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Social indicators for the monitoring  
of the nutritional aspects  
of societal well-being

by

William Alexander McIntosh

A Dissertation Submitted to the  
Graduate Faculty in Partial Fulfillment of  
The Requirements for the Degree of  
DOCTOR OF PHILOSOPHY

Department: Sociology and Anthropology  
Major: Sociology

**Approved:**

Signature was redacted for privacy.

**In Charge of Major Work**

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## CHAPTER 1. INTRODUCTION

Recent years have witnessed an accelerating demand made on the social sciences, and in particular on sociology, by policymakers and planners for improved measurement of social conditions and social problems. Planning journals, research reports, and governmental documents are filled with references to the need for social accounts, societal monitoring, descriptive reporting, or more generally, for "social indicators." The desire for better social measurement is world-wide in scope, and is supported by governments and academia alike. Social indicator research efforts have been promulgated in such "more developed countries" as the United States, Britain, France, Japan, and Finland; in such "less developed countries" and territories as India, Hong Kong, the Philippines, and Thailand; and by such international organizations as the United Nations family of organizations (e.g., FAO, ILO, etc.), the Organization for Economic Cooperation and Development, the Conference of European Statisticians, the Conference of Asian Statisticians, and the Bariloche Foundation of Argentina.

Subsequent activities designed to meet the demand for improved social information have reached such a level of breadth and intensity that it is now referred to as the "social indicators" movement.<sup>1</sup>

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<sup>1</sup>Precursors of the present-day social indicator movement are the attempts to monitor social change in American society during the early part of the century (President's Research Committee, 1933) and the various efforts to distinguish among levels, degrees, and standards of consumption, living, and well-being (Kozlik, 1944; Hagood and Ducoff, 1944; Ad Hoc Subcommittee on Rural Levels and Standards of Living, 1956; Food and Agriculture Organization, 1949).

### Nature of the Demand

The measurement of social phenomena is of historical interest among scientists. What distinguishes the current interest from more traditional concerns is the sense that social statistics are urgently needed if humankind's efforts to develop humane, tolerant societies are to succeed.

The social indicators movement is supported by two distinct groups. The first contains those social scientists who reflect a renewed interest in the conceptualization and measurement of social change (Sheldon and Moore, 1968:1). In sociology, the recognition that the static models and dichotomous descriptions of change sequences have caused such noted scholars as Reinhard Bendix (1967), S. N. Eisenstadt (1968; 1973), and Kenneth Land (1972) to call for new approaches to the understanding of societal change and development, and Huntington (1965) documents a similar concern among political scientists.

The sustaining force within the social indicators movement, however, lies in the second group, made up of policymakers, planners, and applied social scientists who look upon the current state of social measurement for their purposes as rather dismal. Without better social measurement, the rationality, insightfulness, and effectiveness of social plans and policies are substantially restricted (Walters, 1972:8). This dissatisfaction has been expressed in a number of reassessments of the progress of social policies in the United States.

To begin with, there is a general awareness of a notable lack of success in the attainment of many national goals. The National

Commission on Technology, Automation, and Economic Progress, after studying the pace and impact of technological change on production, employment, and human needs found that human needs in the United States, despite extensive social and technical change, were still being inadequately met. Part of the reason for this poor performance is a lack of adequate information to determine social needs, goals, and progress toward goals (1966:95). In order to provide the required information, the Commission recommended considerations of a system of social accounts to determine needs, set goals, and measure performance. The integration of need-assessment, program performance, and social cost would provide a "balance sheet" by which to judge policies (1966:96-97).

The need for a balance sheet or system of social accounts for the assessment of policy is echoed by Gross (1966a; 1966b) and Terleckyj (1970; 1973). Gross has attempted to develop a system's model of society, outlining its structure and performance elements, and suggesting the social statistics or indicators required to assess the degree to which society meets its goals. Terleckyj, on the other hand, has limited his approach to a cost/benefit analysis of United States government social programs and the determination of the interrelation of national goals.

A second factor in the reassessment of national progress has been the increasing perception that the single-minded pursuit of economic goals and the consideration of basic social problems as largely a matter of welfare rather than development policy, leads to undesirable second order consequences. Berliner (1972) describes the unintended

consequences of narrow policies as "social thalidomide," generally resulting from the effects of development in one institutional area on another. Thus unrestricted governmental activities may eventually stifle economic growth. Additionally, narrow goals have had disastrous effects on the environment upon which human beings depend for their survival. The desire for social indicators which would monitor the secondary and tertiary consequences of human activity was one of the original driving forces in the social indicators movement, and current efforts to construct "impact" indicators are reflected in the work of Land (1972), Wilcox et al. (1973), and Laszlo et al. (1973). As yet, however, actual impact indicator construction has been limited to environmental indicators such as water and air pollution indices, and measures of the social consequences of television viewing on children (Laughlin and Penny, 1971; Greenberg, 1972).

Finally, U.S. Congressman Walter Mondale and Fred Harris have expressed a desire to see a greater input of social scientific knowledge into policymaking and planning activities (Harris, 1973). Mondale has on several occasions sponsored a bill in Congress which would institute a Council of Social Advisors in order to provide the President with information analogous to that produced by the Council of Economic Advisors. Through social reports the Council would:

provide a clear and precise picture of whether such conditions [general welfare; the opportunity to live in decency and dignity] are promoted and encouraged in such areas as health, education and training, rehabilitation, housing, vocational opportunities, the arts and humanities, and special assistance for the mentally ill and retarded, the deprived, the abandoned, and the criminal, and by measuring progress in meeting such needs (United States Senate, 1967:1-2).

Although Mondale's bill has yet to be passed by Congress, and the former Nixon administration was generally opposed to a Council of Social Advisors, the basic social information proposed by the Mondale bill has begun to be organized and published in a series of reports under the direction of the White House Office of Management and Budget (OMB). The first report entitled Social Indicators--1973 has been released and the second in the series will appear sometime in 1976. These reports are essentially statistical compendia in tabular and chart form which provide descriptive information concerning "areas of social concern" and specific "social concerns" within those areas. An example of an area of social concern is "health," and social concerns within health include life expectancy and disability.

Within these broad proposals for social indicator establishment and usage, a number of specific roles that social indicators are expected to play can be identified. These roles, for the most part suggested by government policymakers, planners, and statisticians, are listed as follows:

1. Set goals for policies and plans (U.S. Department of Health, Education and Welfare, 1969:iii; National Commission on Technology, Automation, and Economic Progress, 1966:xiv; Senate Bill S.843, 1967:974; National Science Foundation, 1969:xi).
2. Serve as an accounting system for the determination of the social and economic costs and benefits of social programs (Gross, 1966a:162-163; Stone, 1971:17; Senate Bill S.843, 1967:974; Cohen, 1968:14).
3. Measure the degree of goal attainment of specific national goals (Biderman, 1966:89; Bauer, 1966:1; United Nations Economic and Social Council, 1974a:2).

4. Serve as statistics for program and project evaluation (National Commission on Technology, Automation, and Economic Progress, 1966:78).
5. Measure the secondary and tertiary consequences of economic and social policies (Bauer, 1966:1; Girardeau, 1972b:189; Wilcox et al., 1973:28).
6. Detect and monitor social problems and determine their rate of change in order to better inform policymakers and planners (W. Cohen, 1968:14; Moser, 1973:2; Economic Planning Agency of the Japanese Government, 1972:viii; U.S. Department of Health, Education and Welfare, 1969:xii).
7. Provide descriptive reports concerning the state of the nation, including basic conditions and problems, through basic improvements in the information base of society (Duncan, 1969:7; Shiskin, 1973:61; Girardeau, 1972a:231; Sheldon and Freeman, 1970:8-9; Moser, 1973:2); Economic Planning Centre of Finland, 1973:4).

Sociological Problem: The Limitations of Social Indicators

#### Usage

Social indicators have thus been embraced as an overall panacea for all of the problems of social measurement heretofore associated with the measurement of social change, especially in its applied aspects, by those involved and interested in both pure and applied research. Were social indicators research able to meet all the expectations of its supporters, social measurement would be far less a problematic for social science.

As social indicator research has progressed, however, it has become increasingly clear that the part that social indicators may play in the formulation of policies and plans is far more narrow than was originally anticipated. In essence, in a number of areas, social indicators have been

expected to substitute for the more basic research and statistical reform that is needed (Land, 1972; Sheldon and Parke, 1974; Moser, 1973). It is now clear that social indicators are not goal-setting devices. It is through the policymaking process, which includes the use of statistical information among a variety of informational inputs, that goals are formulated. Also, it is generally accepted among a majority of social indicator proponents that social indicators are no substitute for the experimental design required for project and program evaluation. While social indicators might be used as variables in a controlled experiment, the need for experimental and control groups and before/after treatment measurement is undiminished. Finally, social indicators cannot serve in a system of social accounts until a model of society, specifying the critical relationships among its subunits has been specified (Sheldon and Freeman, 1970). Despite the recent attempts by Berliner (1972), Gross (1966b), Kuhn (1963; 1974), and others no such model is presently available.

#### Scientific status

The greatest weakness of the social indicator movement, however, lies not with the expected usage of social indicators, but rather in their basic status as scientific concepts. A social indicator serves essentially the same function as does any variable: it is one of several intermediate links in a logical chain formed between the empirical and the theoretical. Because of this linking function, the formation of a social indicator must take into account both theoretical and empirical requirements. An indicator, therefore, must reflect a

broader, more abstract concept or set of concepts, while at the same time representing measurable phenomena. For example, urbanization is a rather abstract concept contained in the "mobilization" theories of modernization (e.g., Lerner, 1958; Deutsch, 1961), and it generally refers not only to the shift of population from rural to non-rural settings but also involves significant changes in social institutions, in particular that of kinship. Thus "urbanization generally involves a significant transformation of the family from the larger kinship units normally associated with agrarian life to the much smaller nuclear family consisting only of parents and younger children" (Black, 1966:21). The term urbanization thus summarizes a complex process of the geographical relocation of persons and the associated changes in the social organization of those persons. In empirical terms, the indicator or variable "urbanization" is normally considered far less broadly, restricting the empirical concern to the more easily measured aspects of the urbanization process: the movement of population. An indicator of urbanization is most often found to be "urbanization rate" or the growth of the urban population relative to its growth in rural sections.

Problems of theory      An examination of the various definitions given for social indicators in current literature demonstrates an inadequate concern for the theoretical requirements associated with their construction.<sup>1</sup> Definitions either disregard the abstract content

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<sup>1</sup>Irwin Deutscher (1974) recently echoed this concern for the inadequate grounding of social indicators in social theory at the Eighth World Congress of Sociology's roundtable discussion of social indicators.

of social indicators (for instance, refer to Kamrany and Christakis, 1969:208), suggest that their content is "normatively" determined (e.g., U.S. Department of Health, Education and Welfare, 1969:iii), or propose that they reflect an ill-defined entity called the "quality of life" (Andrews, 1974:2; Environmental Protection Agency, 1973:I-7). Several researchers, notably Land (1972), Allardt (1973c), and Wilcox et al. (1973; 1974c), have expressed the need to link indicators with theory in order to give them meaning and validity, and these expressions have largely been restricted to suggestions rather than actual efforts. Wilcox and his colleagues have proposed, for instance, a theoretical perspective from which indicators were then deductively derived, but this work is still highly tentative.

Problems of data Social indicators serve to monitor social change by measuring both the slowly evolving alterations and the radical shifts in the processes and structures of society. Significant evolutionary changes in these basic structures are generally reflected in major trends which may require decades to be identified. William F. Ogburn's studies of social and cultural changes in America, undertaken during the 1930s and 1940s, lead him to conclude that such changes occur slowly and smoothly and are often undetectable until the alteration has become sufficiently institutionalized to have affected a number of areas of human behavior (1964:105). More recently, curve fitting of data pertaining to technological innovation over time by Martino (1972) suggests that even in that segment of culture which is thought to change most quickly, the rate change cannot be estimated without using data accumulated over 40 to 80 year time periods.

While many definitions stress the statistical, disaggregatable, and time series nature of social indicators (e.g., Andrews, 1973; Sheldon and Freeman, 1970; Wilcox et al., 1973), current social indicator research projects have ignored the time series requirements, concentrating instead on correlations, path coefficients, or means and dispersions, and types of categories on the basis of which meaningful disaggregations should be made. The assumption generally made by these researchers is that the time series requirement can be met through the use of existing statistical series; or if their work requires data collection in addition to that contained in existing series, the assumption is that the social, political, technical, and economic means for generating new statistical series are readily available (Wilcox et al., 1974c:5).

Assessments of existing statistics, however, indicate that these often do not adequately reflect social conditions as they actually exist. Bauer (1966) notes that crime statistics do not cover all types of crime; furthermore, apathy and a sense of futility on the part of as many as half the victims of criminal activity causes the crimes in question to go unreported. Morganstern (1963) also reports that government employment statistics, aggregated to represent large portions of the population, can mask high rates of unemployment among various subgroups contained in large population blocks.

Other researchers point to the unreliability of some existing series (Lehman, 1971) and to the politization of still others (Keller, 1973; Hauser, 1969). Researchers proposing essentially new statistical series include those concerned with the perceptual and attitudinal aspects of

"life quality" and those interested in measuring social change for basic scientific rather than more applied purposes. Thus Andrews (1974), Shanks (1971), and Duncan (1969) have proposed that the mechanism for collecting, collating, and analyzing new statistical series be instituted to measure such concerns as "perceived life quality," attitudes related to "ethnic prejudice," and "occupational mobility." Unfortunately, the institutional mechanism, including the means for recurrent funding, has yet to be established for such indicators in order to generate the necessary long-term trend data.

Much of the methodological work carried out in social indicator research has been more related to technique and its application rather than to the basic statistical groundwork so urgently required. Instead of reasonable proposals for statistical reform, the methodological work has largely dealt with the use of path analysis and index construction (e.g., Anderson, 1972; 1973; United Nations Educational, Scientific and Cultural Organization (UNESCO), 1972).

#### Nutrition as an Area of Social Concern

The greatest strides towards constructing a set of social indicators which would provide information concerning the state of and changes in societal conditions have been made by that research carried out under the "social concerns" rubric. A good deal of the current research in social indicators, in fact, centers on the areas of social concern and sub-concerns discussed earlier. Those taking this approach include the U.S. Office of Management and Budget, the Organization of Economic Cooperation and Development (OECD), and the Development Academy of the Philippines

(DAP) among others. Areas of social concern are said to include the basic goal areas around which the activities of society are organized (Tunstall, 1970:108). A close examination of these concerns reveals a great similarity between the areas of social concern and what have been identified by physiologists, psychologists, and sociologists as the "basic needs" of human beings (Cannon, 1939; Maslow, 1954; Etzioni, 1968b). This approach can thus be legitimately said to be based on scientific theory.

The object of study of this dissertation is human nutrition, which is frequently included in lists of social concern, under health or consumption. Human nutrition is an area of social indicator research whose social nature and associated measurement have generally gone unspecified. The assumption seems to be that nutrition's importance for human well-being is self-evident, and that the methodological problems involved in measuring nutrition and its social consequences are relatively minor.

Even a cursory review of recent literature on economic and social development and on nutrition will demonstrate that these theoretical and methodological problems are by no means negligible. While there is an extensive body of knowledge concerning the effect of attitudes and values on food consumption (refer to Dwyer and Mayer, 1970; Burgess and Dean, 1962; Wakefield and Miller, 1971; Mead, 1955 for examples), the interactive consequences of nutrition and social life have only begun to be examined. Early evidence, however, indicates that an individual's nutrition status has very real consequences for his well-being and on his ability to participate as a functioning member of society.

While the work of the United Nations Economic and Social Council and OECD on developing matching social indicators for social concerns has been impressive, their and other efforts taking the social concerns approach contain two basic, interrelated deficiencies. First, the social nature of nutrition and other "social" concerns is not clear; and second, the level of analysis of nutrition and other social concerns is restricted to the individual.

### Social nature

Nutrition and other social concerns such as housing, health, and clean air and water at the outset hardly seem "social" in a sociological sense. These pertain to individual physiological well-being, and there appears nothing social about them. Other social concerns seem limited to individual psychology, again raising the question of the appropriateness of the label "social."<sup>1</sup>

Nutrition and other social concerns, as was mentioned earlier, reflect needs of human individuals. Examination of these concerns from the standpoint of the human behavior associated with need satisfaction reveals their social nature. Behavior directed at the reduction of social, psychological, or biological tension produced by some unmet need is almost always ultimately social in character. Gerge Hebert Mead, in his classic Mind, Self and Society, clearly perceived the pertinence of viewing behavior associated with human needs as social:

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<sup>1</sup>Aware of this limitation in its own work, recently the OECD's Social Indicator Working Party has retitled its list of social indicators to be called indicators of "individual well-being" (Organization of Economic Cooperation and Development, 1974).

The behavior of all living organisms has a basically social aspect: the fundamental biological or physiological impulses and needs which lie at the basis of all such behavior--especially those of hunger and sex, those connected with nutrition and reproduction--are impulses and needs which in the broadest sense, are social in character or have social implications, since they involve or require social situations and relations for their satisfaction by any given individual organism; and they thus constitute the foundation of all types or forms of social behavior, however simplex or complex, crude or highly organized, rudimentary or well-developed (1934: 227-28).

Much of everyday socially organized behavior relates to the need for nutrition, as humans must regularly ingest nutrients important for their health and survival. These activities include producing, purchasing, preparing, and eating of foodstuffs, all of which are group activities.

A concern such as nutrition can further be considered social by taking the same general frame of reference developed by Durkheim to deal with social life. For Durkheim the primary concern of sociology is social fact or those phenomena which are external to the individual, objective rather than subjective, and which serve to constrain any deviation of individual acts from expected patterns of behavior (Nisbet, 1974:55-56).

In particular, Durkheim applied his frame of reference to suicide or individual self-destruction. Basically, suicide appears to be an individual act, psychological and physiological in character. He found by viewing suicide in aggregate form, or as the property of a collective, that its frequency was no longer readily explainable by individual motivation but was rather social in origin:

If, instead of seeing them [suicides] only as separate occurrences, unrelated and to be separately studied, the suicides committed in a given society during a given period of time are taken as a whole, it appears that this total is not simply a sum of independent units, a collective total, but is itself a new fact sui generis, with its own unity, individuality, and consequently its own nature--a nature, furthermore, dominantly social (1897 original; 1951:46).

Human nutrition, taken as a phenomena affecting particular individuals, is physiological in nature. Seen as an aggregate, affecting particular groups or societies, human nutrition becomes social in character. From such a perspective, nutrition like suicide appears as a group characteristic, caused by as well as affecting other group characteristics. Just as suicide is related to familial relationships, nationality, religion, and sex (Durkheim, 1951), nutrition is related to social class, ethnicity, urbanization, income, and social competence (Kallen, 1971). Methodologically, then, human nutrition will be taken as an analytical property of a collective, made up of individuals, in the sense of Lazarsfeld and Menzel (1969). An analytical property is a characteristic of all members of a group with the same or similar characteristic. In the case of nutrition, nutrition status would be a differentiating analytical property among various social collectivities.

#### Level of organization

Limiting the development of social indicators to what are essentially concepts drawn from human need theories effectively restricts social indicator research to the individual level. A good deal of support for social indicators, however, has come from those wishing to measure change in social structure, particularly societal level social structure.

Sheldon and Moore, in their influential Indicators of Social Change, state that the purpose of social indicators is to measure changes in the basic structural components of society (1968:4). More explicitly, such measurement is seen to include alterations in the following societal characteristics:

(1) the demographic basis, including population magnitudes and geographic distribution; (2) major structural components, including the production of goods and services, the labor forces, knowledge and technology, the family and kinship, religion, and the polity; (3) distribute features, including consumption; (4) aggregative features, including social stratification and mobility, and cultural homogeneity and diversity (Sheldon and Moore, 1968:4).

Allardt basically supports the contention that social indicators should primarily measure levels of individual well-being, but also stresses that indicators of institutional and structural change such as differentiation and conformity as well as measures of the outputs from activities undertaken to attain societal goals (e.g., increased political participation or less international dependence) must also play an important part in a system of social indicators (1973c:261).

Few social indicator efforts to date, however, reflect the broadness required to study societal change. A number of writers have pointed to the fact that the discipline of sociology has few comprehensive theories to draw upon (Moser, 1973; Sheldon and Freeman, 1970). Furthermore, the relevance of many of the middle-range or partial theories in sociology for social indicator research has been questioned (Wilcox et al., 1974c; Sheldon and Freeman, 1970). While it is true that many of the "grand" theories are incomplete and overly abstract, there are several broad perspectives that would serve as organizing frameworks and a number of

complementary middle-range theories which, taken together, would form an over-arching societal perspective useful for indicator identification. Allardt (1973c) takes this approach in drawing upon Etzioni's model of the "active society" and Maslow's "need hierarchy" to develop social indicators, while Wilcox and associates (1974c) have suggested a functional model of society, based on Parsonian functionalism, motivational behaviorism, homeostatic physiology, and social evolution. These approaches, however interesting, are highly formative and do not represent the majority of social indicator research efforts to date.

What seems most needed is an over-arching perspective which would allow the integration of the individual and collective aspects of such concerns as human nutrition with the structural consequences of these concerns. There is evidence that nutrition status affects production, social relationships within the family, and educational performance (Berg, 1970), as well as the size and characteristic of the demographic base (Millikan, 1969), but this evidence is nowhere unified by a single theoretical framework.

Having briefly explored the social nature and level of organization of human nutrition, the questions of data requirements and data generation constraints remain.

#### Data requirements

Most of the lists of social concerns and accompanying social indicators that include nutrition suggest "calories" and "proteins" per

capita per day as the indicators<sup>1</sup> (FAO, 1949:29; United Nations Economic and Social Council, 1974a:Annex, 13; Drewnowski, 1971:63; Economic Planning Agency of the Japanese Government, 1972:28). These recommendations are made apparently unaware of the trenchant criticisms made of both the indicators themselves and the data series upon which they are based. As will be discussed in the chapter on measurement, protein and calorie intake measures do not accurately reflect the nutrition status of societal subgroups for they are based on national averages; at the same time, they are poor indicators even for the national level, for they are almost always based on inaccurate data. Protein and caloric intake figures are generally derived from food balance sheets which in essence utilize national foodstuff production figures, after adjusting for imports and exports, to estimate what is available for consumption. Availability does not give the same level of information as do statistics that estimate the actual consumption of calories and proteins by income, sex, age, ethnicity, and regional categories. Consumption by these categories is obtainable through general household surveys in which items that pertain to food consumption are included or from national nutrition surveys. These general surveys, however, lack the depth of inquiry necessary to obtain an accurate estimate of consumption, as they are largely based on household members' perceptions of the amount consumed instead of actual food analysis by experts. National nutrition surveys,

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<sup>1</sup>To the author's knowledge, only the Development Academy of the Philippines (1974) has considered more direct measures of nutrition status as social indicators.

unlike basic household and census surveys, are excellent in their converge of consumption and more direct physiological measures of nutrition status. Such national surveys have in most cases, however, only been carried out once in a given society, eliminating their present usefulness as a source of time series data.

Furthermore, if human nutrition is in fact a social fact, the measurement of the social conditions that produce human nutrition as well as its reciprocal effects on those conditions must also be considered within the scope of social indicators.

The empirical questions surrounding the construction of social indicators for such social concerns as human nutrition are thus by no means resolved.

In summary, there are numerous theoretical and empirical problems that must be successfully solved if social indicators of human nutrition (and, other social indicators as well) are to be valid, meaningful, and operational tools which can serve as inputs into policymaking and planning. This dissertation is not being written under the pretext of providing a solution to all the ills of social indicator research, but it does purport to suggest solutions to several of the problems discussed above with regard to nutrition.

#### Objectives of the Dissertation

The primary objective of this dissertation is to develop the theoretical and empirical basis for dealing with human nutrition as an area of social concern. The social content, the methodology for measurement, and possible data sources required in the construction of social

indicators for human nutrition will be discussed. In order to deal with the theoretical problems of social nature and level of analysis, a general perspective of society and societal development will first be formulated. Following this perspective, a brief discussion of the role of social indicators as background information for the formulation of policies and plans is provided. In developing this perspective the sociological theories of Parsons, Mayhew, and others as well as general analogies from general systems theory and cybernetics are presented. Finally, the general perspective will be applied to nutrition, and the operational requirements for monitoring nutrition for policymaking and planning purposes will be detailed.

It should be noted that the discussion of nutrition will largely be directed toward nutrition conditions in the less developed countries (LDCs), as the research under which this dissertation is undertaken is concerned with social indicator construction for these countries.<sup>1</sup> However, many of the arguments made herein also apply to the industrialized nations or the "more developed countries" (MDCs).

More specifically, the objectives of the dissertation may be stated as follows:

General Objective 1: To outline a theoretical perspective by which the social nature of social concerns such as human nutrition may be ascertained.

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<sup>1</sup>The research discussed in this dissertation is in part based on the author's participation on the "Indicators of Social Development" research project currently under way in the third of a three-year contract between the Department of Sociology (Iowa State University) (Agriculture Experiment Station No. 1837) and the United States Agency for International Development (Contract Number AID/csd-3642).

Specific Objective 1.1: To outline and link analytically the most critical elements of society, including individuals, institutions, environments, and society as a whole.

Specific Objective 1.2: To derive from this perspective levels of societal well-being crucial to societal viability.

General Objective 2: To apply the theoretical perspective to human nutrition to determine its social nature and consequences.

Specific Objective 2.1: To outline the elements of the theoretical perspective as they relate to the production, distribution, and social consequences of different levels of human nutrition.

General Objective 3: To develop the methodological procedures necessary for constructing social indicators of human nutrition.

Specific Objective 3.1: To extend the theoretical perspective in order to define social indicators as elements in the process of societal control.

Specific Objective 3.2: To list on the basis of the theoretical perspective a proposed taxonomy of social indicators required for the societal control of states of human nutrition.

Specific Objective 3.3: To list on the basis of current and proposed measures, the methods and administrative infrastructure required to operationalize the taxonomy of social indicators of human nutrition.

These objectives will be accomplished in a series of three chapters. Beginning with Chapter 2, a societal production model is developed which is general enough to deal with all levels of societal well-being of concern. This model is further elaborated in Chapter 3 as an application

to human nutrition and the role nutrition plays in the maintenance of several levels of societal well-being. The more general perspective is returned to in Chapter 4 in order to define social indicators as elements of social control through societal monitoring. From this definition and the model developed in Chapters 2 and 3, a taxonomy of social indicators, data sources, and data generation mechanisms conclude Chapter 4. A summary of the first four chapters is found in Chapter 5.

## CHAPTER 2. SOCIETY AS A PROCESS SYSTEM AND WELL-BEING

Societies have tended to be viewed by sociologists as mechanistic or organic entities that achieve either homeostasis or some sort of "moving equilibrium" (Buckley, 1967:7). In this chapter a perspective that basically looks upon society as a process system is outlined. In harmony with Galtung (1971), the purpose is to develop a framework that allows the inclusion of the biological, sociological, physiological, psychological, political, and economic features of human life as a unified whole. This framework, however, will be tentative, and it will not be totally inclusive nor axiomatic. The mode of theory construction will be Parsonian, in that it will utilize concepts that "abstract from empirical reality, in all its diversity and confusion, common analytical elements" (Turner, 1974:29), rather than axiomatic and deductive as Homans (1964) and others prefer. The Parsonian mode is selected, as it seems to fit better the preliminary requirements for constructing social indicators: that they describe social conditions and trends (Sheldon and Land, 1972; Moser, 1973).

The perspective of society presented will be an overview, designed to lay the groundwork for dealing with any social concern currently a part of social indicator research. The overview is general in order to provide a grasp of society as an analytical entity, yet certain parts of the overview will be more fully elaborated than others. This differential emphasis is in keeping with the major goal of the dissertation: to deal with a specific social concern--nutrition. In this chapter, a

general process model will be outlined. In the chapter that follows, human nutrition and its relation to the model will be elaborated.

#### Societies as Process Systems

Societies are increasingly being conceptualized as process systems in which inputs and outputs are exchanged and converted into products that serve some level of social well-being. For instance, Allardt (1973c) and Finsterbusch (1971; 1973) look upon society as social systems in which inputs are drawn from the societal environment, processed into output, and utilized to meet internal and external societal needs. Thus, "the inputs consist of the allocations of resources societies make for the economy, for the security of members, for social welfare, and the like . . . outputs of society consist of goals actually attained" (Allardt, 1973c: 260).

Berliner (1972) looks upon society as a process system made up of social institutions, which through the interchange of societal resources among the polity, kinship, and the economy, functions to meet societal goals, and ultimately the needs of people.

Others more explicitly approaching society from a policymaking and planning perspective also assume an input-output production process. The Economic Council of Canada (1971) briefly outlines a policymaking framework through which the output and distribution of societal goals is controlled by the regulation of policy inputs. The policy and planning approach has been expanded, drawing upon and elaborating Tinbergen's basic economic policy model, by Wilcox et al. (1972), Laszlo et al. (1974), Land (1972), and Hetman (1973). These frameworks include consideration of

policy manipulatable and non-manipulatable inputs, outputs and the distribution of outputs, and the secondary and tertiary consequences of processing inputs into outputs.

Social indicators are concerned with assessing societal goal attainments as well as monitoring the maintenance of human well-being, and are considered as tools in the process of setting and evaluating societal goals. For these reasons the societal process concept appears to be a highly useful approach to developing the conceptional schema required for indicator construction.

#### Endstates of societies

Systems that process inputs of whatever nature--be it persons, materials, or messages--to produce outputs of trained personnel, finished products, or responses to messages, generally do so to bring about some endstate. Educational systems, for example, produce graduates to raise the general level of knowledge contained in society as well as expand the size of the skilled labor force; industries produce goods to make and increase profits.

Societies are also thought to produce certain endstates, although there is a fundamental disagreement as to the basic nature of what societies work towards. Arguments employ such concepts as "survival" or "well-being," but essentially focus on either the individual or the society as the most important endstate. The primacy of the individual versus the society is an ancient debate, enjoining such social philosophers as John Stuart Mill (original 1859; 1947), John Dewey (1935),

G. W. F. Hegel (1896), Emmanuel Kant (original 1861; 1953), and others. The issue is by no means resolved today.

Talcott Parsons, perhaps the dominant sociologist of the twentieth century, has taken the position that the survival of the social system or society is of prime importance. A social system is made up of a variety of interrelated, interdependent parts, including individual human beings, which carry out activities designed to successfully meet the "functional problems" that confront any social system (Parsons, 1951a: 167-68). The fundamental problem of human life is the provision social order, and "Parsons' entire work represents an effort to solve the Hobbesian problem of order" (Wrong, 1970:31). Because of this interest, Parsons has dealt mainly with large groups of actors who interact in regularized ways. Individuals and their needs are subordinated to the needs of the system created and sustained by human interaction. While Parsons recognizes that at least a minimum amount of the needs of a minimum number of the populace must be met if a society is to survive (1951:29), this requirement is clearly seen as a means for creating order and harmony in social relations rather than an end in itself.

Recent writings of members of the neo-evolutionary school of social change have emphasized the human species, rather than the social system, as the subject of focus. Corning, for instance, states that "the basic and continuing problem of every society is biological survival . . . [and] the basic survival unit (at least over the long run) is the gene pool of the species and not the solitary individual" (1970:1). Alland (1970) and Dobzhansky (1955) basically reflect the same view. The

neo-evolutionary perspective thus is only concerned with societal order as it affects species survival. Corning (1970), in fact, terms society as a "collective survival enterprise" whose structure and actions have decisive consequences for long-term survival.

Finally, there are those who view society as an instrument for meeting the needs not of a species extended over time, but of individuals of each generation that pass through society from birth to death. Vickers, for example, states that human behavior of any sort cannot be understood except in terms of the needs of individuals. "We cannot make sense of any human behavior unless we identify, behind the objective, the continuing need which it is supposed to serve" (1959:47). Etzioni's (1968a; 1968b) recent work on society appears to stress individual needs over societal goals, in that societal objectives are seen as a means for satisfying basic human needs. Even Allardt (1973c) who deals with system, as well as individual goals, asserts that the primary function of society is to service individual needs.

#### Endstates as need level maintenance

It is clear that needs can be identified at the individual and societal level, and survival requirements can also be extended from society to include societal institutional and stratification subsystems. Institutional and reward patterns require continued acceptance and motivated participation for their continuance. At each level of society, a set of needs can be identified which are critical for the continued survival of the social entities found at that level as well as for the society itself.

