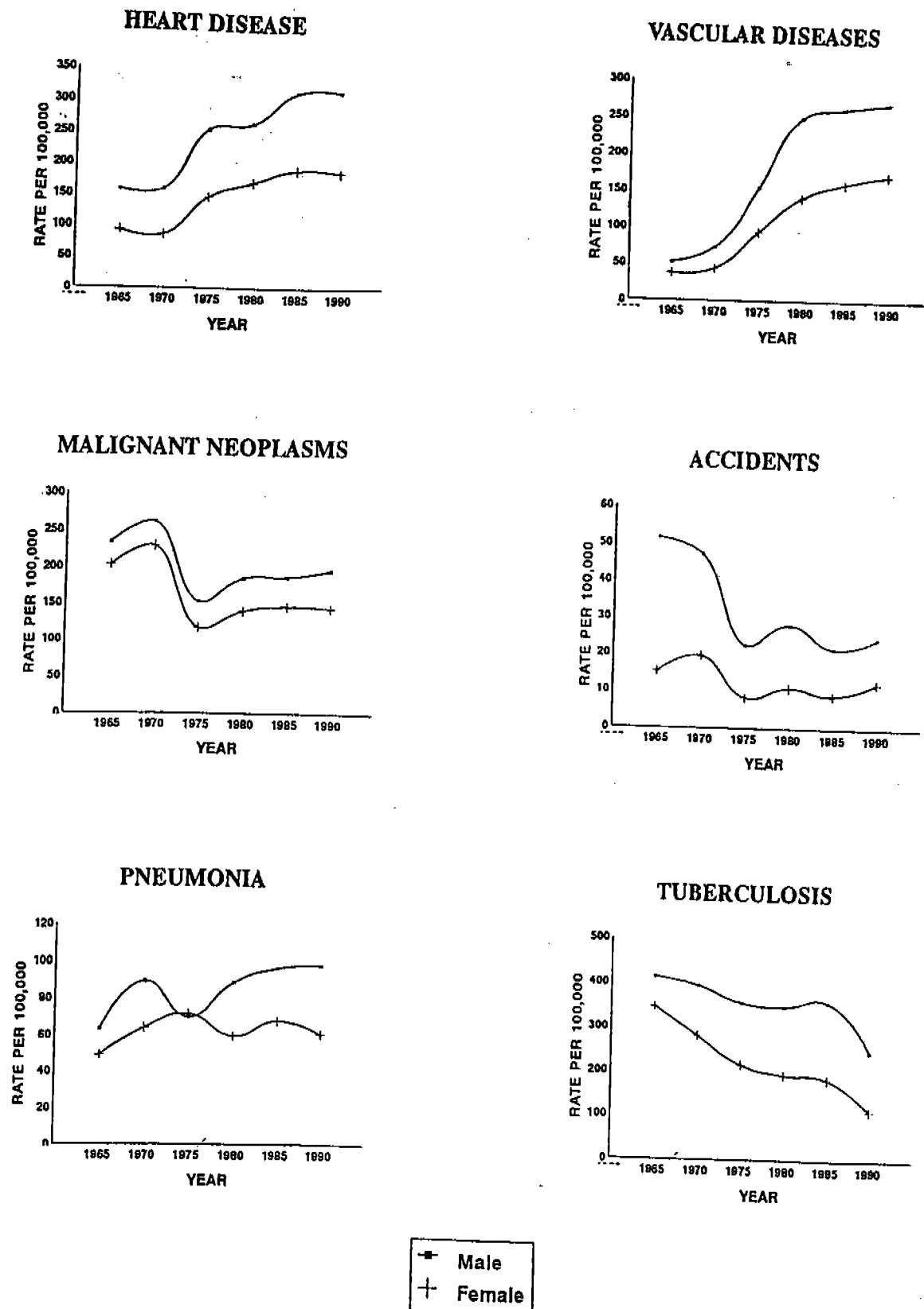


Figure 17. Mortality Rates of Selected Disease Among 50-69 Years, By Sex 1965-1990



