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A METHODOLOGY FOR INDICATORS OF SOCIAL DEVELOPMENT

Report 4: Health Sector Information System

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SOCIOLOGICAL STUDIES IN SOCIAL INDICATORS ..... **Project Co-Directors:** Leslie D. Wilcox, Gerald E. Klonglan, George M. Beal; **Project Associates:** H.C. Chang, Richard D. Warren, Robert Crown; **Project Assistants:** Wm. Alex McIntosh, K. William Wasson, John Callaghan, Kerry J. Byrnes, Saundra M. Hunter, Song-Min Kim, James Malia, Anan Chiamcharoen, Eric Graber, Susan Evers, Jaleh Shadi-Talab; **Editorial Consultant:** Rowena James.

DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY ..... IOWA STATE UNIVERSITY of Science and Technology, Ames, Iowa

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CONTENTS

ABSTRACT

In the future the planning of health care for societies at all stages of development will be based on statistical information. In this report the initial framework of a health information system for developing countries (LDCs) is outlined. The components of this system are simple indicators. Such indicators relate to both stocks and flows and incorporate measures of health status based on mortality, life expectancy, morbidity and disability, and malnutrition. Consideration is given also to measures of health facilities, services, finances, and personnel and to the access and distribution of these from the perspective of various sociodemographic categories of the population. Such health related factors as population, environmental quality and resources, agriculture and food production, income and consumption, education, housing, and shelter are discussed and some brief consideration is given to suitable procedures which may be used to generate simple indicators of health status where demographic and health statistics are incomplete.

PREFACE

The three-year contract (AID/csd-3642) between the Agency for International Development (A.I.D.) and Iowa State University (I.S.U.) has as its major objective the development of a methodology that could be used by developing countries (LDCs) to construct indicators of social development for monitoring progress of social development as each country defines it.

The focus of attention in the earlier Reports 1, 2, and 3 has been toward broad methodological and conceptual concerns. These have set the stage, we believe, for the more specific requirements of an integrated set of social indicators emphasizing societal sectors as the appropriate planning and goal-setting units. In this report (Report 4) we present an outline of the health sector and its statistical information base as a preliminary step toward developing models in this and other sectors.

Policymakers in every country face the question: How to evaluate social conditions to determine rationally what priorities to set and what scarce resources to allocate? For example, the Organization for Economic Cooperation and Development (OECD) and other international organizations have tried diligently to expand the pool of available information on social conditions and to develop an integrated set of social statistics to serve as a practical policy-making tool.

Most countries collect a substantial amount of social statistical information but only some of these are directly relevant to well-being. For example, countries usually measure health progress by a favorable ratio of hospital beds or doctors per 10,000 inhabitants. In data on Gross National Product (GNP) it is expenditure on these health activities that is noted. It would be much more pertinent, however, to discover the number of people enjoying a particular level of health as well as to project the number of years of healthful living they are

likely to have.

Review of the growing social indicator literature reveals that in the context of yardsticks for holistic policy formation we are severely short of reliable, valid measuring techniques. However, it is also noteworthy that a great amount of social data in most countries, including LDCs, is available. We look upon this base of social statistical data, however inadequate, as the foundation upon which social indicator research must be built.

To further develop a health statistical information system from which it will be possible to generate simple indicators and later composite and synthetic indicators and constructs, we believe a number of tasks must be undertaken:

1. Based on work currently under way internationally, it is possible to draw up an inventory of health statistics using censuses, vital statistics, institutional records, and health surveys, assuming a reasonable level of completeness in coverage, accuracy in recording, and detail in information elicited.

2. The data collecting procedures should be evaluated against international standards, for both completeness of coverage and content. For the former it will be necessary to depend on expert opinion, while the latter is an empirical exercise assuming copies of the schedules, certificates, and registration forms can be obtained.

3. Based on such evaluation of data and data collection procedures as they presently exist and operate, a series of simple health indicators can be compiled and compared with the requirements of planners in the health sector. Where serious gaps exist either in procedure (completeness or representativeness of coverage) or content, this may be indicated and suggestions made as to how such inadequacy might be rectified, keeping in mind the feasibility of such recommendations in light of LDC resources and capabilities.

Having developed an adequate health information base, it will be possible, using various forms of multivariate analysis, to develop more complex indicators and constructs--assuming that actual data are available.

SUMMARY

This report is concerned with the development of an initial methodological framework for generating a health information system rooted in a statistical base. We expect these procedures for generating a health reporting system designed for LDC usage may serve eventually as a data base for more sophisticated explanatory analyses, forecasting, policy modeling, and evaluation.

A. Monitoring Health

In earlier reports we have conceptualized society as a social system or interdependent set of subsystems each contributing a unique set of functions essential to the survival and well-being of the overall system and its members. It follows from this definition that change in any one subsystem affects other subsystems and the larger system. Thus, for example, improved health status should be reflected in better work performance in the industry subsystem, better learning performance in the school subsystem, and a more optimistic outlook on life in general.

The extent to which health statistics are available for any country or its regions and areas depends to some extent on the degree of development of public health services. An exception may be that in some cases vital statistics are produced despite the absence or the inadequacy of the development of public health facilities.

Health statistics in LDCs are characterized as suffering from two major defects: (a) incompleteness of reporting and (b) inaccuracy in diagnosis due to lack of professional opinion. This is especially likely to apply in rural areas or among the more deprived groups.

B. Health Status Statistics

In Part Two of this report we outline the major sources of data health

planners might use and discuss their more important characteristics and items of content in relation to standards and recommendations proposed by the United Nations and other agencies.

We examine statistics related to the health status of individuals. We examine five dimensions of health status and outline their related data: mortality, life expectancy, morbidity, disability, and malnutrition.

It is pointed out that where health status data are available in LDCs, they generally are descriptive of very selective population groups. This is due to problems of population distribution in relation to location of facilities and services, and problems of access to these facilities and services attributable to such variables as socioeconomic status, cultural background (including religious beliefs), and level of education.

C. Health Care Statistics

In Part Three we discuss the sources of health care statistics. We examine statistics related to health facilities, services, and personnel as well as those activities directed toward the improvement of the health status or condition.

D. Factors Related to Health Status

In Part Four we examine statistics related to factors of a physical, environmental, social, or economic nature which have a direct or indirect bearing on the health status of the population. Included among these are population (size, growth, density, and distribution); education; agriculture and food production; environmental quality and natural resources (including water supply); income and level of consumption; and housing and shelter.

E. Incomplete Demographic Data

In Part Five we deal briefly with the problems of providing useful demographic and vital statistical information where data systems are incomplete.

It is pointed out that these procedures constitute an interim approach, and in the long run much more detailed data will be required for the analytical study of health problems.

A summary of items of data, classifications, data sources, and social indicators suggested in this report in respect to health status and health care are set out in the Appendix.

PART ONE: MONITORING HEALTH

A. Objectives and Procedures

The present study, an outgrowth and continuation of previous development in the design of a social monitoring system (Wilcox, et al., 1972; Wilcox, et al., 1973; Wilcox, et al., 1974), addresses the methodological problems involved in developing a health information system for an LDC.

The need for a health information system has been suggested by Anderson and Kravits (1968:99): "We think it is a fair generalization that public policy regarding many important problems in society is established on the basis of less information than is actually available. What is usually lacking is a conceptual framework in which to order even the information and facts that are readily accessible."

The methodological approach suggested in this report seeks to view health--a component of social development--within the framework of the priority problems confronting development planning. The major objectives of this methodological perspective are:

1. To identify the principal dimensions or priority social concerns within the health sector.
2. To identify priority information needs, the provision of which may facilitate rational decision making relative to specified health concerns.
3. To identify available statistical series that constitute quantitative measures for each dimension.
4. To identify methodologies to bring these series together into sets of indicators for analysis of each dimension.
5. To suggest a reporting system to monitor the change in each dimension over time.

Since this project is ultimately concerned with the development of a methodology which will assist LDCs to improve their own social information system, we are concerned with first evaluating the data gathering procedures

currently employed in LDCs; the information content which different sources yield; the manner in which such information is made available; and how it is used. It is hoped that whatever procedures can be devised will use existing data to its best advantage. We hope further to be able to identify the more serious gaps that appear to exist in these data in relation to the pragmatic requirements of an integrated set of social indicators for LDCs.

To deal adequately with the range of indicators we feel should be incorporated, we will develop classifications of measures using as guidelines the work of organizations and agencies in the U.S. (HEW, NCHS, and OMB) and on the international scene (WHO, FAO, and OECD). These will be viewed as constituting a somewhat idealistic statistical information system as far as LDCs are concerned.

Additionally, in the evaluation of existing data and data sources the standards and recommendations of various organizations (U.N. and U.S. Bureau of the Census) in relation to censuses, vital records, household and health surveys, and institutional records will be used. Using such guidelines and considering the limits of the data available it will be necessary to reach some decision as to the minimal data requirements perceived necessary for rational decision making. This report constitutes the conceptual and preliminary methodological steps towards such a goal.

B. Complexity of Health

The concept of individual health as a positive state is elusive and difficult to measure. Moriyama (1968:596) stated: "a major problem in the development of a health index is the lack of a satisfactory conceptual definition of health capable of being translated into operational terms."

Health criteria can be classified somewhat arbitrarily into several broad, overlapping categories:

1. An Integrative and Abstract Concept of Well-Being

As defined by the World Health Organization (WHO), "Health is the state of complete physical, mental, and social well-being and not merely the absence of diseases and infirmity" (WHO, 1958:459). Recently, Lerner (1973:7) suggested that one more dimension--that of "moral well-being"--be added to the previous WHO health definition. A similar definition was given also by Sigerist (1961: 100): "Health is, therefore, not simply the absence of disease; it is something positive, a joyful attitude toward life, and a cheerful acceptance of the responsibilities that life puts on the individual."

These definitions of health seem to emphasize the integration of well-being in a positive concept. When we discuss health in a generalized and relative way, we define it to include not only freedom from disease and pain, but also social well-being (Lee, 1967).

2. Equilibrium Perspective

Romano (1950:409) defines health as consisting of "...the capacity of the organism to maintain a balance in which it may be reasonably free of undue pain, discomfort, disability or limitation of action inciuding social capacity." Blum (1971:22-23) offered a somewhat modified version of this definition: "Health consists of the capacity of the organism to maintain a balance appropriate to its age and social needs. . .and to behave in ways which promote the survival of the species as well as enjoyment of the individual." Lewis (1953: 113) explicitly defined health as "a state of physiological and psychological equilibrium" whereas he viewed disease as "the organism's reaction to a disturbance of its inner equilibrium."

3. Environmental Adjustment or Adaptation

The environmental perspective is extended to the external equilibrium of an organism as well as its inner equilibrium. Health is viewed (Hilleboe and Jacobson, 1966:788) as "a quality of life involving dynamic interaction and

interdependence between an individual's physical well-being, his mental and his emotional reactions, and social complex." In another version of health from this perspective Wylie (1970:103) states: "Health is the perfect, continuing adjustment of an organism to its environment; conversely, disease would be an imperfect continuing adjustment."

4. An Attitudinal Perspective

Baumann (1961:39-40) attempted to explain health in terms of underlying attitudes, identifying three orientations toward health: first, "feeling state oriented (general feeling of well-being)"; second, "symptom oriented (the absence of general or specific symptoms of illness)"; and, thirdly, "performance oriented (physical capability to perform)." The attitudinal approach to the concept of health is thought to be based upon empirically differential attitudes of individuals which are influenced by various factors such as age, education, religion, and socioeconomic status. It represents mainly the subjective aspects of health and illness.

5. Function and Normality

In light of American values institutionalized in the social structure, Parsons (1958) tried to consider the sociocultural definition of health and illness with reference to the social role-performance of the individual. He first divided health into two kinds: mental and somatic. Mental health and illness are "states of the personality defined in terms of their relevance to the capacity of the personality to perform institutionalized roles" (Parsons, 1958:166). "Somatic health is, functionally defined, the state of optimum capacity for the effective performance of valued tasks" (Parsons, 1958:168). Integrating both these ideas, health is restated as "the state of optimum capacity of an individual for the effective performance of the roles and tasks for which he has been socialized, with reference to the individual's participation in the social system" (Parsons, 1958:176). Although illness is also a

socially institutionalized role, it is viewed in the Parsonian scheme as a deviant behavior in terms of role-performance.

Normality is also a criterion for defining health. In cultural terms, normal refers to what is usual, expected, understood in its frame of reference, and generally regarded as desirable (Maclachlan, 1958).

Lewis (1953) sought the criterion for the definition of health from Erich Fromm's two ways of normality: from the standpoint of functioning society normality is the fulfillment of the social roles taken, and from the standpoint of the individual, normality is the optimum growth and happiness of the individual. He rejects the Parsonian notion of illness as deviant behavior and the common dichotomy between health and ill-health approach. To him, health is a simple concept and its criteria are "adequate performance of physiological and psychological functions in addition to subjective feeling and total efficiency" (Lewis, 1953:124).