It is these various needs and their satisfaction which link the individual and society. Societal structure and process both provide for and yet limit the level of living of the societal population. Society and its substructure of institutions, stratification-distribution system, and social organizations provide the means through which the biological, psychological, and social needs of human beings are met. While social systems may be inefficient and inequalitarian in the manner in which they provide for their individual members, without a societal system which includes a system of distribution and differentiated institutions and organizations, humans could not survive.

Focusing on society, the individual is seen to play a crucial part in the satisfaction of societal and societal subsystem needs. From this perspective, the continued maintenance and upgrading of the individual's capacity to assume functional roles within social institutions and organizations becomes a necessary consideration. Thus while individuals depend upon a functional social system to meet their needs, the social system cannot persist without individuals capable of performing functionally relevant roles.

The endstate of the societal production system will be viewed here as the satisfaction of the needs or maintenance of well-being of the individual as well as the other levels of society. No primacy will be specified for a particular level of need, either individual or structural, for the functional interdependence of individuals and society precludes this.

The recognition of the equal importance of individual and society has not been fully appreciated in sociology, the stress usually resting on either the individual or the society. While recent discussions of social development indicate that both these elements are critical (Durstun, 1972; Nieuwenhuijze, 1969), apparently only Lenski (1966; 1970) has attempted to address these concerns theoretically, and his conceptualization remains highly general.

#### The Societal Process and Living Systems

Approaching society as a process system and specifying an integrating principle of need and need-satisfaction, binding individual to society, creates a perspective highly similar to what has come to be known as "general systems theory" or "systems thinking" (Ackoff, 1960; McLoughlin and Webster, 1970; Emery, 1969; Ackoff, 1971; Boulding, 1956; Durston, 1972).

In fact, society and its development are perceived by many to be derivatives of the general principles contained in the general systems perspective (Dunn, 1973; Campbell, 1965). Mayhew sums up this perception in the following:

Many of the historic and contemporary problems in the conceptual analysis of society may be clarified by viewing society as a complex of overlapping process systems. We may abstract from the concrete interaction of concrete social persons a number of types of interaction systems. Economic, religious, political, educational, and other types of activity come to cohere into partially dependent systems. These systems overlap; and when a relatively broad range of such systems cohere around a common population, we may speak of a society (1971:583).

According to the principles of general systems theory, a system is a set of elements which interrelate and interact at such a level of

interdependence so as to form an identifiable whole (McLoughlin and Webster, 1970). A system achieves importance, not for its elements or their interrelations, but in the fact that its "wholeness" or identity is separate from and not achievable through the summing up of its parts. Durkheim captured this very notion, long before the birth of general systems theory, in his attempt to distinguish between concrete individuals and the patterns formed over time by the interactions among individuals. Thus he states "society is a reality sui generis; it has its own particular characteristics which are not met again in the same form in all the rest of the universe. The representations which express it have a wholly different content from purely individual ones" (Durkheim, 1915:16).

The properties of society are similar to a particular kind of open system which Miller (1965) refers to as "living systems." An open system is one which has a specified environment with which it both interacts and depends upon for its survival. A living system is an open system that requires energy and information exchanges with its biological, physical, and other environments for maintenance, repair and ultimately, viability (Buckley, 1967:50), and which is made up of "actively self-regulating, developing, reproducing, critical subsystems" (Miller, 1965: 289). The critical subsystems interrelate to carry out those processes necessary for the continuation of the subsystems as well as a whole entity.

The essence of a living system then is an overall system, important for its wholeness as well as its parts, which exists in, depends on, and responds to changes in a surrounding environment. The system is made up

of critical subsystems which interact through resources exchanges. The societal process system has similar properties, and a simple model of this system is described in Figure 1. A brief discussion of this model is presented in the following section, followed in later sections by more specific descriptions of society's critical subsystems, stressing those most fundamental to a social interpretation of human nutrition to be presented in Chapter 3.

#### Overview of the process system

The societal process system interacts with its environments, made up of the societal culture, social relationships, the physical environment in which the society is located, and other societies, to extract such resources as knowledge, technology, values, raw physical materials, integrated social action, and international cooperation to be used as inputs into societal production. These resources are channeled through the institutional structure of society and then through the stratification-distribution system in order to process these inputs into outputs useful for meeting the various needs of society and its subunits. The institutional structure acts as a production unit, processing resources into "goods and services." The economy, for instance, transforms raw materials into consumer goods, which are used in interchanges with other societies, in the upkeep of the organizational basis of the institution, and for satisfying the biological needs of the societal population. The stratification-distribution system is the distributive subsystem of society, channeling the products of the institutional

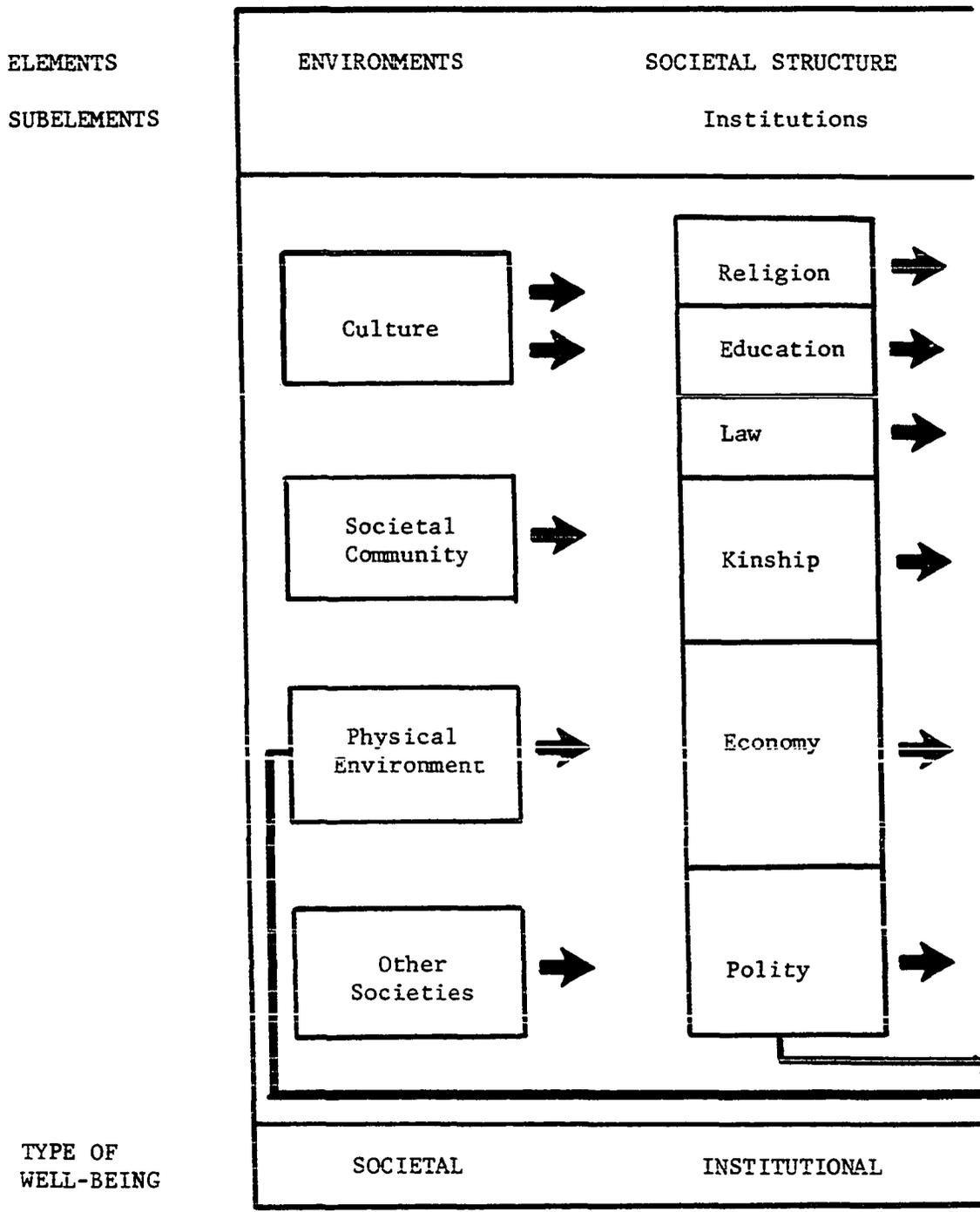


Figure 1. Society as a process system

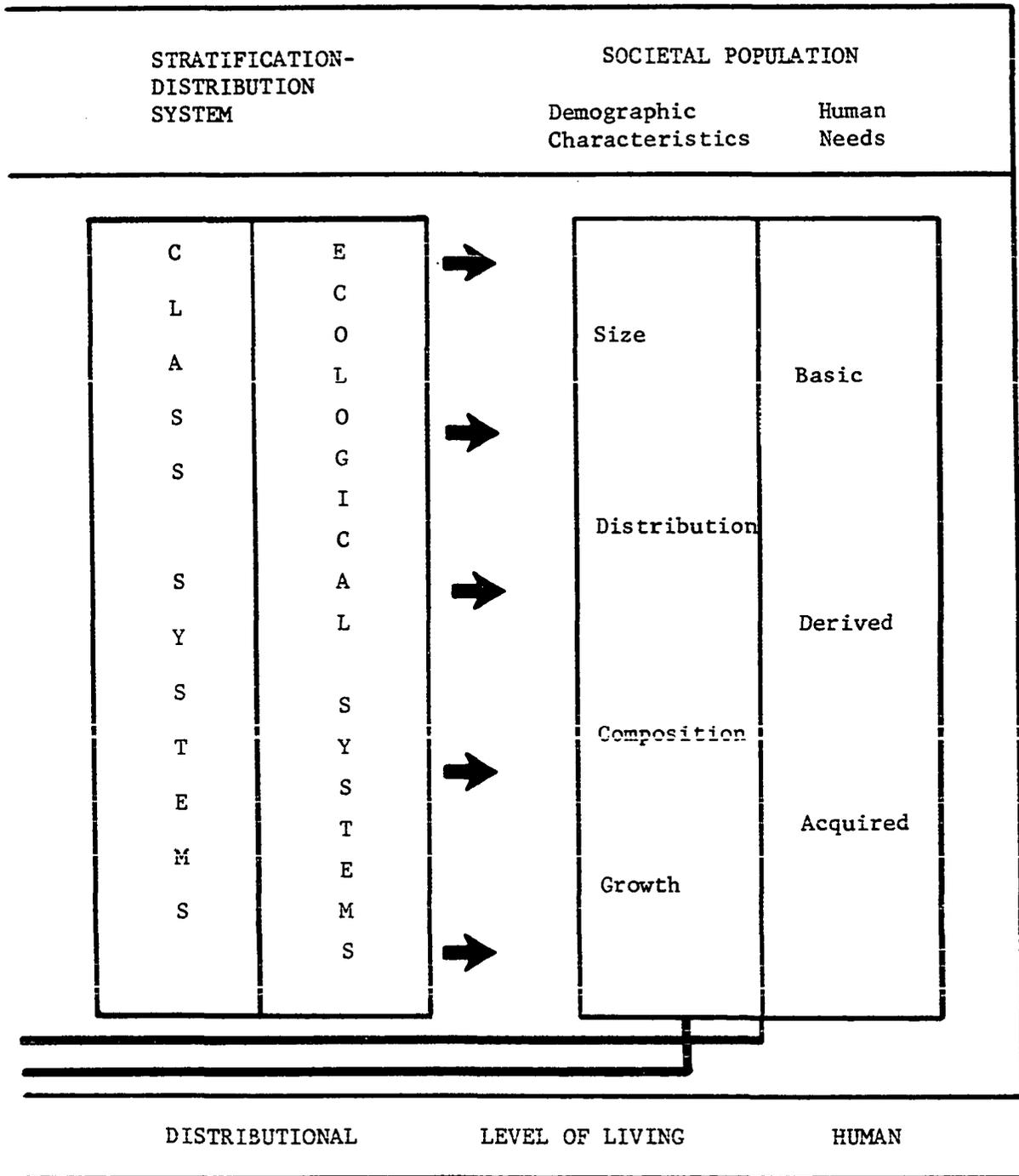


Figure 1 (Continued)

subsystems to individuals participating in society on the basis of class membership and physical location within the societal territory.

Completing the process cycle, the societal population provides a number of outputs which affect the performance of society as other critical subsystems to begin with the size and density of the population interact with the "carrying capacity" of the physical environment. Population size and density, after reaching certain proportions, begin to tax the carrying capacity, and often leave negative consequences for the socio-psychological makeup of people, the legal justice system, and the level of health. For instance, high population concentrations facilitate the spread of communicable diseases. Also, "growth in human members and in material living standards leads to increased production which, given the technologies that are nowadays employed, result in rapid depletion of many natural resources and to the production of numerous pollutants which are not only disagreeable and dangerous but also in some cases, on a scale which cannot be absorbed and dissipated by the natural world" (United Nations Economic and Social Council, 1972:15).

A second, and more direct way in which the societal population affects the rest of the social system, is through the provision of outputs which directly contribute to the stability and continuity of the institutions and class systems of society. Individuals provide competence, loyalty, and motivation in their participation in the institutionalized activities and rewards systems, thus meeting the basic needs of these structures.

Finally, there are interactions among the various institutions which again contribute to their maintenance. Familiar political, social,

economic, and psychological processes make up these interchanges, and Talcott Parsons has devoted considerable energy to develop abstract conceptualizations to characterize them. According to Parsons (1969) and Parsons and Platt (1973), these interchanges are made through "generalized media of exchange" which consist of such abstractions as money, power, influence, value-conformity, definition of the situation, and so on. Later discussion of these interchanges will deal at a far more concrete level than those of the general media of exchange.

#### Society and Its Subsystems

A temporary definition of society can now be proposed as follows: a living system made up of critical subsystems<sup>1</sup> (population, institutions, distributional) which are functionally interrelated and which interact to maintain the system and subsystem in a cultural, social, and physical environment. The similarities between this definition and that of Parsons (1966) and Aberle et al. (1950) should be noted, but this above definition and its development differ in that it is concerned not only with societal continuity within its environment, but with the survival of the subunits as well.

#### The societal population

The societal population consists of all those individuals that reside and reproduce within a territorial area and includes not only the

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<sup>1</sup>Non-critical subsystems which consist of socially organized activities such as art or recreation are not essential for the survival of society.

individuals themselves, but also their various distinguishing morphological characteristics (Goldschieder, 1971:8; Mayhew, 1971:45). A population's morphology includes its size, sociodemographic characteristics, and its physical location. Thus, for example, a societal population can be differentiated by age, sex, occupational, residential, its member per unit area, and other such criteria.

In addition to the morphology of a population, which is essentially a static conceptualization concerned with the state of a population, there are dynamic population processes that must be considered as well. Important in the study of population are the in-flows and the out-flows of persons in society (Stone, 1971:17). For a given period of time persons are observed to enter a particular population unit either by birth or immigration. During the same period, persons leave the unit through death or emigration. The rates of in-flows and out-flows determine future states of the population as well as future relation being the population and its environment.

#### The environments

Society must maintain itself in a set of interrelated environments. In fact society depends upon these environments for survival and finds its relationship with them as well as its survival, problematic, as these environments change over time. In fact it is change in the environments that produces societal change, as will be discussed in an early section of Chapter 4.

The physical environment      The physical surroundings of society are a potential energy source which await the societal application of

technology for their transformation into kinetic energy. Briefly, the physical environment is made up of 1) climate (temperature, humidity, rainfall, and wind conditions); 2) geography (topography, soil fertility, land forms, etc.); and 3) flora and fauna (insects, plants, trees, mammals, reptiles, etc.). These environments not only provide potential energy, but impose constraints on the type of economic and social organization that can successfully be adapted (Malia, 1974).

The culture Information is defined essentially as meaning, and culture is viewed here as a set of shared meanings that transcend a given generation of societal population members, and that "gives shape, direction, particularity, and point to an ongoing flow of activity" (Geertz, 1971:372). Shared meanings are one of a number of relational components which bind elements, in this case participants, together to form a system. As Parsons (1951) and Williams (1971) argue, without a common basis of understanding based on shared meanings human cooperation and organization are simply not possible.

Culture, like social organization, has evolved out of the organized efforts of population groups to better adapt to their environment (Murdock, 1965). In fact many consider culture to be the major means of increasing the adaptive capacity of a society (Y. Cohen, 1968; Steward, 1955).

Culture is the adaptive response to environmental pressures. Man may change his environment, often drastically, through adaptive mechanisms of culture, and this changed environment then acts as a selective agent on man's physical structure as well as on his behavior (Alland, 1970:34).

The influence of physical environment and culture upon one another are mutually reciprocal, with the environment offering challenges to

society which result in cultural, and more specifically, technological changes, which in turn influence the environment. The changed environment, however, imposes new challenges to which culture and social organization must adjust.

Culture consists of a number of informational components, including knowledge or beliefs, values, and technology.

Knowledge      The symbolic content of culture which consists of positions or assumptions of truth about man, society, and the universe (Kluckhohn et al., 1951:432). Belief systems orient the members of the societal population to the putative realities of their existence (Williams, 1971:128).

Values          The symbolic content of culture which consists of conceptions of desirable behavior of the members of the societal population and of the desirable type of society of which they should be members (Williams, 1971:128-29).

Technology      The symbolic content of culture which consists of governing the use of skills and procedures for using implements and artifacts, doing crafts, or extracting resources (Merrill, 1958:576-77).

#### Human needs

The concern for the individuals that make up the societal population go beyond population density or migration patterns. As previously indicated, a major theoretical concern with regard to human beings is their well-being. Human well-being has to do with the biological, social, and psychological needs associated with health, happiness and survival (Mallmann, 1973:1).

It is these needs which form the basis for the interchanges among the societal population and the other subsystems of society. In fact, as Field (1971), Malinowski (1944), Montagu (1955), Washburn (1953), (Hawley, 1950), and Lenski (1970) note, the very origin of society and its substructure derives from the historical experience of humans as they have collectively sought to improve their capacity to satisfy these needs. Human society, from this perspective, is seen as an adaptive response by human beings confronted by an environment in which they are ill-equipped to survive through their individual efforts. In response to their situation and in an effort to reduce the uncertainty of their survival individually, society developed and evolved much in the same way as weaponry, housing, or food production (Lenski, 1970:27; Malinowski, 1944:121). Social and economic institutions, the division of labor in society, and society itself--all are a consequence, at least initially of the necessary interdependence of human beings.

The individual has three types of needs: the biogenic which are essential for survival; the derived which are related to human happiness and mental health; and the acquired which are associated with happiness.

Basic needs      The first type of needs, the basic, vital, or biogenic, have been identified by physiologists as universals of biological survival (Cannon, 1939), and which form the basis of several of the so-called "motivational behavior" theories of psychology (Hull, 1943; Mace, 1953; Olds, 1955).

Man as an animal must breathe, eat, excrete, sleep, maintain adequate health, and procreate. These basic vital needs constitute the minimum biological conditions which must be satisfied by any human group if its members are to survive. These

physiological or biogenic needs and their functioning inter-relations constitute the innate nature of man (Montagu, 1955: 106).

A basic or biogenic need consists of the environmental and biological conditions that must be met for the survival of the individual and the group (Malinowski, 1944:38). A salient example of such a need is the nutritional requirements of the human body, calling for certain levels of protein, calories, fats, carbohydrates, vitamins, and minerals that must be maintained with relative constancy or the biological organism ceases to function.

Basic vital needs are thought to be culturally invarient; they are survival requirements of the human species regardless of cultural and environmental setting. These biogenic requirements are summarized in Table 1. Some of these needs, such as breathing or excretion, require only individual efforts. Other needs, however, require group efforts. For instance, the requirement for oxygen involves an individual's inhalation-exhalation of air and the ingestion of nutrients requires the individual's act of eating. While these are individual acts, they are not carried out independent of group life. First, as Malinowski (1944) notes, even the final individual act of need satiation is altered by group life conditions. For example, breathing must be carried out within the shelters that humans come to construct and must continue interspersed among during the process of verbal communication. Humans must learn to breathe, in other words, within the conditions set by the culture of society. Second, group efforts are usually required to obtain and make available the food, water, shelter, and clothing which serve individual needs.

Table 1. Basic human needs<sup>a</sup>

- 
1. Nutrients (minimums vary by body size, age, amount of activity)
    - a. Vitamins
    - b. Minerals
    - c. Proteins
    - d. Carbohydrates (calories)
    - e. Calcium
    - f. Fats
  2. Bodily warmth and coolness (range of acceptable temperatures without artificial protection is 60° - 85° F.)
  3. Water (H<sub>2</sub>O) (absolute minimum is one pint per day per person)
  4. Oxygen (O<sub>2</sub>) and carbon monoxide release (CO<sub>2</sub>)
  5. Bodily hygiene
  6. Invocation of "striped musculature" (exercise)
  7. Rest of "striped musculature" (rest and sleep)
  8. Expulsion of bodily wastes (bladder-colon tension release)
  9. Avoidance of noxious stimulation (avoidance of fear and injurious conditions)
  10. Avoidance of inclement environmental conditions (avoidance of wind, waves, earthquakes, tornadoes, and so on)
  11. Sexual tension maintenance
- 

<sup>a</sup>Source: Adapted from Clark, 1969; Hall, 1971.

Derived and acquired needs      A consequence of group life is the establishment through the learning process of what are referred to as "derived" and "acquired" needs (Montagu, 1955). The very conditions of group life create, over time, new needs which must be met if individuals are to avoid intra-personal tensions or breakdowns in mental health

(Montagu, 1955:146; Etzioni, 1968b:871; Mallmann, 1973:2). Lenski notes that there is thus paradox inherent in social life: the very act of organizing to meet needs has created new ones which also must be met through further organization (1970:28).

Derived needs include both psychological and socially emergent needs, neither of which are necessary for the physical survival of the human organism, but which limit the organism's ability to function, thus interfering with the meeting of its more basic requirements. Derived needs obtain their name because they are largely a consequence of the participation of human beings in society. Examples of psychological needs include the need to be loved, the need to love, the need to feel important in the eyes of others, and the need for communication (Montagu, 1955:150). There is some question whether psychological needs are directly learned through human interaction or whether they are inherited genetically. For the purposes herein, the question of their origin is far less important than their existence. It is enough that they exist and, therefore, must be accounted for in any listing of human needs.

Social or what Montagu (1955) refers to as "socially emergent needs" are clearly learned and reinforced through the socialization processes that are part and parcel to human interaction within social structure. Examples of these learned needs include the need for clothing, shelter, knowledge and skills, creative work, religion, and non-vital foods (Mallmann, 1973; Montagu, 1955). A list of the derived needs--both social and psychological--are summarized in Table 2.

Table 2. Derived needs<sup>a</sup>

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A. Social

1. Prestige
2. Acquisition of knowledge and skills
3. Explanation of the meaning of human existence
4. Creature comfort (goods and services above and beyond subsistence)
5. Income
6. Employment

B. Psychological

1. Affection
  2. Interaction
  3. Communication
  4. Protection from the social misdeeds of others
- 

<sup>a</sup>Source: Derived from Mallmann (1973); Malinowski (1944); Montagu (1955); Lenski (1966); Allardt (1973a); and Maslow (1954).

Acquired needs are akin to habits. They are neither necessary for biological maintenance nor for mental well-being and include such things as preference for piano as opposed to guitar music. As such acquired needs vary widely from individual to individual and as they do not pertain to the ability to survive or to function as a member of society, they will not be considered here.

### Institutions

Institutions are considered by many sociologists to be the backbone of society (Turner, 1972:7; Parsons, 1969:126), for they are the socially organized means by which human beings meet their needs (Washburn, 1953:4). Typical institutions include the family, economy, polity, and education. Eisenstadt perceives institutions as regulatory principles that direct the activities of individuals in the functionally important roles of society.

Thus

Institutions or patterns of institutionalization can be defined here as regulative principles which organize most of the activities of individuals in a society into definite organizational patterns from the point of view of some perennial, basic problems of any society or ordered social life (Eisenstadt, 1968:410).

Similarly, Parsons looks upon institutions as "those patterns which define the essentials of the legitimately expected behavior of persons insofar as they perform structurally important roles in the social system" (1969:126). Finally, Turner (1972) and Washburn (1953) define institutions in an analogous, albeit less abstract manner, suggesting that institutions are those societal status-roles and their accompanying norms which cut across the whole of society, which are extremely large, and which are highly conspicuous.

Without elaboration, the human needs and the institutions that perform to satisfy those needs are listed in Table 3. A more complete discussion of institutional need maintenance follows in the discussion below of some of the societal institutions most significantly related to human nutrition.

Table 3. Human needs and corresponding institution that satisfies those needs<sup>a</sup>

Need	Institution
1. Nutrients	Economy (agricultural sector)
2. Water	Polity (regulation)
3. Warmth and coolness	Economy
4. Oxygen	Polity (regulation of pollution)
5. Hygiene	Kinship and polity
6. Exercise	Kinship and education
7. Protection from violent and fearful acts	Polity
8. Protection from inclement conditions	Economy
9. Rest and sleep	Kinship
10. Sexual activity	Kinship
11. Waste	Kinship
12. Prestige	Polity and economy
13. Knowledge	Education and kinship
14. Explanation of "ultimate reality"	Religion
15. Creature comfort	Economy (luxury goods)
16. Income	Economy
17. Employment	Economy
18. Affection	Kinship
19. Communication	Kinship
20. Protection from disease	Health

<sup>a</sup>Source: Adapted from Parsons (1969), Mallmann (1973), Allardt (1973a), Malinowski (1944), and Gerth and Mills (1953:26).

The economy Because society is an open system, it carries on certain interchanges with its political, social, and physical environments. Just as the human organism selects elements from its environment to be transformed into substances directly utilizable in the body's efforts to maintain itself, so too a society, through the economy, extracts and converts resources into commodities which serve the purpose of subsystem and system survival (Turner, 1972; Parsons and Smelser, 1956).

The economy is made up of four subsystems including the gathering or extraction, production, distribution, and service systems (Turner, 1972:20-21). Gathering consists of the activities required to extract resources from the environment through such processes as mining, agriculture, fishing, and others. Resources gathered or extracted normally must be converted into usable products called goods or commodities. Production may involve the simplest of activities in the household such as human-powered rice milling to complex processes of converting coal, iron, and oxygen into steel.

As units of the economy are normally differentiated by the activities of gathering, production, servicing or distributing, this means that there is a division of labor both functionally and territorially. Except in the least differentiated of societies, production and extraction are carried out by different groups. In relatively undifferentiated societies, like many of the LDCs, where the division of labor is minimal, do households carry out the majority of extraction, production, distribution, and servicing required to meet the needs of its members.

In more differentiated societies, however, groups organized beyond the confines of the family, either on a community or regional basis,

specialize in particular economic activities interdependent of one another. Thus some groups grow such items as cotton, which other groups convert into cloth and clothing.

More than functional differentiation is involved in the separation of these various economic activities, for these activities are located physically in terms of those environmental qualities most favorable to the particular activity involved (McKenzie, 1968:9). Gathering processes are located as closely as possible to the source of materials to be extracted, and production is located adjacent to the source of energy required to transform the extracted raw material into primary or secondary goods and commodities.

The functional and physical separation of extraction, production, and services requires mediating processes of exchange or distribution which allow for the transfer of raw materials from extracting units to production units, produced goods such as steel to intermediate producing units such as auto makers, and final goods, such as autos, foodstuffs, radios, or clothes, from their producer to consumers, often via an intermediate "market."

Finally, services involve economic products which do not pertain directly to the extraction and production of physical materials, but instead facilitates these activities. Services include banking, financing, insuring, investing, crediting, and accounting activities (Turner, 1972:21). "Services" in a more general sense include what are generally referred to as social goods which are "not divisible into individual items of possession but are part of a communal service

(e.g., national defense, education, beautification of landscape, flood control and so on)" (Bell, 1973:304).

The level and sophistication of these various activities depends upon the level and sophistication of processes in those systems that inter-penetrate the economic subsystem. The culture and population provide inputs such as entrepreneurship, technology, labor, and values which delimit the nature and scope of the economy.

The economic outputs of goods and services are consumed by members of the societal population to meet their basic and derived needs. The agricultural sector of the economy provides food in order to satisfy nutrient requirements, and other sectors produce the clothing and housing necessary to protect humans from their climatic environment. Furthermore, goods are produced such as means of transportation which aid the individual to take greater advantage of the range of goods and services available in society. Finally, economic outputs in the form of "consumer goods" are produced to enhance the prestige of societal members.

The focus on the economy here is purposely broad, but the later discussion of the economy and human nutrition will focus mainly on agriculture sector as the means by which the human need for nutrients is met. While the economy and the family are distinct institutions in the MDCs, they are less so, particularly in the rural areas of LDCs. There the family and economy blend to such a degree that it is difficult to separate even analytically economic and familial role structure, goals, and place of activity. This is especially true in those non-monetized economies,

where, when economic needs do extend beyond the family, the interchanges are largely mediated by norms of reciprocity rather than money (Moerman, 1968, especially Chapter VI; Mulder, 1969; Leach, 1961).

Kinship Kinship is perhaps the most basic institution of society, for it channels the various goods and services required to satisfy human needs to members of the societal population. Kinship refers to the institutionalized patterns of behavior with reference to the organization, authority structure, size and composition, and resilience of families. These behavior patterns vary across societies, but they provide the same essential functions for society and its population.

"Kinship is the vast web of relationships among familial status" (Turner, 1972:82). Essentially, what is involved is the family, located in a household, and the relationships among those family members within the household as well as with relatives living outside the household. As a matter of convention, the kinship system will be referred to throughout as the family.

Through the family a number of functions are performed which serve either to satisfy human needs or equip its members to do so on their own. This subsystem takes on even greater significance in LDCs whose economic, governmental, and educational institutions are neither as effective or as pervasive as those found in the more advanced countries (Yang, 1965:5).

Regardless of the society's level of development, the family provides, first, for the regularizing of sexual relations, thus reducing the tensions and potential conflict involved in competition among individuals for the means of sexual gratification (Murdock, 1949). This

regularization entails the specification of sex by whom, with whom, where, and when.

Second, as sexual relations lead to biological reproduction, and as human offspring, at least for their first 12 to 15 years of life, are dependent upon others to meet their needs, the family provides the means for sustaining their young. Food, clothing, and protection from physical harm and fearful situations are supplied until such time as those individuals can provide for themselves. These same needs are provided to family members who are either temporarily or permanently disabled (Ogburn and Nimkoff, 1955:126).

Third, much of the general role competence required of individuals entering occupational, familial, and other social roles as adults must be acquired through the process of socialization that begins in the family (Parsons, 1955:16). While the education institution has taken over much of the economic and citizenship training of children, much of the generalized capacity to function in any society is still acquired through kinship (Inkeles, 1966; Aberle, 1961).

More specifically, within the confines of this institution, new members of society learn many life-long habits pertaining to hygiene, nutrition, and health care (De Garine, 1972; Steward, 1955). Food, hygiene, and health habits are of critical concern of development, and many programs have been devised to alter these.

Fourth, a major source of the affection that individuals require to exchange with others derives from familial relationships (Linton, 1945:7). Affection pertains in the relationship among children and parents,

brothers and sisters, and between young persons seeking to form new familial units.

Fifth, and finally, "in the relationship of the individual to culture, individuals contribute to integration by internalizing and practicing, either directly or through the family, many of the values which are incorporated in the cultural system" (Deutsch, 1964:196). In order for the various institutions to cohere and provide properly for human needs, institutionalized behavior must be properly learned and practiced by members of the societal population. As will later be discussed in greater detail, values play a significant part in the formation of food habits.

As well as vested with functions for societal viability, the family is characterized by internal structure and process which serve to maintain the family as a viable institution and to perform the family's functions. More specifically, family members serve in specific familial roles which are differentiated on the basis of task to form a division of labor and on the bases of status to form a miniature system of stratification (Bell and Vogel, 1968). The bases of family stratification revolve around influence, authority, and values, and serve as spheres of decision-making with regard to the specific familial activities and the allocation of family resources. Additionally, the motivation of family members to continue in their familial roles, despite the stresses and strains inherent in such closely quartered and socially differentiated surroundings contributes to a sense of solidarity among the members (Mayhew, 1971). Finally, there are certain societal values

which pertain directly to family goals and the means of their achievement. These values form overall prescriptions concerning desirable family member behavior and desirable types of families.

The polity All living systems have goals, whether it be long-range survival or intermediate goals which may or may not contribute to this survival (Corning, 1970:22). Among the goals of society are such diversities as increased economic growth, a higher standard of living for international prestige and influence, or regional hegemony.

In order to maintain goals, a society requires a mechanism which mobilizes, allocates, and directs the necessary resources. The polity functions as a "collective pursuit of collective goals" (Parsons, 1969: 318). Physical and human resources are thus mobilized and organized so as to effectively accomplish the goals specified by those holding status-roles within the polity.