**Figure 18. Morbidity Rates for Selected Diseases Among 50 - 69 Years, By Sex
1965 - 1989**

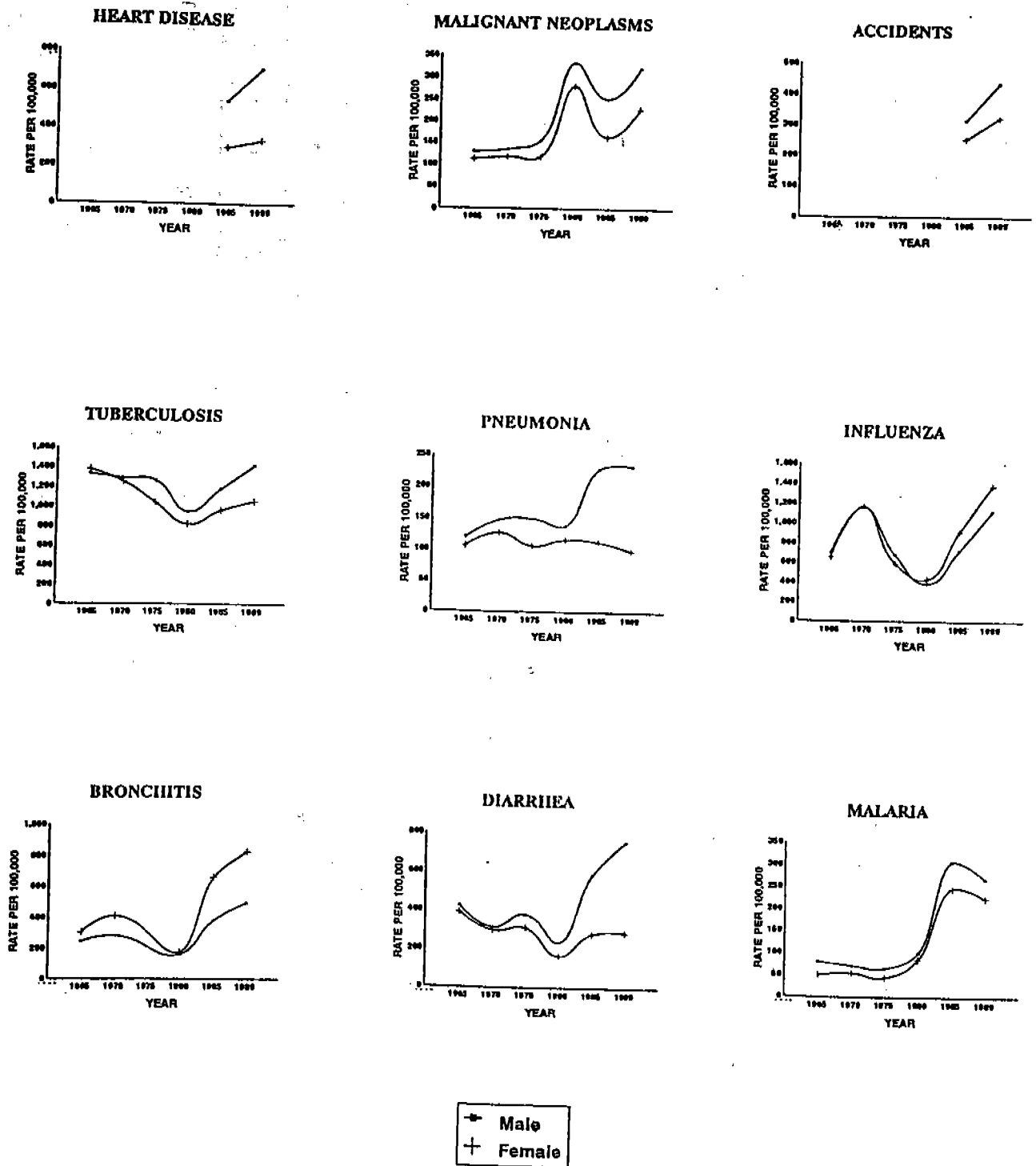


FIGURE 19. POTENTIAL YEARS OF LIFE LOST OF LEADING CAUSES OF DISEASE EXCLUDING PNEUMONIA, 1970, 1980 AND 1990