6. Health as a Component of Well-Being

The five categorical concepts of health listed above are not necessarily selected on the basis of theoretical concern; rather they are outlined as a basis for understanding the nature, scope, and complexity of health. Sorochan (1968:673) summarized the concept of health, identifying it as a central component of the concept of well-being:

1. Health is a relative and an abstract term. . .health should be conceived as an idea, a symbol or a model. The term "well-being" should be used instead of health.

2. Health is made up of many kinds of personal well-being--emotional, spiritual, social, and physiological.

3. There are many levels of personal, family, and community well-being; each level is probably influenced by the many kinds of personal well-being and one's environment.

4. A high degree of ever-expanding wellness is essential if one is to function at an optimal level of well-being.

5. Well-being is not static, but instead is a continuously ever-changing, dynamic and evolving homeostatic process of the whole human organism adapting to the interactions of his society and with his environment.

6. The degree or level of well-being that may be expected or attained appears to be a complex by-product of one's genotypic endowment, of the adaptive functioning of one's physical body, on one's adaptability to stresses, of one's emotional-mental and spiritual aspirations for life and of one's social compatibility.

7. Wellness and levels of well-being are interpreted and determined according to the existing value systems of each culture or subculture.

8. High-level wellness should be perceived as an essential towards personal happiness and satisfaction.

9. Well-being may be an indirect outcome of a constellation of circumstances interacting within one's environment and/or body.

C. Health as a Human and Social Concern

The multidimensionality of health as a human condition is clearly evident in these various perspectives of health. The fact that health is an abstract idea, symbol, or model of human well-being makes it a very difficult concept to define and certainly even harder to operationalize and measure.

All countries share a common social concern with respect to health--that of providing the highest quality health care possible. Programs to improve the health of a country's population are established not only to contribute to the satisfaction of basic human needs, but also to secure a healthy population as an investment for the future. If development is to progress, it is desirable for a nation to have an energetic, alert, physically fit citizenry. Health, therefore, is not only a social concern in regard to the well-being of a society's members, but also a priority component of social development and, thus, a basic goal area of development planning. Health planning focuses on a set of basic and highly interrelated problems or health concerns (e.g., infant mortality, malnutrition, etc.) that negatively affect the functioning of society and the well-being of society's members.

In this report, we define health as one major factor affecting--positively or negatively--the individuals well-being and his performance in the many important functional roles which he plays in a society. In turn, when the individual's abilities are impaired, whether through mental or physical illness, each society or social group attempts to cope with the problem by allocating facilities, services, finances, and personnel in specialized roles in order to alleviate suffering, deal with premature mortality and minimize disabilities which impair human ability to function in social roles. The term health care system refers to the resulting organization of facilities, services, finances and personnel which provide or deliver health services to members of a society. The term health sector refers to the partition of the administrative structure of a society charged with responsibility to plan and implement and administer the health care system and evaluate its effectiveness in meeting the health needs of a population or society.

D. Information for Health Planning

Health planning requires an adequate health information system to provide the data base which is essential to rational decision making. A health information system for a developing nation should provide statistical data which can be used by health planners to assess and evaluate health problems in relation to health resources and services. A health information system must also shed light on the interaction between health and the other goal areas in social development. Not only does agriculture, education, and income affect the level of health experienced by an individual, but also, health affects employment, education, and agriculture. For example, "the lengthening of an individual's life expectancy through improved health raises the returns on investment in his education. In turn, an improvement in productivity through education raises the returns on investment in health" (Blaug, 1972:318).

Health planning information will be considered in this report under three main headings:

1. Health Status
2. The Health Care Delivery System
3. The Broad Societal Factors (income, housing, environment, etc.) Which Affect Health Status

1. Health Status

HEW (1972a) has identified a health-disease spectrum that is not culture specific. It considers health as composed of states ordered along a continuum ranging from optimum health through incipient illness, overt illness, to recovery or death. This broad spectrum identifies the factors that influence the progression along the linking processes from one state to another and identifies the characteristics of each of the stages. Thus one can generalize from such a spectrum five areas of social concern: survival, longevity, life free from disease, life free from impairment, life free from hunger.

2. The Health Care Delivery System

Factors included in the health delivery system may be classified as inputs (health personnel, facilities, and supplies); operations within the system; outputs (number of healthy people); and the distribution of these among relevant population categories. Other factors included in this category are accessibility (psychological, sociological, and physical) to health care services, and the evaluation in terms of cost-benefit analysis of preventative services such as immunization. Information on these factors is basic to an analysis of the efficacy of a health care delivery system.

3. Broad Societal Factors

Factors in the broad social context which lead to health or disease include geography, water, sanitation, nutrition, education, and population.

E. Social Statistics and Social Indicators

Girardeau (1972:229) has noted that the recent interest in construction of social indicators is a response to two types of information need. The primary interest is an expression of the efforts of planners and research workers to reconstruct the unity and the complexity of the problems with which they are faced. However, this concern is also a result of the need to summarize an increasing volume of statistical information into a set of key indicators. To a great extent, current social indicator research seeks to improve the scientific knowledge of social reality and its development through utilization and improvement of existing social statistics.

Girardeau (1972:234) has also noted that social indicators are not a priori in any way different from all statistics (if one excludes synthetic indicators, defined below). Statistics can be considered as social indicators primarily in terms of the informational value they provide concerning the state or change in social phenomena of interest to the observer. Thus the construction of social indicators is often nothing more than a selection from existing statistics; quantified data that reflect the state or change in the social phenomena for which information is desired.

F. Simple and Synthetic Indicators

Information components (or indicators) may take the form of means, medians, ratios, rates, or proportions. We have explained the use of simple indicators as opposed to composite or synthetic indicators (Wilcox, et al., 1973b). To restate, simple indicators are quantified data that often are presented as means, medians, ratios, rates, or proportions that reflect the state or condition of the society of interest. A comprehensive system of simple indicators is of value in the sense that it provides a descriptive inventory or profile of the characteristics of a society or social group along with the disparities

and tensions that may exist. Most of the social indicators currently in use fall into this category.

Simple indicators provide the basis of social reporting. In turn, when used for comparative purposes, simple indicators can provide the basic statistical information to establish a typology of situations in the different areas of social concern, revealing fields in which comparisons can be made and similarities or differences observed between social groups at different periods of time.

A comprehensive set of simple descriptive indicators can rarely be found (even in technologically advanced countries) in any area of social concern in development. In LDCs, the lack of an adequate statistical basis for rational decision making has been noted in nearly every administrative sector of development planning (Waterston, 1969; Swaroop, 1960; Shryock and Siegel, 1973). Clearly, therefore, one of the critical needs to be filled through social indicator research must be the improvement of both the scope and quality of descriptive reporting in social areas of concern in development planning.

Synthetic indicators are coefficients that summarize, integrate, or synthesize existing statistics. Synthetic indicators are usually structured through statistical multivariate analysis of the interrelationships between simple descriptive indicators and include:

1. Time series analysis
2. Composites, such as factors formed through factor analysis, scales (i.e., F scale), and index numbers (i.e., GNP), etc.
3. Models such as input-output, explanatory, or causal and policy models.

Clearly, progress toward the construction of synthetic indicators is highly dependent on the success with which a comprehensive system of descriptive indicators is developed. Without an adequate statistical base from which to

work little can be accomplished by way of developing models and composite indicators. The primary focus of a methodology to assist LDCs to devise and implement their own set of social indicators must therefore center upon the problem of generating an adequate social information or social reporting system that provides this requisite statistical basis. This statistical basis, in turn, must be developed in terms of a realistic assessment of current and future information needs of LDCs. The critical focus of the methodology should therefore attempt to identify a typology of information needs that provides a guideline for identifying the range of information required for rational scientific decision making in areas of social concern. A well-developed system of descriptive statistics will, in turn, greatly enhance the ability to construct models, composites, and time-series indicators.

G. Components in a Health Information System

Taking a view similar to Girardeau (1972) and U.S. Bureau of the Census (1969), we perceive social indicators of health as the components of a health information system. The degree of sophistication or complexity to be incorporated in the development of an information system can vary quite widely from a system which attempts to incorporate great detail, and assembles and disseminates information in the form of complex indices, synthetic indicators, and graphical procedures to a system of simpler descriptive and analytical indicators. Considerations of feasibility for LDC usage dictate that the simpler type of system be tried.

H. Inputs to Health Information System

The great variety of information required in health care planning dictates that several different data sources be used and combined. For example, census data will yield a range of sociodemographic information which becomes the denominator in the construction of simple indicators. Vital records, records

of medical facilities and practitioners, and health survey data provide the actual health data but they will generally lack the ". . .demographic and socioeconomic foundations necessary to relate them to population groupings" (U.S. Bureau of Census, 1969:2).

It may be possible to identify on the basis of census data alone the social groups or geographic areas where poverty is most prevalent or where certain types of ill-health predisposing factors are in evidence. To identify the types of resources and services required to meet health needs, specialized data collected in studies specially designed to collect health information are required. Each source is capable of providing specific types of information, but where these sources can be linked or combined a much greater information yield is produced.

In summary, the categories of information required for planning in the health sector might be outlined as (Krohn, 1968:152):

1. Demographic statistics
2. Vital statistics
3. Health statistics giving information on:
    a. causes of death, morbidity
    b. distribution of health status
    c. environmental factors influencing health
    d. availability and utilization of health services
    e. health personnel and training facilities
    f. cost by type of service provided.

The main sources of such information are census data, vital records, records of health care personnel and institutions, and health surveys.

PART TWO: HEALTH STATUS STATISTICS

Complex indices are given increasing attention in the measurement of health status (Sullivan, 1966; Bush, Fanshel, and Chen, 1972; Chiang and Cohen, 1973; Berg, 1973). An index of health should: "(1) Reflect changes over time; (2) be available for states, counties and smaller units of population; (3) indicate differences for demographic subunits of the population; and (4) be amenable to subdivision by causal disease groups" (HEW, 1972:55).

The health status index which Bush, Fanshel, and Chen (1972) have been attempting to develop, with its dimensions of function levels, prognosis, and duration, is illustrative of at least one approach to a health index. However, since their "Functional Status Index is based on a data base that doesn't really exist" (Tunstall, 1972:90), it is not immediately clear whether this particular index could be used to distinguish population subgroups with different levels of health or to chart progress in achieving higher levels of health. And, as HEW (1972:55) has noted, "...efforts to develop indices of health have not produced measures which have proved broadly useful. It is clear that more work needs to be done, perhaps including modification of present concepts and further development of data sources before satisfactory indices of health become available." Rather than focusing on the development of a single index for health, Part Two of this report is concerned with the identification of a set of simple indicators that can provide the basic statistical information necessary to describe and analyze societal health status.

Mortality rates (crude death rate, infant mortality rate, and tuberculosis death rate, among others) have traditionally been used as summary indices of health. Where infectious diseases are a major component of mortality, death rates provide reasonably good measures of health status. But, as infectious diseases are brought under control, and chronic, disabling diseases with low

case-fatality rates assume major importance, "morbidity becomes a more important indicator of the level of health" (HEW, 1972:55). Life expectancy, especially expectancy of life at birth, is generally considered as the best indicator of population health status, regardless of level of societal development (Shyrock and Siegel, 1973:433; United Nations Economic and Social Council, 1972:147).

A. Subareas of Health Status

Health status as an analytically separate area of social concern in development subsumes several subareas of concern which we classify as: mortality, life expectancy, morbidity, disability, and malnutrition.

1. Mortality

In more developed countries death has become very much an event of advanced age and the cause of death is often difficult to discern accurately from the several degenerative complications associated with death at this stage of the life cycle. However, from a health information perspective it may not be crucially important to identify the specific causes of death among the older age groups. It is much more important that the cause of death be identified for individuals who have not reached an advanced age.

In LDCs mortality is especially great among the younger segment of the population. According to Howard (1970:11), of the estimated 60 million people who die each year throughout the world, approximately 30 million are young children in LDCs.

a. Data Sources

Mortality is a basic component of population change and constitutes one of the major vital events for which vital statistics are collected and compiled. Vital statistics on mortality are needed in demographic studies, many of which have broad ramifications in national planning. Such statistics are also fundamental in the planning of health programs.

Mortality statistics generally come from vital statistics registers but

in some instances, they are obtained from national registers of population.

To analyze mortality statistics reliable population data must be used as the base or denominator for the computation of such simple indicators as rates, ratios, and proportions. Such a data base is usually provided by population censuses or surveys or combinations of both. In those countries where national registers are kept, the required data for analysis of mortality may all be recorded in such a register.

In LDCs the vital statistics registration systems are often so grossly inadequate that national census and national surveys are used as alternative data sources in measuring and analyzing mortality. The census, if it provides detailed data on age composition, allows inferences to be made as to the level of intercensal mortality; the survey may focus more directly on mortality data. This procedure has been adopted in several areas of Africa, Asia, and Latin America where vital statistics registration systems are either of very poor quality or nonexistent (U.N., 1967a; Shryock and Siegel, 1973).

b. Mortality Statistics

Mortality statistics derived from vital statistics registration systems are likely to suffer from any or all of the following deficiencies (Shryock and Siegel, 1973:391): (1) inaccuracy in defining death, (2) incompleteness of registration, (3) inaccuracy in recording death by place and time, (4) inaccuracy in classifying deaths by cause, and (5) inaccuracy in classifying deaths by demographic and socioeconomic characteristics of the decedent.