Commitment of members of the societal population, along with societal resources requires decision making and the exercise of power on the part of the polity. This, in turn, has the following consequences: first, the goals of society and priorities among them are set; second, resources are then mobilized and allocated; third, valued resources are distributed to constituents within the societal population; and fourth, control is exercised over those members of the societal population who do not choose to comply with the polity's decisions voluntarily (Turner, 1972:267).

A functioning polity has consequences for several of humankind's needs. In its regulative capacity, the polity is concerned with facilitating and standardizing the operation of the private market, stabilizing

the overall economy, regulating the family, maintaining social order, and providing support for society's ethical norms (DeSchweinitz, 1970: 507). More concretely, this includes the deciding of the water rights amid conflicting claims, establishing air and water pollution standards, and providing the legal means for forming and dissolving families. Societal order is largely possible through the polity's monopolization of access to the legitimate use of force (Parsons, 1969:368). The polity serves to regulate human interaction and institutional activity through the provision of law, and only the polity may justifiably resort to the use of force when individuals ignore laws.

The polity is a particularly important subsystem in terms of its influence over the direction that a society takes in the pursuit of societal and individual well-being. Critical for the development of society is the polity's increasing capacity to take control over the course of that development (Dunn, 1973:201). The polity has achieved the capabilities required for the setting of development goals, the allocation of resources to achieve those goals, the monitoring of progress toward those goals, and the establishment of new goals in the light of changing conditions (Deutsch, 1961:127). The polity's role relative to the planning and monitoring of social development with regard to human nutrition will be taken up further in the chapter that follows.

#### Institutional interchanges

The institutions of society, as implied by their conceptualizations as subsystems within a larger system, do not function independently from one another. In fact, their very operation demands that the exchange of

resources carry on among them. In the subsections that follow are some of the more critical interchanges between various institutions and the polity. This discussion is restricted to several examples as these interchanges have already been thoroughly explored by others (Eisenstadt, 1968a; Turner, 1972; Deutsch, 1964; Parsons and Smelser, 1956; Moore, 1955; and Parsons and Platt, 1973) and because the subject of the measurement of the changes in such exchanges will be dealt with only in a general sense here.

Polity and economy      The economy provides the government with taxes, "for taxes are imposed on people mainly in their role as members of the economy. The government, in turn, supplies the economy the legal order in which economic decisions can be made under conditions of expectability" (Deutsch, 1964:192). This legal order includes the assurance that economic opportunity, consumer rights, workers' safety, and "legal tender" will be protected by governmental action (Moore, 1955: 30 and Parsons and Smelser, 1956:73).

In exchange, the economy provides the government with "productivity" or with control over society's general adaptive processes. This, in effect, supplies the government with a form of power. In return, the government provides opportunities and certain freedom of action for credit and investment (Parsons, 1969:400).

Polity and kinship      The exchanges between the polity and kinship subsystems have formed the basis for the political system model constructed by Easton (1965) and utilized by Moore (1971) and Whitney (1969). Despite Easton's critique of Parsons, the model of political inputs and outputs conforms closely to conceptualizations in Parsons (1971; 1969).

Members of kinship groups in their relation to the polity are generally considered as the "public," and it is through their role as the public that interchanges with the polity take on meaning. The public provides the polity with a source of power through two inputs. First, the public supplies the polity with generalized support, taking the form of broadly based confidence in those assuming responsibility for leadership in governmental affairs which is necessary to enable them to act with real power; that is, "to make necessary and far-reaching decisions responsibly in the sense that elements of the population affected will accept the consequence" (Parsons, 1969:208). In exchange, for support the polity provides "effective leadership" in attaining societal goals. Effectiveness, in the sense used, here is "parallel to utility, as used in economic theory" . . . and refers to . . . "the probability that implementive measures will in fact bring about the desired changes" (Parsons, 1969:319). Effectiveness as a value-standard thus involves an assessment of resources availability to and organizational competence of the polity.

The second source of political input provided by the public is its expression of its "interests-demands" giving government direction. Based on the interests-demands, and with certain modifications in order to maximize support, policy decisions are made. As Turner (1972) notes, much of the policies directed specifically at the kinship subsystem are of a "welfare" nature, such as providing the aged with the means to meet certain of their basic needs or through birth control programs designed to reduce the number of people making demands on scarce resources (1972: 122-23). Other policies directed at the family include those designed

to affect the nutrition status of particular disadvantaged subgroups such as children and pregnant women.

### Institution level needs

There are identifiable needs which are specific to the institutions of any society. Three of these needs derive directly from the participation of members of the societal community in institutionalized activities, and the fourth has to do with the legitimacy of the institutions, based on the societal culture. It should be noted that these needs derive directly from the functional problems so familiar to Parsons' theoretical work.

Because of the systemic nature of society, the societal population and societal institutions are mutually interdependent. Thus while institutions provide for human needs, so individuals provide for institutional needs. Without the survival and participation of a sufficient portion of the societal population, the total system could not survive (Kuhn, 1974:38; Chinoy, 1968:120).

Of concern here are the individual traits required for human participation in the various positions and associated tasks that characterize society. These positions and their tasks are more generally referred to as status-roles which are "positions which can be filled by an individual, and to which distinctive behavioral expectations are attached" (Lenski, 1970:39). Status-roles include such diverse positions as father, housewife, agricultural worker, boatman, rice miller, statistician, and planner. Note that status-roles include positions normally considered as

a part of the societal "division of labor," which will be discussed in the section on the stratification-distribution system in the section that follows.

To begin with, institutions are made up of status-roles which require individuals who are not only knowledgeable of the behavioral expectations that define the institutional roles, but are also loyal to the institutions to which their role behaviors contribute. Loyalty is involved in the relations between human beings and their society and in the relations between individuals and institutions. "Loyalty is a readiness to respond to properly 'justified' appeals in the name of the collective or 'public' interest or need," and the role-pluralism, or the involvement of the same persons in multiple institutionalized activities, requires careful regulation and differentiation among loyalties (Parsons, 1971:12). In particular, an individual must display the proper degree of loyalty to his family, economic affairs, and his national government, and yet prevent these loyalties from coming into conflict. Loyalty and its individual self-regulation to avoid situations in which competing loyalties cause breakdowns in institutionalized activities are brought about largely through socialization (Inkeles, 1968).

In addition to obligations of loyalty, there is the question of motivation to become and remain an incumbent of various institutionalized social positions as opposed to attempting individual action to meet individual needs. Institutions arise through collective efforts to meet needs and as institutionalized activity becomes more complex, need gratification becomes less immediate in the sequence of events. In

discussing organizational production subsystems, Katz and Kahn note the following:

Every step of the productive process of the organization, though carried out by human beings, is not necessarily going to coincide with their immediate needs. Moreover, the role requirements for stability and uniformity are not consistent with the facts of human variability (1966:79).

This motivation to defer gratification and to subordinate the desire to act individually is partially provided through socialization which brings about the internalization of the values and norms that pattern behavior, and partially through rewards (providing for social, psychological, and biological needs) and punishments (non-provision for needs) (Tolman, 1951:125; 157).

Finally, individuals cannot adequately fill the status-role positions they are expected to take as their contribution to the social order unless they are competent to do so. Status-role competence is defined simply as "the ability to effectively attain and perform in three sets [of status-roles]: those which one's society will normally assign one, those in the repertoire of one's social system one may appropriately aspire to, and those which one might reasonably invent or elaborate for oneself" (Inkeles, 1966:265).

The important aspects of competence are thus the ability of individuals in roles that have certain behavioral requirements attached to them to utilize societal resources within the parameters set by normal and sometimes abnormal circumstances. Thus, for example, a father is expected to raise his children, earn a wage, and defend his family from harm, all within expected ranges of acceptable behavior.

Table 4 includes a general list of those elements that must be learned or acquired through socialization in order for most individuals

Table 4. Elements of status-role competence<sup>a</sup>

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1. Aptitudes	6. Affective modes of functioning
2. Skills	7. Modes of moral functioning
3. Information (level and styles)	8. Self-concept
4. Cognitive functioning	9. Modes of orienting to authority
5. Special language skills	

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<sup>a</sup>Source: Derived from the discussion in Inkeles, 1966:269-278 and Inkeles, 1968:83.

to be able to function in most roles. It might be argued that the listing is too general to be of any use, but its non-specificity is actually preferable for practical reasons. First the number of roles that society requires be filled are in the thousands. It would not be useful to fill these pages with an elaboration of all possible roles and their behavioral requirements. Second, and even more practically, very little work has been done to specify the roles and their expectations for any society (Inkeles, 1968:94).

In terms of the legitimacy of institutions, this depends upon the continued consonance of institutional behavior with the values of society, which in essence determine what is "desirable" in terms of behavior (Kluckhohn et al., 1951:395; Williams, 1971:129). As long as there is the essential consonance, individuals will perceive institutionalized

behavior as legitimate and institutional interchanges can continue. As institutionalized activity changes due to either internal or external exigencies, values either eventually shift to refit these activities, or the activities cease to be perceived as legitimate and are replaced by new ones (Byrne, 1971:144; Clark, 1972:280).

### Societal community

The societal process model includes a "societal community" along with the societal institutions. The societal community is generally not perceived as an institution in sociological literature, perhaps because it is considered more abstract than institutions, and because it generally encompasses a greater number and wider range of roles than do institutions. The societal community is conventionally linked to an administrative entity such as a village, town, or subsection of a larger city, but has also been defined in terms of shared values, shared perceptions of community, or in terms of economic functioning (Hillery, 1955).

The societal community, from the Parsonian point of view is the actual, regularized interactive behavior of societal members in their various roles. The function of the societal community is the assurance of order (Parsons, 1969:21), where values fail to provide sufficient specificity for role behavior or where motivation among the social actors to fulfill behavioral expectations is low. The societal community, in essence, fills the gap between values and motivation, or between ideals and needs.

Human social action is said to be patterned, and this patterning is possible only through the acceptance by individuals of the rights and responsibilities associated with the roles they are assigned. As individuals actually interact via their roles, their behavior is reciprocally evaluated by those with whom they interact in terms of the behavioral expectations or norms associated with those roles. Interactants who behave in a manner inconsistent with their roles are considered to be "deviant." As the rights and responsibilities of fellow role players depend not only upon their own behavior, but the behavior of persons to whom they are linked in functionally interrelated roles, deviation by one participant threatens the rights and responsibilities of the others. In order to reduce or eliminate this threat, social sanctions are applied to the deviant. Usually the non-deviant role incumbents exercise social sanctions in terms of reproof, snubs, name-calling, ostracization, or, ultimately, physical coercion over the deviant. George Park (1974) catalogues a number of case studies of social control among American Indians, Africans, and New Guineans, finding that social sanctions are performed not only by political structures, but by kinship groups and role incumbents of small social groups. Among the sanctions Park reports are shaming, execution of wrong-doer by the kin of the victim, and the forced payment of goods or services to those offended.

#### The stratification-distribution system

The institutional outputs designed to meet human needs flow to the members of the societal population differentially. The degree to which

individuals' needs are met varies directly with the level of their loyalty, motivation, and competence. Stratification is universal for all societies face the requirement of "placing and motivating individuals in the social structure" (Davis and Moore, 1945:242). Rewards must be accorded differentially because some tasks are more agreeable than others, some require special talents or training, and some are simply more important for the functioning of society than others.

Inequalities in rewards, however, are not solely determined by the instrumental relationship between human beings and society, for many rewards are acquired through birth due to family wealth and position. Other so-called "ascriptive" characteristics of individuals such as race, religion, educational achievements of parents, sex, political connections or rural-urban residence also are factors into the differences in reward they receive (Lenski, 1966:80; Turnham, 1971:11; Thurow, 1973:68-69; Anderson, 1974:78; Fallers, 1973:252).

The stratification-distribution system cross-cuts the individual and institutional levels of society to further specify the interdependence of these levels. This system is formed by "all of the systems of stratification in a society (e.g., the occupation systems, the racial-ethnic systems, the property systems, etc.)" (Lenski, 1970:43). Systems of stratification are formations of classes, or aggregates of persons possessing essentially the same amount of a particular resource, such as wealth, education, occupation, or any other resource which brings power, prestige, or privilege (Gerth and Mills, 1946; Bendix, 1974). Acquisition of power, prestige, or privilege brings with it an increased probability of

satisfying human needs (Lenski, 1966:44-45). Stratification permeates all societal institutions, hence forming the division of labor in the economy, differential access to power in the polity, and differential control by age criteria over socialization of new members in the family.

Stratification by class system is not the only means by which differences in access to need gratification are determined. Just as the social access of individuals is determined by their various positions within the various class systems of society, their physical access to goods, services, power, or status is mediated by their geographical position relative to sources of these desirables (Pahl, 1970). "Geographical location is a characteristic of people in the same way as race, color and religion" (Smith, 1973:4) as it has been shown to be highly associated with inequalities in wealth, income, health and prestige. In the United States, for example,

. . . the national rate of infant mortality is 19.8 per 1000 live births (31.4 for non-whites), but it rises to 28.2 in Mississippi (over 40 for blacks) and drops to 14.1 in North Dakota. And in a city it can change from 100 to 10 in the few miles that separate the ghetto core from white middle suburbia (Smith, 1973:4).

Studies in Africa indicate that the physical distance between subsistence resources and family residence have a profound effect on the nutrition and health status of family members (Sharman, 1970), as the discussion in Chapter 3 will demonstrate.

Center-periphery An important subsystem of the stratification-distribution system is the center-periphery. The center-periphery concept is one which distinguishes access to power, prestige, and sacred social values by social structural and territorial units.

Individuals that have access to the territorial and structural center of society are generally referred to as the societal elites. These elites are drawn from the highest positions in the economy, kinship system, the polity, higher education systems, and form a center by virtue of "common authority, overlapping personnel, personal relationships, contracts, perceived identities of interest, a sense of affinity within a transcendent whole, and a territorial location possessing symbolic value" (Shils, 1961:118).

In addition to the monopoly over societal power and prestige possessed by members of the center, the influence of these elites is greatly enhanced by their ability to "pursue and affirm" the central or sacred values of society.

By their very possession of authority they attribute to themselves an essential affinity with the sacred elements of their society, of which they regard themselves as the custodians. By the same token, many members of their society [the periphery] attribute to them that same kind of affinity. The elites of the economy affirm and observe certain values which should govern political activity. The elites of the polity affirm and observe certain values which should govern political activity (Shils, 1961:119).

Finally, the center represents a major means of controlling access to the higher positions in each of the societal class systems. Control is exercised largely by the center's ability to define the criteria of the general media of exchange as well as the rates of exchange among power, money, influence, and value-commitment (Eisenstadt, 1971). It is thus not enough for a member of the periphery to attain wealth through entrepreneurial activity to enable him to join the center, for the center's control over the exchange rates can prevent that individual from translating his wealth into power or prestige.

The periphery is a residual in the sense that it contains the remainder of the societal population not contained by the center. Structurally and territorially the periphery includes all those living in rural areas (with the exception of high governmental officials residing in the provinces) and the urban middle and lower classes. Members of the periphery have negligible access to the center and have low amounts of the resources of power, influence, money or value-commitments necessary in order to effectively deal with members of the center. As societal members with basic and social needs and values defined by the societal context which includes both a center and a periphery, movement out of the periphery is perceived as a highly desirable, albeit difficult, transition to make.

Center-peripheries in LDCs are separated to a higher degree than in most MDCs by the tendency for periphery members to feel so distant from attaining access to the center or performing more exactly in consonance with sacred values that they tend to perceive themselves as "outsiders" (Shils, 1961:127). At the same time, however, members of the periphery remain attracted to and influenced by the values and life styles of the center. [The reader is referred to several articles by Rubin (1973a; 1973b) for more empirical descriptions of the relationship between members of the center and the periphery.]

The distance between the center and periphery is said to be reduced by development (Eisenstadt, 1971), although others suggest that the distance is increasing. Owens and Shaw note that poverty, unemployment, and the gap between rich and poor are on the increase (1972:2); the

Adleman and Morris study of development shows that improved income distributions and political participation have not followed in many nations as a consequence of economic development (1973:186); and Weintraub (1973) shows in the Philippines that while the rural peripheries stagnate, the modern businesses controlled by the center elite flourish.

The various class systems as well as the distribution of the societal population across relevant territorial units (e.g., rural-urban, regional, provincial, etc.) form the distribution-stratification system. All societies possess such a system in one form or another, but the type of classes that make up the stratification system and the spatial categories of the distribution system will vary in type and extent, depending upon the culture, level of technology, commitment to human rights by the polity, and degree of polity involvement by the military, and geographical makeup (Lenski, 1966:88-89; Smith, 1973:4). One general case of a stratification-distribution system, characteristic of several nations of Southeast Asia, is presented in Figure 2. Excluded for reasons of space are the Buddhist hierarchy, forming a religious class system, the age structure, and other relevant class systems which serve to differentiate among people for reward distribution.

The needs of the stratification-distribution system are similar to those of institutions: this system must continue to receive legitimacy from the value systems of society, and the societal population must perceive its function and reward structure as just (Parsons, 1971:13).

The stratification-distribution system					
The political class system	The property class system	The occupational class system	The ethnic class system	The rural-urban system	The educational class system
The monarchy	The wealthy	Large landowners	Thai	U	University degree
The elite	The middle class	Independent farmers	Chinese	R	Technical school
The bureaucratic		Officials	Indians	A	High school
		Merchants		N	
The apolitical class		The poor	Landless peasants	Lao-Thai	R
	The impoverished	Vietnamese		U	Some grade school, no skills
Suspected enemies of the regime		Beggars, prostitutes, etc.	Hill tribes	R	
	L			No school	

Figure 2. Graphic representation of the stratification-distribution system of a "typical" Asian society (Adapted from Lenski, 1966:80).

### Society

All the "critical subsystems of society have now been considered, and in light of these considerations the earlier definition of society will now be refined. This is necessary as a basic proper of system,

previously noted, is that they are more than the sum of three parts. Thus, property distinct from those that characterize the societal population, institutions, and stratification-distribution system must be identified. A recent definition states that "societies are all of the systems of human action sustained by the self perpetuating inhabitants [societal population] of a given territorial area" (Mayhew, 1971:21). This definition is obviously inadequate as it explains society in terms of its parts, and not in terms of what distinguishes it from those parts.

One of the few definitions of society that meets the system's requirement is that offered by Parsons. Unfortunately, his definition is also one of the most abstract and, consequently, is difficult to operationalize for measurement purposes. Still, it provides a meaningful beginning.

"A society is a type of social system, in any universe of social systems, which attains the highest level of self-sufficiency as a system in relation to its environments" (Parsons, 1966:9). Self-sufficiency, in turn, is a function of the balanced combination of societal control over relations with society's environments and of its own state of internal integration. Self-sufficiency is only a relative concept, in this case, as a society depends upon interchanges with its culture, physical environment, and the behavioral organisms of its population in order to function. Parsons' description of societal self-sufficiency relative to these environments, while intriguing, is not particularly applicable beyond a concern for theory. Its abstractness fairly eliminates its application to applied or measurement concerns. As suitable alternatives

are not currently available, and Parsons' definition provides a useful point of departure in a discussion of societal development, it will be utilized here despite its shortcomings.

In order to achieve a greater degree of concreteness than is offered by the above definition, society will be equated here with the nation-state. Again there are certain difficulties here, as Kuhn (1974:402-03) and others have noted that this definition could also apply to tribes and communities. And Horowitz (1966) points out that important societal economic activities often transcend nation-state boundaries, and it is obvious that many hill tribe groups in Southeast Asia form societies yet are subunits of larger nation-states (Black, 1966). Several reasons pragmatic in their nature compel this compromise. First, it is at the national level where most of the major policies and plans impacting human life in given territorial areas are affected (Rokkan, 1973:17); ultimate control over and allocation of resources also resides at this level. Second, many important statistical series concerning the societal population and its well-being are maintained by national governments (Gibbs, 1972:135). As the interest here is in comprehensive, controlled, and monitored development, despite the pitfalls in doing so, societal development will be considered synonymously with national development. Others including Sofranko and Bealer (1972:9) and Nieuwenhuijze (1969:23), suggest dealing with societal development at the nation-state level. In the words of Field "the society as a nation-state . . . is the largest self-sufficient political entity in the world today" (1971:101).

Nation-state self-sufficiency

A society as a nation-state has needs, or what have been referred to as requisites by Aberle et al. (1950) and Parsons (1966) which must be met if it is to survive. Thus the following criteria are of import.

First, "to survive and develop, the societal community must maintain the integrity of a common cultural orientation, broadly (though not necessarily uniformly or unanimously) shared by its members, as a basic of its societal identity" (Parsons, 1969:11-12). This cultural orientation ethos includes its history, traditions, legends, and myths (Field, 1971:101; Aberle et al., 1950:107). This ethos is common in the sense that it is taught to the new member of the society, and thus becomes shared from generation to generation. It is from the shared nature of a society's culture that provides the legitimacy institutionalized behavior and the stratification-distribution system require.

For the Third World, the problems associated with this societal need stem from the fact that because of great diversion of cultural, ethnic, and language group formed within many nation-states, there is no nationally shared culture. For these nations, the problem is to create national identity where a lack of common culture heretofore has prevented its development (Kahin, 1952; Toye, 1968).

Second, the goals set for society by the polity must be reasonably and effectively met. Furthermore, these goals must reflect to the greatest degree possible the goals of the majority of those that take an active interest in political outputs if the "costs" to the perceived legitimacy of both the current regime and the polity itself are to be

minimized (Parsons, 1969:319). Finally, the use of force by the polity to insure the collective goals are collectively pursued is used only as a last resort. Recurrent reversion to the application of force will ultimately cause society's undoing.

Again, a major problem facing LDCs is their inability to meet their national goals (Waterston, 1969), their elitist approach to goal-setting (Wolfe, 1973), and their frequent need to resort to violence to either preserve the status-quo or change it (Lloyd, 1972).

Third, control over the territorial boundaries of the society is essential; without such control the nation-state is subject to absorption by other nations as well as dissolution by separatists internally (Field, 1971; Easton, 1965; Haas, 1974). Wilcox (1965) notes that effective planning in Southeast Asia has been largely prevented by the civil unrest in some countries and the warfare between others.

Fourth, the society must be able to control the uses to which its resources are put in order to insure that they are applied to a degree sufficient to meet societal goals (Field, 1971; Parsons and Smelser, 1956; Deutsch, 1964). This calls for governmental regulation of industrial, entrepreneurial, and agricultural business activities, within society and the exports-imports, foreign investments, loans, and credit extensions between societies.

Societies are thus seen here as a systems of interrelated levels of organization, each of which has needs and depends upon the effective functioning of the entire system in order to satisfactorily deal with those needs. In this sense society is a process system which produces

states of well-being for each level of society, be it the individual, the institutional, or the societal. From this perspective so-called social problems such as health, crime, or nutrition take on additional dimensions, for they are no longer relevant solely to individual well-being but to institutional and societal welfare as well. In the following chapter this general principle is illustrated as human nutrition is treated as a concern of society and its interrelated subsystems.

## CHAPTER 3: NUTRITION AS A SOCIAL CONCERN

The framework presented in Chapter 2 was developed in order to accomplish several goals: first, to provide the theoretical context necessary to demonstrate the social nature of nutrition; second, to provide a means of examining the individual as well as societal consequences and causes of human nutrition; and, third, to provide a means for later determining the kinds of indicator types that societal monitoring in such areas as nutrition require.

As was previously discussed, such seemingly non-social concepts as health, nutrition, and shelter are social in nature for they are components in the structure of well-being that social individuals collectively seek to sustain and improve. Also, it was suggested that the state or levels of these concerns have consequences for the structural viability of society and its subunits.

The societal process model was constructed in a most general fashion in order to demonstrate its generality and therefore its inclusiveness of a number of "non-social" factors. In other words, based on the societal process model, this chapter could be equally devoted to health, shelter, clothing, or consumption.

An attempt is made in this chapter to apply the societal process model to human nutrition, to demonstrate nutrition's social nature, its consequences for social life, and the effects of social conditions upon it.

The presentation will begin, however, with a slight deviation from sociological discussion in order to define and explain human nutrition as it is normally perceived: as an outgrowth of physiology and chemistry.

### Human Nutrition

Nutrition, in the strictest sense, concerns those actions of the human body that promote growth, maintenance, and repair of organic structure through the use of externally introduced resources in the form of foodstuff. In other words "nutrition is the sum of all the processes by which an organism ingests, digests, absorbs, transports, and utilizes food substances. Utilization includes incorporation into protoplasm, breakdown for release of energy and storage for future use" (Krehl, 1964: 191). Nutrition is thus basic to the survival and well-being of humans, for nutrition is among those factors which are of vital concern for human biological integrity.

The interest in nutrition here is not with the adequacy or functioning of internal physiological processes per se, but rather for those processes external to the human body which affect human anatomical and biochemical processes and therefore social life, and in turn are affected by human behavior. While some of the more critical internal consequences of inadequate nutrition will be noted, these will be provided only to make intelligible the external antecedents and consequences of those inadequacies. For the most part the human anatomical and physiological structure will be taken as "given."

Because of the external perspective, much of the concern for nutrition herein will be expressed in terms of the quality and quantity of foodstuffs made available for human ingestion through social activity. Thus much of the chapter will deal with the cultural, economic, political, stratification-distributional, and environmental factors that both cause

and are caused by various states or levels of nutrition within the societal population. Those readers interested in pursuing the physiological aspects of human nutrition should consult Williams (1962), Mayer (1972), Williams (1973) and Guthrie (1971).

### Food and nutrients

One of the basic vital needs of human needs is that of nutrient intake. The nutrients found in food serve a number of physiological functions. First, they provide energy for bodily activity, warmth, and human physical activity (Clark and Haswell, 1964:2). Carbohydrates, protein, and fats are processed within the body to form energy, the amount of which that is available to the body as a consequence of the intake of the nutrients is normally measured in calories<sup>1</sup> (Williams, 1973:36). Carbohydrates and fats also provide energy and fat-soluble vitamins and fatty-acids for metabolic functioning.

Second, food contains proteins which, through regular ingestion, are basic to the building of tissue involved in growth and to the replacement of tissue involved in maintenance (Stini, 1971:1021). Protein is particularly important in the early stages of life when the brain and body achieve most of their structural development. Third, vitamins and minerals are contained in most foods, and these nutrients are crucial for their contribution to metabolic functioning and to prevention of the various deficiency diseases (Williams, 1973:42 and 70). The deficiency

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<sup>1</sup>A calorie is equal to .001 kilocalories; a kilocalorie is the amount of heat required to raise 1 kg. of water 1° C.

diseases are important, as will be discussed in the next two sections in their impact on human well-being and ability to function in societal roles.

#### Malnutrition and Nutritional Deficiencies

Malnutrition is treated here as a global concept to include under-nutrition or lack of the proper amount of foodstuffs ingested as well as a more general lack of one or more essential nutrients in the human diet (White et al., 1973:1199; Pollitt and Ricciuti, 1969:735; Robson, 1972:30).<sup>1</sup> Malnutrition is considered in two forms, the clinically recognizable state in which the disease and debilitation caused by body disfunction are recognizable by the patient and his family and those subclinical deficiencies that can only be ascertained through clinical and biochemical means.

Prolonged malnutrition results in deficiency diseases of various types. The deficiency diseases discussed in the subsection that follows are those identified by the World Health Organization as among the highest priority for remedy (WHO, 1972a:160). The extent, social significance (e.g., contribution to mortality), and feasibility of prevention of the priority deficiencies are summarized in Figure 3.

#### Protein-calorie malnutrition (PCM)

PCM is probably the most widespread and the most dangerous of the deficiency diseases. This deficiency is a complex one for there is an

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<sup>1</sup>Definitions of a more technical nature relating to physiological functioning of organisms can be found in Platt (1958).

Conditions	Extent	Social significance	Feasibility of prevention
PCM	●	●	●
Xerophthalmia	●	●	●
Nutritional anaemias	●	●	●
Endemic goitre	●	●	●

-  = High  
 = Medium  
 = Low

Figure 3. Priorities among nutritional conditions (WHO, 1972a:160).

interaction among protein-calorie usage by the body. Inputs of protein essential for growth and maintenance will be used instead as an energy source when calorie intake is too low (Robson, 1972:55). Also, bodily utilization of protein depends on the caloric intake (Robson, 1972:220). When the diet is deficient in both protein and calories, the body is therefore deprived to a greater degree than when the deficiency is in terms of protein alone.

Another factor complicates the protein-calorie requirement. Protein needs are not only in terms of amount but quality. The human body requires a number of essential amino acids which come combined in particular foods (White et al., 1973:1138). The quality of the protein content is determined by that essential amino acid present in the food in the smallest amount or quantity relative to recommended standards (Berg, 1973:52). This minimal essential amino acid is referred to as the "limiting amino acid."

Protein-calorie malnutrition has a number of deleterious effects on the body. In children, growth is slowed and the child is "usually thin, under-sized, and underweight" as a result (Robson, 1972:56). Two major forms of PCM have been identified and are referred to as kwashiorkor and marasmus. Until recently kwashiorkor was thought to be the more prevalent of the two, but recent evidence cited by McLaren (1974) indicates that as measurement techniques have steadily improved in the last two decades, marasmus is clearly shown to be far more prevalent.

The two deficiencies are distinguished by the following:

Classical kwashiorkor (síndrome pluricarenal, culebrilla, infantile pellegra) is characterized by a history of late weaning to a family diet which is deficient in protein, but only moderately deficient in calories. The disease usually affects the pre-school child in the second and third year of life. The victim often has only achieved 60 to 70 per cent of his ideal weight for age, and he may show a symptomatic complex of oedema, skin lesions and hepatomegaly (Sadre et al., 1971:55).

Marasmus, on the other hand shows fewer "spectacular" clinical signs (Sadre et al., 1971), and "results from grossly restricted intake of all nutrients and energy" (McLaren, 1974:95). Early weaning is a frequent cause of this form of PCM.

PCM in extreme cases results in death. For those who do not perish, PCM in their early years (0 - 2 years of age) can result in mental and intellectual impairment, oftentimes irreparably (Pan American Health Organization, 1972; Coursin, 1965; Cabak and Najdanvic, 1965; Stoch and Smythe, 1967). PCM also results in generally apathetic, insecure children which, in turn, results in poor social development through reduced social interaction (Cravioto, 1966a; Pollitt, 1969; Chavez and Martinez, 1972; Monckeberg, 1969). PCM is prevalent in all of the developing countries.

#### Vitamin A deficiency

A prolonged lack of Vitamin A results in blindness and eventual death. The disease associated with this deficiency is designated as xerophthalmia, and affects adults, infants, and young children (WHO, 1972a: 163). Xerophthalmia has been found in India, Indonesia, Vietnam, Brazil, Libya, Pakistan, Syria, the United Arab Republic, Sri Lanka (Ceylon), and Egypt (Gyorgy, 1968; WHO, 1972a). Its social significance results from handicapping blindness.

#### Nutritional anaemias

"Nutritional anemia is caused by the absence of any dietary essential, involved in hemoglobin formation or by poor absorption of these dietary components" (Guthrie, 1971:148). Megaloblastic anaemia or Vitamin B<sub>12</sub> and folic acid deficiency and iron-deficiency anaemia are the primary diseases of this type affecting the less developed countries (WHO, 1972a: 164). Little is known as to the exact prevalence of megaloblastic anaemia, but iron deficiencies are found in North and South America,

Africa, Asia, and Europe (WHO, 1972a:164-65). The social significance of the anemias is reduction in working capacity.

#### Endemic goitre

Iodine deficiency brings about a significant enlargement of the thyroid gland, and is called endemic goiter. This deficiency in its severest form can cause cretinism and endemic deaf mutism (Stanbury, 1970:537). Although the prevalence of endemic goiter has been reduced through the introduction of iodized salt, it is still prevalent in parts of Africa, the Americas, south Asia, and southeast Asia (Bengoa, 1966: 815).

Other deficiencies include beri-beri, rickets, scurvy, and pellagra which are either now rare or not considered major health problems (WHO, 1972a:165). Mineral deficiencies have only recently come under close scrutiny, and their extent and physiological and social effects are as yet undetermined (Berg, 1973). Endemic goitre, however, is well known for its debilitating effects, again resulting in reduced capacity to perform labor.

#### Nutrition as a Problematic

Malnutrition should not be confused with what is referred to and is more familiar to the general public as "starvation." Starvation, while a major problem periodically in the world, is dwarfed in significance in most years when compared with the extent of malnourishment. The greatest effects of malnutrition are on children in terms of their capacity to survive, their health, and their ability to become productive members of society.

### Mortality

Child and infant mortality in the less developed countries are of "staggering proportions." In these countries children under five generally make up one-fifth of the population, yet their deaths are a disproportionate 60 - 70 per cent of the total mortality (Berg, 1973:4). A major direct or indirect cause of such mortality is malnutrition, as the following examples demonstrate.

Studies carried out in several Latin American nations by the Pan American Health Organization conclude that

Malnutrition was shown to be an underlying cause in 7% of all deaths in young children and an associated cause in no less than 46%, i.e., it was directly or indirectly responsible for about 53% of all deaths in children under 5 years of age in the study areas (Bengoa, 1974:5).

In the Philippines and Mauritius, nearly 50 per cent of all deaths in children 0 - 5 years of age are due to malnutrition (United Nations Statistical Office, 1967:Table 25). In Bangkok, where infant mortality is higher than for the remainder of predominantly rural Thailand, again a major contributor to these deaths is malnutrition (Khanjanasthiti and Wray, n.d.:10-11). Finally, of all the causes, both direct and indirect, of infant and child mortality, malnutrition is considered to be the "biggest single contributor" (FAO, 1970:25).

Malnutrition also plays an indirect part in bringing about death in children. Measles, respiratory and gastrointestinal infections, and diarrheal diseases become virulent killers when accompanied by malnutrition (Bengoa, 1971; Williams, 1962; Robson and Jones, 1971; Behar et al., 1958). Nutritional deficiencies essentially function here to

reduce the capacity of the host to resist infection. Furthermore, infections can bring on Malnutrition. Thus what is called a "synergistic" interrelation exists between infectious disease and malnutrition (Scrimshaw et al., 1968:14; Bengoa, 1966:813). This synergism is not simply a combination but instead is an enhancing of effects creating a far more threatening situation for the victim than would either of the components taken separately (Gordon, 1969:4).

The magnitude, and perhaps the significance, of the effects of malnutrition upon those who survive is greater than the mortality attributed to it. According to Berg,

More than two-thirds of the 800 million children now growing up in developing countries are expected to encounter sickness or disabling diseases either brought on or aggravated by protein-caloric malnutrition (1973:4-5).

More important than the illnesses brought on by lack of proper nutrients is the permanent damage caused to the brains of young children by PCM. Although no figures are available as to the precise magnitude of the problem, sample surveys in Africa and South America indicate that most children having suffered from severe malnutrition early in life are mentally retarded in various degrees (Stoch and Smythe, 1967; Cravioto, 1971). The loss of these individuals to society is twofold. First, potentially active, supportive societal members are lost; second, these incapacitated individuals serve as an additional burden in terms of their dependency requirements.

Finally, malnutrition has serious consequences for adults as well, particularly pregnant and lactating mothers, resulting in higher rates of

maternal morbidity and mortality, and higher rates of involuntary abortions (Jackson, 1972; Jeans et al., 1955). When adults and children are included, the total proportion of the world's population affected is greater than one-half or 2 billion persons (Bengoa, 1974:2), and this proportion is thought to be increasing rather than decreasing.

#### Nutrition Status as an Input and Output in the Societal Process Model

As was noted in Chapter 1, individual needs such as those for nutrients are social to the extent that much of socially organized collective behavior is designed to meet those needs. Satisfying the individual's nutritional needs involves complex social processes of securing and transforming material and man-made resources into products and consuming those products.

In many societies a single institution, the family, performs most of the activities required in nutrition-need satiation. Families in the LDCs, for the most part, contain within their institutionalized role structure conversion, distributional, and consuming activities, all of which are regulated by social norms and values. In more highly differentiated societies, these roles are more finely divided and specialized, and thus make up separate spheres of institutional activity (Blau, 1974). Even in the MDCs, characterized by high degrees of role and institutional differentiation-specialization, families do regulate and provide the social context for the inter familial distribution of food and its physical consumption (Moore, 1965).

George Herbert Mead recognizes the importance of the family for meeting basic needs such as nutrition in the following:

. . . the family is the fundamental unit of reproduction and maintenance of the species: it is the unit of social organization in terms of which the vital biological activities or functions are performed or carried on (1934:229).

The nutrition state of individuals and thus as an analytical characteristic of groups is produced by interactions within the family and between the family and other institutions, the outputs of which are complexly mediated by the stratification-distribution system. The roles held by the various participants in the family and other institutions, and the interactions among these roles along with the cultural, physical, political, and psychological context of interaction produce particular states of nutrition and health.

The remainder of this chapter is divided into two parts. The first concerns the environmental and interactional antecedents of nutrition; the second deals with the consequences or feedback effects of certain states of nutrition for human interaction, the environment, and institutional and societal viability.

In order to deal with the interactive processes involved in the relation between nutrition and social structure, attention will be refocused onto the societal process model, concentrating on its relevant parts for nutrition, nutrition's social antecedents, and its social consequences.

#### Social phases in the production of human nutrition

Nutrition involves, as previously noted, the conversion, distribution, and consumption of foodstuffs.<sup>1</sup> These activities are

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<sup>1</sup>Note that this description of nutrition is similar to that commonly attributed to the field of economics. The concern here, however, is with the economics, the social stratification of the distribution, and with actual physical consumption or ingestion of food.

identifiable sub-processes in the societal process model, involving the institutions of economy, family, polity, and education; the stratification-distribution system; culture; and the physical environment. These elements and their interrelations are diagrammed in Figure 4, which is a simplified version of the earlier model. Basically, the model is one in which physical resources are transformed in the interaction between the economy and the physical environment, finished products are allocated to the family whose members consume those products, and this consumption produces states of nutrition and health. The states of nutrition and health, in turn, feed back into society, affecting both institutions and society itself. The production process represented by the chain of events that lead to nutrition and its consequences also includes inputs from societal culture, the polity (and its interactions with other societal polities), and most especially from the stratification-distribution system.

The conversion, distribution, and consumption of food are each separable complex processes affecting one another and affected by inputs from their surrounding environments. In order to deal with each antecedent process, and the various effects on the quantity and quality of nutritional status itself, these processes will be treated as three stages or phases. These phases begin with inputs from the environment which are converted, distributed, processed, and re-distributed, and finally consumed, and whose resultant output is nutritional status. Each phase can be viewed as a "processor production model" in the same sense as society was earlier, in that each phase involves the input of

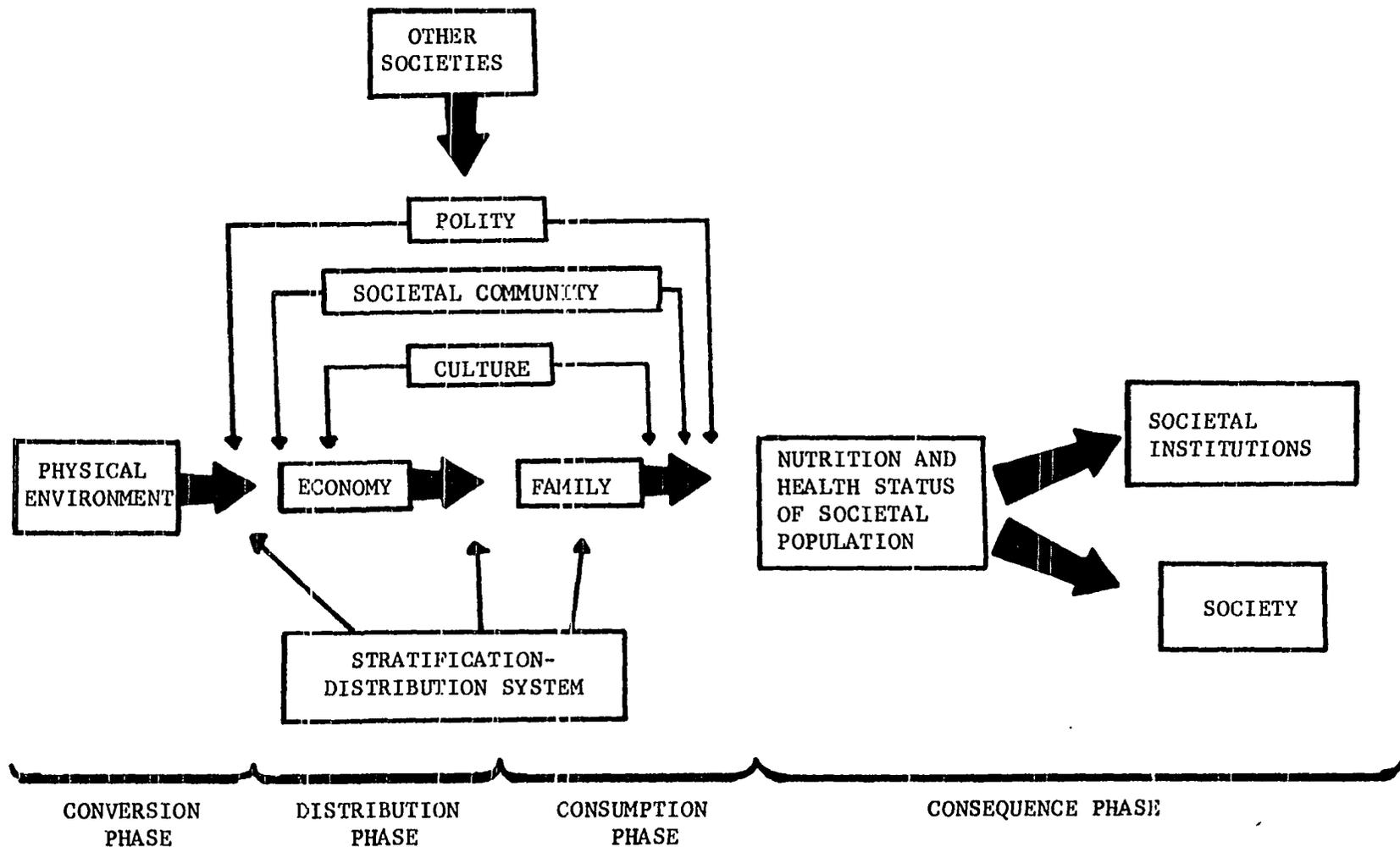


Figure 4. Reduced societal process model

various factors into a specific transformation process, which is affected by various distributional contingencies, and which results in an output. The fourth phase, the consequences of human nutrition, will be considered in the final sections of this chapter.

The three antecedent phases are labeled the conversion phase, the distribution phase, and the consumption phase. These phases are discussed below in the context of the family and its environments.

### Conversion phase<sup>1</sup>

This phase refers to the conversion of human task performance or efforts and resources drawn from the physical environment, mediated and constrained by societal factors, into foodstuffs (see Figure 5). In essence the economy performs interchanges with the physical environment, and the family performs interchanges with the economy in order to complete this phase. These interchanges are fundamentally altered and are partially at the mercy of inputs from the polity, the societal system of values, and the stratification-distribution system.

In the less developed countries, as previously mentioned, the conversion phase consists of economic tasks performed by various family members on farms and the surrounding non-cultivable physical

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<sup>1</sup>The conversion phase is essentially what is referred to as the agriculture sector of the economy. This section is less detailed than the other sections more closely related to the actual physical consumption of foodstuffs because the author's primary research duties have largely centered on nutrition while other project members have taken responsibility for the agriculture phase of the research. The author recognizes that other important factors such as managerial capacity and the role of governmental programs also affect ultimate agricultural output.

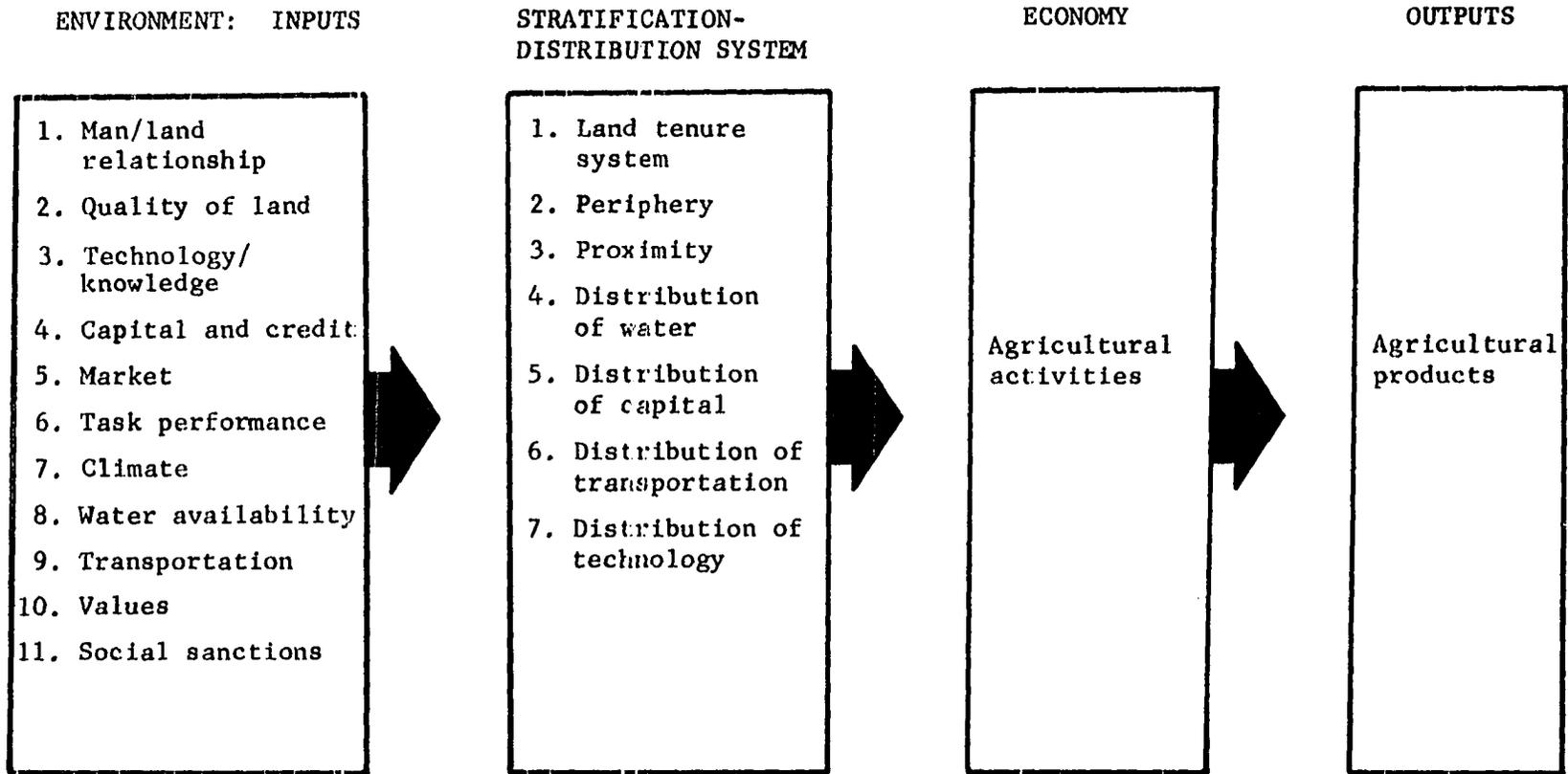


Figure 5. Conversion phase (Adapted from Mosher, 1966; Dorner, 1964; Engmann, 1972; Oshima, 1967; Christensen, 1965; Heady, 1966; Mellor, 1966; Bell, 1970).

environment. Filtered through the stratification-distribution system (and its supporting value systems), such as land tenure, credit, or marketing, and the inputs (labor, techniques, factor inputs such as seed, fertilizer, and capital) are converted into agricultural outputs. Thus, livestock, crops, game, and foraged items are obtained. In the discussion that follows, the inputs and their differential distribution that eventually are converted into foodstuffs are discussed in terms of the recent empirical findings and theoretical discussions supplied by sociology, economics, and nutritional science.

Allocation and conversion of inputs      The various agricultural inputs allocated through the stratification-distribution system are of particular importance for they prescribe and proscribe the level of foodstuff production. These constraining allocated inputs are largely thought to be responsible for the low level of productivity attained by the less developed countries. Weitz, for instance, contrasts LDC and MDC productivity in the following:

In the traditional agriculture of Asia and Africa from 2.5 to 10 work days were required to produce a hundredweight of grain, whereas in the west of France only 0.4 of a workday was needed to produce the same quantity, and in the American Midwest (Indiana and Iowa) the time required was only 6 to 12 minutes (1971:6-7).

Man/land relationship      This input-constraint has to do with the land available for cultivation and the number of persons that the land must support. LDCs, with the exception of several countries such as Brazil, currently utilize all cultivatable land for agricultural

activities; they have exhausted all sources of "new land."<sup>1</sup> At given levels of technology, there is a maximum this land may produce, which must then be shared among the population. Population, unlike available farmland, is growing at uncomfortably rapid rates, reducing the size of farm units allotted to the societal membership (Nicholls, 1971:379). Technology, of course, is not given, but is generally a dynamic factor. Technical innovations involving intensification of land use have produced dramatic increases in crop yields where they have been applied, and intensification potentially could be applied to other agricultural land units currently less intensively cultivated. The optimism once associated with intensification programs has sharply waned as continued, unchecked population growth has gobbled up yield increases. Schertz (1973), for instance, notes that while yields have increased significantly in India, the quality of the average Indian's diet has been reduced by the increased demands placed on the food supply by an ever-expanding population.

A number of scientists believe that economic and social development and a raising of the level of living throughout the world is not possible without first controlling population. Meadows et al. (1972) forecast massive starvation in many of the less developed nations unless population growth and its strain on resources are not checked. Many of those who support such so-called "models of doom" concerning population growth are therefore highly skeptical that technology can continue to avert potential

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<sup>1</sup>"New land in the sense of current feasible levels of investment.

disaster, as did the "Green Revolution" in the 1960s. Aware of the danger inherent in unlimited population increase, the United Nations family of organizations has made the restriction of population expansion a major development objective (United Nations Economic and Social Council, 1972). Likewise, the United States Agency for International Development considers the problem a fundamental constraint to development and has oriented its programs accordingly (U.S. AID, 1971:iii).

There are many who feel that technology in agriculture can discount potential disaster and eventually bring about a stable world population. Thus, ". . . if a rapid and continuing increase in production can be directed toward improving the lives of the poor rural masses, one of the essential conditions for lowering human fertility will be attained" (Revelle, 1974:166). The road to vastly reduced growth, however, entails more than merely increasing production, for as Revelle himself points out, these increases must result in higher levels of rural living. Poleman (1972), Oshima (1967) and Mellor (1973) all agree that production can only be stimulated by increased demand, and increased demand is only possible through increased rural incomes. The major problem, according to them, is less of population growth and more of stagnation in the realm of employment.

Disregarding the debate over primacy and the exact causal sequence that creates the man/land (and thus man/resource) problem; population growth, increased production, income, and employment all appear important for human nutrition and survival.

The effects of increased nutrition on the rate of population growth will be dealt with in the section concerning nutrition's consequences, found in the latter part of this chapter.

Technology Culture contains not only systems of values, but also the level of societal knowledge, including technology. Each society has attained a level of technological expertise through evolutionary and diffusion processes, and the technology applied to do subsistence and semi-market farming derives from this overall societal body of knowledge and is supported by values.

Because technology is fundamentally a part of culture, the introduction of new technology is often a slow and uncertain process. New technology must be integrated into societal knowledge and be made consonant with societal values. At times societal values must change to accommodate widely adopted innovations (Johnson, 1966:65-66).

The so-called "Green Revolution" demonstrates that within limits, technology can radically increase agricultural output. Most technological innovations in agriculture come either from the MDCs or from specialized international research organizations such as the International Rice Research Institute in the Philippines.

Innovations such as improved seed varieties, however, have reached only a few farmers in those LDCs in which they were introduced. In Laos, for example, the civil war and insufficient numbers of Lao and American personnel to introduce the program through demonstration plots has prevented the diffusion of IR-8 or San Patong to no more than a small

fraction of the farm population.<sup>1</sup> In India, only those farmers with a significant amount of the capital required to purchase the seed, fertilizer, and insecticide that make up this innovation have felt economically secure enough to take advantage of IR-8 (Warriner, 1969). For the vast majority of Indian farmers lacking risk capital, reasonable credit resources or grain reserves to fall back on, the "Green Revolution" has proved too risky a venture in which to participate.

In Africa the diffusion of agricultural innovations has largely been constrained by the center-periphery problem characteristic of rural-urban value differentials. As Engmann thus describes the problem:

What appears to be an antipathy to change arises partly from suspicion and mistrust. But there is no reason why the illiterate farmer who has learnt his craft through tradition, folk-lore, and hard experience should trust the educated urbanized agricultural officer who hardly knows the conditions on the farms. There is a cruel cultural gap between them; one has been to school, possibly even abroad; but the other, perhaps, has hardly even stepped beyond his own threshold (1972:134-35).

The conclusion drawn from the experience of attempts to diffuse new technology to rural areas in LDCs is that the technology either does not reach the rural areas in which most farming activities take place, or when it does the farmers either find that it entails too many risks, requires too much capital, or they mistrust it.

Capital and credit Farming in LDCs is usually described as subsistence agriculture, meaning that it provides only a basic minimal

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<sup>1</sup>A personal observation based on the author's experience in the U.S. Agency for International Development's attempts to increase rice production in Laos, 1967-70.

output for human need satisfaction (Ng, 1974). Because output exceeds only slightly a subsistence level, few savings result. Weddings and funerals, often requiring relatively high levels of capital expenditures in LDCs, frequently cause families to become creditors of local money-lenders who charge usurious interest rates (Jacoby, 1968; Feder, 1971). Families without capital and in debt are hardly in a position to expand production. Generally rural LDC families are not willing to go into debt in order to expose themselves to the risk of losing both their investment and their source of subsistence by experimenting with new seeds or new techniques.

Land tenure arrangements Land tenure refers to the relationship between the landowner and the farmer that works the land. In some regions such as Southeast Asia, land is plentiful enough so that the landowner is also the farmer. In India and in many countries of South America, the majority of the poor farmers or peasantry do not own the land they work. Instead they rent the land at rates that vary from 30 per cent to over 50 per cent of their annual output, and live in constant fear of eviction (Barraclough, 1970).

Dorner (1964) elaborates the types of tenure arrangements which effectively limit the level of production attained. There is first what he describes as an insecurity of expectations: the tenant lacks a clear title; the lease is not in written form; the peasant is forced to accept a short-term lease; the peasant lacks guarantees that any investments he makes will be adequately compensated. The second configuration has to do with efforts and non-commensurate rewards: here the tenants providing any new inputs share disproportionately the returns; the tenants'

salaries do not differentiate between the hard-working, the innovative, or the production-increasers. Third, necessary resources may not be available: there may not exist adequate credit facilities; the market may be unfavorable; the tenant may lack water rights (1964:250).

Equally constraining here is the complacency of landlords who apparently do not wish to risk their steady income, gentry-like status, or work harder in order to increase their profit margin (Barracrough, 1970:121).

Market mechanism and price Markets for locally produced food-stuffs may not be physically accessible to the farm family. Those areas in which income is sufficient to create a demand and thus a market are generally the large towns and cities. These large social units are generally not economically accessible to the farmer because of a lack of adequate transportation and communication (Mellor, 1966:340; Schultz, 1964:189). Income and transportation are thus crucial in the stimulation of greater production, and again they are contingent on the manner in which society is stratified.

Task performance Agriculture in LDCs is labor intensive, involving long hours and heavy work. The level of effort mounted by any one individual in his agricultural status-roles is determined not only by motivational factors, but also his physical capabilities. Leaving motivation aside for the moment, the level of effort sustained by farmers is highly dependent upon the energy their bodies have stored to do work. When the energy level is low, laborer productivity is low (Berg, 1973:13). In a recent study, Correa and Cummins estimated that for nine Latin American countries "increased calorie consumption accounted for, on the

average, almost 5% of the growth of the national product. This is nearly as great as the contribution of education" (1970:565).

As that portion of worker productivity that is derived from effort is a consequence of nutrition status, a full discussion of the research conducted to attempt to measure work efficiency as it is related to nutrition will be left to the section on the consequences of malnutrition.

Climate Little needs to be said here as to the importance of climate for production. Droughts, floods, hurricanes, hail, and other untimely drastic climatic conditions have turned potential bumper crops into shortfalls in the recent past in India, Pakistan, the United States, Central Africa, and the USSR (Valdes and Scobie, 1974:3; Schertz, 1973: 202). Furthermore, diets in a number of societies are seen to fluctuate greatly in quality and quantity with the seasons of the year (Ogbu, 1973; Gonzalez, 1972).

In concluding this section several points need to be emphasized. First, production and its increase or change in crop mix are critical for the betterment of human nutrition in LDCs. In increasing production, the important factor, however, is not so much the quantity of inputs available as it is the quality of those inputs and the way those inputs are distributed among members of the rural societal periphery.

Second, it should be emphasized that production is clearly not the full solution to problems of nutrition as two other phases are involved in the "production" of states of nutrition. In discussing the experience of raising cereal production in Mexico, Teply relates:

Adequate supplies of foods is the main fundamental for the achievement of good nutrition of a population. It is clear, however, that abundant food supplies--even of the proper nutritional balance--cannot be expected to lead automatically to good nutrition (1969:37).

In India the increase in the production of wheat has been accompanied by a decline in the production of food legumes or pulses (peas, lentils, beans, mung beans, etc.), a basic source of protein in the Indian diet (Berg, 1973:58). Williams (1962) and others see malnutrition as a problem of distribution of food, not the overall quantity of that food.

Problems in the distribution of foodstuffs to families and within families account for a good deal of the problems of nutrition faced in the LDCs, as the next two sections elaborate.

#### Distribution phase

The foodstuffs produced in the conversion phase are not, in an analytical sense, directly consumed even in subsistence or other such familial systems of low differentiation. Instead, the flow of these foodstuffs is partially controlled by the actions of the polity in its goal-setting capacity and it also must pass through the societal stratification-distribution system. The polity's international and development policies have an effect on the flow of food to the family, and the stratification-distribution system allocates foodstuffs, depending on the family's placement in income, education, territorial, and center-periphery subsystems.

Distribution refers here to the allocation of foodstuffs to families or across groups of families stratified by membership in various class

and geographical subsystems. It does not refer to the distribution within families, which is a concern of the consumption phase.

This "production" of societal distribution of foodstuffs is illustrated in Figure 6. The "production" of distribution will be discussed much in the same way that conversion was: that is, in terms of input/constraints.

The polity      The policies set by the polity in its attempts to structure societal relations with the other societies in its environment often greatly affect the flow of food to families (Chafkin and Berg, 1974). In order to obtain modern technological machinery and to generate foreign capital, food is often the only resource a nation has to draw upon. The use of food on the international market, of course, effectively reduces the supply at home. As Schertz relates the problem, the low-income families of LDCs do not have the effective demand to compete with European and United States incomes. Thus, in Peru, fish and fish products, and in Korea, milk, is exported rather than sold within those countries (1973:206).

A factor related to economic policy is the prices set by other societies for the raw and processed materials upon which others depend (Valdes and Scobie, 1974). A particularly salient example of this is the recent decision of the oil producing nations to raise the price of crude oil several hundred per cent. The mismanagement and drought and the "drastic increase in world oil prices not only has raised the cost of pumping ground water for irrigation but also has raised the cost of nitrogen fertilizer, which was already in short supply" (Revelle, 1974: 166), thereby dealing a crippling blow to India's harvest prospects.

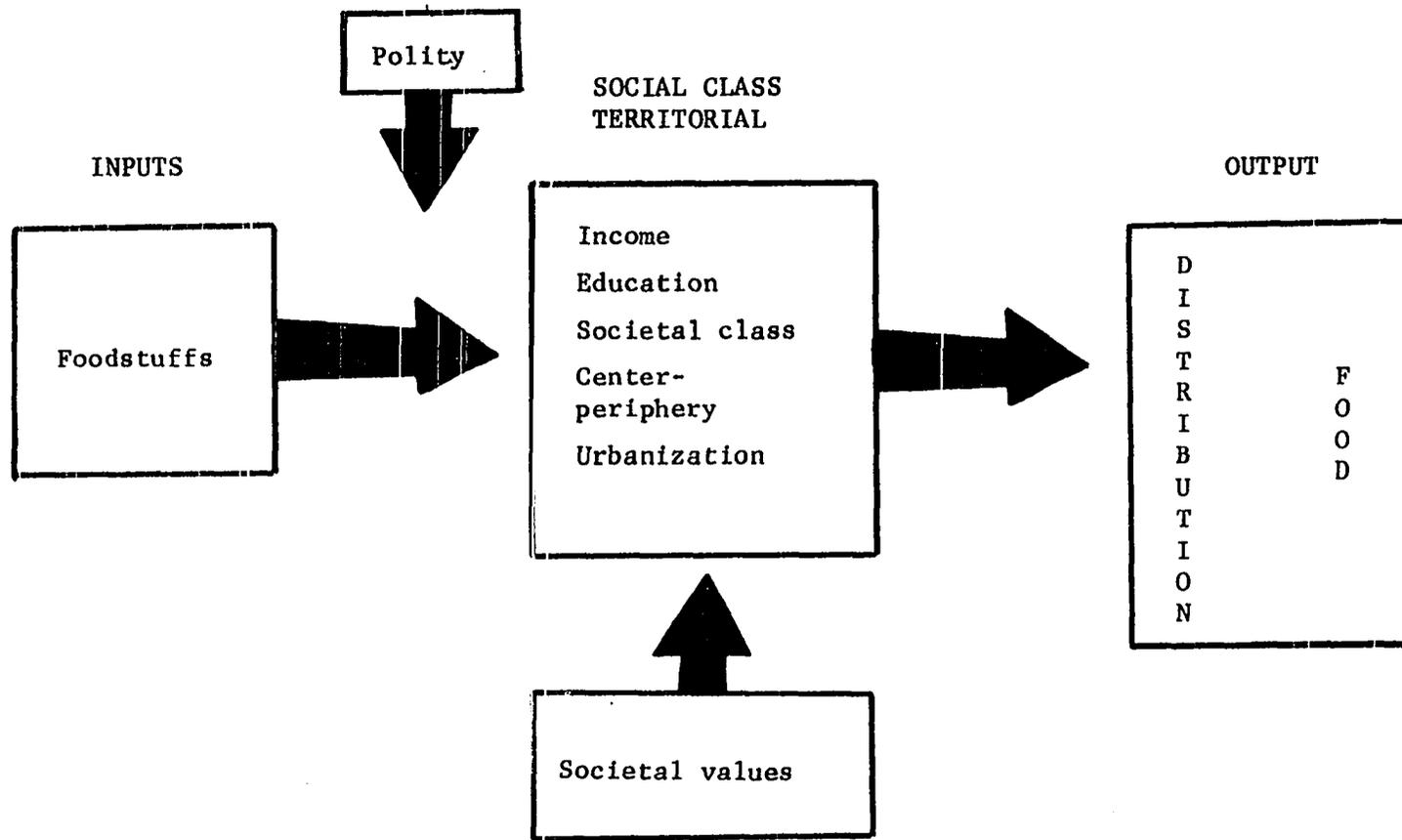


Figure 6. Distribution phase

Finally, the development policies set by the polity effect the available food for consumption. Just as foodstuffs are used in efforts to gain an advantageous balance of payments, so they may also be used to generate capital for industrialization, both to pay for machinery and to feed industrial workers (Mellor, 1966:18).

Income Economic growth with accompanying increases of income is considered by many as the key to solving nutritional problems (Poleman, 1972; Mellor, 1973). This view is supported to a degree by the finding that as income increases so does the amount of food purchased. The elasticity of demand for food increases with income, but at a decreasing rate. Thus the proportion of income allocated to food purchases decreases as income goes up.

Numerous studies during the last 20 years in all parts of the world have explored the complex relationship between income and the distribution of food to families. Bennett, using FAO data, found that the composition of national diet is closely related to the level of national income (1954:216). In a more recent national comparison, Turnham shows that diet quality is positively related with increasing increments of income. "Income has a considerable effect on the nutritional adequacy of diet and poor households in LDCs experience diets which are grossly inadequate" (Turnham, 1971:89). In support of these findings are the studies carried out in Latin America, the United States and Asia which find family income and income-related variables correlated with malnutrition in the children of those families (Young, 1970; Cravioto et al., 1967; Monckeberg, 1969; Oshima, 1967; Mora et al., 1974).

A number of other studies indicate that the income-food purchase relationship is affected by confounding factors causing the researchers involved to be less sanguine concerning the prospects of economic and income growth solving nutritional deficiencies without additional efforts. Plank and Milanesi note that "whatever protection additional income might have afforded was evidently nullified by accelerated weaning" in their study of infant weaning and infant mortality in Chile (1973:207). Accelerated weaning is often a consequence of development, and it is seen here as off-setting a positive effect of economic development.