Inaccuracies in the definition of death arise largely in relation to death occurring immediately after birth. In some cases such deaths may be treated as stillbirths and may not be registered either as births or deaths.

The registration of deaths is subject to serious degrees of incompleteness throughout the developing countries of the world (United Nations, 1966). Incompleteness of registration includes (a) geographic selectivity where only

part of a country is included in the registration area, and (b) incomplete registration of vital events. Both are serious problems throughout the developing world, and few satisfactory procedures exist for estimating the completeness of vital records.

In relation to the registration of deaths by place and time, the United Nations Principles for a Vital Statistics System (1953) recommended that place of usual residence and year of occurrence (as opposed to year of registration) be used.

In developed countries information is recorded on the cause of death at the time of registration of deaths. The procedures for recording such information has been largely standardized in the more technologically advanced countries. This has resulted from the development of international standards for death certificate format, international coding rules, and the use of the International Classification of Diseases and Causes of Death (WHO), a volume which over the past two decades has had several revisions.

The reporting of cause of death in LDCs is likely to be unsatisfactory where there is no antemortem medical attendance or where cause of death has not been medically diagnosed and certified. HEW (1972a), in a study of a

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The reporting of cause of death in LDCs is likely to be unsatisfactory where there is no antemortem medical attendance or where cause of death has

not been medically diagnosed and certified. HEW (1972), in a study of a developing country, found that while a considerable percentage of deaths occurring in urban areas were medically certified, this was true for only a very small percentage of rural deaths. Even with medical certification multiple causes may further complicate matters, and it appears that only very rarely is malnutrition diagnosed and recorded as the cause of death. This is because the condition of malnutrition makes the individual susceptible to a wide range of illnesses, and it is to one of these that death, when it occurs, is more likely to be attributed. In the case of infant deaths also the cause is generally difficult to pinpoint.

In the analysis of mortality by cause, two common measures are used: death ratios specific for cause, and death rates specific for cause (Shryock and Siegel, 1972:404). These two measures may be used for cross-national comparisons and comparisons over time. They may be disaggregated in order to make regional or rural/urban and other comparisons depending on the subgroups or subunits for which disaggregation can be achieved.

The cause-specific death ratio is the proportion of total deaths that can be attributed to a specific cause or group of causes while a cause-specific death rate is generally defined as the number of deaths attributed to a given cause or group of causes during a year per 100,000 of the midyear population (Shryock and Siegel, 1973:404).

In view of the treatable and preventable nature of many of the health conditions which such statistics might help describe and to locate (socially and geographically) it should be possible to identify areas where health service activities could be profitably initiated or stressed.

United Nations Economic and Social Council (1972:147) proposes two health indicators using data on mortality:

> (a) Number and rate per 1,000 persons at risk, standardized for age and sex, of deaths according to cause: total population, urban and rural areas, national or ethnic origins, socioeconomic classes
>
> (b) Number and rate per 1,000 persons at risk, standardized for sex, of neo-natal and post-natal deaths: total population, urban and rural areas, national or ethnic origins, socioeconomic classes

HEW in a research series (1972a, 1972b) also emphasized the importance of being able to disaggregate cause-specific death rates by similar subdivisions. Disaggregation by age or age group is of particular importance and the HEW study, for example, found that deaths from communicable diseases were particularly prevalent among the younger population (1-4 years of age).

2. Life Expectancy

The longevity of human life and the quality of that longevity are basic human and social concerns. From the societal perspective the lengthening of life expectancy through better health yields greater returns on the investment in the individual during his childhood dependency including his education (Blaug, 1972:318). The individual, on the other hand, requires some assurance that he can expect to live long enough to reap some benefit from his efforts. Without this assurance there is little, if any, incentive to commit oneself to the long-term investment of effort which development requires.

Shryock and Siegel (1973:433) distinguish between two subconcepts of longevity: life span and life expectancy. Life span is "the maximum age that human beings as a species could reach under optimum conditions," while life expectancy is "the expected number of years to be lived, on the average" by members of the cohort under consideration.

In recent years, life expectancy has increased considerably in most countries throughout the world largely through reduction of infant mortality and a wider control of infectious diseases. These improvements in health can be attributed, at least in part, to better sanitation and general living standards and to advances in medicine (Bryant, 1969; HEW, 1972a; Swaroop, 1960).

a. Data Sources

Life tables to estimate life expectancy can be constructed from reliable data on births, deaths, and population. Data sources are censuses of population and vital records. In many countries census enumerations are especially inaccurate for the younger age groupings. In such instances, Shryock and Siegel (1973:435) propose using a procedure of "tracing birth cohorts." In this procedure the recorded births and deaths for as many years as is deemed necessary are used and "the cohorts of births are traced through successive years by subtracting the recorded deaths to arrive at an estimate of the living population."

b. Life Expectancy Statistics

The life table is a device specifically designed to measure mortality or in Barclay's (1958:93) words, it is "a life history of a hypothetical group (cohort) of people," the record of which begins at the birth of each member and diminishes until all have died. The life table as it is normally constructed provides a variety of statistical information. Each specific piece of information from the life table may serve as an indicator of the health status of the population; for example, life expectation at birth and at various ages; the median age at death (the age to which half the cohort initially assumed in the life table survives); and mortality rates at various ages which may be used as comparative measures between societies and over time for the same society. (See also Wilcox, et al. 1973b, for discussion of life table uses.)

United Nations Economic and Social Council (1972:147) proposes the following indicators of life expectancy: "expected years of life at birth and at 50 years of age according to sex, total population, urban and rural areas, national and ethnic origin, and socioeconomic classes." This is generally in agreement with those proposed by HEW (1969).

The life table may be viewed as essentially a single statistical model which combines mortality rates of a population at different ages (Shryock and Siegel, 1973:429). Two types of life tables are generally distinguished--the current (or period) life table and the generation (or cohort) life table. The current life table gives a cross section or snapshot of current mortality in that it "considers a hypothetical cohort and assumes that it is subject to the age specific mortality rates observed for an actual population during a particular period" (HEW, 1969:3). The generation or cohort life table on the other hand is constructed on the basis of the mortality rates experienced by a particular cohort. The current life table is the type most commonly in use.

Life tables may be further classified as either complete (a table containing data for every single year of age) or abridged (a life table containing data by intervals of 5 or 10 years of age). The abridged life table is easier to prepare and is sufficiently accurate and informative for most purposes.

Expectation of life at birth is generally considered to be among the best indicators of population health status (Swaroop, 1960; HEW, 1972a; Shryock and Siegel, 1973; United Nations Economic and Social Council, 1972). However, as with many other desirable social indicators, reliable data are lacking in many countries. The United Nations, in their interim guide on international definitions and measures of levels of living (1961), expressed the opinion that the 1970 Round of Censuses with their more detailed data on population age structure should make it possible to construct life tables and hence to estimate life expectancies for many more countries. The mere availability of more

detailed data may, however, be of limited value since these data will in many cases be derived from birth and death registers whose reliability is suspect. The degree of completeness of registration is closely related to the level of social and economic development which a country has attained. Thus some LDCs may have to resort to the sample survey as an alternative method of obtaining sufficiently accurate data on births and deaths.

3. Morbidity and Disability

The WHO Expert Committee on Health Statistics has defined morbidity as "any departure, subjective or objective, from a state of physiological well-being" (WHO, 1959:5). The term morbidity in this sense is synonymous with such everyday terms as illness, sickness, or disease (Swaroop, 1960:193). The latter term, disease, has been defined as "the state of man's inability to adapt to his internal or external environment, both physiologically and psychologically" (Howard, 1970:11). "The ultimate failure of adaptation is death"; a relatively infrequent occurrence, however, as compared to the prevalence of morbidity. Thus, for example, in the LDCs, while the number of deaths "...may range from ten to forty per 1,000 population per year, sickness of great variety and degree of severity may affect as many as 900 persons per 1,000 population per year" (Howard, 1970:11).

Specifying a minimum list of indicators of morbidity and of disability is particularly difficult in view of the complexity of the phenomena involved. Brockington (1968:242) points out that "...in the circumstances where every nation's needs are so different and their capacity so varying, it is hardly possible to state precisely what an annual programme of tabulation should seek to do. Every country must examine its own possibilities." At a more general level, however, a methodology to develop social indicators of morbidity and disability must adequately deal with a number of highly inter-

related problems which will be more or less present in any LDC. These problems may be generally discussed in terms of two broad categories: (a) measurement considerations and (b) sources of data.

a. Measurement Considerations

The WHO Expert Committee on Health Statistics has recommended a number of factors which should be taken into account in the calculation and interpretation of a morbidity statistic (WHO, 1959):

1. What is the purpose of the statistic?
2. How is "sickness" defined?
3. Does the statistic relate to sickness beginning within a given period of observation (i.e., incidence), to sickness current during this period (i.e., point prevalence or period prevalence), or to the duration of sickness?
4. What is the particular disease (or diseases) to which the statistics relates?
5. What is the particular time at which a period of sickness is defined as having begun or terminated, e.g., cessation or resumption of work, admission to or discharge from hospital, etc.?
6. What is the length of the period of observation?
7. What is the common denominator, i.e., the population at risk?

All these factors enter into the calculation and interpretation of morbidity statistics, but the basic methodological problem is that of using morbidity data in respect to the population and the time frame in which the morbidity occurs. A morbidity rate, however, fulfills this requirement by measuring morbidity in terms of the amount of sickness per unit of population during a defined period or at a particular point in time. In a morbidity rate, the numerator represents the occurrence of morbidity and the denominator the population at risk. When calculating a morbidity rate, it is important to ensure "that the denominator is appropriate in the sense that all persons in the denominator population were at risk of suffering the morbidity that characterizes the individuals who represent the numerator" (WHO, 1968:24-25).

The most frequently used rates are incidence rates and prevalence rates. An incidence rate is the number of new cases during a defined period divided by the average number of the population at risk during the period (WHO, 1968: 24). It will be difficult in LDC situations to calculate incidence rates so point or period prevalence rates can possibly be calculated. A prevalence rate is the number of cases either at a given point in time or during a period divided by the average number of the population at risk at or during the corresponding point or period, respectively (WHO, 1968:24).

The basic data required for morbidity indicators are thus basically two-fold: (a) the number of persons diagnosed as having a particular condition at a defined point in time or duirng a defined period of time X; and (b) an estimate of the size of the relevant population at risk at a particular point in time or during a particular time period X.

Given that basic rates of morbidity can be calculated, another priority consideration is the ability to disaggregate these rates along relevant dimensions (e.g., age and sex, type of disease, etc.) to delineate those population subgroupings in which morbidity is particularly severe and most in need of medical care. As with mortality indicators, if information about a specific condition is required about any particular population subgrouping, it follows that two basic items of data are required: (a) the number of persons in the population subgrouping of interest diagnosed as having the particular condition and (b) an estimate of the size of the population subgrouping. The WHO Expert Committee has suggested a number of relevant classifications (WHO, 1968:25): type of disease, age and sex, regions of a given country, urban and rural communities, levels of medical care provision, ethnicity (where cultural, nutritional, or other differences may influence levels of health status), and occupations. Where estimates of the age and sex distribution of the population are available, the calculation of age-specific morbidity rates for each sex

is particularly informative. Where such estimates are not available, it may yet be possible to classify morbidity data per se by age and sex (WHO, 1968:26)

Assuming that suitable data have been collected and are amenable to cross classifications, we can now examine some of the possible indicators of morbidity which might be developed within a given LDC.

Three indicators of the general state of health of a population at a specified date are outlined by United Nations Economic and Social Council (1972:147):

1. Number and percentage of persons and average height and weight standardized for age and sex, according to height, weight, and measurable states of health: total population, urban and rural areas, national or ethnic origins, socioeconomic classes

2. Number and rate per 1,000 at risk, standardized for age and sex, persons with limitation of activity due to chronic condition according to type of condition: total population, urban and rural areas, national or ethnic origins

3. Number and rate per 1,000 at risk of mentally retarded according to degree of retardation and age and sex.

These indicators, however, are suggestive only of the type of morbidity and disability indicators that might be developed within any given LDC. In LDCs there should be greater interest in the development of measures of the incidence and prevalence of infectious diseases and parasite infestations in the population, or in certain population subgroupings such as young children.

In the LDCs, as is often noted, the data on morbidity and disability are especially scarce. Records of illness on injury are rarely available since persons affected do not or cannot consult with health care personnel. Perhaps they are even unaware of their services. In view of data shortages, a methodology to develop social indicators of morbidity should try to make use of such data as may be available from any source.

In studying morbidity, stress is sometimes given to its disability aspects: restricted activity days, bed-disability days, work loss days, hospital days,

and chronic activity limitation (HEW, 1973). These data have provided the basis for the variety of statistics on rates of disability (HEW, 1972:52). Generally, indicators of disability among such population subgroupings as the school-age, working-age, and elderly populations would seem reasonably desirable for any country. A percentage breakdown by duration of disability within each of these population subgroupings would also seem desirable.