Examining the relationship of specific income levels uncovers further contradictions. In general the quantity of foods consumed, and often the quality of foods consumed by higher income groups exceeds that of lower income groups. More specifically, higher income groups tend to purchase more carbohydrates and protein-containing foods (DeGariné, 1972:156), although the total nutritional quality of these foods may be less than that of foods consumed by lower classes. There are, however, prominent exceptions to this general finding. For instance, the case cited earlier in which Indian farmers are growing fewer pulses for more grain may indicate a lowering of protein available for consumption. Also, in Thailand, and presumably other Southeast Asian countries, there has been the propensity for machine-milled rice over hand-milled increases for higher income groups. Machine milling has the unfortunate consequence, unrecognized by the consumer, of removing a portion of the protein content of rice. A significant source of protein is thus removed from the Thai diet. From the Thai point of view, the commercially milled rice is more

desirable because of its whiter color, a characteristic identified with the consumption of the upper classes, and thus thought worthy of emulation.

Finally, Millikan (1969) notes that income would have to increase by 7 - 8 per cent to have a significant effect on nutritional status.

Education Other social class variables directly affect the distribution of food to families and thus the nutrition status of their members. Education has been shown to be a significant factor affecting consumption and nutritional status of individuals, particularly those of children (Puffer and Serrano, 1973; Mora et al., 1974). While maternal level education has not always genuinely distinguished among those with undernourished children in all cases reviewed (for instance, refer to Bekele, 1973 and Desai et al., 1970), literacy rate has proved to be a strong determinant. Wray and Aguirre found that maternal literacy is significantly related to children's growth rate (a common indicator of nutritional status, as will be discussed in the chapter that follows) (1969:88). Cravioto and colleagues, exploring this relationship further, note that not only literacy, but radio listening and newspaper reading rates correspond significantly to weight gain in children (again a common nutritional status indicator (1967:80-81). In discussing the socio-cultural changes occurring in tropical countries, Jelliffe declares that the slow increase in general education is resulting in improvements in infant feeding practices (1962:42). Plank and Milanesi (1973) note that increases in education have no effect on infant mortality when accompanied by accelerated weaning.

Other stratification effects Further research has shown that stratification by ethnicity also produces differentials in consumption and nutritional status (Chen and Huang, 1959; Arroyave, 1971; Gonzalez, 1972). Also, nutritional status is positively related to occupational status (Desai et al., 1970:140; Young, 1970:52; Mora et al., 1974:216; Khanjanasthiti and Wray, ca. 1973:7).

Center-periphery Physical distribution in geographic space creates high fluctuations in nutritional status (Berg, 1970; Welle, 1973; Sharman, 1970). Annegers, for instance, discovered that the amount of proteins and caloric sources available in West Africa varies greatly by ecological region. He notes that "these [regional differences] provide a great variety of diets with a corresponding range in the ratio of the contribution of calories from protein to the total calories" (1973:234).

Of particular importance is the rural-urban difference mediated by the center-periphery relationship, most strikingly exhibited in children's mortality and morbidity rates. This relationship is of particular importance in that it is generally assumed that urbanization positively contributes to a society's development and thus to the well-being of its people (Berry, 1973; Lerner, 1958; Farrell, 1972). Urbanization is said to expose individuals to modernizing influences and free them from the constraints of more tightly socially-controlled rural social structure (Inkeles and Smith, 1974). Also, the movement of rural peoples to urban settings more directly exposes them to the values and associated behavioral patterns maintained by the center elite. These elite serve as the "reference group for the aspiring masses" (Berry, 1973:94).

Finally, urbanization is associated with social mobilization, or the . . . overall process of change, which happens to substantial parts of the population in countries, which are moving from traditional to modern ways of life . . . where advanced, non-traditional practices in culture, technology and economic life are introduced and accepted on a considerable scale (Deutsch, 1961:493-94).

The consequences of urbanization and exposure to the center have had, contrary to what might be inferred from the theory of social mobilization, a negative influence on feeding practices and nutritional levels in general. The behavioral and value change involved is partially "modern," but the change is incomplete, resulting in negative consequences for the health of children. The most widely noted negative nutritional effect of rural-urban migration is the shift from breast feeding to bottle feeding of infants. Among the westernized elite of the center, breast feeding is considered indicative of a "low upbringing," "animal-like behavior," "unclean," and "unhealthy" (Berg, 1973; Jelliffe, 1962; Jelliffe, 1966a, 1966b; Barnes, 1965).

These views, while nutritionally unsound, can at least among the elite be compensated for by the substitution of sanitary commercial milk in sterilized bottles. For the lower class migrants, wishing to emulate the elite, the result is the abandonment of the breast for whatever substitutes are economically feasible. Unaware of the full ramifications of the behavioral change, corn meal water or rice water and contaminated water served in unclean bottles is frequently substituted. Sadre and associates (1971) point to a resultant increase in marasmus in Teheran. Khanjanasthiti and Wray note similar problems in Bangkok at least

partially brought about by the need of mothers to obtain employment, causing an early termination of breast feeding (ca. 1973:9).

Another effect of the transfer of residence from village or rural community to city is the loss of physical access to the natural food resources found in fields, woods, and jungles (Berg, 1973:45). A significant proportion of vitamins in the diets of the poorer classes is derived from leaves, moss and seaweed, berries, and bamboo shoots that grow without the attendance of humans. The nutritional significance of this loss is only speculative, but given the importance of vitamins and the lack of knowledge of basic nutritional principles on the part of the lower classes, its effect should be a priority for investigation.

Urbanization is often hailed as an integral component in the pattern of development from which the United States and Western Europe emerged. The Western experience was one, however, in which rapid urbanization began only after a degree of economic development was attained. It can be said that there was a direct and positive relationship between development and urbanization. In the LDCs, the relationship has been turned upside-down, for those countries with the "lowest levels of economic development" are experiencing the highest levels of urban growth (Berry, 1973:74). Moreover, as Berry notes, it includes those countries with the poorest levels of nutrition. Whether these relationships will eventually reverse, making urbanization a more positive force remains to be seen. Many observers suggest, however, that urban conditions are presently worsening rather than improving (Friedmann, 1973:21; Clinard and Abbott, 1973:78-79).

The distribution of foodstuffs is thus highly dependent on the configuration of international relations, internal policies, and the class and geographical systems of society, supported by various value systems. The distribution of food to families is by no means the end of the distribution process. Within the family, tasks, values, and division of labor all serve to further differentiate the amount and quality of food eventually consumed by individuals. The analysis will next focus on the internal structure and processes of family life which lead to and regulate food consumption.

#### Consumption phase

Food is not only produced socially but is also consumed socially. This is because the family must meet its external obligations or functions for society as well as meet its own contingencies as an institution. The consumption of food serves not only to meet the human need for nutrients, but also plays a part in biological maintenance of the societal population as a whole and especially of young children, the socialization of children, the upholding of societal values, and the promotion of motivation through solidarity.

The fulfillment of these internal and external family functions depends on the internal activities of the family as well as interchanges between the family and its environments. These environments, of course, are the relevant parts of the societal process model, including the societal population, the economy, and more importantly the societal culture and the stratification-distribution system. (Refer to Figure 7.)

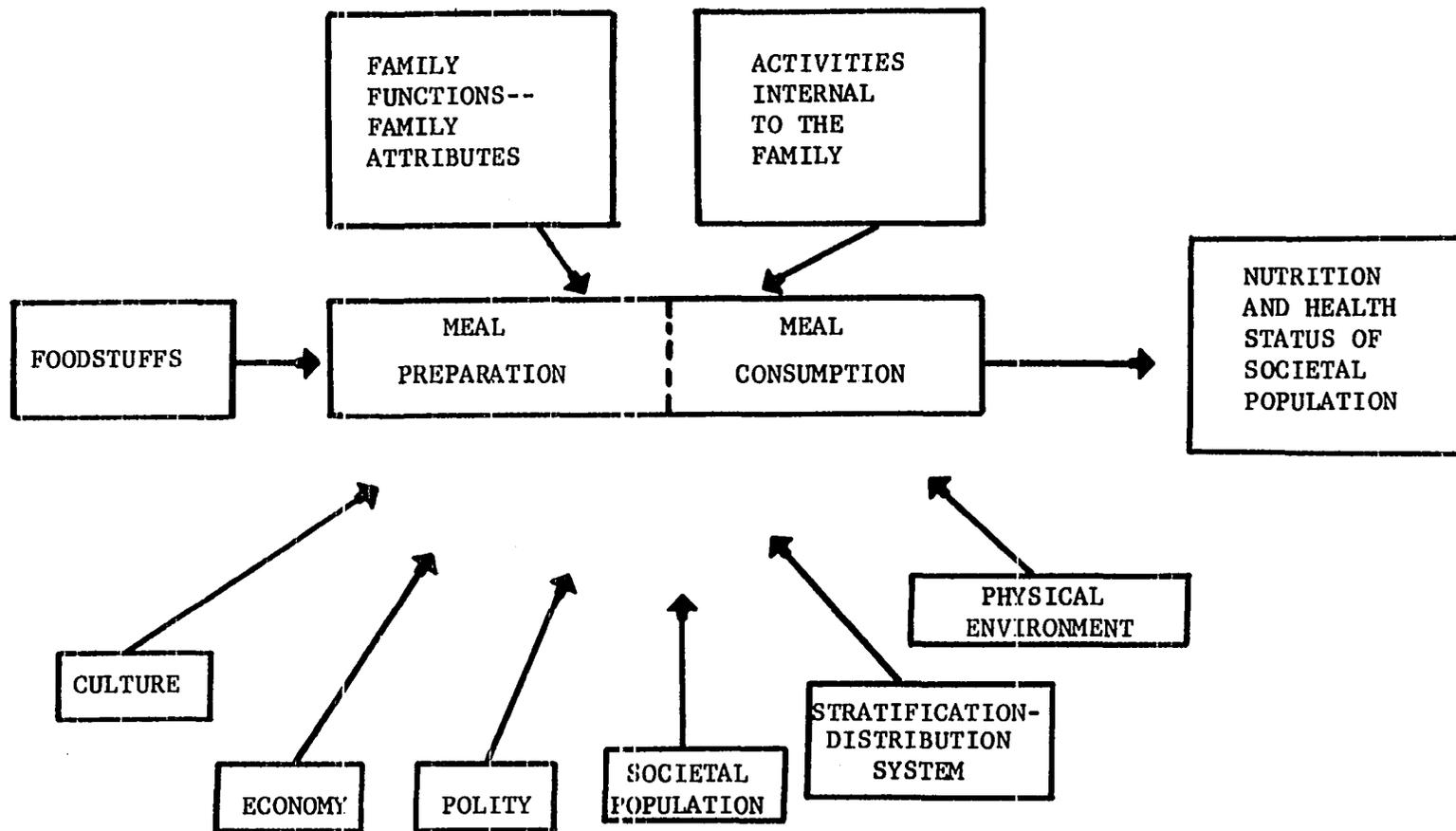


Figure 7. Consumption phase

The internal and external functions and intra-societal interchanges that result in the physical consumption of foodstuffs, and thus nutrients, converge within two sub-processes contained within the family: meal preparation and meal consumption.

Meal preparation The activities involved in the preparation of meals in one sense belong analytically in the conversion portion of the reduced societal process model as this activity involves the transformation of resources into consumables. As meal preparation falls into the realm of familial rather than economic institutionalized behavior and it has direct bearing on the various functions carried out by the family, the preparation of meals is considered under the consumption phase of the reduced societal process model.

The social and biological functions served by food preparation include the support of those value systems that relate to human sustenance, socialization of new societal members of these values and related technologies and beliefs, and indirectly meeting the biological need for nutrients of the societal population.

Culture Meal preparation involves a decision-making process regarding the use of scarce resources in the form of foodstuffs. Women in most societies are chiefly responsible for decisions regarding food use and preparation in their family role as mother (Lewin, 1951; Sims et al., 1972). Decisions in this context must be made concerning the quality and quantity of food utilized in each preparation and the type of preparation that will be utilized, and these decisions, in turn, are dependent on available resources and are regulated by social sanctions and cultural values, technologies, and beliefs. It is not unwarranted

repetition to emphasize here that culture and its components, and to some degree social sanctions are positive adaptive mechanisms; however, they also serve to limit the range of behaviors conceivable and permissible that may be undertaken to meet needs (Montagu, 1955:131). This is no less true of food related behaviors than of any others.

Technology      The constraining nature of culture is evident in the technologies and related beliefs and values that prescribe the materials and methods of food preparation and proscribe alternatives. In Northern Thailand and Laos, for example, glutinous rice is soaked in water and then steamed in compliance with local custom. The washing and soaking, however, reduce significantly the quantity of thiamine contained in the rice (Kik, 1959:125). Hauck and Sudsaneh, in their examination of dietary patterns in rural Thailand, relate:

Since over four-fifths of the thiamine content of the foods used by each group [nourished and malnourished families] came from rice and the thiamine loss when rice is cooked as it was in Bang Chan has been estimated as 75 percent or more, the actual per capita intake of thiamine probably fell short of the 0.2 to 0.3 mg. per 1000 calories which the Food and Nutrition Board [U.S. National Academy of Sciences] considers to be minimal for adults (1959:1153).

Values      Religious and other values attached to what otherwise would be considered as food objects constrain the use of those objects as food. Thus:

The relationship between technical knowledge, production, and food consumption are by no means automatic. If the Chimbu of New Guinea are almost exclusively vegetarian it is not due to their ignorance of animal husbandry. They own large numbers of swine and regard them as a symbol of wealth. However, they rarely consume them, occasionally at ritual feasts (DeGariné, 1972:145).

In this case a potentially useful food item is more highly valued for its contribution to prestige rather than to sustenance. A similar pattern has been observed among certain African tribes who regard their cattle as symbols of prestige (Berg, 1973).

Furthermore in societies whose religious faith is Theravada Buddhism, significant financial outlays are made by the family in order to increase the "merit" of the family members (Hanks, 1962). These expenditures occur in spite of other pressing needs such as more food.

Merit offerings from these expenditures consist of the purchase of robes and other necessities associated with the monastic life of the monkhood. These items are offered annually to local Buddhist monks. A second area in which family monetary resources are drawn upon is the initiation or ordination ceremonies for village boys entering the monkhood. The effect on real family income which might otherwise be used for savings or increased food purchases is not insignificant, as Pfanner and Ingersoll relate in the following example from their Thai-Burmese socio-economic village studies:

In one village of 150 houses in the Pegu District during 1959-60 where the average annual net disposable family cash income was calculated to be about \$200, a village total of \$2,300 was spent in the two initiations and two alms-giving ceremonies during the year. Of this amount 38 percent was actually spent on gifts to the monks, while 51 percent went for the purchase of food for guests, who were counted in the thousands (1962:348).

Knowledge Values essentially define desirable food behavior, but their very generality precludes exact definitions of food preparation and consumption behavior. The gap left by values is generally filled by social sanctions, beliefs, and knowledge. The part

knowledge plays in the determination of which materials are to be considered as foodstuffs and which are not is of fundamental importance. Several noted nutritional scientists, in fact, feel that ignorance of foods and of the differential quality of foods in respect to bodily needs influences preparation and consumption and thus nutrition to a far greater degree than is generally believed (Williams, 1965; Scrimshaw, 1967).

Through years of experimentation most societies develop a culturally grounded knowledge base concerning the edibility and utility of various materials. This knowledge is always less than complete, however, causing the elimination of potentially useful items from the diet. These items thus are not gathered and prepared for consumption. The extensiveness of this lack of understanding of what elements of the environment are useful for survival is highlighted by an observation of Gordon: "In a region [Guatemala] where everything grows--even the fence posts sprout leaves in the rainy season--the choice of basic foods is culturally restricted to corn and beans, morning, noon and night" (1969:4).

Knowledge is, thus, never perfect and in the place of perfect knowledge misinformation and superstition reign. Existing knowledge becomes rooted and intertwined in beliefs and ultimately values, and unless there exists a value system that supports experimentation and questioning of existing knowledge, perceptions of food worth are likely to remain fairly static. It can be surmised that relatively unchanging perceptions of food is a major characteristic of LDCs value systems (Peshkin and Cohen, 1967).

Human nutrition makes up a relatively new and small portion of modern knowledge available in most MDCs. Knowledge of nutrition has yet to

become widely diffused among the societal population of any nation, despite its importance (Robson, 1972). It is, therefore, not surprising that human nutrition is unknown in the peripheries of the less developed countries. Here even the relation between health and nutrition is only dimly, and usually incorrectly apprehended (Foster, 1966). For example, in numerous societies certain meats and fish are consumed uncooked on the basis of the perception that the best food value is obtained in this way (Migasena, 1972:8). The knowledge which would inform these consumers of the dysfunctions of such uncooked foods is neither physically nor culturally accessible. Instead, the illnesses and parasites that result are attributed to the intervention of supernatural forces or spirits (Operation Brotherhood, 1967; Tambiah, 1970). Not all LDC cultures provide supernatural explanations of illness; Warren (1974) found that among the 1200 identifiable diseases in Ghana, only 100 or so of these were believed by the Ghanians to be caused by spirits. The rest were given a more scientific explanation.

Low levels of knowledge concerning health and nutrition are also the apparent reason for the lack of sanitary cooking facilities and personal hygiene characteristic of many rural LDC communities. From the data drawn from 17 areas (cities, regions, suburbs) in South America, Puffer and Serrano indicate that postneonatal death rates range from approximately 15 - 50 per cent higher among those families without piped water and flush toilet facilities as compared with those families possessing those facilities (1973:320). The Cravioto et al. (1967) study of 235 families relates that low weight gain in children is significantly related

to sanitation of the home. Also, low weight gain was associated with parental personal hygiene ( $\chi^2 = 7.10$ ;  $p < 0.01$ ) (1971:80).

Resources Other factors acting as constraining inputs on food preparation include the resources (both internal and external) that the women in meal decision-making roles have available to them. An important resource often overlooked is that of time. Limited in energy and to 12 active hours a day (Clark and Haswell, 1964) those responsible for meal preparation as well as with aspects of gathering and farming often must compromise some of their various role requirements. As the Sharman (1970) study suggests, the more time spent in gathering roles because of scarcity conditions, the less time there remains to devote to meal preparation. One result is less adequate meals.

A second resource restriction has to do with income or barter materials which might be exchanged for more foodstuffs to improve the family's diet. While women are generally held responsible for meal preparation, men often are found to have control over whatever family income is available. As several studies have found, the men, concerned with other familial needs such as prestige, tend to spend this income on non-food consumer goods (Williams, 1965:22; King et al., 1972:918).

The resources that a woman has to devote to her family's feeding are reduced in those instances where she finds it necessary to obtain employment outside the home. Scrimshaw, in discussing the research results of Dr. Ernesto Pollitt of the Massachusetts Institute of Technology, relates that Pollitt's study of malnutrition in Boston is largely due to "extreme social disruption, usually necessitating that the mother work outside the home. The result is that the child is neglected"

(Scrimshaw, 1974:793). Where other persons are available as substitutes for the mother while she is away, as in the case of extended families in Thailand (Goldstein, 1972:425), child neglect does not result. However, even the presence of sisters, daughters and sons, or grandparents is often inadequate in those situations where the child still requires breast feeding.

Before moving forward with the discussion of the final stage or sub-phase of the societal production of human nutrition, a summative statement is perhaps appropriate. The barriers to optimal usage of materials as foodstuffs within the family are social and cultural in nature. Culture reduces alternative uses and preparations of food, thus restricting more optimally balanced prepared foods for consumption in the meal. Furthermore, stratification-distribution, through the center-periphery, constrains the flow of alternative solutions to the peripheries while at the same time sets desirable standards of food preparation behavior that cannot be fully duplicated in the peripheries.

The next section deals with actual physical consumption of the output of food preparation in a social setting. Again, the constraints on human nutrition as a result of food consumption in meals are largely due to culture and stratification-distribution, but other factors such as societal population (family size) and the intervention of the polity play a part too.

Meal consumption      The family, which is the basal unit of the kinship institution, performs a number of important functions for society's survival at all levels. It meets certain biological, social, and

psychological needs basic to the survival of the individual; it prepares, motivates, and legitimizes the individual's participation in various institutional roles; and it provides society with a basic unit upon which much of society's adaptive capacity depends.

The consumption of foodstuffs in a social setting, regulated by values and norms and constrained by other environmental contingencies, plays a major part in the fulfillment of the various familial functions. The following paragraphs briefly reiterate these functions, in the context of meals or meal consumption. This discussion is of more than passing interest, for the meeting of familial functions is not only of importance in its own right, but also because these functions interrelate to effect the outcome of the familial function central to the major concern of this writing; that is, human nutrition.

A primary function of the family is the provision of the motivation to its members to continue to participate in family and other institutional roles. Without such motivation there is always the threat that individuals might seek alternative means to achieve fulfillment of their needs. The solidarity that develops among family members provides much of the motivation required for continued participation in institutional roles.

Solidarity, and thus motivation, begins when new members are added to the family. Freeman (1973) describes the interaction process through which the infant learns to depend on its mother or mother substitutes for satisfaction of its basic needs, and in doing so becomes highly attached to the person in that role. Solidarity is first achieved through the development of this attachment of child to mother.

The maintenance and strengthening of solidarity are achieved through the participation of the family as a group in religious, economic, and community festivities. "The performance of specific routines at mealtime, in which the family unites as a whole, gives the family a feeling of solidarity. . . ." (Bell and Vogel, 1968:26).

A second function that meals aid to fulfill is a functional requirement internal to the family. The status differentiation and division of labor must be maintained to a degree sufficient to insure family survival (Parsons and Bales, 1955). Food portions are consequently allocated differentially in quality, quantity, and in time on the basis of task and economic roles, and sex, age, and seniority characteristics. Men, whose economic activities are considered in many societies to be most fundamental to family survival eat first and eat best. The very young and the aged, whose contributions to family survival are thought to be more marginal, eat less. Women, whether pregnant, lactating, or without children, often eat last, least, and leanest.

A third function is the feeding of infants and young children still unable to feed themselves (Bell and Vogel, 1968). Infant care may occur during family meal time or as a separate event. The feeding of infants is regulated by the values and beliefs that pertain to the continuation or restoration of the health of the young. It is within the family that the basic need to provide society with new members is met, yet within this same social context, the very survival of those new members is greatly dependent upon the efficacy of the knowledge, beliefs, and perception of foods, sanitation, and illness.

Inculcation of food values, beliefs, technology, and knowledge is the fourth function of the family (Bell and Vogel, 1968). New societal members are taught directly about foods and their value, and meals serve as an indirect means of reinforcement and supplementation. The new member learns what is acceptable, good, adequate, inadequate, unpalatable, or disgusting through participation in thousands of meals before that member leaves his family to form a new family unit. It is also significant that the social setting provided by mealtime allows social regulation of mealtime behavior. In this manner, deviance can be closely controlled.

Sixth, the meal provides one of many routinized contexts for social interaction which are fundamental to the general process of socialization, formation of self or personality, and the development of different role competencies (DeGariné, 1972). The importance of the meal in the fulfillment of this final function will become clear in the section on nutrition consequences that follows.

Finally, foodstuff consumption through meals serves to meet the physiological requirements of optimal nutrition and health of the societal population as a whole.

The satisfaction of the nutritional needs of family members is constrained in the same fashion by limitations in the same inputs discussed in earlier sections, and is, in turn, further limited by the various other functions required of the family. The fulfillment of other functions requires both activity and inputs. Family members must allocate their scarce resources and choose among the activities in order to fulfill each function. The result of this allocation among competing functions has

consequences for the degree of function-satisfaction attained at any particular time, and thus affects the family's satisfaction of nutritional needs. Thus, the energy and the behavior required to maintain the division of labor and internal stratification cause a great differentiation in the allocation of meal portions to family members, and thus causes differentials among the various levels of nutrition attained by those members.

As the discussion below of constraints on nutrition engendered by the complexities of meal consumption indicates, culture and the stratification-distribution are the forefront of the barriers to adequate nutrition.

Family size Not only do family functions constrain the nutritional status attained by family members, but other family characteristics can have similar effects. Among these include family size and density and sanitation of the household (Refer to Figure 7).

Studies carried out by Nimkoff and Middleton, using Murdock's "World Ethnographic Sample" reveal, among other things, that family size (or more basically, whether the family is nuclear or extended) is at least in part determined by the primary type of economic subsistence activities (agriculture, animal husbandry, fishing, gathering, etc.) engaged in by the family (1960:217). Steward (1955) has hypothesized from historical accounts that family size is directly related to the level of the food supply.

A conclusion that most certainly can be drawn from the relationship between family size and food supply is that they are optimally linked. Thus, when supplies are small and scattered, families are small; with

concentrated, larger supplies, families grow in size to increase labor supply. Other research indicates, however, that family size is not directly related to level of food supply (Burr, 1973; Bottomly, 1970; Rao, 1972). In fact, the only link between the two factors appears to be family wealth.

Family size has been correlated with the nutrition status of the children of those families in a number of recent studies. The investigation carried out by Cravioto and associates (1967) in a Guatemalan village concludes that the "upper weight gain children derived from smaller families than did those infants showing low weight gains" (1967: 77). The families under consideration here were both nuclear and extended families. The size-weight gain relation held not only for differences between nuclear and extended, but also between families of various sizes within these types.

A second study undertaken in a small town in Colombia utilized the "number of living children" as an index for family size. No investigation of nuclear versus extended family types was made, but birth order and interval between births were examined in terms of their effects on protein-calorie malnutrition within the families in the sample. The percentage of PCM affected children was seen to increase in families with five or more children, and that the prevalence rose with birth rank (Wray and Aguirre, 1969:90).

Finally, Rao (1972) and Berg (1973) present findings from separate studies carried out in India supportive of the Latin American experience with family size and nutrition. Berg notes that "protein availability per child in families with one or two siblings would be 22 percent higher

(some 13 grams per head) than in those with four or five siblings. In most cases this additional amount would be enough to meet current protein deficits" (Berg, 1973:37).

Family density Related to family size is familial density or number of persons occupying the family dwelling on a permanent basis. The studies that have examined familial density, number of rooms in the house, and general housing condition have uncovered a fairly consistent relationship between density and nutrition status. Puffer and Serrano's (1973) reviews of various Latin American studies of the causes of infant mortality reveal a wide variation in the number of rooms contained in the family household. The number of rooms available varied from 1 - 4, with families of infants dying in the neonatal period having "homes with more rooms than those of infants dying in the postnatal period" (1973:322). [It should be noted here that postnatal deaths are generally thought to be caused by environmental problems while neonatal mortality generally occurs because of congenital factors such as genetic or heart conditions in the infant (Gordon et al., 1967:360)].

A similar relationship was found when familial density was examined directly. Specifically, "more families of infants dying in the postnatal period had households with three or more persons per room than did families in the neonatal group . . ." (Puffer and Serrano, 1973:323-24). Desi and associates confirm that overcrowding (more than three persons per room) and houses of less than three rooms are significantly associated with low rates of weight gain in Jamaican children 0 - 5 years in age (1970:140).

The impact of density and crowding grows when these conditions are accompanied by measures of sanitation. Unfortunately, only Stoch and Smythe have tested the triadic relationship of density, sanitation, and malnutrition. They conclude that the malnourished children in their study lived in "atrocious conditions in lean-to, corrugated iron, one-room shanties built in sand without any sanitary facilities" (Stoch and Smythe, 1963:546).

Stratification-distribution and culture In many societies the internal structure of the family has been a major subsystem of social stratification in its own right. China prior to the revolution of 1949 provides an excellent example of this as Confucian China families tended to be divided by rigid class lines. Such lines flow primarily along age, sex, and seniority differentiations, with the father or grandfather (in those cases when he is still living) as the supreme decision-maker with the literal power of life and death over the remaining family membership (Yang, 1965). The mother role assumes subordination to these male held roles, but contains chief responsibility for decisions regarding the use of food at mealtime and the socialization of the young.

The stratification of persons in family positions is of significant consequence for their status in relation to nutrition, as the following relates: "It is, in general, a common ration that will provide different members with daily meals, but the various portions will rarely be identical. Differences will appear according to sex, age, transitory situation" (DeGariné, 1972:153). Food is also allocated on the basis of the various tasks performed by family members pursuant to the fulfillment of their role obligations. It should be clearly understood, however,

that these various modes of allocation--task versus ascriptive--are generally consistent with one another, as family roles are allocated on the basis of age and sex (Parsons and Bales, 1955; Zelditch, 1955). Individuals holding certain roles on the basis of their age and sex are presumed to have food needs commensurate with the requirements of their positions. For example, in African and other societies where the male household head is believed to be both the protector and provider for the family, he is allowed to eat his meal first, selecting from the total family portion what he desires to be his share. The rest of the family eats what remains after he has finished (Robson, 1972:88).

Presumption of need derives from cultural beliefs and knowledge. Knowledge, as was noted previously, is the product of cultural interpretation of many years of human adaptation to the physical environment. The assumed requirements are unfortunately not always as accurate as those derived from scientific sources, thus resulting in a maldistribution of food according to need.

In particular there are several "groups at risk" for whom proper nutrition is most fundamental to their health and continued survival, yet these groups are those most often discriminated against as a result of faulty nutrition knowledge.

Women are perceived in many societies as less important members as far as their contribution goes. As a result, the portion offered women at mealtimes is less than that of the men. This differential allocation is made despite the empirically demonstrated fact that women frequently carry out as many if not more important economic and social functions relative to family survival (Williams, 1965; Berg, 1973). Such is the

strength of culture and its manifestation in internal family stratification.

In addition to the socio-economic functions that women perform, they also are responsible for the bearing of future societal members. Child bearing places a greater demand upon the women's physiology for both energy and nutrients, thus raising the food requirements of the pregnant mother. "Extra energy is needed for the growth of the fetal and maternal tissues, as well as for moving the increased body mass" (Robson, 1972: 328-29).

The response of the family, again regulated by cultural beliefs and knowledge, in most of the peripheries of LDCs, is to further restrict rather than increase the woman's food allotment (DeGariné, 1972:148); Jelliffe, 1962:33). Berg (1973) suggests that "the notion of a pregnant woman eating for two is a western concept; in most Asian countries, in fact, women consciously undereat during pregnancy, with the objective of a small baby and an easy delivery" (1973:47).

Beliefs and knowledge further impinge upon expectant mothers to further exacerbate nutritional deprivation. Pregnant women are believed, in several societies, to be in harmony with the natural order of the universe (DeGariné, 1972). It is felt that great care must be taken in order to maintain this harmony. Thus, foods that are perceived as potential disruptors are withheld. Furthermore, the continued health of the mother and infant are thought to be highly dependent on the mother's behavior during and after pregnancy. Again, correct behavior is frequently tied to what is eaten and what is avoided. In their systematic

attempt to catalogue health beliefs and practices in Laos, Operation Brotherhood International (OB), a voluntary medical organization from the Philippines, lists the following eating restrictions on pregnant women in Laos:

A pregnant woman should not . . . eat rats because they induce bleeding; papaya because the foetus will grow too big; eggs because they thicken the uterus causing severe pains during delivery; coconut and bitter tasting food because these induce abortion; hot food because it kills the foetus . . .; oversized fish because it causes oversized babies . . .; drink alcoholic beverages because the child will become a drunkard and a ne'er-do-well . . ." (OB, 1967:304).

Further examples of food restrictions for pregnant women found in LDCs are listed in Jelliffe (1962), DeGariné (1972), Berg (1973), and Foster (1966). These various dietary patterns have had differential on the health of mother and child, either insignificant, beneficial, or deleterious in nature. Among the harmful results are the removal from the diet of those foods which are some of the best sources of protein and vitamins available (Robson, 1972:90).

A second high-risk group are infants at time of weaning. Except in cases of failure to lactate, infants thrive adequately on their mother's milk until six months of age; after this time breast milk must be supplemented with high-quality foodstuffs. Furthermore as socio-cultural change induces earlier weaning, a greater quantity and quality of food supplementation must necessarily be introduced at an earlier age. As was related in the earlier discussion of urbanization's consequences for nutrition, inadequate supplementation or outright replacement of breast milk can cause acute intestinal infections and malnutrition because the supplementary foods are inadequate and the feeding utensils are unsanitary.

As children grow older, erroneous beliefs, inadequate knowledge, and prolonged weaning continue to threaten their health. Again tradition often calls for the elimination from the child's diet of foods high in protein quality. In countries such as Malaysia, Indonesia, Guatemala, and Burma, protein sources such as fish, eggs, poultry, or beef are thought to produce worms in young children, even when these foods have been thoroughly cooked (Jelliffe, 1962:28).

Furthermore, because of family feeding order, the child receives far less of even those foods which are defined as acceptable for children by the culture. Berg provides the following example:

In Fiji an increasing amount of money is spent on canned beef and other popular European foods, but custom demands that adults eat first, and little of these fancy foods is left for the child. His diet, as a result, is often white bread, tea, and sugar" (1973:46).

Also, children do not eat as quickly as their elders, and the meal may end before they are fully satisfied (King et al., 1972:918).

A third group seriously affected by food restrictions are children who are ill. Absent from the knowledge base in many LDCs is the recognition that biological agents perpetrate disease rather than spirits and other transcendental phenomena. Food restrictions placed on the ill are done so as a part of the treatment prescribed by the family and local healers. Families, in their capacity as providers of biological necessities, serve as the medical system for societies of low differentiation (Parsons and Fox, 1958). Even in more modern societies the family still makes certain fundamental decisions regarding the care of ill members.

In some LDCs foods are thought either to be related to individuals' relationships to the spirit world, the ability of their bodies to counteract the disease, or to the ailment itself. The following examples are illustrative of the application of society's accumulated culture by the family in the treatment of the ill.

In Northern Thailand and Laos when the patient has intestinal problems, such foods as chicken, hot pepper, paadtek (fermented fish) or potatoes are withheld for fear of both exacerbating the illness and driving away the beneficial spirits (phiidee) that naturally inhabit the human body and which are essential for good health (Tambiah, 1970:317; Operation Brotherhood, 1967:1, 12). On the other hand food such as chicken or pork might be offered ceremonially in order to drive away malevolent spirits or induce departed body spirits to return.

For the Sengalese, foods that are perceived as being less digestible than others are removed from the diet of ill children, for undigestible foods are considered to weaken them (DeGariné, 1972:148-49). Unfortunately, the foods considered undigestible are rich in protein and fat, while those which are not withheld are generally low in these nutrients.

Family solidarity Another attribute of the family, the level of solidarity it achieves, also greatly affects nutritional status. Family solidarity serves to bind members to the family in the face of adversity from both internal and external sources. Solidarity, however, is not always sufficient in its provision of motivation for continued participation in the family's collective efforts at survival. Economic

circumstance, marital disputes, and the discovery of more desirable partners often brings about the temporary or permanent loss of one or more family member (Lloyd, 1972; Slater, 1968).

Disruption of the family means instability in the family division of labor, interaction patterns, and ultimately in the solidarity of the remaining members. Absence of the father often necessitates the mother's obtaining outside work or spending more time on subsistence agriculture activities and less on maintaining the household. Studies of two rural Mexican communities, found for instance, that in 20 per cent of the cases of malnourished children, the household lacked a father. In another 20 per cent the fathers, while still at home, were at least functionally removed to a degree because of their alcoholism (Chavez et al., 1971:226). Similar results were found for the families of low weight gain children in rural Jamaica by Desai and associates, where more than 20 per cent of the absentee fathers in the sample were not providing any monetary support to their families (1970:137-38). Chase and Martin (1970) include parental separation and alcoholism as social determinants of undernourishment in 19 hospitalized children in Denver General Hospital (U.S.A.).

Disruption, as was discussed previously, often forces the mother to look for work, particularly in those cases in which she does not have an extended family to rely on. In disrupted families the pattern seems to be one in which either the food resource flow is disrupted or the mother's time available for properly feeding and caring for her young is severely restricted. Other studies have sought to show that "common law marriage" represents a form of disruption and therefore should be related to infant

malnutrition (e.g., Puffer and Serrano, 1973). Apparently the societal community serves as a sanctioning force when the union does not fall under legal jurisdiction, for common law marriage has not been demonstrated to contribute to child neglect or malnutrition.

Relation to the center With the growth of communications and urbanization, persons in the peripheries of society, still without the means of true access, tend to take on the values and behaviors of the center where possible (Eisenstadt, 1971). One area of imitation, as the earlier discussion of breast feeding in urban areas indicated, is food values and beliefs. The upper classes not only tend to eat larger quantities of food than do those in lower strata, but they also tend to include a greater variety of foods in their meals, resulting in what is referred to as "diet complexity." Diet complexity in essence is the progressive and inclusive movement from cereals, to meats, to potatoes, to butter, to citrus fruits, to green and yellow vegetables (Chassey et al., 1967:57). In their study of a planned Mexican industrial city and its surrounding rural villages, Chassey and her associates found that diet complexity forms a Guttman scale, and that families fall along the various levels of the scale according to their residence, occupation, and exposure to urban ways of living (1967:60-61). Although the study does not conjecture the determinants of increasing complexity, the relation between diet complexity and exposure to urban ways is likely attributable to the upper classes as reference groups of the lower classes, as Berry's conceptualization of rural migrants and transients emulate urban upper class food behavior in order to enhance their status along the prestige dimension.

Another, albeit indirect, indication of the influence of center-contact on diet, and consequently weight-gain, is the language used by parents in communicating between themselves and their children. In a number of LDCs, the language spoken at the center of society is different from the one or ones used in the peripheries. A form of contact between, and thus partial access to the center by the peripheries is the acquirement of facility in the language of the center by members of the peripheries. In a nation such as Laos this would be tantamount to a Lao villager learning French or Meo and Yao hilltribesmen learning Lao.

Language facility implies here identification with the center and its broader scope of knowledge and technology. In this instance identification with the center has proved efficacious for the nutritional status of children, as a study of Indian families in Guatemala with differential ability to speak Spanish shows. A statistically significant difference ( $\chi^2 = 4.96$ ;  $p < 0.05$ ) was shown among families with Spanish speaking ability by the parents with high weight gain children as compared with families having no such ability and whose child had low weight gains (Cravioto et al., 1967:81).

Social sanctions      A factor that must be considered as a constraint to the alteration or change of food behavior, beliefs, and knowledge is the societal community, which can withhold social rewards or apply social punishments in the face of perceived deviation from community standards.

In less developed countries, especially in the peripheries, innovative, experimental behavior does not engender the admiration of the

community, but instead is considered as deviant.<sup>1</sup> This partially explains the great consistency in general food behavior within particular societal groupings, and it is indicative of the difficulty involved in bringing about changes in food habits (Scrimshaw, 1974; Malinowski, 1944). In order to change the behavior of individuals towards food, the broader social context of community must first be changed--a conclusion drawn by several community development specialists (Owens and Shaw, 1972).

With regard to specific research concerning the effects the sanctions applied or potentially restraining innovation, apparently no designs have taken these into consideration. The construction of future community studies of dietary practices and nutrition would do well to examine the degree and strength of community social control, and determine the types of deviant behavior that result in less stringent types of negative sanctions than others.

Polity Societal evolution has resulted in the continuous transfer of many basic social and welfare services from the family to the polity on the one hand (Titmuss, 1958), and the differentiation and specialization of such growing institutions as the medical on the other (Field, 1971). Governments are increasingly concerned with social security, universal education, public health, and labor conditions.

Medical roles have increasingly specialized as the scope of population such personnel must service increases, and with the advance of basic and applied research work. Nutrition is one of the more recent subfields

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<sup>1</sup>This is a conclusion drawn from the author's experience in and extensive readings on the traditional segments of LDCs.

to grow out of medical research, and has rapidly developed into a major field in its own right (McHenry, 1960; McCollum, 1960).

As governments increase the number of functions for which they are responsible, the organization of government comes to reflect these functions. Responsibility in the areas of health, agriculture, and labor for instance have resulted in the development of departments, agencies, or ministries of health, agriculture, and labor. The areas of organization of government frequently correspond to the areas of social concern discussed in Chapter 1, and these areas of organization are referred to here as "sectors" (McIntosh et al., 1974). It should be noted that "sectors" as used herein differs from the usage in the field of economics.<sup>1</sup>

Nutrition has not yet evolved to the point where it has been included in governmental structure as a sector, although the governments of many MDCs and LDCs have developed an "intersectoral" approach to nutrition, forming interministerial committees to develop national programs (cf Thailand Interministerial Working Group, 1973). Most of these national efforts are fledgling in nature, although India and Thailand have included nutrition in past and present 5-year plans (Berg and Muscat, 1972; McIntosh et al., 1974).

Since nutrition is a relatively new area of intervention, many of the programs promulgated are experimental in nature, affecting only a

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<sup>1</sup>A sector in the economic sense is a functional distinction among various economic activities such as agriculture, industry, and so on. A sector as used here not only refers to functions, but to administrative structure and responsibility.

small portion of the various groups at risk. Included in these programs are the fortification of traditional foods with vitamin and protein supplements, seed improvements, development of artificial foods, food purchase subsidies, special clinics, and special education programs (Berg, 1973; Schaefer et al., 1970; Korte, 1974; Hegsted, 1968; WHO, 1972a).

While certain programs such as mother craft schools, which aim to provide mothers in the peripheries with increased knowledge of food and health concepts as well as with center values to normatively bolster the acquisition of new knowledge, have apparently been successful (King et al., 1974 and King, 1967), other programs have not. The reasons for these failures are manifold, but basically are attributable to a number of the same constraints that limit societies from producing high levels of nutrition among all groups.

A major factor limiting the efficacy of nutrition programs is center-periphery relations. Although center indifference to the peripheries has certainly decreased, the commitment of the center, and thus the polity, to improving conditions in the peripheries remains to be unequivocally demonstrated (Owens and Shaw, 1972). It is in the development and distribution of programs that the split or gap between center and periphery as described by Eisenstadt (1971) and Shils (1961) is most evident. Doctors, clinicians, and modern health facilities continue to be located in the major urban areas (Levinson and Oftedal, 1974), and health technicians have developed a growing distaste for living and working in rural areas (Callaghan et al., 1974).

Also several informed observers have shown that current approaches to the alleviation of malnutrition have failed, largely because they have not reached their intended target groups (Scrimshaw, 1974; Berg, 1973).

One study conducted in the Indian state of Tamil Nadu found that almost all of the children attending "balevadi" or child care programs lived within a radius of one-quarter to three-eighths of a mile from the center. Location of the centers, determined by local ruling elites, accordingly excluded the lowest socio-economic groups who usually lived in colonies physically separate from the village proper (Levinson and Oftedal, 1974:2).

Levinson and Oftedal also observed that nutrition education, commercial food programs, and the use of clinics as nutrition rehabilitation centers have all failed to reach those groups of greatest need for economic, social, and political reasons. Again, the problem of access to and control over the various media of exchange manifests itself.

Other factors characteristic of members of the peripheries, such as beliefs and resources, limit participation in programs. Mothers do not have the time to expend in visiting the clinic or distribution center daily, the child is usually brought after the most critical time of need, and traditional beliefs concerning food's relation to health remain unchanged by the programs, resulting in continued withholding of protein foods from children when they are ill (Scrimshaw, 1974:793).

Other approaches to the improvement of a nation's nutrition are income and agricultural production increases (Schaefer et al., 1970:105). Berg (1973) believes, however, that these are either too slow in their effects or are neglectful of the various distribution problems that constrain adequate nutrition for all groups.

The general role of the polity in participating in the societal monitoring of nutrition will be considered in the following chapter, but the specific aspects of government nutrition programs will not be considered at all. Social indicators, as will be seen, are not concerned with monitoring the progress of programs and projects nor with assessing specific cost/benefit. Instead, social indicators deal with the broader picture of interrelated societal changes.

The discussion thus far has detailed a complex set of processes, each of which produces outputs from inputs and constraints which are then passed on to the next process in the chain of subsystems which eventually produce levels of nutrition. Agricultural production is thus so linked to distribution which is linked to consumption, and this chain of interdependent processes is, in turn, dependent upon inputs that both facilitate or hinder the outputs from the various processes. Human nutrition can thus be accurately said to be the product of a complexity of social processes.

#### Consequence phase

The convergence of the various phases--conversion, distribution, and consumption--and their accompanying constraints not only affect health and nutrition but have far reaching consequences for all levels of well-being within and including society itself. The discussion thus far has presented a unidirectional picture of the production of human nutrition, while in fact, the very result of this production, in turn, effects many of the elements that combine in nutrition production. The family,

economy, and education, the general role competence of the societal population, and society itself are affected by certain levels of nutrition produced within certain societal groups. As will be seen, the very effectiveness of institutions and the overall adaptability of society are highly dependent on the production of human nutrition. This final major section of the chapter pertains to the fourth phase of the revised societal process system model: the consequences of human nutrition.

The consequences of malnutrition can be organized into four basic classes through application of the societal process model. The first class pertains to the individual or societal population level, and concerns the interrelationship of nutrition and health. Nutrition's contribution to learning competence or socialization for institutional roles is the second class of consequences. Actual performance in institutional roles makes up the third class of nutrition effects. Finally, the fourth class consists of a more general type of effect: nutrition's contribution to overall societal adaptability and survival. These various consequences are illustrated in Figure 8.

Health status Malnutrition results in a steady, often invisible deterioration of health. Its continual erosion of health is of such extreme proportions that malnutrition has been identified as the world's number one health problem (Bengoa, 1974). The vast proportions of this significant barrier to human welfare has already been given adequate attention for the purposes herein. For more detailed discussions of the impact of nutrition on health and reciprocally, health on nutrition, the reader is referred to Scrimshaw et al., 1968.

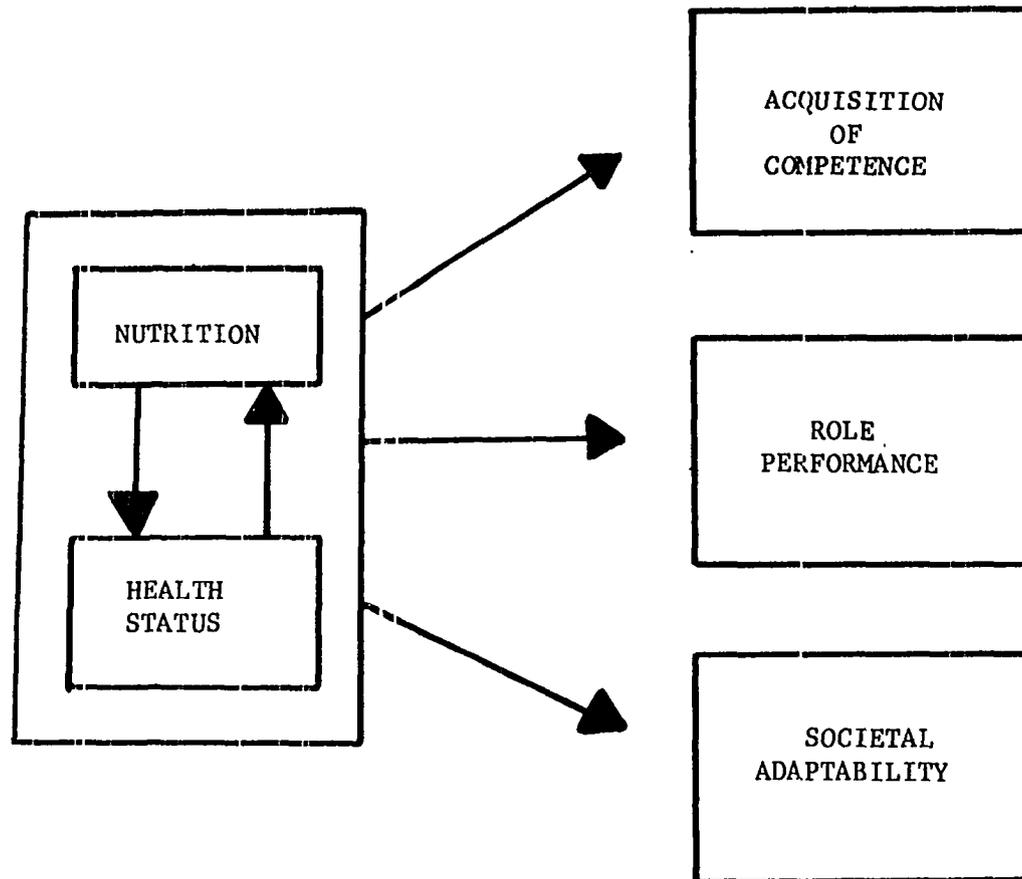


Figure 8. Consequence phase

The concern here is not limited to individual welfare, but extends to the various levels of societal welfare as well. As was demonstrated, nutrition is produced socially, and its consequences are also social in nature, in that malnutrition and related malhealth have real costs for societal functioning.

Development of competence      A panoramic view of the consequences of malnutrition for the development of capable, motivated societal members has unfolded with expanded research efforts in recent years. Nutrition plays a part in the formation of a number of the basic components of competence, and often its effect is permanent (See Figure 8).

Brain growth      The development of the components of competence starts shortly after the child's birth. The scenario begins with infantile malnutrition brought on by low birth weight, early acute infections, early weaning, poor sanitation, and food withholding (Williams, 1965). While the early months are often critical for the long term health of the child and nutrition, they are also important in that they represent the beginning of accelerated rates of physical and mental development. Exemplary of the importance of this early period is brain growth and development. In the first three months of infancy the brain cells grow in size and number (Monckeberg, 1973). Protein, therefore, is required in sufficient quantity and quality for optimal brain growth, yet this vital nutrient is usually present in inadequate quantities when the child is afflicted by either kwashiorkor or marasmus (Monckeberg, 1969; Winick, 1969, 1972; NAS/NRC, 1973). Monckeberg relates the following effects on the central nervous system: "Significant atrophy has been observed in

the brains of children who died from malnutrition. This atrophy has been associated, as well with biochemical alteration in the composition of the brain tissue, in DNA, RNA, protein and lipid contents" (Monckeberg, 1973:108). Retardation of brain growth can begin as early as the fetal stage if the mother herself is severely malnourished.

There is some evidence to indicate that early detection and treatment of poor central nervous system development through intensive medical and social interactional programs can lead to reversal of this deleterious trend (Ricciutti, 1973; Kallen, 1971). After a certain point is reached, however, the retardation is irreversible, resulting in permanent brain damage. It is, furthermore, fairly well established that retarded persons, even with training, reach only sub-optimal levels of competence (Childers, 1969).

Socialization During the early months of life, the infant is totally dependent upon others for the gratification of its organic needs, and the very process of administering to these needs marks the commencement of the socialization process (Parsons, 1964). It is here that the beginnings of self-worth, personality, social values, and role competence take root in the individual (Jersild, 1954; Mead, 1934).

Socialization occurs through the interaction of parents, particularly the mother, with the infant on the basis of common expectations about appropriate behavior for themselves and the other person (Brim, 1957:344). Initial socialization, however, involves the establishment of a common set of expectations among the interactants. For instance, the child learns to "suckle better than he is equipped to do by sheer 'instinct' through differential application of rewards--or the withholding of

rewards--in order to get him to eat properly and to sleep and eat on a schedule established by the parents" (Parsons, 1964:85). In turn as the infant is increasingly able to control his own behavior (e.g., smiling, crying, cooperating), it too attempts to establish some control over its mother's behavior through its own, albeit, recently established expectations (Brim, 1957; Bell, 1970).

The effectiveness of the socialization process depends on several factors that intervene in the parent-child interaction process. First, as Brim (1968) suggests, the structure of the group (e.g., age or sex) highly influences the interaction process in social groups, and thus affects learning. The dispersion of various group members along age or sex lines determines the degree and type of interaction that is carried out among two or more group members, and thus affects group socialization.

Recent research has shown that malnutrition produces particular characteristics in infants and children, and that these characteristics, like sex or age, greatly affect the interaction the child or infant has with its parents. The studies in question have described the malnourished child as inadequate and undesirable interactants because of the general state of apathy, irritability, fatigue, and inability to sustain prolonged physical or mental effort (Birch, 1972:781). In contrast with well children, who are "more active, independent and aggressive, and [who] obtain a better response from their family" (Chavez et al., 1971:286), the malnourished child manifests low levels of arousal and response to environmental stimuli and elicits less response from his parents (Pollitt, 1969). It is not of incidental interest that brain damaged children have been described as possessing a set of characteristics similar to those

exhibited by malnourished children, and that these characteristics tend to elicit poor levels of interaction with the parents (Freedman et al., 1968).

Thus, what begins as physiological weakening of various reflex mechanisms in the infant leads to a social situation in which the learning mechanisms are also weakened. Because of low interest and response to environmental stimuli and declining parental interest in providing such stimuli, the child learns less and has lower desire to learn than its more healthy peers. Also, because parental response to the malnourished child's behavior is generally negative in nature, the child develops an image of low self-worth (Cravioto and DeLicardie, 1974). The family, in some instances, may perceive the child to be socially deviant, producing a similar self-image in the child. Such a situation may lead to anomie (Kallen, 1971) or juvenile delinquency (Chase and Martin, 1970) in later years.

A second, related problem concerns maternal competence or ability and interest in determining the needs of the child by the person in the mother role. Maternal competence has been observed to be regulated by three factors: the resources available to her, her intelligence, her access to knowledge, and her state of health. As discussed in several previous sections, the mother role is often highly constrained by the number of activities that must be carried out which in turn limits the amount of time that can be devoted to any one activity.

The mother, on one hand, is often extremely constrained in her ability to provide child care when she is employed outside the home (Burr, 1973:244; Scrimshaw, 1974:794; Sharman, 1970:91). Child care is

further limited, on the other hand, by the very nature of the mother-role. A primary responsibility attached to the mother-role is having and caring for children in nuclear families (Parsons and Bales, 1955). In families with more than one child, the mother's time and energy must be divided among the children and as the family grows in size the individual time allotments naturally decrease. A great many studies, particularly those carried out in LDCs, have shown that infantile malnutrition is significantly related to the number of children in the family as well as the spacing between the births of the children (Berg, 1973; Cravioto et al., 1967; Wray and Aguirre, 1969; Puffer and Serrano, 1973; Mora et al., 1974; Christiansen et al., 1973).

As the family grows larger; and, if the birth spacing is relatively narrow, the energy that the mother can muster to devote to her children is greatly decreased. In mothers who are themselves weakened by malnutrition this sapping of energy not only threatens her life and health but also reduces her ability to perform mother-role tasks (Wray and Aguirre, 1969; Puffer and Serrano, 1973; Cravioto and DeLicardie, 1972).

A second factor is maternal intelligence, a component of role competence. In many instances mothers of malnourished children are mentally deficient. On the basis of various tests of intelligence carried out in the slums of Santiago, Chile (Monckeberg, 1973), in a village in southwestern Mexico (Cravioto and DeLicardie, 1972), and in an urban area on the southern edge of Bogota, Colombia (Mora et al., 1974), mothers of low intelligence are far more likely to have malnourished children than are more proficient mothers. Monckeberg notes that not only does malnutrition contribute to low intellectual performance in

children, but that in turn "mental deficiency [in mothers] aggravates malnutrition (1973:118). An intergenerational vicious circle is thus established. Incompetent mothers produce malnourishment in their children, which creates incompetent children. As their children grow up and become parents their incompetence produces further malnutrition and mental deficiency as they begin families.

Closely related to intelligence is access to more scientific information which would allow mothers to make a more correct assessment of her child's needs. As the earlier discussion of information-access related, the mothers in the peripheries of society have almost no access to knowledge which would improve upon their efforts to maintain healthy children. The Chavez et al. study of two rural Mexican communities found, as an example, that 40 per cent of the mothers with malnourished children in one community and 62 per cent in the other rejected the idea proposed by the researchers that the children were malnourished or sick because of improper eating (1971:266).

It would appear, then, that some of the factors that make up maternal competence contribute significantly to the nutrition status and thus to the intellectual development of their children.

Physiological development      A number of research studies have identified the stunting of physical or bodily growth as a primary result of malnutrition (Young, 1970; Cravioto et al., 1966b; Hansen et al., 1971; Gomez et al., 1958; Pollitt and Ricciuti, 1969). In fact measures of physical growth compared with standards for age often serve as indicators of malnutrition (Monckeberg, 1973). The social significance of growth stunting in societies that do not confer prestige to persons on the basis

of their size appears slight (Kallen, 1971). In fact Stini (1971) and others believe that growth stunting is a positive factor in human development in that it represents body adaptation to the nutrients available from the environment.

Growth stunting is not without consequence for role competence, however, in those instances where coordination, speed, and muscle response are part of necessary basic skills (Berg, 1973).

Effects on competence      The effects of malnutrition (both brain damage and inadequate socialization) on what the nutrition literature refers to as "mental capacity" or "behavior" can be organized on the lines of the various elements that make up role competence (refer to Chapter 1 and Figure 8). This reorganization of research results is presented in Table 5, with the elements of competence linked to various aspects of mental capacity. Of the nine elements of competence, all but two--information and affectation--have been measured in one or more ways in numerous studies in Africa, Asia, Latin America, and the United States. Only the information level and capacity of malnourished children has not been studied, although it should also be noted that the relation of self-concept development and malnutrition have inferentially been related by Kallen (1971). This inference is given considerable support, however, by Freedman et al. (1968) in their finding that severely brain damaged children tend to develop low self-esteem.

The above comments need to be qualified by observing that the nutrition-competence relationship is by no means a settled issue. An increasing number of observers feel that social conditions such as class

Table 5. Nutrition effects on role competence

Elements of competence	Test	Researcher
1. Aptitudes	Motor and adaptive development; development of touch, vision, kinetic behavior, grasp of concepts, memory	Klein et al. (1972); Hoorweg and Stanfield (1972); Cravioto et al. (1966a); Chase and Martin (1970); Cravioto and De Licardie (1974); Sulzer et al. (1973); Mora et al. (1974).
2. Skill	Reaction time; associative learning; reasoning; organization of knowledge; learning strategies	Sulzer et al. (1973); Champakam et al. (1968); Mora et al. (1974); Cravioto and DeLicardie (1972).
3. Information		
4. Special language skills	Bipolar concept formation; spontaneous language; psycholinguistic abilities	Cravioto and DeLicardie (1972); Chase and Martin (1970).
5. Affectation		
6. Cognitive functioning	General intelligence (intelligence quotients)	Cabak and Najdanvic (1965); Stoch and Smythe (1963); Hansen et al. (1971); Mora et al. (1974); Chase and Martin (1970).
7. Moral functioning	Identification of morality and moral characters in stories	Sulzer et al. (1973)
8. Self-concept	Inference from other related research	Kallen (1971)
9. Orientation to authority	Abnormal behavior and emotionality (juvenile delinquency)	NAS/NRC (1973); Chase and Martin (1970); Kallen (1971).

origin and family disruption act either independently or in concert with malnutrition to produce low levels of competence (Richardson, 1968; 1972; Pollitt, 1969; 1973; Kallen, 1971; Monckeberg, 1973; Nichols and Anderson, 1973).

The deleterious consequences of malnutrition for role competence and thus the ability of individuals to assume and perform adequately in vital institutional roles does not end with the transition from infancy to childhood but instead continues to plague young individuals as they enter more formalized contexts of socialization.

Educational performance Among the third class of nutritional consequences is educational performance. Education, along with urbanity and economic and political participation, are considered to be fundamental parts of societal modernization (Lerner, 1958; Farrell, 1972). For many LDCs this has meant the striving for universal education among their peoples, often at great cost (Galtung, 1971).

More recent accounts of national development have concluded, however, that there is a great deal of "educational wastage" in that many students drop out of school after only one to three years of training (U.N.E.S.C.O., 1974). This, in essence, represents a poor utilization of resources in that the dropouts were not in school long enough to benefit from the experience in any permanent way.

Studies of malnourished schoolchildren add new dimensions to the concept of wastage in that improperly nourished children not only drop out with greater frequency, but are more likely to be absent due to illness and to be less able to concentrate in class than their school

peers. Using estimates of knowledge absorption or teacher evaluations, malnourished and well-nourished school children in Chile and Jamaica were compared, and the malnourished groups consistently had lower achievement scores and teacher rating (Monckeberg, 1972:50; Birch and Richardson, 1972:69-70).

Other studies have described the classroom performance of the malnourished child as less optimal than more favored classmates. The malnourished school child is generally said to have low levels of concentration and interest in classwork, poor memory, and a general inability to cooperate both with peers and instructors (Berg, 1973; Birch and Richardson, 1972; Kallen, 1971).

Finally, as malnourishment increases the child's susceptibility to illness, nutritionally deprived children are more likely than others to be absent from school (Cravioto, 1971). As absentee rates tend to be high in LDCs (up to five times higher than in MDCs), there is reason to believe that malnutrition may play a significant contributory part in the child's loss of educational opportunity (Berg, 1973:14). No research, however, has been directed toward determining the extent to which malnutrition figures in the constellation of other factors such as families removing boys to do work or girls because their education is seen as unnecessary that cause absenteeism.

Role performance Evidence has slowly accumulated in the period since World War II that indicates that nutritional status is directly related to the performance of workers at their jobs. Low levels of nutrition have been shown to be related to low levels of effort and

output, and inferred to be related to job absenteeism and accident rates (Turnham, 1971; Clark and Haswell, 1964; Lowenstein, 1963). Furthermore, increases in diet quality have demonstrably increased the level of output of construction and factory workers (FAO, 1962b).

Berg's review of the literature on nutrition and working efficiency concludes the following:

Men living on 1,800 calories [sic kilocalories] a day have been shown to lose 30 percent of their muscle strength, and 15 percent of their precision of movement. Speed, coordination, and many behavioral characteristics also have been altered (1973:13).

Data published by Correa and Cummins shows a clear increasing relationship between daily caloric intake and degree of productive capacity attained by the worker by industrial group. This relationship holds when corrected for climate, sex, and age. Lowenstein's discussion of caloric intake and working efficiency provides further support:

The coal output [in Ruhr District, Germany] in tons in a coal mine decreased from 1.9 tons/day in 1939 when 4,500 calories [sic kilocalories] per man/day were available (2,300 work calories) to 1.65 tons/day in 1944 when only 1,900 work calories were available and started to rise again with an increase in calories available (Lowenstein, 1963:6).

Societal well-being Last, but hardly least, is the aggregate effect of massive malnutrition on the well-being or over all adaptability of society to its environment. Included in increased societal adaptability is the notion of growth in societal structure and in outputs from structures (Chodak, 1973). In particular the various institutional subsystems of society are expected to differentiate and specialize and increase the level and diversity of their outputs. The economy is described by many as the lead institution of development, and the growth

of national and per capita economic output are often considered synonymous with societal development (Seers, 1972; Grant, 1972).

Nutrition has recently been recognized as a major deterrent to economic growth by economists and nutritional scientists who place considerable weight on human resources (Berg and Muscat, 1971; Call and Longhurst, 1971; Cook, 1971; Berg, 1969; Oshima, 1967; Schultz, 1967). The aggregative implications of the output from industrial and agricultural workers who are neither physically capable or motivated to produce at optimal levels is thought to constrain the rate of growth in LDCs. Returning to the studies by Correa (1969) and Correa and Cummins (1970), it was found first that in nations such as India, Honduras, and El Salvador, that working capacity (as determined by caloric intake) is substantially lower than its potential and that slight increases in caloric intake across the general populace could result in an increased economic growth rate of 5 per cent.

The above studies are the only empirical estimates made of nutrition's contribution to national growth currently available, and the assumptions the estimates required were both manifold and tenuous. Because the nutrition-national development relationship has yet to be satisfactorily substantiated, a number of commentators have either rejected the notion that nutrition contributes to growth and instead relegate nutrition to human welfare (Mellor, 1973), or feel that the relationship is so complex that precise measurement of the relationship is currently unfeasible (Call and Longhurst, 1971).

The assumption and basic interrelations contained in the societal process model tend to support the nutrition-national development

hypothesis recognizing, however, that more conclusive evidence is currently unavailable.

A second, and highly related, issue is the cost that malnutrition accrues to society, thus lowering societal adaptability. It is observed that society makes investments in various subgroups of the societal population in order to secure certain levels of performance on their part. Malnutrition, however, reduces or eliminates the effectiveness of investments thus creating costs to societal well-being. In the first instance the overall effect of malnutrition on the education of new societal participants is profound. If a significant proportion of school children are either malnourished or simply hungry, their capacity to learn is reduced through absenteeism, poor concentration, and general apathy (Berg, 1973). Knowledge levels in society are thereby reduced and the overall capacity of the societal population to contribute through the acquisition of skills to development is reduced.

A second factor is the cost to society represented by the expenditure of resources on the rearing of children should the child die before making a contribution to society in any way. Financial loss includes the food, medicines, school books and space taken up in the classroom, as well as the cost of the funeral and wake. Cook has made proximate estimates of the total cost of "child wastage" in the Caribbean.

An estimate of these costs in Jamaica in 1968 comes to \$110 for a child dying in infancy (whose average age we guess to be about seven months) and \$190 for a child dying at an age over one year but under five (whose average age, since most of this mortality is in the second year we put at 21 months) (1971:324).

Cook believes, furthermore, that his estimates are conservative. Berg (1970) and Wilson (1973) have calculated similar estimates for India and societies in general.