We define disability as any temporary or long-term reduction of a person's activity due to morbidity or injury. With this time distinction in mind, one may conceptualize that an individual may be classified in terms of any one of three categories as follows (OMB, 1973):

1. Long-term institutional disability; when a person is confined to a resident health care facility and is able to function only in a limited way;
2. Long-term noninstitutional disability; when the person has an enduring limitation but is able to live at home;
3. Short-term disability; when the person is only temporarily incapacitated.

Of the three categories of disability, short-term disability is generally the most common.

b. Data Sources

The WHO Expert Committee on Health Statistics has stated that while "procedures for analyzing data are available, ...appropriate data on morbidity are not yet generally on the scale and with the speed that is required" (WHO, 1968:6). The general unavailability of data on morbidity stems in part either from the lack of satisfactory data-producing sources or from the failure of existing or potential sources to produce the kinds of data that are required.

Morbidity data can potentially be obtained from several broad categories of sources:

1. Disease registers: notifiable and other
2. School and industrial absenteeism records
3. Institutional records and statistics
4. General practitioners' records
5. Insurance and social security records
6. Interview and examination surveys

Disease register: The primary purpose of a disease register is to record cases of diseases of various types, particularly notifiable diseases*, as a basis for forecasting the imminence of outbreaks of diseases that are highly communicable (WHO, 1968:10). Such a register may record also cases of such other diseases as cancer, tuberculosis, venereal, and mental diseases (Swaroop, 1960:193). The accuracy and completeness of the diseases recorded depends largely on the degree to which there is full cooperation and/or compliance (where required by law) in reporting the diseases being monitored.

School and industrial absenteeism records: These are records of the number of person-days which school children and workers have missed from their normal work setting because of sickness that is accompanied by temporary incapacity to work. The worth of this data source is generally related to urban areas where industries employing large labor forces are more likely to be located and school absenteeism records are more likely to be kept.

Institutional records and statistics: These data records, obtained from institutional records (hospitals, hospital out-patient departments, health centers, clinics), pertain to the numbers of people who have sought medical care. Such data may include the cause (i.e., diseases) for which a particular consultation or institutionalization (e.g., hospitalization) has been made, and the frequency of consultations or hospitalizations for a particular cause. It

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* Most countries maintain a list of those diseases--usually communicable diseases--which are considered particularly serious hazards to public health. The reporting of these diseases is mandatory.

may then be possible to estimate the distribution of the particular cause in question relative to other causes and the effectiveness of the consultation or hospitalization (HEW, 1972:13).

The WHO Expert Committee has recommended that hospital morbidity statistics minimally include a count of patients discharged and of their hospitalization days since admission, by diagnosis and sex (WHO, 1968:11). Caution must be taken not to project conclusions as to the health status of any population beyond that segment which has access to that hospital. For example, if a child health clinic serves all the children in a given population, its records may describe the pattern of morbidity among the children in that population. However, to the extent that large numbers of children do not have access to these clinics, it becomes more difficult to define the actual coverage of the clinic's statistics, in other words, the population at risk.

General practitioners' records: The WHO Expert Committee (1968:22-23) has outlined several statistical units used in the study of morbidity: a case of illness; a spell of sickness; admissions to, discharges from, and patients currently resident in hospitals; sickness absence or claims for sickness benefit; and consultations. In examining general practitioners' records, the use of the consultation as the statistical unit may entail several operational difficulties. For example, several consultations may take place within the course of one spell of sickness. However, if statistics are collected by means of a sampling technique that involves only occasional reporting days for individual practitioners, or if the first consultation in an episode of illness is selected as the reporting unit, the consultation is a potentially useful statistical unit.

Medical insurance and social security records: These sources may be able to provide data on illnesses that cause temporary or permanent incapacity for

work. However, they are likely to be of limited application in LDCs because of predominantly rural populations.

Interview and examination surveys: Health surveys of various types have been conducted in the more advanced countries of Europe, Japan, and the United States (Swaroop, 1960:194). They would appear to be the means most likely to produce accurate data on morbidity. The U.S. National Center for Health Statistics (NCHS) has relied heavily in obtaining morbidity data and statistics on three surveys: the Health Interview Survey (HIS) and the Health Examination Survey (HES), and the Hospital Discharge Survey (HDS), with supplementary data from reports of the Center for Disease Control on "notifiable" (primarily infectious) diseases and mortality data obtained through the Federal-State Vital Statistics Program. The HIS and HES use national probability samples of the civilian noninstitutionalized population. The HDS draws from the universe of patients discharged from short-stay hospitals, including those who die in the hospital. Of the three approaches (HDS, HIS, and HES) to the measurement of morbidity, the HES is considered to provide "the best data obtainable about the physical and physiological characteristics of the American people" (HEW, 1973:894).

Household interviews as a source of morbidity statistics are greatly limited by the accuracy of the diagnostic and other information provided by respondents. The information a respondent gives on conditions which have not been medically attended may be nothing more than a description of symptoms. Even where the respondent (or a member of the respondent's family) has received medical care, he or she may at best only be able to pass on to the interviewer such information as the physician may have communicated. Certain facts, however, such as the number of disability days, are most accurately obtained from household members. Finally, it has been shown that knowledge of health conditions and the ability or willingness to report them tends to vary with socioeconomic and cultural characteristics of the respondent or the respondent's household.

4. Malnutrition

Since 1949, seven Joint FAO/WHO Expert Committees on Nutrition have convened. In addition numerous seminars and international meetings have been sponsored in recent years by FAO, WHO, UNICEF, and other organizations to deal with the problem of malnutrition in the world. The knowledge about the etiology, prevention, and treatment of malnutrition, and its consequences and socioeconomic repercussions is fast-growing.

Malnutrition is a health concern because of the widespread suffering for which it is directly or indirectly responsible and also because of the impediment to socioeconomic development which malnutrition imposes through impairment of human resources. The processes of physical and mental development are retarded, and the general standard of health is poor among those who are malnourished. Evidence that relates malnutrition to mental retardation is growing and since the majority of children in LDCs are in various states of malnourishment, this constitutes a serious problem.

More than half the deaths in some LDCs are of children under six years of age. Many of the diseases to which these deaths are attributed are considered relatively minor in developed nations indicating the contributory effect of malnutrition in aggravating the health conditions. The body becomes so debilitated by malnutrition that it is incapable of resisting relatively minor infections. Berg (1969:3), for example, points out that measles and chicken pox often are fatal in countries where the levels of nutrition are seriously deficient.

The costs of malnutrition in the different areas of social development are high. For example, besides loss to the population by the curtailment of physical and mental potential, losses exist in the form of medical costs, welfare payments, and the loss of productive labor through premature death.

With shorter life expectancy the cost of early life or childhood dependency (up to the age of labor force entry) becomes relatively more onerous per productive year in labor force. Among many of those that survive malnutrition in early life, both physical and mental growth is retarded. Besides the loss to the labor force, such retardation becomes an increasing burden on the educational system where slow learning may be in evidence.

FAO/WHO (1970) investigations indicate that the lowest labor productivity is found in countries where protein and caloric consumption per capita is lowest. Apathy, lack of energy, and hence low productivity are seen as resulting from lack of the required quantity and quality of nutrients. Labor productivity is further retarded by a lowered resistence to disease. As a result, absenteeism is frequent and prolonged. Indications are that job related accidents are more prevalent among malnourished laborers.

The more salient nutritional problems and related conditions experienced on a world scale are (WHO, 1972:160):

1. Protein-calorie malnutrition (PCM)
2. Vitamin A deficiency
3. Nutritional anemias
4. Endemic goiter

The most serious and widespread nutrient deficiency throughout the world is protein deficiency. More than half the world's protein supply comes from grain. Different grain crops yield different qualities of protein--the quality depending on the content of "essential amino acids." Several cereal grains are low in the essential amino acid lysine. Many of the oilseed crops, however, are high in good quality protein content and are relatively inexpensive to grow.

Vitamin A deficiency in young children is an especially critical problem in Southeast Asia, but many other nutritionally based health problems are critical in their impact in pregnancy and early childhood (Scrimshaw, 1964:117).

The Joint FAO/WHO Expert Committee on Nutrition (1971:62) points out the necessity for many types of action: increased production of foods to provide adequate protein, calories, and other essential nutrients, by means of crop husbandry, animal husbandry and fisheries; reduced losses in harvesting, transporting, and storing and a better distribution and utilization of supplies; development of nutritious food mixtures for weaning; development of industries for the preservation and processing of food; education and training including the education of consumers; a broad program of environmental sanitation and disease prevention, especially in childhood; and studies to provide better information on dietary intake and factors that influence it. National plans for social and economic development must attempt to include all of these activities.

As with many behavior components of human life, the eating habits of people are difficult to change. Attempts at incorporating more nutritious foods in deficient diets or the use of protein and vitamin supplements meet with limited success in many cases indicating that eating habits are rather inflexible.

FAO (1972:84) outlines a number of indicators of nutritional status (Table 2.1) which they have evaluated on the basis of their specificity in measuring changes in levels of nutrition and the feasibility of obtaining the required data in developing countries.

a. Estimates of Prevalence

The only satisfactory method for estimating the prevalence of malnutrition is a survey of representative communities throughout the population of interest. The basic data to be collected are age, weight, height, and the presence or absence of clinical signs of malnutrition. Certain standardized procedures have been developed in order to make comparisons possible; a variant of the percentile distribution or Harvard Standards of height and weight (Jelliffe, 1966) is a common procedural tool in studies of prevalence.

Table 2.1. Suggested Indicators for Progress Assessment in Activities Directed Toward the Protection of Mothers and Young Children From Protein-Calorie Malnutrition

Indicators	Specificity of indicators in nutrition evaluation			Feasibility of obtaining accurate data in developing countries, especially in applied nutrition programs in rural areas	
	High	Medium	Limited	Easy	Difficult
Specific mortality rate from malnutrition	*				*
Infant mortality rate			*[1]		*
Mortality rate in children 1-4 years		*			*
Percentage of deaths of children below 5 years of age in relation to total mortality			*	*	
Wills-Waterlow index (i.e., the ratio of deaths among children aged 1-4 years to that of infants aged 1-12 months)		*		*	
Specific mortality rate from diarrhea and some infectious diseases (measles)			*	*	
Prevalence of protein-calorie deficiencies					
Clinical signs	*				*
Weight deviation for age	*				*
Weight-length ratio		*		*	
Arm circumference		*		*	
Head-chest circumference	*			*	
Skinfold		*		*	
Total serum protein			*	*	
Serum albumin	*			*	
Urinary area, expressed per gram of creatinine	*				*
Amino-acid imbalance test	*				*
Low birth weight (data from maternities)		*			*
Weight gain during pregnancy		*			*

[1] Greater value in areas of early weaning.

Source: FAO, 1972, Planning and Evaluation of Applied Nutrition Programmes, Nutritional Studies No. 26, Rome.

b. Indirect Indicators

(i) Age Specific Death Rates

The WHO Expert Committee on Medical Assessment of Nutritional Status (WHO, 1963:11) stressed that the age specific mortality rates for children in the 1 to 4 year age group is a reasonably good indicator of the nutritional status of this age group. It is, however, difficult to separate out the effects of diseases per se from those of malnutrition in different circumstances. Compromising the usefulness of this measure further is the fact that the younger age groups are likely to be subjected to under-reporting in many LDCs.

A high proportion of infant mortality can be attributed to a combination of factors. "Malnutrition causes a lowered resistance to infection while frequent episodes of infectious diseases precipitate clinical malnutrition" (FAO/WHO, 1971:44). The relative importance of these combined factors decreases with age.

(ii) Disease Specific Death Rates

The recording of deaths by cause is not a very reliable tool in assessing nutritional status because generally some associated disease is likely to be adjudged the cause of death regardless of the degree of malnutrition. This situation arises partly because relatively few deaths in LDCs are medically certified and the layman is unable to identify malnutrition as a primary or even a secondary cause of death.

There may be some value, however, in using disease specific death rates as an indicator of nutritional status of children in that deaths from such diseases as measles are much higher in LDCs as a result of lower resistance directly related to nutritional status (Jelliffe, 1966; Swaroop, 1960).

(iii) Occurrence of Infectious Diseases

Where environmental sanitation and personal hygiene are poor, malnutrition

in children as measured by weight for age is found to be associated with high frequency of infectious diseases. Because of this close association, it should be possible to generate an indirect indicator of protein/calorie malnutrition prevalence from carefully interpreted data on the frequency and duration of infectious diseases.

Besides the survey procedures proposed above for the measurement of nutritional status, two other main sources of data proposed by the Joint FAO/WHO Expert Committee on Nutrition (1971:49) are:

(a) The records of infant welfare and other centers

(b) The records of hospital inpatient and outpatient departments

It might be noted that both these sources are likely to be representative of a very select segment of the population and hence their usefulness is limited.

PART THREE: HEALTH CARE STATISTICS

Many health and health care problems are so closely interwoven with overall problems of social and economic development that they are not directly amenable to influence by a formalized health service. Many other problems, however, fall within the scope of a health service influence. Bryant (1969:317), for example, states: ". . .it is essential to identify those areas where need and beneficial action can be joined and to design a system of health care that makes this possible." The health care system is thus depicted as operating somewhere in the gap existing between health needs on one hand and limitations of resources on the other, and it must try to relate the two effectively.

Standards of health and health services are strongly influenced by limitations of resources. It may be the goal of every government to provide health services for all citizens on an equal basis, but a choice may have to be made between allocating resources too thinly or concentrating on specific regions. Undoubtedly the areas of greatest need are the remote rural areas but scarcity of resources and the magnitude of initial investment in hospitals, clinics, and other facilities in urban areas dictates that resources continue to be allotted to staffing, maintaining, and improving these central urban facilities. and other facilities in urban areas dictates that resources be allotted to staffing, maintaining, and improving these central urban facilities.

The planning of health care in LDCs differs from health planning in more developed countries (Gish, 1970:67) because:

1. The resources in the form of money and skilled personnel are in very limited supply.

2. The age structure reflects a much younger population while the geographic distribution of the population is predominantly rural.

3. The disease patterns are entirely different, with infant and childhood mortality many times higher than in more developed countries.

From the point of view of accessibility of health care for the majority of the population, urban hospitals in the Western sense have little impact but consume a large proportion of health finances.

How a health care delivery system works is a required component of health statistics. Data required in this regard relates to number, size, type, distribution of facilities, and staff personnel, together with the training or skill levels of personnel.

Recommendations have been made (WHO, 1967) that all countries collect information on their health care system under the headings of finances, personnel, facilities (buildings and equipment), and organization.

A World Health Organization Expert Committee on Health Statistics meetin in 1969 outlined five main reasons for requiring health care statistics (WHO, 1969:6-7):

1. To assist in the administration and co-ordination of health services in any particular community, region, or country, and for the effective management of curative, preventive, and environmental health services;

2. For the short-term and long-term planning of health services, both locally and nationally;

3. For assessing whether health services are accomplishing their objective, i.e., their effectiveness, and whether they are doing so in the best possible way, i.e., their efficiency;

4. For the study in depth of particular problems of health and disease and their effect on the administration of health services, i.e., for research purposes;

5. To provide background data that may be required from time to time by the administration, by legislative bodies, and by members of the public.

A. Health Facilities

Little consensus is to be found in the literature concerning the defining characteristics of different health facilities. The World Health Organization Expert Committee on Health Statistics (1963) attempted some definitions, but these do not appear particularly useful for our purposes. In general, a health facility is defined as ". . .the physical setting in or through which preventative, diagnostic, curative, and supportive services may be provided", whereas a service is defined as ". . .a specific activity provided in or through a facility which is designed to contribute to the good health of the community" (HEW, 1972:148).

It is possible then to classify the facilities on the basis of the types of services they offer. In an LDC the more important facilities in reaching people in need are the health centers with their outlying aid stations or dispensaries and mobile clinics (Gish, 1970:70). These types of facilities provide a wide range of health services including family planning services, health education, immunization, and preventative and curative measures for diseases.

Suggested categories of facilities of primary importance in comprehensive health planning are outlined below. This classification and the definitions provided by HEW (1972:150-153) and WHO (1963) might be used as a guide in outlining the categories of statistical information to be sought in an LDC.

1. Categories

   A. Inpatient care

      1. General hospitals
      2. Special hospitals (including mental retardation centers)
      3. Rehabilitation facilities

   B. Outpatient care

      1. Outpatient clinics
      2. Health centers

   C. Home nursing care

D. Physician care

1. Solo and group practice

E. Blood banks

F. Laboratories

1. Clinical laboratories
2. Radiological laboratories

G. Public health services concerned with prevention and administration

1. Local health authority

Detailed knowledge of the categories of facilities is required if existing programs are to be coordinated; if available resources are to be deployed efficiently; and if overlapping and duplication in existing programs is to be avoided.

The categories of characteristics outlined by HEW (1972:153-154) might be used in LDCs in the design and investigatory stages of guiding the collection of relevant information.

2. Categories of Characteristics

A. Basic inventory

Number; location; size; categories of services; physical conditions; special diagnostic and therapeutic equipment; accessibility.

B. Organizational characteristics

Ownership or control; accreditation; approvals; certification; staff by-laws; board of trustees composition; articles of incorporation.

C. Service characteristics

Utilization of services (statistical summary); utilization rates by age, sex, race; area served by type of service provided; admissions; discharge diagnosis summary; type of payment; patient characteristics--age, sex, race; length of stay; disposition by type of patient and age, sex, and race.

D. Personnel

Staff by category; staff by shift; staff by service; physician staff list; allied health professionals--including psychologists, sociologists.

E. Financing

Expenses by type; income--sources and amount; per diem cost by type of service and cost component; fees; charges; other financial information.

F. Special programs

Research-internal, external, community; teaching--professionally oriented, by type of program, allied professionals by type of program, community by type of program.

G. Policies

Inter-facility transfer agreement; service sharing agreements; admission policies.

H. Detailed utilization of services

All services provided in or through the facility: pathology laboratory, dental facilities, pharmacy, occupational therapy department, physical therapy department, premature nursery, outpatient department, emergency department, psychiatric inpatient department, rehabilitation inpatient department, post-operative recovery room, social work department, hospital auxiliary, radioisotope therapy, cobalt therapy, radium therapy.

Ideally, descriptive and analytical data for comprehensive planning in the health sector would cover all the above categories. It is necessary to know what types of services are available, how these are used, and how they are distributed, and who has access (geographically, financially and culturally) to them. It is important also to know the different categories of health personnel, their number and distribution by facility and geographic area and potential clientele, as well as details on how the facilities are organized and administered. Data are required also on the cost of different types of services to clients; for example, per diem charges or fees.

3. Data Sources

Ideally, the effectiveness with which health care planning proceeds depends on the availability of detailed current and accurate data. It is assumed that health facility and service data are available from government and private sources at regional and national levels. Where data are available from several

different agencies, it will be necessary to establish uniformity or standardization in definition and classification of facilities. It will be necessary initially to identify and evaluate the available data in relation to criteria to be established in conjunction with personnel involved in health care administration and those concerned with data collection in order to reach some decision on feasible standards for a comprehensive planning framework. As a result it may be possible to pinpoint information gaps and inconsistencies and propose solutions.

The categories of data sources for health facilities outlined by HEW (1972:164-165) might again be used as a guide in exploratory stages of research in LDCs. These include federal, provincial, local, voluntary, and national agencies each of which subsumes a number of subcategories whose labels or titles will vary by country:

Federal: Department of health
State or Provincial: Department of health
Local: Local office of health department
Voluntary: National, regional and local voluntary agencies
National: Including professional associations, associations of hospitals, etc.

B. Health Services

It should be possible to relate data on health service use to sociodemographic information in order to enable the analysis of health service usage. In turn, it should be possible to discern the factors that affect use, potential cost, cause of use, and specific services used.

The components of a health service data collection scheme are proposed by HEW (1972:174) and WHO (1969:14-16):

1. Who rendered the health services?
   a. physician (by specialty)
   b. nonprofessional (specify), etc.

2. Where was health service provided?

   a. health center or clinic
   b. at place of residence
   c. general hospital
      (i) inpatient
      (ii) outpatient
      etc.

3. What was the health service?

   a. examination (i.e., physical, psychiatric, dental, etc.)
   b. medication (oral, intravenous, intramuscular) etc.

4. Why were health services administered (give appropriate diagnoses)?

5. What was the charge for the health service (either to client or to third party)?

6. How was the health service paid for?

   a. patients' own resources
   b. government provided program
   c. charity
      etc.

7. Duration of health services (e.g., days of care where appropriate)

1. Data Sources

The three main sources of health service statistics are facility records (including institutional records and physicians' records); insurance reporting forms; and household health surveys (HEW, 1972, and WHO, 1969). The availability and usefulness of data from these sources in specific LDCs is a matter for investigation.

Hospital discharge records may also yield information on services provided to hospitalized patients. The records of clinics, outpatient departments, and providers of individual service are further possible sources. Periodic surveys of records together with periodic household health surveys would seem to be the most economical procedure in obtaining health service data. Questions on health service utilization may be included in other national, regional, or community household surveys to keep the cost of obtaining such information at a minimum.

C. Financial Resources

Limited financial resources must be allocated among alternative and competing uses. It is difficult to obtain data on health service expenditure but data may be available as a by-product of accounting procedures performed in conjunction with administering facilities and services. Other sources of data include sample surveys of household expenditure on health services or studies of financial operations of a sample of health institutions.

Financial data might be used to construct such indicators as: (a) expenditure as a percent of gross national product; (b) expenditure as a percentage of national income; and (c) expenditure per head of population (WHO, 1969:13).

D. Health Personnel

Health service personnel make up a sizable and growing segment of the labor force in most countries. The classification of such personnel has not been standardized internationally but some useful divisions have been suggested (Bryant, 1969; and WHO, 1969:9-10).

Personnel providing direct personal service; for example doctors (subdivided by specialty), dentists, and nurses are differentiated from members of allied health professions: pharmacists and laboratory technicians.

Bryant (1969:335-336) classifies health personnel in developing countries into four broad groups: professional workers, subprofessional workers, paramedical workers, and auxiliary workers.

1. Professionals usually function in their area of competence without supervision. They are usually educated to the level accepted for that discipline in a particular country.

2. Subprofessionals often have an education similar to that of professionals. Such individuals are usually community health officers.

3. Paramedical personnel are those individuals allied to individuals in medicine who together make up a health team: nursing, sanitation, etc.

4. Auxiliary personnel are individuals with less than full professional qualifications. Different levels exist within the broad categories of auxiliaries; for example, in nursing, auxiliary nurses.

1. Data Sources

The type of information required on these categories of personnel include their numbers; ratio to population; work load information (such as patient loads or beds to attend) in health care facility; geographic distribution; job vacancies; levels of qualification and personal characteristics. These data may be available through licensing or registration or from census enumeration. Registers of professional personnel may also be compiled and kept current by national professional associations. Statistical data on personnel in the process of training should be obtainable from the training establishments; for example, medical schools, pharmacy schools, and nursing schools.

In developing countries the auxiliaries (e.g., midwifery personnel, etc.) together with traditional healers are major providers of health care (Gish, 1970:72). However, these categories are least likely to be accounted for in an information system. The success of the "barefoot doctors" in China, and the "helots" (village midwives trained as health and family planning educators) in the Philippines points to the need to give a high priority emphasis to these categories of skill in preference to conventional health professional training in future health planning (and health care monitoring) for developing countries (Hetzel, 1972:315).

Life tables of professional life expectancy (the time we can expect a worker to be available for employment [HEW, 1972:113]) also need to be developed.

E. Need and Demand

An integrated system of health statistics centers around the concept of requirements (HEW, 1972:110). The terms need and demand are two facets of

this concept. For example, personnel need refers to the number of health professionals required to meet a predetermined standard of health care. Personnel demand is related to the demand for health services and is a function of such economic and noneconomic factors as cost, distance, time, values, and mores.

An integrated set of statistical information for the health sector will allow planners to compare demand for services, facilities, and personnel with the need for these. If the supply of available services, facilities, and personnel permits, action may be taken to increase the effective level of demand and bring it more in line with the levels of health care needs.

PART FOUR: FACTORS RELATED TO HEALTH STATUS

It has become increasingly evident that development planning must be a dynamic process capable of embodying all aspects of a society's resources, both human and material, as well as all its activities.

Only very general comments in this section will be addressed to data and data sources since statistical information directly involving many of these related factors will be elaborated more thoroughly as we develop the other sectors (population, education, food and nutrition, and agriculture).

A. Health and Social Development

The tie-up of health with other sectoral concerns is complex and is becoming well documented. The interrelationships between health on one hand and population, nutrition, and education on the other are especially important, and all of these need to be considered as the development process is examined.

Health programs are generally accepted as a component of development planning. However, doubt is expressed as to the degree of importance to be attached to such health programs, mainly because of the effect which better health appears to have on population growth and also because of the difficulty of making quantitative assessments of the contribution of health programs to development.

Myrdal (1968:1537) pointed out that health is an integral part of the development process and hence must be considered in the context of its complex interrelationships. Health has an impact on many aspects of individual functioning nutrition, occupation, income, and education, among others and these in turn affect health.

The evaluation of investment in health from a strictly economic viewpoint has had its critics, but the methods used are quite informative. Mushkin (1962),

for example, considered three perspectives. First, there is the investment needed to rear a child from birth until he is a productive member of the labor force. The returns to such investment may be lost wholly or in part through premature death or disability. Second, there is the contribution to output and economic growth attributable to health programs. Taking the negative perspective, the measures of the effect of ill health on labor productivity could be classified (Mushkin, 1962:138) as: deaths (loss of labor units); disability (loss of time at work); and debility (loss of ability to perform at full potential). A third perspective is the present value of future work potential attributable to health programs. The present value can be viewed as a capital asset (Mushkin, 1962:148).