Even when the child is able to reach adulthood and enter the labor force, often the potential contribution of its participation is cut short because of short life spans in the society. Early deaths cut short participation, while an extension of life expectancy would increase this participation. Increased life expectancy would also reduce the dependency ratio (proportion of non-workers to workers) (Berg, 1973).

Finally, several researchers have calculated the hospital costs of treatment of nutrition-related illnesses and find in comparison that it would be cheaper for society to prevent malnutrition than continue to incur its costs (Cook, 1971; Beghin, 1970). It has been found that infant malnutrition can be combated through "mother-craft centers" or "nutritional rehabilitation centers" at a fraction of what hospitalization costs, because there is no need for bed/days, expensive antibiotics or high demand on physician time (Beghin, 1970:1414). King et al., find that a child can be essentially permanently protected from malnutrition for the total cost of \$6.82 U.S. per child per year (1974:6), as compared to the larger costs of hospitalization.

Population-environment balance Perhaps one of the most intriguing of nutrition's social consequences is the effect on population growth. Overpopulation with respect to the carrying capacity of the physical environment is a problem of increasing concern for most nations of the world, threatening basic societal viability. In light of population problems it might appear unwise to promote nutrition programs which would

surely exacerbate the problem by reducing mortality. It is fairly well recognized, after all, that improvements in health are largely responsible for past and current rapid population increases (Cowgill, 1972; Demeny, 1974:152; Coale, 1974:49). Improved nutrition would therefore exacerbate the problem, not aid in its alleviation.

A growing body of research on family size and desired family size, however, has convinced many that the key to population control is improved health and nutrition (Berg, 1973; United Nations Report to the Secretary General, 1971; Millikan, 1969; Tremoliers, 1971). Carl E. Taylor of Johns Hopkins University has summarized many of the more recent findings and has concluded that unless families in LDCs are assured that there is reasonable probability that children they already have will survive to adulthood they will not reduce their high rates of fertility (1973:76). A large family is considered necessary, for there must be some guarantee that the family will have adequate labor supplies and that family members will survive in sufficient numbers to provide adequate social security for their parents.

Taylor cites the following evidence: first a fall in death rates historically has always preceded birth rate decline by 10 - 30 years; second, studies in Hong Kong and Nigeria relate that women who already have several children but have lost one of them to mortality are more likely to want more babies than women with no such child losses (1973: 76-77). The argument goes that once health and nutrition begin to take effect, then fertility behavior is modified although there may be a lag one generation for this knowledge to be translated into behavior. In

the short run fertility may increase slightly as Chavez and Martinez (1972) observe that increased nutritional health increases the span of the reproductive period by causing earlier menarchia, and later menopause, and a decrease in the lactating amenorrhea period.

The population-nutrition relationship is presently still under close examination, for it is recognized that within different cultural contexts the "value" of children varies substantially. Children are desired for a multiplicity of reasons, as research at the East-West Center at the University of Hawaii indicates (Fawcett and Arnold, 1973). The evidence to date, however, supports the general hypothesis that nutrition contributes positively to societal adaptation, well-being, and viability through its braking effect on population growth.

#### CHAPTER 4. SOCIAL INDICATORS FOR THE CONTROL OF STATES OF HUMAN NUTRITION

The societal process model is a construct created by application of general systems theory to the sociological view of society presented by Parsons and Mayhew. A useful view of society as a system that produced outcomes for various levels of well-being was derived in Chapter 2.

A second perspective, that of cybernetics, can be applied to the sociological view of society in order to generate further useful insights, in this case, for the specification of the role of social indicators in society's attempt to assert conscious control over the achievement of levels of well-being.

The purpose of this chapter is three-fold. First, the theoretical status of social indicators with regard to a view of societies that not only produce outcomes but consciously direct their production is presented. Second, given a theoretically based definition of social indicators, their application to the measurement of the state and state-changes of various elements in the nutrition production process is considered through the presentation of a tentative taxonomy of indicators. Finally, some methodological and administrative procedures to be employed in LDCs in order to develop the statistical capabilities to develop and implement such a set of social indicators are suggested.

##### A Cybernetic View of Society

The cybernetic perspective begins with an assumption similar to one contained in general system's theory; that is, the system under study can be treated as a "production process with inputs, throughputs [production],

and outputs" (Hage, 1974:8). A cybernated production system is one which in addition to its productive elements contains a centralized control center or regulating element. The control center, either consciously (as in social systems) or unconsciously (as in mechanical and lower level biological systems), regulates the production of the system's output through the acquisition and use of information (Cadwallader, 1964:161).

A simplified cybernetic system is presented in Figure 9. Represented here is a general production process such as the type that produces

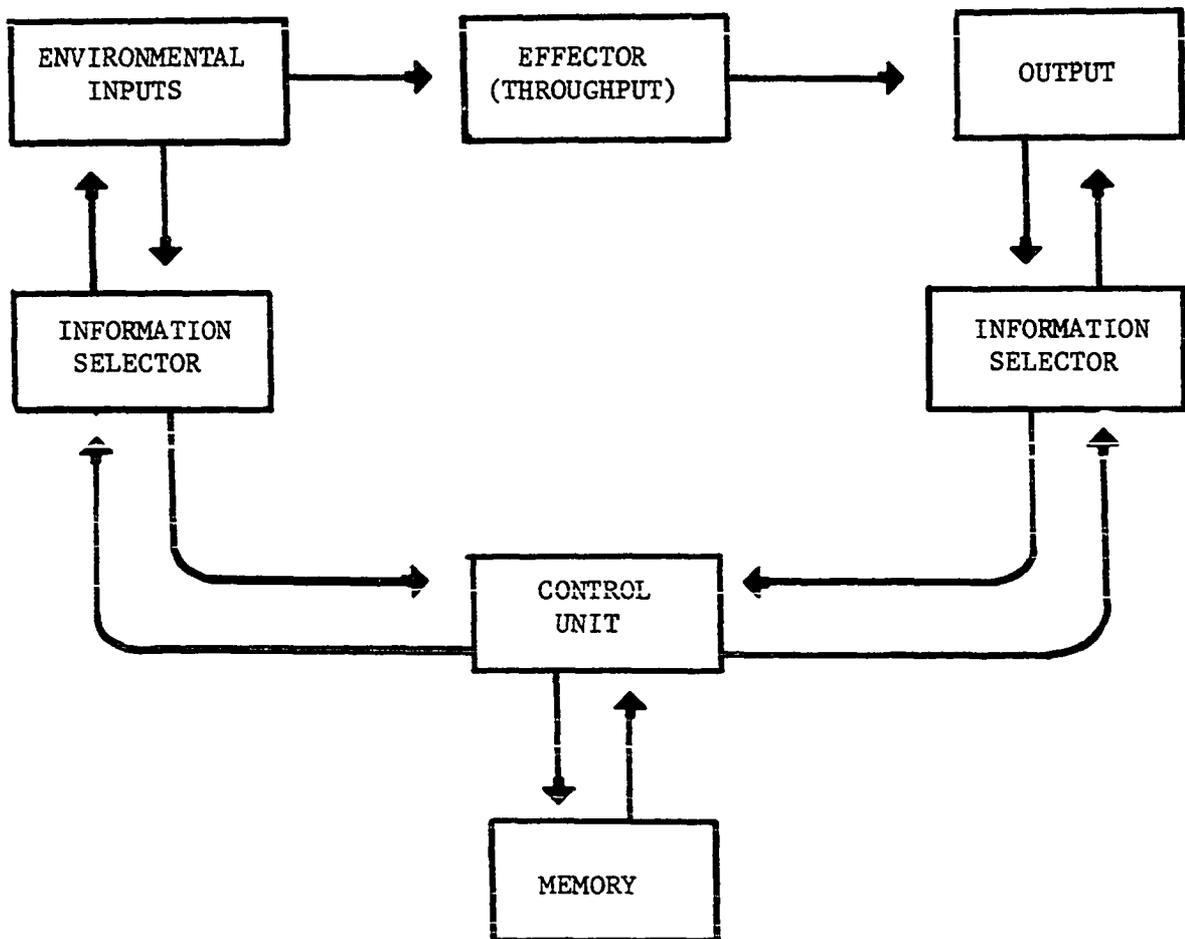


Figure 9. A cybernated production process

nutrition states within society. The difference between a production process and a cybernated process is one of the presence of an external unit that regulates the flow of outputs from the process. In most societies, as was discussed, there is as yet only weak regulation in the form of governmental intervention of the nutrition production system.

Control in a cybernated system is attained through the use of information. Beginning with the setting of production goals by the control unit, which are formed by the utilization of the control system's memory containing standards, the control unit signals the production unit its expectation of output. This information then serves as a standard for the production of output. Information is further utilized by the control unit to monitor the actual performance of the production unit through the use of an information selector. A common example of such an information selector is the thermostat in a heating system which provides a simple control switch with the current temperature of the room to be heated. Should the temperature fall below the standard selected for the room, this information is transmitted to the switch which, in turn, activates the heat producing unit to produce thermal output until the switch, based on continual monitoring, informs the control device that the room temperature conforms to standard. With that information, the switch and thus the production of thermal output are deactivated.

In higher order systems the information selector may have greater discretion in terms of the type of information it seeks from the environment. For instance, it may seek out problems within the environment, the knowledge of which is translated to the control center

for a decision as to what action, if any, ought to be taken with reference to the problem. Problem-seeking is limited, however, by the content of the control center memory, which in essence provides the perceptual capability necessary to recognize "problems" in a continually changing environment. Disturbances which are not definable in terms of the selector's library of perceptions and definitions go unrecognized. Also in higher order systems, learning and innovation are utilized in order to consciously and creatively set goals (Buckley, 1967:56; Dunn, 1973:46; Etzioni, 1968b:112). Control centers thus are able to regulate production process through informational control over energy. Information concerning energy levels is used to determine the use and direction of use of that energy.

In higher order systems such as those represented by highly differentiated societies, the polity is generally considered, from the viewpoint of cybernetics, as the controlling subsystem (Lewis, 1968; Etzioni, 1968b; Y. Cohen, 1968; Zapf, 1974). Societal control by the polity is diagrammed in Figure 10, illustrating the polity's increasing attempted intervention through sectoral activities in the institutional production of various levels of well-being. The polity, utilizing information concerning the level of the various types of well-being, the efficiency of their production, and values drawn from the cultural memory bank, determine the level of programmatic intervention required to bring the various levels of well-being up to standards set by the polity through the culture (Deutsch, 1963; Laszlo et al., 1974). The polity transmits its decisions to its various effector units or its implementation

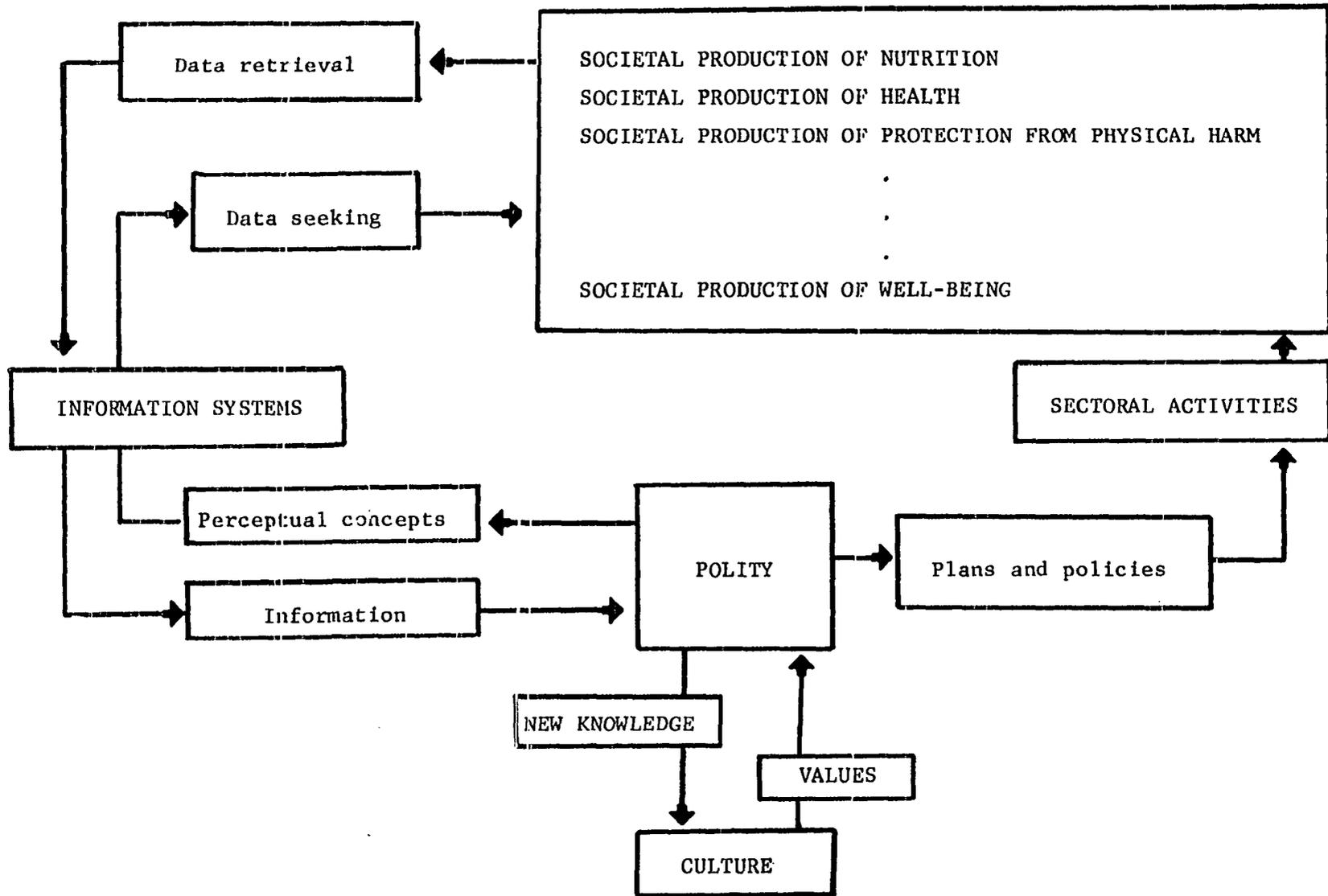


Figure 10. A cybernetic view of society

agencies, creating new ones where necessary, through particular information types: policies and plans. Policies and plans, from this perspective, are continually reformulated as information concerning new and old problems and system's performance are continually processed.

The polity has, by no means, always held such a powerful position relative to the outputs of other subsystems, and its exact position in the societal hierarchy with respect to energy and information access differs across societies. Controlling polities, in fact, are the product of the same continuous process out of which culture and institutions and their continued evolution derive; that is, the controlling polity has arisen out of the continual attempts of human beings and human organizations to more effectively organize in order to meet their various needs. To fully understand the nature of societal control and its limitations, a brief digression into the process of social evolution is necessitated.

#### Societal Development

Societal development is once more viewed as an evolutionary process by many social scientists. After a long period during which the evolutionary analogy drawn from Darwinean biology was considered "unfortunate" and "misdirected" (Chodack, 1973; Nisbet, 1972; Bock, 1963), Parsons (1966), Campbell (1965), Lenski (1970), and others have refined and improved upon the analogy, altering many of its earlier, highly criticized underlying assumptions. Stripped of the assumptions that evolution necessarily means increased human happiness among individuals or that all social change is necessarily evolutionary and therefore developmental, the school has once more become a dominant perspective of societal change.

Relatedly, general systems theory, with its conceptualization of social change as morphogenesis, has also drawn extensively on a biological growth analogy (Buckley, 1967; von Bertalanffy, 1968; Chadwick, 1971).

#### The general evolutionary process in society

The central tenet of the evolutionary perspective is that of "progress." Progress, however, is not defined in the usual normative fashion; evolutionary progress can either be positive or negative, depending on the value orientations of the evaluator. Progress here is the direction of evolution, which is toward increased systemic control over and independence from the system's environments (Huxley, original, 1926; 1964).

Lenski has adapted Huxley's definition to apply it specifically to society as a system. Thus, evolution is the raising of the upper level of the capacity of the collective population to mobilize energy and information including genetic DNA and RNA as well as culture stored in memory (1970:59). Black (1966) defines development as the increase in knowledge or information (e.g., science and technology; cultural values) which, in turn, permits a greater control over the societal environments. In an extensive review of various conceptions of development, Huntington (1965) relates that control over human and inanimate energy forms is a common element in numerous definitions set forth by political scientists, economists, and sociologists alike.

#### Social evolution

The evolutionary process begins with some disturbance in the symbiotic relationship between society and its environments (Berrien,

1968). Buckley (1968) labels these disturbances as "environmental intrusions," but the actual problem is not the environment itself but the relationship between society and environment. Change or disequilibrium of this relationship can come from intra- or inter-societal cultural change (e.g., ideological, ideational, or technological innovations) (Johnson, 1966; Parsons, 1967; Moore, 1968), population growth (Goldscheider, 1971; Parsons, 1967; Durkheim, original, 1893; 1964), or changes in international political and economic relations (Haas, 1974; Bendix, 1967).

Societal complexity Change begins at the interface between societal structure and the various societal environments, involving those institutions and roles concerned with interchanges at the societal boundary. Two basic changes are initially evident: first, there is a growth or proliferation in the number of societal institutions and roles; and, second, there is a concomitant specialization among the new and old roles (Parsons, 1966; Friedland, 1969). These initial processes make up what usually is referred to as the increase in societal complexity (Chodack, 1973), and is largely an energy mobilization process.

Nation-building The second phase of societal evolution consists of the establishment of integration among the new roles (and institutions in which the roles tend to cluster). Integration concerns several related factors. First, communication capacities must be established among the roles in terms of new expectations, standards of behavior, and values in order to make the interchanges among roles and among institutions stable and predictable. Second, and relatedly, an increase in a type of societal information--the loyalty felt by role participants for

the new role-configurations--must be developed. Without loyalty, the new institutions fail to achieve legitimacy and are consequently not filled by members of the societal population.

The process described here in essence is the transfer over time of loyalty to more inclusive social groupings and institutions. Loyalty thus shifts degrees of its primacy from the family, local community, and specific ethnic identifications to the polity, the nation, and citizenship (Cohen, 1968; Geertz, 1971).

A third factor in the process of integration of new roles and institutions consists of the mobilization of persons with the competence to fill the new positions and carry out the more specialized tasks. This mobilization is essentially one of creating organization or negative entropy through energy mobilization. The means of mobilization is essentially an information process, for the basic change involved is one of a shift in evaluative criteria and expectations for the new positions. This information change is often described as increase in achievement orientation and rationality, and is achieved by information investiture in individuals through the school system, on-the-job training, and the mass media. This second phase is often described in the literature as "nation-building."

State-building      A similar process, called "state-building," represents the third evolutionary phase. The integration of specialized roles and the participation of societal members, as was previously discussed, is not always accomplished smoothly or automatically but instead frequently occurs only under the threat of coercive sanctions.

The use and regulation of these sanctions is reserved for the state, which also serves to protect societal integrity from potentially dis-solutive conflict with other societies.

With increasing differentiation-specialization, the problems of regulation increase, and the polity itself differentiates and specializes in order to increase its capacity and effectiveness (Almond and Powell, 1971:59; Pye, 1971:50) [This increase in complexity to deal with increased complexity conforms to Ashby's Law of Requisite variety which states, in effect, that only variety (complexity) can deal effectively with variety (complexity) (Ashby, 1956:206).] State-building includes the functional and territorial spread of governmental agencies, bureaucratization, and an increase in the number and type of demands made by both the polity on the citizenry and the citizenry on the polity. Empirical studies of the polity's development in relation to evolution in other institutional spheres can be found in Cutright (1963) and Shannon (1958).

Culture-building      The fourth phase of societal development involves value changes, introduction of new technology, and new bases of motivation for people to participate in the new social structure. This phase, for lack of a better term, will be called "culture-building," and is made up of the following subprocesses:

1. value generalization (which permits greater flexibility in behavior) (Parsons, 1966);
2. secularization (which alters the perception of humans at the mercy of their environment to one in which humans are seen as mastering their environment) (Zapf and Flora, 1973);

3. rationalization (which involves risk-taking; deferred gratification; acceptance of the manual, manipulative, and practical aspects of work). (Peshkin and Cohen, 1967);
4. values underlying civil service (which involves an increase in the view that bureaucracy exists to serve people rather than manipulate them (Shils, 1960);
5. Westernization of technology (which involves the replacement of traditional technologies by Western scientific innovations) (Black, 1966).

#### Historical evolution of the polity

The polity arose in societies of sufficient size and differentiation because of a need for defense against foreign encroachment and the need for internal maintenance of law and order (Chodack, 1973:238, Spencer, original 1892; 1972:124-25) and in those special cases where massive population mobilization was frequently required to maintain societal viability [e.g., flood control and irrigation in ancient China (Wittfogel, 1957)].

The polity has historically, in most societies, continued its growth in size and regulation or control over societal resources and has done so increasingly through the use of more complex information processes. As societal technology and economic activity have become more highly differentiated and specialized, with the rise of new institutions such as education and health, and with the increasing of institutional autonomy with interdependence fostered by specialization, the polity has had to increase its capacity to regulate and control the flow of interchanges among increasing differentiated institutions (Eisenstadt, 1969:377). Furthermore, the polity has had to assume functions lost by other

institutions as they have continued to specialize (Titmuss, 1958). Historical accounts of the growth of the evolution of society and its effect on the polity can be found in Smelser (1959), Eisenstadt (1964a; 1964b), Titmuss (1958), and Friedland (1969).

The twentieth century history of the polity, however, illustrates dramatic increases in its controlling capacity. To begin with, in those countries where there is rapid industrialization, there is a tendency for the polity to take over fields of activity from the market (Vickers, 1959:126). This control includes the growing fields of public monopolies, public goods (e.g., defense industries), and private monopolies no longer felt to be adequately constrained by "free market" forces (e.g., certain major industries).

Perhaps most important, however, is the increased recognition that short-run societal viability is no longer an acceptable strategy for societies. Two factors figure into this reassessment of the basic goal of society: first, the realization that technological, economic, and social changes may have had negative secondary effects which far outweigh their contribution to society. Included here are the perceived ill-effects of automation, industrial waste, urbanization, and televised sexual and violent behavior (Bauer, 1966; Greenberg, 1972; Olson, 1974). Second, there is a heightened desire for the achievement of higher levels of social-psychological need satisfaction in the MDCs, now that basic physiological needs are adjudged adequately met for a large majority of their populations (Dunn, 1974; Allardt, 1973b). As reflected in Etzioni's (1968a; 1968b) concern for societal "activeness," the dichotomy

of viability vs. non-viability is no longer the most relevant criterion for assessing societal effectiveness, but rather it is the quality of that survival which should be considered.<sup>1</sup>

Finally, and perhaps most importantly, is the growing feeling that the supreme importance attributed to economic development as the leading process in societal development is unwarranted (Mischan, 1969; Nieuwenhuijze, 1969). Non-economic problems which were at one time perceived as welfare residuals which would essentially be solved as a positive secondary consequence are now perceived as fundamental to the development process itself (Berg and Muscat, 1973). Furthermore, a reassessment of the secondary consequences associated with economic development has found many of them undesirable. Chandavarkar (1972) has observed that increasing rates of economic growth in some countries of Latin America have been accompanied by rising unemployment. Blaisdell notes more generally that the deprivation of many groups is intensified rather than ameliorated as economic development proceeds in the LDCs (1970:40).

The response to this re-examination of the expectations of economic development has been attempts to expand the definition of development to capture more completely the interrelatedness of the various aspects of development, assigning no priority to any one aspect. Among these new approaches include such perspectives as Ilchman and Uphoff's "political

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<sup>1</sup>Corning feels, however, that "any measure of the quality of life could therefore be dangerously misleading if they did not at a minimum tell us how we are doing with respect to the basic problem of survival and production" (1971:2).

economy" which includes elements of social, political, and economic growth (1971) and the United Nations' efforts in "unified development" which stresses economic growth with social structural change (1970).

The concern for a more balanced societal development has not been restricted to MDCs or international agencies but has spread to the countries of Latin America, Africa, and Asia (Economic Commission for Africa, 1962; 1964; Economic Commission for Latin America, 1966; Economic Commission for Asia and the Far East, 1971).

#### Planning and societal control

A societal response to the secondary consequences of both economic and general development, the need to bring about structural changes, and an interest in selecting a desired societal future has been an increasing attempt to apply the science of planning to governmental decision-making (Ozbekhan, 1969; Catanese and Steiss, 1970). Planning is on the increase in MDCs and has been embraced by most LDCs as the most acceptable and workable means of achieving rapid development (Myrdal, 1968; Portes, 1973; Shils, 1960). Waterston (1969) verifies LDC interest with his finding that 135 of the nations of the world (most of which are LDCs) have established a national planning body of one form or another. Proponents of "active societies" and the "futurists" have suggested that planning is a major means of selecting the future (Etzioni, 1968b; Jantsch, 1972; 1974; Emery, 1974; McLoughlin, 1973).

Planning is considered a higher form of societal control in that it is more systematic than many current forms of coping with problems

employed by the polity. Because its level of complexity, precision, and scientificness is greater than conventional coping processes, the need for information of greater quality and quantity increases. In fact it is axiomatic that without information there is no planning (Chadwick, 1971; Laszlo et al., 1974; Hermansen, 1968; Economic Council of Canada, 1971; Rubin, 1969; McLoughlin, 1973; Baram, 1973). Tinbergen states furthermore that the level of sophistication of the planning itself depends upon the level of information available (1964:78).

There has been a recognition of the need to develop the capability to direct the development of society depends on increase and improved information. A number of reforms and new approaches have appeared in the form of the national data bank movement, calls for reform of national statistical systems, and the social indicators movement (Dunn, 1974; Shiskin, 1973; Gwyn, 1972).

#### Information for Societal Control

Returning to the cybernetic perspective of society, for higher-order systems such as society, information plays a very significant part not only in goal attainment, but also in the very formulation of goals through the identification of the problems themselves. Unlike the cybernated heating system, society has no predetermined room nor the problem of providing heat spelled out for it; instead, society must seek the identity of its ills (Zapf, 1974:652).

Various types of information need, conforming to differing conceptualizations of societal control capacity, are outlined in the literature. Buckley, for instance, relates information and control

capacity in the following: "For effective 'self-direction' a socio-cultural system must continue to receive a full flow of . . . information," and of this information three types are necessary for societal control (1967:56).

1. Information concerning the societal, environment or goal-seeking information;
2. Information concerning the past state and performance of the system in relation to its environment or learning and memory which include the capability of a wide range of recall and recombination of informational elements;
3. Information concerning the current, internal state of the system and its elements or self-consciousness.

Holleb (1969) and Girardeau (1972a) have listed a more detailed yet comparable inventory of information for societal guidance, specifically for application in planning and policymaking. Thus, information is required to: 1) describe the state and pattern of societal events; 2) determine the relationship among those events; 3) predict future societal changes; 4) formulate means for influencing societal futures; and 5) provide the capacity to alter specific aspects of plans and policies for more efficient and effective goal-attainment.

Others have noted that information is required concerning the secondary consequences of societal action (Bauer, 1966; Wilcox et al., 1972; 1973), guidelines for acceptable societal action (Hermansen, 1968), and distinctions among those factors which are relatively manipulatable through policies and plans and those which are less so (Land, 1972; Wilcox et al., 1972; 1973; Organization for Economic Cooperation and Development, 1973; Laszlo et al., 1974).

As should be evident, most of the above suggestions either explicitly or implicitly involve societal control through planning and more rigorous policymaking and are similar to proposals set forth in discussions of the means for improved planning (Systems Development Corporation, 1968; Economic Planning Centre of Finland, 1973). These various types of information need can furthermore be arranged into a hierarchy regarding their utility for planning and policymaking and their feasibility in terms of current societal information capabilities. The resulting hierarchy is illustrated in Table 6.

Table 6. Societal information hierarchy

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<p>Increasing utility for planning and policymaking; increasing complexity</p>		<ol style="list-style-type: none"> <li>1. Description of society and its environment.</li> <li>2. Correlational and relational.</li> <li>3. Predictive (primary, secondary, and tertiary consequences manifest in the future).</li> <li>4. Policy assessment and readjustment.</li> </ol>
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An examination of these levels reveals a basic conformity with the various proposals presented in Chapter 1 as to the potential roles for social indicators. In that discussion it was suggested that the current state of social indicator research necessitates that, at least for the time being, their development be restricted to level one (description) and to the more simple aspects of level two (simple correlational and relational). Dunn's (1974) assessment of the various informational reform

measures currently underway in the United States also suggests that the more ambitious reforms cannot succeed unless they are preceded by more modest ones.

A conclusion to be drawn from the lengthy discussion of societal control, information, and their relationship with social indicators is as follows: First, it is evident that societies, for a variety of reasons, are attempting to take increasing conscious control over the means for influencing their futures. Second, the information needs for societal control grow in complexity relative to the level of societal control desired. Third, social indicators are a device which will provide for many of these informational needs. But, fourth, the current state of measurement and theorizing preclude any of the more ambitious roles for the present, thus relegating social indicators to descriptive and simple correlational-relational roles.

An approach most frequently suggested as the beginning step necessary for developing the more simple types of social descriptions and interrelationships is the use of proposed indicators to serve as guidelines for improving and expanding existing statistical series (Shiskin, 1973; Wilcox et al., 1974a; Girardeau, 1972b). One of the basic reasons for the information shortage experienced in the attempt to increase societal control is the antiquity, inadequacy, and inaccuracy of current statistical series. In order to fully appreciate the task facing those who will attempt to develop a descriptive monitoring system of societal change the problems inherent in the current state of societal information must be outlined. The following section will review briefly this very

state of affairs, and will be followed, in turn, by a short section which summarizes the discussion and provides a definition of social indicators.

### Current information deficiencies

The identification of information needs for improved societal control by the polity has arisen in part as a reaction to the perceived weaknesses in current statistical series. The information requirements of governmental as well as private agencies have continued to outstrip the capability of existing information systems, and the response to calls for reform have been, until recently, sluggish at best.

The information systems that policymakers and planners rely upon are inadequate, on one hand, because they were developed for a variety of purposes, most of which have little to do with planning. On the other hand, information systems are almost always constrained by the technical, administrative, political, economic, and cultural factors that make up their environments. Some of these constraints are briefly reviewed in the following subsections.

Problems of volume      The information potentially available to policymakers and planners is frequently voluminous (Shiskin, 1973). Many nations spend millions of dollars for the collection, collation, analysis, printing, and storing of great amounts of data, much of which is never used (Economic Commission for Asia and the Far East, 1972:2). Planners, however, often are not aware of the information potential available to them and when they do recognize the potentialities of these data resources, they are often unable to separate from the totality the specific information they require. The very volume of available data and

the lack of summary mechanisms, isolate these data from the decisionmaker. Policymakers, planners, and their respective staffs have neither the time, the economic resources, nor the patience to invest in locating the proper data (Rose, 1973:124).

Relevance Existing information systems tend to focus on subjects that have no relevance for the guidance of society. For instance, the majority of statistics generated by society is expressly for internal management procedures of agencies (Sheldon and Freeman, 1970). These data serve various bureaucratic functions such as accountability, personnel evaluation, and coordination of physical resources. Such data can be totally irrelevant for the information needs of identifying societal problems, program assessments, and so on.

A second area of irrelevance is the statistical system's orientation to problems of society's past. Prime examples can be found among the statistics series begun in the 1930s in the United States to monitor what were then perceived to be critical economic problems. Among the series still relied upon for policy and planning guidance are the unemployment statistics. As Levitan and Taggart (1974) note, observations of those employed as against those unemployed are now less reflective of income adequacy problems than are certain statistics that would, if instituted, give a more accurate picture of social need. Employment statistics are now inadequate for: 1) a job is no longer the sole source of income; 2) four out of every ten wives work; and 3) many of the unemployed are teenagers looking for a job while still in school (1974:23).

Third, in many countries the most basic statistics concerning the demographic characteristics of the societal population, agricultural

output, wages, or governmental expenditures are either limited estimates (Oshima, 1957) or non-existent (Novak, 1973; Caiden and Wildavsky, 1974). In other countries these statistics are published subsequent to the time they were needed in the planning and policymaking processes and in the interim "informal guesses" served as substitutes (Waterston, 1969; Novak, 1973; Walters, 1972).

As a consequence, planning and budgeting, normally perceived as future-oriented activities, in the LDCs have been described as retrogressive or as the attempt to determine what occurred and how much was spent over the past fiscal year (Caiden and Wildavsky, 1974).