B. Related Concerns

1. Population

The vexing problem of improving health and health-care facilities and programs and the resulting impact of reduced morbidity and mortality and ultimately population increase which in turn taxes further the already limited educational and nutritional resources is not amenable to a simple solution. However, in some instances the benefits of health improvement in better role performance capability of individuals and increased efficiency of the labor force as a whole are evident. The improvement in attitudes toward life in general and the acceptance of the fact that improvement is possible is likely to emerge more forcefully in a climate of improving health among the population. The positive attitudes attributable to better health status are more likely to have a long-term impact and hence may be considered to outweigh the consideration of population increase.

The negative argument stating that improved health results in increased population growth must be balanced also against the acceptability of high mortality as a means of population control. In solving this two-sided issue,

a balance must be sought ". . .between the moral imperative of providing health care and the urgent need for developing effective means of population control" (Bryant, 1969:100).

The part played by improved health in increasing population through lowered infant mortality may be offset by the part it plays in lowering fertility. Many demographers argue that to significantly reduce fertility in developing countries, it will be necessary to first lower the rate of infant mortality.

The health service can also be a medium for the diffusion of new and optimistic--as opposed to fatalistic--social attitudes which are vital to all aspects of development. The mother who through pregnancy and childbirth is most likely to have contact with and need for health services becomes the means through which health services can influence family behavior. Bryant (1969:102) states:

> Whether the goal is to improve health or to reduce the birth rate, the means is behavior change, and this can seldom be accomplished in a health center or hospital clinic. Health services must reach into the communities and establish close and trustworthy relationships with the people before they can hope to influence the ways in which people live their lives.

2. Access and Distribution

The computation of rates and ratios of population to health care personnel and facilities are of limited utility in describing the real issues of health. Whether it is hospital beds, clinics, doctors, nurses, or other facilities or personnel that are being described, the consideration of distribution, utilization, and quality must be emphasized.

The meaning of hospital bed, hospital, clinic, or doctor will vary considerably with the situation being considered and the quality of health services is probably more dependent on the availability, organization, and distribution of many different aspects of health facilities than on the numbers of doctors or the type of training they have received.

If, for example, the geographic distribution of health care facilities can be estimated, this information per se is of limited value since it must be determined how these facilities are used by the local population. Rural areas rarely have facilities comparable with urban areas. In Thailand, for example, the ratio of population to doctors is seventeen times as high outside the capital city as inside the capital city. The vital statistics for rural and urban areas--where they are available--reflect this inequity. In Nigeria the infant mortality for the capital city is approximately 70 per thousand; in rural areas it is claimed to be as high as 300 per thousand. It is worthy of note that many of the doctors and other health personnel and facilities outside the capital cities are most likely to be located in provincial towns. This leaves the strictly rural population with virtually no health services in many cases. The seriousness of this situation is amplified when it is realized that the rural population constitutes approximately 80 percent of the national population for most LDCs.

The availability and distribution differentials is not a clearcut rural/urban phenomenon. Such variables as ethnicity, religion, or socioeconomic status may all contribute to such differentials. This is the case in developed societies. For example, in the United States the nonwhite population in urban areas experience much higher infant mortality rates than the white population.

The health problems of whatever society one wishes to study are closely intertwined with the history, culture, and socioeconomic development of that society. Many aspects of health may only be understood when viewed against the specific contextual factors with which they are associated. The scarcity and inadequacy of health services across LDCs is not matched in all cases by an overzealous demand for these services. For example, in Africa and Latin America the demand for health services tends to exceed the supply of services; in Thailand the sparse services are in little demand (Bryant, 1969:78). No satisfactory

explanation has been offered for such variances, but it has been suggested that in the case of Thailand the social distance other-worldliness so characteristic of Asian Buddhism may be an important explanatory factor.

3. Environmental Quality and Resources

Recognition of the relationship between environment and health has increased. This is especially true of those countries undergoing industrialization where traditional sanitation services and facilities are unable to cope with industrial wastes.

Traditionally, sanitation services have directed their activity largely toward the prevention and control of communicable diseases transmitted through physical environmental elements: water and human wastes. These concerns are still of primary importance in LDCs but, in industrializing countries as well as in the urban sectors of LDCs, control of water and air pollution, noise, accident reduction, and the improvement in housing and physical planning receives increasing emphasis. Concern is being voiced also about the social and psychological factors associated with crime and delinquency in the overcrowded and deteriorating squatter areas or slums.

a. Water Supplies

"There is probably no factor that has a greater effect on the health, well-being, and development of a community than the provision of an ample and convenient supply of good quality water" (U.N., 1971:167). To amplify this observation the same report cites a delegate from an Asian country attending the 1969 World Health Assembly who estimated that waterborne diseases were directly responsible for 40 percent of all mortality and 60 percent of all morbidity in his country.

The importance of a suitable water supply for towns and cities is given wide recognition because it is so vital for street cleaning, sewage disposal, fire fighting, and industrial uses. Provision and maintenance of rural water

supplies has been given much less attention and constitutes a problem of great magnitude. According to U.N. (1971:168) estimates, ". . .at any one time the number of people suffering from disabling disease due to lack of clean water is not less than 500 million." In developing countries it is estimated that the proportion of rural dwellings served with safe water is in the neighborhood of 10 percent. The Second United Nations Development Decade has set a target of raising this figure to 20 percent at an estimated cost of $1,600 million, three quarters of which the countries will be required to raise themselves. The plight in regard to water supplies is grave when one considers that more developed countries are faced with deteriorating supplies as a result of chemical and bacteriological pollution.

(i) Data Sources

Few countries, regardless of their stage of development, collect, analyze, or report data on water supplies. As a result, attempts to provide safe water supplies--a high priority among U.N. development programs--are hampered. Referring specifically to community water supplies, WHO (1972:7) points out that data on the following subjects are frequently lacking:

1. Demography (population statistics, social information relating to existing and future water demands);
2. Health (the endemicity of water-associated diseases and conditions likely to cause epidemics);
3. Existing installations (the technical and financial soundness of present facilities);
4. New sources (the quality and quantity of possible new sources);
5. Criteria (for the design and performance of installations);
6. Costs (unit costs of constructing, administering, operating, and maintaining installations); and
7. Benefits (to health, social welfare, and economic development--preferably in economic terms--resulting from new and improved water supplies).

Data gathering and processing is expensive and only data likely to be useful should be collected. This principle applies to all data gathering situations in LDCs.

Information on community water supplies is needed at the local level ". . .for planning, designing, and constructing installations; management and supervision; the procurement of funds; public information and securing community interest" (WHO, 1972:9).

At the national level, data are needed for planning of community water supply policies as well as for monitoring and evaluation. National programs require data on:

a. demography;

b. quantity and quality of water resources;

c. financial matters, to enable budgets to be prepared and to justify the deployment of national financial resources;

d. approval for obtaining or providing loans;

e. calculating the proportion of external funds needed;

f. manpower needs;

g. training programs;

h. undertaking programs to prevent the pollution of water supplies;

i. research and development programs.

In conjunction with health statistics these data will be useful in justifying the need for better water supplies and the surveillance of water quality.

International agencies need data to plan the allocation of their support for community water programs as well as to evaluate their impact. Since the demand for such funds far exceeds the supply, data need to be carefully collected and presented so that priorities can be identified. Data to establish the viability of proposed water schemes are often lacking in LDCs and so areas

in dire need may fail to benefit from international financial and technical assistance.

The WHO (1972:11) suggests that pertinent data may be acquired from the following agencies:

a. National planning agency and the planning departments of the institutions responsible for community water supply

b. Ministry or other agency responsible for environmental health; the control of pollution and surveillance of water quality; and urban and rural community water supply programs

c. National, regional, state, and local water authorities; semiautonomous bodies or private companies supplying water

d. Financing institutions or lending agencies (such as national and international banks); bilateral and multilateral agencies; national, state, or provincial subsidizing agencies; and local financing organizations

e. Bilateral and multilateral technical assistance organizations

f. National, state, and local organizations for the management, administration, operation, and maintenance of water supply schemes.

g. Governmental and private construction agencies

h. Housing agencies

i. Census bureau

j. Agencies responsible for hydrological, meteorological, and geological surveys

k. Land surveyors

l. Government departments of industry, decentralization, relocation, and industrial development

m. Legal departments

n. Firms of consultants

The importance of water supply data and the diversity of sources from which it may need to be gleaned suggests the need for national or regional centers on water resources in order to coordinate information. It is also well to reiterate at this point that much of the information on requirements of a

water supply will be based on population statistics (census bureau) and statistics on morbidity, mortality, and water quality (ministry of health).

b. Waste Disposal and Air Pollution

The problem of waste disposal, so long a relatively neglected topic in developed countries, has commanded increasing attention in recent years. This development has come about in recognition of the social and economic importance of proper waste management. The health consideration is of primary importance but industrial growth, urbanization, the fishing industry, and tourism are all part of this picture.

Air pollution is a growing problem in most big cities mainly as a result of the volume of motor traffic and the number of industrial plants. Changes in atmosphere conditions are associated with sharp fluctuations in air pollution. When sudden increases occur, those have been shown to be causally related to increases in mortality and morbidity. Also, a growing body of evidence indicates that air pollution has delayed effects in the form of bronchitis and possibly lung cancer.

4. Agriculture and Food Production

Farming is the main livelihood of most people in LDCs. In many cases, however, agricultural production is insufficient to meet domestic food demands. A common reason is that only a fraction of the arable land is under cultivation. Production from the area in cultivation can be increased considerable by better management techniques in cultivating, draining and irrigating, fertilizing, using better varieties, pest control, and more careful harvesting and storage.

Agricultural production has shown large increases in recent years and there is considerable potential yet to be exploited. However, the increases in production are barely on par with the demand created by population growth.

An appraisal of the adequacy of increased production can be made by comparing food production with population increases (Table 4.1).

and waste in storage and transportation. Estimates are thus obtained of the quantity of food available for human consumption.

In the preparation of food balance sheets, the FAO uses all available statistics from countries on the production supply and utilization of foodstuffs. Such statistics ". . .vary a great deal between countries both in terms of coverage as well as in accuracy and, in fact, there are as many gaps particularly regarding the statistics of utilization for non-food purposes such as feed, seed, and industrial uses as well as those of farm, commercial, and even government stocks" (FAO, 1971:vii). Averaging out over a three year period is considered by FAO as overcoming some of this inaccuracy. Considerable improvement in accuracy can also be made through field surveys.

Consistency checks are used extensively in the preparation of food balance sheets. Food balance sheets then, while being less than statistically accurate in many cases, provide a good approximation of the food situation and may be used in economic and nutritional studies as well as in the preparation of development plans. FAO (1971:viii) also expresses the hope that ". . .through identification of major gaps in available data the improvement of national statistics at the source will be stimulated."

Classified under the heading of per capit food consumption in the balance sheets are estimates of per capit food supplies available for consumption for a given period in terms of quantity, caloric value, and protein and fat content (Table 4.2). In calculating caloric value and protein and fat content of per capit food supplies, various expert resources and food composition analysis standards are used.

FAO production yearbook: The FAO Production Yearbook contains annual data on many aspects of food and agriculture including population, index numbers of agriculture and food production, food supplies, prices, freight rates and wages. These data are supplied to FAO by governments in reply to an annual

Table 4.1. Food Production and Population Growth: Thailand

1. Total population: 1970

35,814,000

1948-52	1961-65	1966	1967	1968	1969	1970
19,652,000	28,950,000	31,698,000	32,680,000	33,693,000	34,738,000	35,814,000

2. Index of food production (Thailand):

1961	'62	'63	'64	'65	'66	'67	'68	'69	'70	'71
91	98	105	102	105	121	106	115	124	127	128

3. Total agricultural production:

1961	'62	'63	'64	'65	'66	'67	'68	'69	'70	'71
91	96	106	102	107	124	108	115	125	128	130

4. Per capit food production:

1961	'62	'63	'64	'65	'66	'67	'68	'69	'70	'71
97	101	105	99	98	111	94	99	104	102	100

5. Per capit total agricultural production:

1961	'62	'63	'64	'65	'66	'67	'68	'69	'70	'71
97	99	104	99	101	113	96	99	104	103	103

Source: FAO, Production Yearbook (1970), FAO: Rome 1971.

It appears that food production is inadequate to meet the minimum nutritional requirements of the population and, furthermore, the increases in agricultural production are largely offset by population growth.

In many countries the production and distribution of agricultural produce is further curtailed by inadequate marketing and distribution systems.

a. Data Sources

FAO food balance sheets: FAO first published its food balance sheets for 41 countries in 1949. In 1954 annual balance sheets were discountinued and three-year-average food balance sheets were substituted showing production, available supply, feed, and manufacture as well as per capit food supplies available for human consumption in quantity, caloric value, and protein and fat content.

A prewar World Food Survey (FAO, 1946) and two postwar World Food Surveys (FAO, 1952; FAO, 1963) were conducted in which ad hoc procedures were used in the preparation of balance sheets for some countries. The statistical information used in FAO's Indicative World Plan for Agricultural Development (FAO, 1969) was mainly derived from 1961-1963 average food balance sheets which were prepared for 64 developing countries.

FAO has extended the scope of its work on food balance sheets ". . .to meet the statistical needs of FAO's contribution to the review and appraisal studies for the second U.N. Development Decade" (FAO, 1971:vi). In view of this objective, food balance sheets for 132 countries were assembled for the 1964-1966 period.

Food balance sheets provide an outline of the stocks and flows related to the supply and utilization of foodstuffs during a given period. Making up the supply side are production, imports, and net changes in stocks. Use is categorized as export or domestic. Domestic use is divided between food and nonfood purposes. The nonfood category comprises feed, seed, industrial usage,

Table 4.2. Food Sources and Supply Per Capit: Thailand and United States

Year	Cereals	Potatoes Starchy & Other Staples	Sugars & Sweets	Pulses Nuts & Seeds	Vegetables	Fruits	Meat	Eggs	Fish	Milk	Fats & Oils	TOTAL
Thailand					Quantity							
1964-66	446	62	30	48	101	137	37	10	24	18	5	
Compare with U.S.A. (1963-65)	179	141	131	22	302	239	276	50	17	669	59	
Thailand					Calories							
1964-66	1605	66	119	130	20	73	83	15	37	17	43	2210
U.S.A. (1963-65)	652	97	505	103	72	99	598	72	26	400	520	3140
Thailand					Proteins							
1964-66	30	0.5	0.2	4.5	2.0	1.0	4.4	1.1	6.2	0.6	--	
U.S.A. (1963-65)	15.4	2.2	0.1	4.4	3.6	1.1	34.1	5.5	3.3	23.5	0.1	

	Total Animal Protein	Total Protein
Thailand 1964-66	12.3	50.5
U.S.A. (1963-65)	66.4	93.3

Source: FAO Production Yearbook (1970), FAO: Rome, 1971.

questionnaire. Where no official figures are available from particular countries, FAO makes estimates of area and production of major crops and livestock numbers and products. The publication of these estimates gives the countries concerned a chance to examine them, pass judgement as to their accuracy and if necessary, to propose revisions.

5. Income and Consumption

Those factors influencing the nutritional state of the population and those which determine socioeconomic development are closely interrelated. The quality and quantity of food consumed by a family is dictated by availability, cost in relation to income, acceptability, and the degree of development of the distributional structure in the economy.

Nutritional state is also influenced by the degree of literacy, cultural and religious taboos, development of environment sanitation, and the extent to which a cash economy has emerged, as well as the degree of urbanization. As family income increases, the diet will undergo some restructuring with the total expenditure on food increasing but the proportion spent on food tending to decrease.

The socioeconomic development index developed by the United Nations Research Institute for Social Development (1970) was compared with mortality rate in the age group 1 to 4 years and a strong inverse correlation was noted (FAO/WHO, 1971:48). It is inferred that malnutrition in this age group is closely related to family socioeconomic level.

6. Education

Only relatively recently has criticism been voiced at the absence of or low priority given to health and education in national development planning.

The interdependence of health and education can be demonstrated in many ways. If educational services are available or accessible to a child, his

state of health will determine how efficiently he can use such services if at all. Furthermore, the ability of potential labor force members to use their skills to their own and to society's advantage is dependent on the individual's state of physical and mental health.

The knowledge people have about health practices and their attitudes toward such practices determine the improvements that can be effected in health in any given time period. Pointing out that development in the areas of health and education depends largely on societal attitudes and institutions, Myrdal (1968:1535) expressed the view that only broad social reforms can bring about significant changes in health and education. In effect, then, health planning cannot be effective if it is attempted in isolation from the broader development process. Food production, education, population control, and reduced poverty--to mention but some of the factors--are intricately related to improved health status.

7. Housing and Shelter

Housing conditions in LDCs generally show great extremes in quality. These conditions range from the dilapidated shacks of subsistence farmers and the hurriedly constructed shelters of urban migrants to the quality housing of the rural and urban upper social classes. The use of mud walls and floors and thatched roofs is common among rural dwelling structures throughout many countries. Generally speaking, water and sewage facilities are inadequate and the contamination of food and water supplies through seepage of human wastes, insects, and rodents is a common occurrence. The lack of drainage around dwellings and stock houses results in stagnant water pools which provide a breeding ground for insects. Similarly, earthen walls and thatched roofs cannot be cleaned as adequately as other materials and thus they become havens for disease-carrying insects and animals.

Lack of lighting--either window openings for sunlight or artificial lighting--is also characteristic. Damp proofing in floors and walls is generally

nonexistent and construction materials are often flammable thus constituting a serious health hazard.

The often crowded unsanitary conditions in such housing, whether in rural areas or urban areas, provides conditions on which such diseases as tuberculosis thrive.

The U.N. (1962) proposes a number of indicators of housing conditions. These are divided into basic and supplementary, the former referring to generally accepted housing qualities such as protection against weather, the safeguarding of privacy, a protected water supply, and the provision of sanitary facilities. The supplementary indicators are designed to provide more detail on housing conditions with one an "index of dwelling construction in relation to estimated requirements." The total list of indicators outlined by U.N. (1962) is:

Basic Indicators

1. Percent of population living in dwellings
2. Percent of occupied dwellings with three or more persons per room
3. Percent of occupied dwellings with piped water inside the dwelling or outside the dwelling but within 100 meters
4. Percent of occupied dwellings with toilets

Supplementary Indicators

1. Percent of the population living in housing units classified as "rustic," "improvised," "not intended for habitation," or which is without shelter of any kind
2. Average number of persons per room (for occupied dwelling only)
3. Percent of occupied dwellings with flush toilets (urban)
4. Percent of occupied dwellings with toilets other than flush
5. Index of dwelling construction in relation to estimated requirements

These indicators are intended to be descriptive of "actual housing conditions as a component of levels of living" (U.N., 1962:1) and must be viewed within their context of climate, culture, degree of urbanization, and the demographic, economic, and social structure. No single one of these indicators provides adequate descriptive and analytical information on housing conditions.

In this sense the list should be viewed as a set.

The U.N. Statistical Yearbook tabulates data on housing for each country as follows:

A. Households

- Number
- Average size (persons per household)
- Tenure of household
  - percent owner occupants
  - percent renters

B. Conventional dwellings

- Total number
- Number occupied

C. Occupied conventional dwellings

1. Size
   - average size (rooms per dwelling)
   - percent of dwellings with:
     - 1-2 rooms
     - 3-4 rooms
     - 5-6 rooms
     - 7 rooms or more

2. Density of occupation
   - average density (persons per room)
   - percent of dwellings with persons per room:
     - less than 1.5
     - 1.5 or more
     - 2.0 or more
     - 3.0 or more

3. Facilities
   - percent of dwellings with:
     - piped water inside or outside
     - piped water inside
     - toilet (any type)
     - toilet flush
     - fixed bath or shower
     - electric lighting

Data for construction of indicators of housing conditions are obtained from (1) census of housing, (2) housing surveys, and (3) current housing and building statistics. Data are frequently reported missing for many of these classifications in the U.N. Statistical Yearbooks leading us to conclude that most countries do not have detailed data on their housing situations.

PART FIVE: INCOMPLETE DEMOGRAPHIC DATA

As outlined earlier in this report, the categories of statistical information required for comprehensive health planning are:

1. Demographic and vital statistics
2. Health statistics; information on:
   a. causes of death, morbidity
   b. distribution of health status
   c. environmental factors with influence on public health
   d. availability and utilization of health services
   e. health personnel, training facilities
   f. cost, by type of service provided

This section deals briefly with the problems of providing useful demographic and vital statistical information where data systems are incomplete.

Two types of information are essential for the description of the main demographic processes of populations and population subgroupings: stocks and flows. Stocks refer to the number of persons at a given point in time appropriately classified by characteristics (sex, age, socioeconomic status, and geographic area). Data of this type are collected in the census of population. Flows refer to events (births, deaths, and migrations) which change the population in terms of its size, structure, and composition as well as geographic distribution. Data on flows have been collected in developed societies through a system of vital registration.

The discussion throughout this report may give the impression that demographic data are generally available in most countries. This is far from the true situation. As Shryock and Siegel (1973:810) point out, the deficiency in demographic data may be seen as a part of underdevelopment, and significant progress toward better data is likely to occur only as a concomitant of general social and economic improvement. To purposively speed such development, it is necessary to make the best possible use of any available statistical information

and to attempt to improve and supplement it as it becomes feasible to do so.

The improvement of existing systems of social information in LDCs might be viewed as simply a matter of putting into operation the procedures in use in developed countries. However, many difficulties exist in such a transition, foremost of which is the great financial cost. Experiences in some LDCs would indicate that in many cases even if such expenditures were made, success in the shape of a reliable social information system may not logically follow. This is true because a high degree of voluntarism is required of such systems to operate effectively and to provide reliable information, and the reliability of a system of vital registration of any description is often viewed with suspicion even in developed countries. It is also recognized that even where census and vital registration systems are established these will be found wanting in relation to the more stringent standards required for description and analysis which social indicators are designed to address.

Further difficulties arise in constructing even simple indicators from existing census and vital records. For example, in the calculation of a mortality rate, the analytical usefulness of the rate will depend on how well we are able to disaggregate or delimit both the denominator (or population at risk) and the numerator (or number who actually died during a given period). It may be assumed that classification by sex will be common but classification by age will be much more difficult to find. For socioeconomic variables, this difficulty is likely to be even more pronounced. The reason for such discrepancies may be that vital registration and census enumeration are planned and administered quite independently. Required and corresponding classifications such as sex, age, and socioeconomic status may not be recorded in both sets of records or even when they are, they may be independently biased to such a degree as to limit their usefulness.

A. Interim Alternatives

Faced with such considerations interim alternatives to the more elaborate systems of vital registration must be sought if current and future planning is to be given the guidance it requires.

1. Sample Surveys

The obstacles to developing a system of social information based on combining census and vital records has tended to focus attention on using sample surveys together with census information or on sample registration systems with sample surveys.

In general, developing countries are more likely to have survey or census-type data than vital statistics. Census-type data will tend to be of better quality than vital statistics even where the latter are available (Swaroop, 1960; Waterston, 1969). This fact has resulted in considerable effort being expended by demographers toward the wider and more imaginative usage of census and census-type data.

The census gives essentially a cross-sectional view of the population and certain of its characteristics. However, some inferences about the dynamics of the population and its characteristics can be derived from census-type data provided data from one or more censuses are available. A further recent development in census-taking techniques is the use of recall-type questions (questions requiring recollection of events which have occurred in the past) in order to reconstruct the time sequence of intercensal events. In this way it is possible to approximate functions which would normally be provided by vital registers. The technique of developing longitudinal or flow-type data using cross-sectional procedures has long been used by survey researchers and would appear to have some possibilities in making greater use of censuses and census data. However, greater expense is incurred in eliciting retrospective information since large numbers of more highly skilled field

personnel are required because of the high incidence of illiteracy among the respondents in developing countries. In view of this, sample surveys appear to offer a more feasible solution to obtaining retrospective data. When carefully planned they can supplement and complement the census and in so doing may substitute temporarily for vital records.

The sample survey has several advantages over the census in the collection of recall or retrospective data. It is more flexible, easier to report, can have a humanly oriented content, can incorporate subjective elements, and produces usable data in a shorter time span at much less cost. In addition, where the sample design is valid for the total population, the findings can be generalized. All of these are important attributes, many of which are often lacking where the data are obtained from complete national censuses coupled with vital records of doubtful quality.

2. Population Registers and Panel Studies

Procedures other than limited or sample vital registration and survey techniques might be adopted where census and vital statistics data are inadequate or incomplete; examples are population registers and panel studies (i.e., surveys that are repeated over time using the same or similar samples of respondents). The limitations of these latter procedures both in terms of cost and information yielding potential are such as to relegate them to minor consideration. Thus the most feasible procedures appear to be: (a) those which use census or survey data alone and through demographic models and other analytical techniques generate information otherwise not available; and (b) the use of data from sample registration areas which may then be linked with cross-sectional data available from census or survey sources (Shryock and Siegel, 1973:812).

Where available data per se are insufficient, lacking, or defective, demographic models may be used as "tools of estimation." Shryock and Siegel

(1973:812) claim that ". . .the judicious use of models is indispensable in checking and adjusting data, in filling gaps in the available records, and in deriving reliable estimates from fragmentary pieces of evidence each of which may be defective if taken in isolation." Model life tables and model stable populations are particularly useful in this regard.

B. Demographic Models

1. Model Life Tables

The construction of life tables must be based on reasonably reliable data on age specific mortality. In developing countries such data are rare. In these circumstances life tables available for countries which may reasonably be assumed to have similar patterns of mortality might be used. Based on such a rationale, the United Nations (1955b and 1956) has documented a set of model life tables.

Coale and Demery (1966) developed four sets of regional model life tables, designated as "north," "south," "east," and "west," referring to the mortality patterns in distinct regions of the world. In each set are twenty-four tables with separate calculations for males and females. The decision as to which model to use is based on some substantive evidence that the country under study tends to have mortality characteristics approximating those of a particular model.

2. Model Stable Populations

If it can be realistically assumed that a population is stable based on the age structure and distribution observed in consecutive censuses, the stable population model permits the estimation of population characteristics where available demographic statistics are deficient. All available statistical information is used to construct a stable population and then values within the stable population are used as estimates of corresponding parameters in

the actual population. Shryock and Siegel (1973:816) state that the usefulness of this technique lies in the fact that a stable population can be constructed on the basis of fragmentary data and once such a model is developed and its parameters used as estimates of the real situation, it is possible to obtain ". . .a whole series of sophisticated measures for which no direct information exists at all in the actual population." It may, however, be difficult to approximate the real situation either because the available data are too deficient and fragmentary or because the stable model may be a poor representation of the actual situation. The latter can result from the effects of sex selective migrations or such unusual conditions as epidemics and wars even where fertility and mortality are constant. Much of what is known of world population trends and characteristics can be attributed to the development and use of model stable populations.

Procedures for devising model stable populations together with examples are found in Coale and Demery (1966) and United Nations Manual IV (1967b) as well as in Shryock and Siegel (1973).

Life tables are required in using stable population techniques but if data are so deficient as to require these latter techniques, it is unlikely that actual life tables will be available. Regional model life tables are most often used.

C. Methods of Estimation Based on Censuses and Surveys

1. Estimates Based on Two or More Censuses

In many LDCs vital records are seriously inadequate or lacking altogether. However, if these countries have conducted one or more censuses or if one or more demographic surveys have been taken, certain techniques can be used to measure dynamic aspects of population. Such techniques are contingent on the types of flows to be measured and on the type and quality of data available.

Vital rates may be estimated where population data are available for two or more censuses by observing the intercensal population growth rate and the survival rates. For example, if census data are available classifying the population by sex and age and if age classifications are by five year intervals, it will be possible to identify the members of a 5-year birth cohort surviving and hence the effect of mortality on the cohort assuming, of course, that migration has a limited or known effect. Estimates of vital rates based on two consecutive censuses require an analysis of the population by age distribution in both censuses so that age specific survival rates and population growth rates can be calculated.

Using data from two or more censuses alone, intercensal deaths for the population under 10 years (assuming a decennial census) cannot be accounted for. However, by using model life tables and assumptions based on the census enumerations, it is possible to estimate crude death rates and crude birth rates.

2. Retrospective Reporting

The use of retrospective census or survey reporting (i.e., the recording of information about events which have occurred during a past time period) on childbearing to estimate fertility is a very practical means of providing information on vital events. Data on vital events collected in this manner have a number of attractive features including low cost and the fact that vital events and the population at risk--the numerator and denominator, respectively, in rates or simple indicators--are linked on the one set of schedules. We have already indicated that the cost will be higher than that involved in a census without retrospective questions but because it supplies information on vital events as well, the cost in relation to overall information yield can be relatively low.

These attractive attributes of retrospective census and survey procedures are contingent on the accuracy of recall data. In the process of recall, the respondent may have some difficulty in locating events in time so that under- or over-reporting for a specific time period may result. This will be especially true of births. A technique is, however, available (Brass, 1968) for estimating the average time distortion in reporting. In respect to deaths an additional bias is introduced because of the differential importance attached to deaths of individuals depending on several of their attributes and characteristics, especially age. Also duplication of retrospective death reporting is likely since, unlike reporting of births where only women of childbearing age supply information in relation to themselves and their children, any of a number of respondents may report the death of a particular relative.

Questions used in retrospective reporting on fertility for women over 15 years of age refer to number of births occurring during a specified time, number of children still alive, and number of children ever born. A measure of child mortality can thus be obtained but is likely to be characterized by under-reporting. A method is, however, available (Brass, 1968) through which correction can be made for bias and transformation of such information into a more conventional mortality index can be achieved.

Fertility may be estimated from data on child mortality and the age distribution of children and, with more detailed retrospective questioning, pregnancy histories can be outlined. In this fashion estimates of fertility and mortality may be obtained.

D. Data Requirements for Censuses and Surveys

Censuses and surveys are often designed according to descriptive administrative requirements and their substantive content and data tabulation and publication formats may not lend themselves to the analysis of key development problems. Available census and survey data must meet certain minimum criteria

in order to be useful. We have already indicated that many of the deficiencies in census and survey data in relation to analytical requirements are a result of lack of coordination between the purposes for which surveys and censuses are designed and the purposes for which demographic data are being increasingly required. In some cases it may be relatively easy to rectify this deficiency.

It is important that data collection procedures be designed to allow the same indicators to be constructed using alternative methods, and that it be possible to use checks within the methods themselves (Shryock and Siegel, 1973: 832) like, for example, being able to estimate and compare male and female birth rates.

For the estimation of vital rates using census or survey data, it is possible to outline minimum required classifications. These are (Shryock and Siegel, 1973:832):

1) Population by age, sex, and marital status;

2) Women by age; and total number of children born alive for each age group of women;

3) Women by age; and total number of children living, for each group of women.

There is no universally valid set of subdivisions or categories in addition to these that should be sought. However, it is recommended (U.N., 1967a and 1964) that data allow subdivision by geographic area, socioeconomic status, and by such social demographic categories as race, religion, and language.

E. Sample Registration

Sample registration is one way of obtaining the required detail. It may be designed so that it is representative of the entire population. In that case it can yield estimates of vital events in the total population. Since the number of skilled personnel needed to operate such a system can be rela-

tively small, only the most competent staff need be hired and the system can operate relatively economically. However, census and survey-type data on population stocks are needed to complement sample registration data for analysis of social concerns.

Some of the data obtained in sample registrations are also obtainable through sample surveys and censuses, and thus it may be possible to do some cross-checking of data provided the systems of data collection operate independently.

F. Long-Term Demographic Data Requirements

Where vital records are incomplete or deficient the most economical and timely approach to development of indicators of vital events will be through estimation procedures using census and surveys. The development of measures in such a fashion constitutes an interim procedure which can yield valuable trend information. But analytical studies on health, for example, require in many cases much more detailed data on age and cause-specific death rates, much of which can only be accurately obtained from a continuous vital registration system in combination with census and survey data.

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Appendix
Table 1. Health Status and Health Services: Indicators by Substantive and Sociodemographic Classifications and Data Sources.

Health Concern	Indicator Descriptor	Social Indicators	Substantive Classifications	Sociodemographic Classifications	Data Sources
		A. Health Status of the Population			
Life expectancy	Cohort estimates	Expected years of life at birth and at 50 years of age, according to sex: total population, urban and rural areas, national and ethnic origins, socio-economic classes		Age and sex, urban and rural areas, national and ethnic origins, and socio-economic classes	Census, vital records, and model life tables
Mortality	Incidence (Infant)	Number and rate per 1,000 persons at risk; standard-ized for sex of neo-natal and post-natal deaths according to cause: total population, urban and rural areas, national or ethnic origins, socioeconomic classes	Cause of death	Sex, urban and rural areas, national and ethnic origins, and socioeconomic status	Census, vital records, and institutional and health care personnel records
	Incidence (General)	Number and rate per 1,000 persons at risk; standard-ized for age and sex of deaths according to cause: total population, urban and rural areas, national and ethnic origins, socio-economic classes	Cause of death	Age and sex, urban and rural areas, national and ethnic origins and socio-economic classes	Census, vital records, and institutional and health care personnel records

Appendix
Table 1. cont. Health Status and Health Services: Indicators by Substantive and Sociodemographic Classifications and Data Sources.

Health Concern	Indicator Descriptor	Social Indicators	Substantive Classifications	Sociodemographic Classifications	Data Sources
		A. Health Status of the Population			
Morbidity-disability	Incidence and prevalence	Number and rate per 1,000 persons at risk standardized for age and sex, persons with limitation of activity due to chronic condition according to type of condition, bed disability and restricted activity according to broad classification of diseases and injury: total population, rural and urban areas, national and ethnic origins, socioeconomic classes	Type of chronic disability or condition, acute infections and non-infectious illness, and injuries	Age and sex, urban and rural areas, national and ethnic origins and socio-economic classes	Surveys, institutional and health care personnel records
	Prevalence (mental illness)	Number and rate per 1,000 at risk of mentally retarded according to degree of retardation and age and sex	Degree of mental illness	Age and sex	Surveys, institutional and health care personnel records

Appendix
Table 1. cont. Health Status and Health Services: Indicators by Substantive and Sociodemographic Classifications and Data Sources

Health Concern	Indicator Descriptor	Social Indicators	Substantive Classifications	Sociodemographic Classifications	Data Sources
		A. Health Status of the Population			
Malnutrition	Incidence and prevalence	Number and percentage of population showing clinical signs of malnutrition by type for age and sex: total population urban and rural areas, national and ethnic origins, socioeconomic classes	Clinical or other signs of malnutrition by types	Age and sex, urban and rural areas, national and ethnic origins and socioeconomic classes	Health and nutrition surveys, institutional and health care personnel records

Appendix
Table 1. cont. Health Status and Health Services: Indicators by Substantive and Sociodemographic Classifications and Data Sources.

Health Concern	Indicator Descriptor	Social Indicators	Substantive Classifications	Sociodemographic Classifications	Data Sources
B. Availability and Use of Health Care Facilities, Services, Personnel					
Availability: Availability of health personnel	Number and rate at specific date Gains or losses since previous year	Number and rate per 1,000 persons at risk of professionals, subprofessional, paramedical and auxiliary personnel (by specific types e.g., doctors, dentists, nurses, midwives): total population, urban and rural areas, and geographic and administrative areas	Health personnel by type or specialization	Urban and rural areas and geographic areas	Census Records of licensing and registration Registers of professional personnel
Availability of health facilities and services	Number and rate of specific date Gains or losses since previous year	Number and rate per 1,000 at risk of 1) inpatient care facilities (beds) and 2) outpatient care facilities (health centers, stationary and mobile clinics): total population, urban and rural areas, and geographic and administrative areas	Health facilities and services by types	Urban and rural areas, and geographic areas	Records of federal, provincial, local voluntary national agencies Institutional records (e.g., hospital entry & discharge and clinics & outpatient services) Practitioner records Household surveys

Appendix Table 1. cont. Health Status and Health Services: Indicators by Substantive and Sociodemographic Classifications and Data Sources.

Health Concern	Indicator Descriptor	Social Indicators	Substantive Classifications	Sociodemographic Classifications	Data Sources
B. Availability and Use of Health Care Facilities, Services, Personnel					
Use: Institutional (inpatient) health care	Incidence (usage during year)	Number of patient days, rate of admission per 1,000 persons at risk standardized for age and sex according to broad classifications of diseases and injuries: total population, urban and rural areas, national or ethnic origins, socioeconomic classes	Type of service (including specialty) No. of patient days Rate of admission No. of days per admission Type of chronic disability Type of acute infectious & noninfectious illness Mental illness Type of injury	Age and sex, urban and rural areas, geographic areas, national and ethnic origins, socioeconomic classes	Records of federal, provincial, local voluntary national agencie Institutional records (e.g., hospital entry & discharge and clinics & outpatient services Practitioner records Household surveys

Appendix Table 1. cont. Health Status and Health Services: Indicators by Substantive and Sociodemographic Classifications and Data Sources.

Health Concern	Indicator Descriptor	Social Indicators	Substantive Classifications	Sociodemographic Classifications	Data Sources
B. Availability and Use of Health Care Facilities, Services, Personnel					
Use: Institutional (outpatient) health care	Incidence (use during year)	Number and rate per 100,000 at risk of outpatients by chronic disability, acute illness, injury, other: total population, urban and rural areas, national and ethnic origins, socioeconomic classes	Kind of service including specialty Chronic disability, acute illness, injury, and other	Age and sex, urban and rural areas, geographic areas, national or ethnic origins, socioeconomic classes	Records of federal, provinciai, local voluntary national agencies Institutional records (e.g., hospital entry & discharge and clinics & outpatient services) Practitioner records Household surveys

Appendix
Table 1. cont. Health Status and Health Services: Indicators by Substantive and Sociodemographic Classifications and Data Sources.

Health Concern	Indicator Descriptor	Social Indicators	Substantive Classifications	Sociodemographic Classifications	Data Sources
B. Availability and Use of Health Care Facilities, Services, Personnel					
Use: Noninstitutional health care	Incidence (use during year)	Number and rate per 100,000 at risk of individuals cared for in office and/or home by health personnel by type or specialization (doctors, midwives, dentists, nurses): total population, urban & rural areas, national or ethnic origins, socio-economic classes	Chronic disability, acute illness, injury, and other	Age and sex, urban and rural areas, geographic areas, national or ethnic origin, socio-economic classes	Records of health care personnel Household and health surveys
	Average cost per person per year	Per capita consumption expenditure on medical care and health: total population, urban and rural areas, national & ethnic origin, socioeconomic classes		Urban and rural areas, national and ethnic origins, socio-economic classes	Household and health surveys Government estimates