Measurement and inference problems      A weakness of major proportions concerning secondary statistical series, and whose significance is often underrated, is their accuracy, reliability, validity, and generalizability.

An error particularly present in large surveys such as censuses in LDCs is sampling misrepresentation or sampling error. Often for reasons of practicability only a portion of population are sampled. In attempting to cut corners, however, the sampling units are frequently chosen from more easily accessible units. The resulting bias of the sample is an over-representation of urban areas and more easily available rural areas at the expense of rural and isolated rural (Shryock and Siegal, 1971:158, 168; Institute of Population Studies, 1971:10-11).

Reliability concerns the errors committed in data collection and processing, and as Novak (1973) and other observers point out, the data collection processes of many agencies, particularly those found in LDCs,

are sloppy and amateurish, resulting in inaccurate statistics. A further problem of reliability results from the tendency by some governments to falsify those particular statistical results which are normally made public in order to avoid political embarrassment (Taylor and Hudson, 1972:4). Other instances of political regulation include the decision to avoid collecting potentially socially divisive data, particularly in ethnically and culturally heterogeneous societies. An example given by Geertz (1968) underscores this tendency. In Lebanon, a society divided by extreme religious differences, the population census has not been made since 1945 in order to avoid the threat of possible conflict were the relative size of each religious group known to the other.

As for validity, or the congruence between the indicator and the concept it is thought to represent, again a number of problems are encountered in secondary series. For instance, "health" is a complex concept which includes such subdimensions as mental health, disability, morbidity, mortality and life expectancy (Callaghan et al., 1974). Health statistics are frequently limited to particular types of mortality and morbidity, thus seriously under-representing the state of health. The health of the nation cannot be validly determined unless all of its dimensions are represented in statistical series.

Other problems of validity occur in such areas as social order and education where official records are relied upon to produce images of societal well-being. The status of society relative to education is measured, not by the knowledge, skills, or values that students take away with them, but the number of students that graduate. These data

do not tell how well its members are prepared as participants, only how many participants there are available. Crime statistics, on the other hand, actually represent the number of crimes reported rather than the actual number committed. Those reported may represent only as many as one-third those actually committed.

Comparability A problem unrecognized by many statistical reformers is that different agencies use differing units of analysis and measurement, different coding procedures, and different procedures for condensing and summarizing their data (Wilcox et al., 1974a:53-54; Dunn, 1974:12). Underlying the various information requirements of improved societal control is the need to examine society's strengths and ills, strong points and problems side by side in order to assess the state of the nation. To do so requires the comparability of diverse political, economic, health, nutrition, education, and other data of societal concern.

Coordination and centralization of statistical services Many of the problems associated with existing statistics while not created are exacerbated by inadequate integration among proliferating agencies and subagencies of government. A number of observers have noted that development is uneven in nature, resulting in dislocation and diseconomics (Sofranko and Bealer, 1973; Moore, 1966; Smelser, 1959). Much of the dislocation results from role and institution proliferation with lagging integration.

Evidence for proliferation with lag is found in the creation of specialized planning bodies and statistical agencies. In such a situation, it is possible to have planners making plans without the

proper information and statistical agencies producing irrelevant and unused data. Such a situation is documented in a brief survey of planning and data in Thailand carried out by McIntosh and colleagues in late 1973. Their report finds that planners, statisticians, and program implementors work relatively autonomously from one another; each activity is self-contained and treated as an end in itself (McIntosh et al., 1974).

Other problems Culture, economic and technical limitations such as the lack of cultural relevance, scarcity of funds, and absence of needed skilled personnel, further delimit the statistical series available in any given society. The reader is asked to refer to Wilcox and colleagues (1974a; 1974c) and McIntosh et al. (1974) for detailed accounts of the nature of these limiting factors.

#### Social Indicators and Societal Control

The social indicator movement is thus a product of two inter-related themes in the contemporary world. The first theme is the continued evolution of society. Social indicator proposals, in a very real sense, are the product of particular levels of evolutionary development. As polities evolve an increasing awareness of information needs that reflect the state of society as well as the performance of organized attempts to alter that state in desired way, new information types are required. The second theme involves the present capacity of existing societal information systems to provide for current and ever expanding information needs. Social indicators have emerged along this line as one of several proposed means of ameliorating information inadequacies.

The various social indicator proposals discussed in Chapter 1, including societal description, social accounts, social and policy modeling, and policy assessment form a hierarchy of expectations and capabilities which roughly conforms to the information need hierarchy described in Table 6. The more systematic, analytical proposals such as models and accounts conform to the higher levels of information need; namely, prediction, manipulation, and goal-seeking and assessment. The most basic, descriptive social indicator proposal, societal monitoring (also referred to as descriptive reporting), is most consistent with the information need of a basic description of the state and changes in society, its interrelated parts, and its environments.

Several factors previously discussed suggest that the descriptive approach should be the focus of concentrated social indicator research efforts at the present time, leaving greater emphasis on the more sophisticated analytical approach until a more appropriate time. First, the progress of analytical work in social indicators has been restricted because of theoretical limitations and the lack of adequate concern for the time dimension in the statistical base. Second, current data weaknesses and gaps preclude any extensive modeling efforts. In fact, as was noted, the greatest progress in social indicator development has been made by those attempts to utilize and improve upon existing statistical series through descriptive profiles (e.g., Office of Management and Budget, 1973; Economic Planning Agency of the Japanese Government, 1972; Central Statistical Office, 1972). Finally, as is suggested by information hierarchy in Table 6, higher analytical levels cannot

logically preclude the descriptive, simple relational bases upon which analysis ultimately depends.

#### Towards a social indicator definition

The discussions of this and earlier chapters have suggested a number of criteria as well as limiting features of the nature of social indicators. These criteria and features will be briefly discussed in this section in order to derive a tentative definition of social indicators.

The first criterion concerns the relation of indicators to theory. It is clear that in order to transmit meaning, social indicators must be theoretically based. That is, social indicators necessarily are selected on the basis of their theoretical importance (Moser, 1973; Land, 1972; Wilcox et al., 1974c).

The outlines of a theory which has heuristic utility for conceptualizing sociologically most of the social problems with which social indicator researchers concern themselves is contained in the "societal process system" model (Figure 1, pp. 32-33) and derivable sub-models. It is from such theories, however tentative and sketchy, that meaningful social indicators must be drawn. Moser, for instance, believes that such models are necessary, for the current level of sophistication and utility of economic indicators were achieved through the simultaneous, hand-in-hand development of economic theory and indicators (1973:4).

The societal process model suggests that societies contain and ultimately depend upon the well-being of their several levels of order.

Society is a production process in the sense that it seeks to produce the outcomes necessary to improve upon those levels of well-being in the face of ever-changing, unstable environments. Meaningful social indicators, from this perspective, would be those that described the state and changes in the various levels of societal well-being. Furthermore, the societal process model demonstrates that the systemness of society makes the achievement of well-being at any level dependent upon, on one hand, the output from many societal subunits, and on the other, the consequences of achievements at other levels. Social indicators, therefore, not only describe the states of well-being, but also the processes required for their achievement and their effects on one another. For example in the production of levels of nutrition, indicators would thus be required to reflect the state of and change in the various input/constraints and outputs from the various processes that culminate in the output of human nutrition as well as to reflect the consequences of individual nutrition for other levels of well-being.

A second criterion, more in the form of a current limitation, is that social indicators monitor states and change of states descriptively rather than analytically. Or in the words of the United Nations Social and Economic Council, social indicators should provide measurement of "the state of, and trends in, the main aspects of social conditions with a view to detecting social problems and monitoring progress toward (or retrogression from) generally accepted social goals" (1974:2). The monitoring of progress, at the descriptive level, entails the simple reflection of movement towards or away from societal goals (which are inferred from the various production systems of well-being). These

reflections would not identify the specific causes of levels of well-being, only the current and changing states of that well-being and the factors thought to produce them. This description will be provided for by simple rates and ratios, simple correlations, means, and dispersions (Allardt, 1973a; Wilcox et al., 1974b).

Third, the emphasis on description of societal production of levels of well-being must be focused on efforts to improve and expand existing statistical series. As mundane a requirement as this might appear, the institutionalization of social indicator monitoring means that a good deal more attention than heretofore must be paid to data sources. The development of the necessary statistical series will require the injection of theoretically based social indicators into the processes of statistical reform by indicator proponents who are keenly aware of the necessity to strike a balance between theoretical requirements and the limitations characteristic of statistical series. As was earlier suggested, statistical series are a part of society, and thus must function in political, economic, technical, and cultural environments. Each of these environments acts to limit the nature, extent, and use of data produced in the societal information systems. Social indicator proponents must formulate their approaches within the guideline inherent in these constraining environments if they desire social indicator institutionalization.

The fourth criterion or present limiting feature is that of the place of social indicators in policymaking and planning activities. The current emphasis on description of the complexities involved in the

societal production of well-being, with the de-emphasis on sophisticated modelling and rigorous policy assessment fairly limits social indicators to a far less influential place than many proponents would desire.

C. A. Moser, Director of the Central Statistics Office (London, England) believes that the most social indicators can contribute to policymaking and planning is to provide background enlightenment rather than figuring in decisionmaking directly (1973:2). Sheldon and Parke are more blunt:

. . . the usefulness of indicators as direct guide to action is small; by contrast their role in improving the statement of problems on which action may be desirable is potentially very great. A comprehension of what the main features of the society are, how they interrelate, and how these features and their relationships change, is, in our view, the chief purpose of the work on social indicators (1974:16).

Fifth, social indicators are also characterized by a set of other properties, many of which have been implied or alluded to throughout the discussion of this and other chapters. First, social indicators are intended, for the most part, to reflect or represent empirically observable phenomena, and thus are considered, unless otherwise specified, to be statistics (Kamrany and Christakis, 1969:208). Second, because of the concern for monitoring trends or state-changes, social indicators involve time series statistics (Andrews, 1973:5; Wilcox et al., 1974c:6). Third, the level of aggregation of social indicators can (and generally will, depending on their usage) vary by institutional, demographic, or territorial subunit (Sheldon and Freeman, 1970:97). This property is more than a function of the current concern for greater equity among societal groups (e.g., United Nations General Assembly, 1970), but instead is a fundamental requisite for dealing with the various levels of societal well-being. Fourth, and finally, social indicators, in order to cover

all the important aspects of the production of level of well-being, yet present a reasonably coherent description of the state of society for policymakers and planners, must be comprehensive yet limited (Andrews, 1973:5; Moser, 1973:3).

#### Societal Monitoring of Human Nutrition: Methodology

In the following sections a number of proposals are made with reference to development, implementation, and institutionalization of social indicators of human nutrition. These proposals should be considered as suggested experiments to be tested, accepted or rejected, and improved upon by future research efforts.

The development of a methodology for social indicators of human nutrition for societal monitoring purposes requires the consideration of the data base (data which describes the context and environment in which production of well-being takes place), the actual social indicators and their various cross-classifications, data sources upon which the indicators will rest, and data generating mechanisms for both base and source data. These considerations are drawn, on one hand, from the application of the societal process model to human nutrition and the indicator/data needs which then logically appear. On the other hand, a number of the proposals having to do with data sources and mechanisms are drawn directly from the "Indicators of Social Development" project's experience in examining and evaluating planning and data in LDCs, particularly Thailand.

### The data base

A requirement for the formation of societal social indicators is an adequate data base that forms the means for distinguishing the various levels of well-being among social collectivities or territorial groupings, a prerequisite for data to be of use to planners and policy-makers (Wilcox et al., 1973; Thompson, 1971; Stone, 1971). The data base serves to make social indicators reflective of the conditions of relevant groups or territories in several ways. First, the population and territorial data contained in the data base serve to identify the various groups and areas of concern. Conceptualizations such as rural-urban populations, age structure, or region are only abstractions until such time as their empirical characteristics such as number, size, or density are determined. Second, the data base serves as the means for formulating statistical populations for the construction of representative survey samples. This is of fundamental importance for sample surveys form the backbone of the means for generating data on levels of well-being. Unless these surveys of samples of the population are adequately representative of the societal population, their results are likely to mislead the policymaker and planner. Third, base data generally contains much of the information required by the societal production model in the consideration of the contributions/limitations of environmental resources to well-being.

The following subsections describe what appear to be the major types of base data required for indicator formation and for policy-planning purposes.

The morphology of the societal population      The morphology or structure of a population concerns its demographic and social characteristics. Some of the most basic information required to identify groups and areas and to build indicators which compare the level of well-being of one group with another are contained in these characteristics. Thus, age, sex, birth rate, death rates, population distribution and density, marital status, and others are critical elements in the development of a system for monitoring societal change and making plans and policies.

Most of the characteristics considered relevant by demographers and social demographers are listed in column 2 of Table 7. These were drawn from working documents produced by the U.S. Bureau of the Census, the United Nations Statistical Office, and others. The reader is asked to refer to the documents cited at the bottom of Table 7 for further details and justification of these basic categories.

Structural population data are in themselves useful, but their utility soars when they are cross-classified by territorial determinations. Some examples of territorial aggregations are presented in column 3 of Table 7. These data are important for locating societal problems in physical and administrative space as well as for such activities as regional planning (Shah, 1974; Economic Commission for Asia and the Far East, 1972).

Households      A second basic type of information is the organization of social individuals into the family's behavioral setting generally referred to as the household. The household is a primary

Table 7. Samples of basic data types<sup>a</sup>

Concern	Sub-concern	Cross-classification
A. Population	1. Total population	1. By territory
	2. Characteristics	a. Administrative divisions
	a. Age	1) urban
	b. Sex	2) provincial
	c. Ethnicity	3) regional
	d. Marital status	4) geographical
	e. Type of marriage	5) cultural, etc.
	f. Birthplace	b. Predominant economic activity
	g. Citizenship	c. Ecology (e.g.)
	h. Language (mother tongue, usual language and dialect utilized, other language abilities)	1) high disease areas
	i. Education	2) high drought areas
	1) literacy (full, functional, etc.)	3) high poverty areas
	2) level of educational attainment	
	j. Ethnicity	
	1) race	
	2) tribe	
	3) religion	
	4) cultural identification	
	5) national origin	
	3. Dynamics	
	a. Growth	
	1) births	
	2) deaths	
	3) natural increase	
	4) migration	
	5) fertility	
	6) life span	
	7) life expectancy	
	4. Density	

<sup>a</sup>Source: United Nations Statistical Office (1958; 1959; 1962; 1974a and 1974b); Shryock and Siegal et al. (1971); Shah (1974); Murdock (1957); Adulavidhaya (1972); Thammasat University (1971); Office of Population Censuses and Surveys (1973); Ministerior Do Planejamento E Coordenacaco Geral (1972); U.S. Department of Interior (1972a; 1972b).

Table 7 (Continued)

Concern	Sub-concern	Cross-classification
B. Households	<ol style="list-style-type: none"> <li>1. Settlement type               <ol style="list-style-type: none"> <li>a. Village</li> <li>b. Commune</li> <li>c. Tribe</li> <li>d. Town, city, etc.</li> </ol> </li> <li>2. Households               <ol style="list-style-type: none"> <li>a. Total</li> <li>b. By type                   <ol style="list-style-type: none"> <li>1) housekeeping units</li> <li>2) private households</li> <li>3) institutional households</li> </ol> </li> </ol> </li> <li>3. Date of entry into settlement               <ol style="list-style-type: none"> <li>a. By birth</li> <li>b. By immigration</li> </ol> </li> <li>4. Construction characteristics               <ol style="list-style-type: none"> <li>a. Total structure</li> <li>b. Roof</li> <li>c. Walls</li> <li>d. Floor</li> </ol> </li> <li>5. Rooms               <ol style="list-style-type: none"> <li>a. Total</li> <li>b. By function</li> <li>c. Familial density</li> </ol> </li> <li>6. Family type               <ol style="list-style-type: none"> <li>a. Total by type:                   <ol style="list-style-type: none"> <li>1) nuclear (independent, lineal, stem)</li> <li>2) communal</li> </ol> </li> </ol> </li> <li>7. Marital residence               <ol style="list-style-type: none"> <li>a. Avunculocal</li> <li>b. Bilocal</li> <li>c. Duolocal</li> <li>d. Matrilocal</li> <li>e. Neolocal, etc.</li> </ol> </li> </ol>	Refer to items under cross-classifications for A.

Table 7 (Continued)

Concern	Sub-concern	Cross-classification
	8. Kinship and descent	
	9. Facilities	
	a. Total	
	b. By type	
	c. By location	
	d. By sanitation	
	10. Access to other institution/ facilities by type (km & time units) (e.g., farm plot, forest, clinic, village shaman, temple, market, maternal clinic, school, central government authority, p.o., road, radio, T.V., etc.)	
	11. Tenure	
	a. Rent	
	b. Lease	
	c. Own	
	d. By rent or lease free	
	12. Age of household	
	13. Method of construction (hired labor, voluntary, commercial, etc.)	
C. Physical	1. Land form division	Refer to items of cross-classification under A above.
	2. Climate	
	3. Soils	
	4. Land use	
	5. Mineral resources	
	6. Hydrologics	
	7. Water resources (surface and ground)	
	8. Flooding	
	9. Flora and fauna	

focus of research efforts, for through the auspices of the family, many of the basic economic, family planning, health and nutrition, and educational decisions affecting societal population members are made. The importance of the household as a unit of research is underscored by the proliferation of household studies and household surveys manuals to carry out such studies (United Nations Statistical Office, 1962; Juster, 1973; Thammasat University, 1971; Institute of Population Studies, 1971; Office of Population Censuses and Surveys, 1973; Allardt, 1973b; Pekkarinen, 1970; Reh, 1962; United Nations Statistical Office, 1964).

Household surveys are used not only to determine levels of well-being, but more importantly, to provide information concerning the social, cultural, economic, and physical contexts in which the human action to achieve various levels of well-being are carried out. As Chapter 3 demonstrates, the structure and sanitation of the household, its internal stratification, and its social and physical access to other important social institutions play a highly significant part in the production of human nutrition.

Household surveys are a generic type of instrument used to fill the time gaps between decennial population censuses and the growing need for more information than administrative records provide, and they provide a useful means of exploring the interrelationships among many of the main facets of social life (Office of Population Censuses and Surveys, 1973:1).

Household surveys can also be molded around more specific information needs such as the determination of poverty levels (Economic Commission for Asia and the Far East, 1973), food consumption

surveys (FAO, 1962a), surveys of housing conditions (Thammasat University, 1971), or studies of fertility (Institute of Population Research, 1971).

Some of the basic information found in many household surveys is listed in Table 7. These examples are drawn from the studies and manuals referred to in the preceding paragraphs, as well as Murdock's (1957) "World Ethnographic Survey." Ethnographic works such as Murdock's are an under-used resource of information concerning subsistence economics, stratification, the structure of kinship, and various aspects of local and center polities. Such data can be used to further specify the social, political, economic, and cultural contexts of the production of nutrition.

Geology, geography, and ecology      A basic type of information whose social significance has recently become more relevant for policy-making and planning are the various physical dimensions of the human environment (White, 1962; Rostow, 1961; Smith, 1973). Exemplary of this concern is the proliferation of socio-economic impact studies of large-scale irrigation projects. In the countries included in the Lower Mekong Basin Development Project (Laos, Thailand, Burma, and Cambodia), numerous impact studies have already been completed and others are planned (Ingersoll, 1969; Adulavidhaya, 1972; Kardell, 1970; United States Department of Interior, 1972c). In these studies the interrelationship between socio-cultural homes and economic activities and their physical and organismic environments are of prime concern. Other research which stress physical and geographical factors include "growth center" studies (Shah, 1974; Kuehn and Bender, 1969).

A number of types of studies provide for geological, geographical, and ecological data. Among these include hydrologic, soil, land use, and topological surveys, which are normally carried out by specialized central governmental agencies. In the United States, the primary agencies involved in conducting such surveys are the U.S. Bureau of Reclamation (Department of the Interior) and the U.S. Army Corps of Engineers.

Among the data collected in such studies include descriptions of land forms and land usage, climate, soils, water resources, and flora and fauna. These data are of significance for geological and ecological purposes, which are the main reasons for their collection, but their significance grows when they are linked to population, economic, and social data. Levels of human adaptation, potentialities and limitations for agricultural change, and familial economic role structure are clarified with the availability of data describing the physical environment in which a society carries out its activities and upon which it must depend for its survival.

#### Social indicators of human nutrition

Beyond the specification of the data base, the more specialized information set--the social indicators of human nutrition--must next be considered. Before doing so an elaboration of social indicators' status as measurement devices as was first discussed in Chapter 1 is presented.

Social indicators, like any indicator or variable, are a type of link between the theoretical and empirical levels of scientific analysis. Thus a social indicator represents a more abstract concept or set of concepts whose isomorphism with observable phenomena is unclear.

A social indicator utilizes a second concept considered measurable which is related logically to the first, more abstract concept the indicator is to represent. The second concept contained in the indicator thus is isomorphic with some of specified empirical phenomena. Social indicators are thus measurement tools in that they provide the means of mapping concepts into a space made up of observables (Stevens, 1967).

The link social indicators perform between the abstract conceptual and the empirical is illustrated in Figure 11.

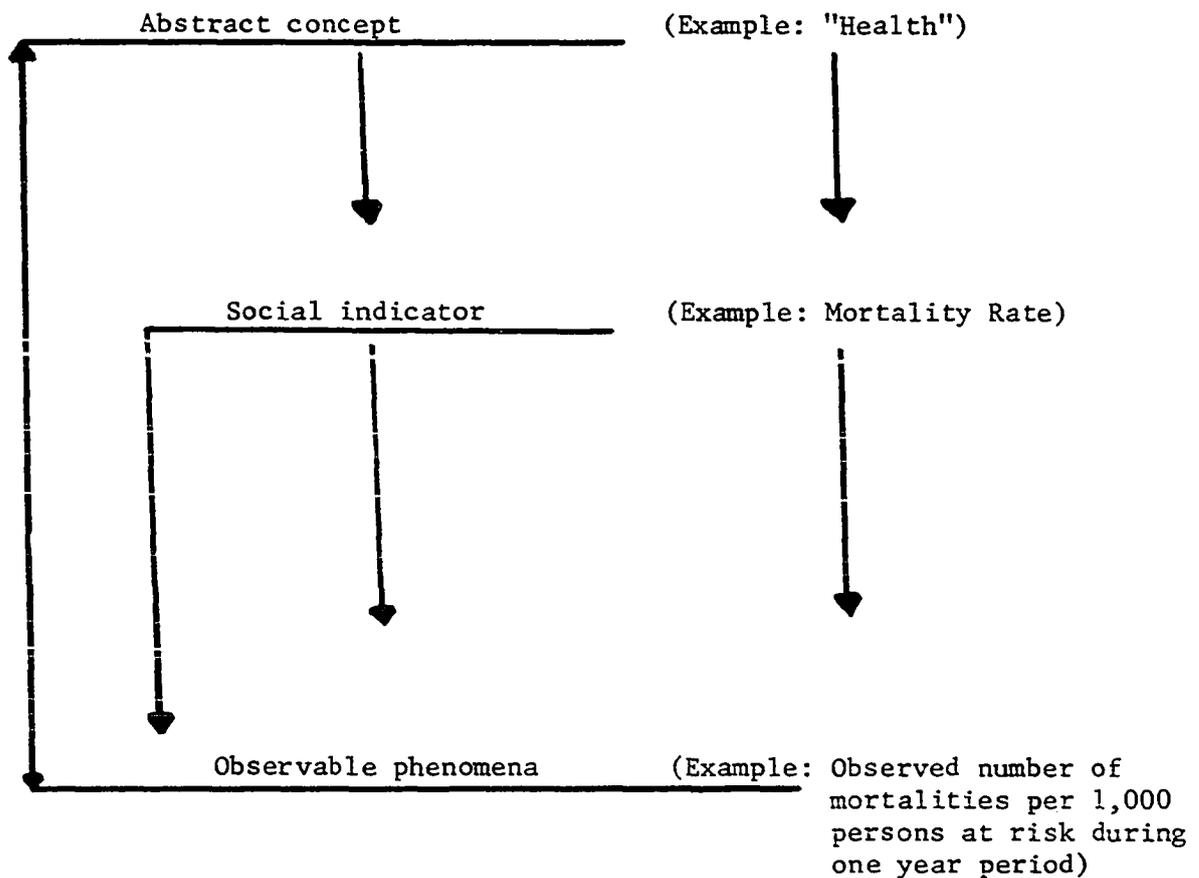


Figure 11. Social indicators as measurement link

Figure 11 denotes two steps. First, an observable concept deduced from the unobservable concept is specified. For example, using the notion of "health," a concept generally thought to have no specific empirical referent, a component of health reflective of an observable event in the lives of human beings such as mortality or morbidity is selected. Once the observable has been identified, then a means of enumerating the observable or one of its attributes is then selected. In the case of mortality and morbidity, the numbers of observed deaths and illnesses can serve as enumerations. Generally, morbidity and mortality become indicators by specifying morbidity and mortality rates, or the number of persons who have become ill or died in a given period of time per 1,000 persons at risk.

The social indicators of human nutrition proposed in tabular form are a result of the application of the above process to concepts provided by the "societal production of human nutrition model" (Figure 3, Chapter 3). This application resulted in the temporary categorization of a set of measures or indicators, which were then adjusted, where possible, to fit categories of existing secondary statistics. These adjusted indicators will be referred to as "master social indicators." Using base data types and theoretical and policy considerations, the adjusted or master indicators were then cross-classified into more specific indicators (referred to as "social indicator derivations").

As adjusting proposed indicators to align more closely with existing statistics involved an examination of data sources, descriptions of data sources and data generating mechanisms were also obtained. Where

no sources and means could be located, suggestions concerning new data sources and new instruments were developed.

The outcome of the application of the adjusted societal process model to measurement considerations and the examination of data sources and instruments are presented in Table A-1.<sup>1</sup> Column 1 of the table lists the elements (inputs/constraints, outputs, status, or consequence) of the adjusted societal production model outlined in Chapter 3, Figure 3. These elements were then further differentiated and specified and included as subcategories in column 2. The master social indicators, based on logical deduction from the process model and adjusted in the face of existing statistical series, follow in column 3; and the social indicator derivations are found in column 4. Columns 5 and 6 are devoted to data sources and data generating mechanisms, respectively. Documentation of indicators, sources, and mechanisms are found at the bottom of Table A-1. It should be noted here that movement horizontally across from column 1 through column 5 is an elaboration of the linking process described by Figure 10. Contained in these columns, starting with the first column, is a progression of levels of abstraction from the most abstract to the least abstract or the empirical (represented by column 5). Social indicators, in columns 3 and 4 are again shown in their midway, linking capacity.

Because of the number of items contained in the table, discussion of specific items will be limited to several of those about which there

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<sup>1</sup>Due to the length of this table, it is presented in Appendix A of this dissertation.

is some controversy. The remainder will have to stand alone, justified only through the references from which they were drawn.

Master social indicators Many of the master social indicators listed in column 3 of Table A-1 represent standard items in population and agricultural censuses and household and special sample surveys. In those cases where indicators were not located within current surveys, where possible, statistics are proposed for possible inclusion into expanded efforts at data collection. In some cases, a quantitative indicator was proposed. In other cases, however, a qualitative indicator fills the column. Thus, in the case of "reduction of societal knowledge" for which no general indicator was located in the literature reviewed, the term "reduction of societal knowledge" is written into the column.

The indicator taxonomy listed in column 3 is in many senses comprehensive in terms of its coverage of nutrition as a social concern, but reducing its length to come more into line with the criteria "limited" would appear to be desirable. The actual reduction process as well as the search for more "indicative" indicators is a matter of future research. This is especially true in the case of measurement of nutrition status, the accurate and representative measurement of which remains an unresolved issue.

Social indicator derivations One of the more important features of social indicators is their disaggregatability over relevant collectivities and areas. From the policymaking and planning perspective, the ability to refine the means of associating certain states of well-being with specific population subgroups or areas vastly increases the

utility of the item of information (Thompson, 1971:20). It is one thing to know for instance, that a society is troubled by malnutrition, but the level of understanding greatly increases when the population and territory affected by particular nutrient deficiencies are known. The ability to discriminate among sub-populations and territories would appear to be a fundamental characteristic of any information source drawn upon by policymakers and planners. All too often, however, highly relevant data have been aggregated to provincial and national levels to facilitate data handling and storage, with the means of disaggregation left unattended. In many cases, data on local population and territorial conditions are no longer retrievable (Sheldon and Freeman, 1970; McIntosh et al., 1974).

The specific breakdowns or levels of aggregation for a particular society's information needs will vary to a degree according to its physical makeup, culture, and social structure. The categories offered in column 4 of Table A-1 are, therefore, both general and tentative, and should be modified as they are implemented in a particular society to that society's needs and characteristics.

#### Data sources

Of primary importance is the source of data upon which social indicators must rely, a theme of social indicator research stressed earlier in this writing as well as by an increasing number of commentators (Dunn, 1974; Perle, 1970). For LDCs, in light of the constraints under which data collection labor and of the wealth of data already available, it has been emphasized by the Indicators of Social

Development Project that the fullest possible use be made of available data (Wilcox et al., 1974c; Callaghan, et al., 1974; McIntosh et al., 1974). In attempting to develop social indicators of various societal production of well-being processes, existing data sources should first be consulted. In those frequent instances where the data are deficient, means for improving the faulty series should first be sought before proposing new data sources.

As already indicated many countries have instituted population, agricultural, and housing censuses, as well as numerous household, employment, geological, and ecological surveys. These sources not only contain the broad outlines of society and its population, but also contain many useful series which can be used for societal monitoring purposes. Many of the societal problems involved in the attainment of various levels of well-being are measured either directly or indirectly by such existing instruments. A list of many of the data sources on individuals and households is presented in Table 8.

Not all of the LDCs collect such a tremendous variety of statistics as is reflected in the listing. However, as has been pointed out, they collect more than enough of certain types of information to begin the process of developing social indicators.

The data sources a society has to draw upon are important for yet another reason, for it is these, for the most part, along with sampling, collection, collating, and analysis methods, which will have to be standardized and linked so that the same or similar social units are being dealt with. The necessity of bringing together data from heterogenous

Table 8. Societal data sources<sup>a</sup>

- 
1. Censuses of population, agriculture, and households;
  2. Research surveys;
  3. National registrations for births, marriages, deaths, passports issued;
  4. Postal directories;
  5. Social security records for pensions, unemployment, and illness or disablement;
  6. Welfare institution records;
  7. Health service records of doctors, hospitals, clinics, and other medical records;
  8. School and educational services records including enrollment, dropouts, performance, library usage, classroom space, teachers, and other educational facilities;
  9. Employment records, including those at labor offices and those at place of work such as earnings records, job history, occupational training and unemployment;
  10. Records for services--gas, electricity, telephone, water supplies, or refuse disposal;
  11. Tax records of occupation, income, and tax category;
  12. Bank and insurance records including account holders, borrowers and insured persons and properties;
  13. Communication and media records such as those for telephone, radio, television, newspapers, and periodicals;
  14. Records of membership and officeholders associations, clubs, and societies, including cooperatives;
  15. Church records of membership and in some cases records of births, marriages, and deaths;
  16. Defense records such as conscription and recruiting records, as well as membership in armed forces;
  17. Police and courts of law records such as arrests by types of crime, records of crimes reported;
  18. Transportation records such as registrations of motor vehicles and records of driving licenses.
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<sup>a</sup>Source: Adapted from Wilcox et al., 1974a and Hyman, 1972.

sources to construct a homogeneous picture of the various degrees of well-being experienced by various levels of society requires modification of current techniques and instruments. These modifications, in turn, will necessitate far greater levels of cooperation and coordination among a diversity of governmental policymakers, planners, and statisticians and private and university researchers and observers. This re-orientation of relations is discussed in the following section.

Column 5 of Table A-1 is thus an application of the available data sources (theoretically present in any society) contained in Table 8.

Existing statistical series, of course, will not serve entirely or adequately all of the information needs attendant with societal monitoring efforts. Information needs concerning dietary intake or social access to polity to seek remedies for social ills are not normally considered in the various censuses or household surveys that are carried out on a regular basis in most societies. Measurement of these and other policy concerns will require the institutionalization of new survey instruments into the normal processes of generating societal time series data.

A number of slots in column 5 of Table A-1 reflect the need for special surveys. The development of special surveys is one of the major research tasks facing the social indicator movement, and a few preliminary efforts have recently commenced. One such effort is the United Nations Research Institute of Social Development's (1973) institution of "village observatories" which would serve as the means of generating social indicators relevant to local conditions. Another effort is that

of Dr. Karl Fox (1973) (Department of Economics, Iowa State University) to blend Barker's "behavior settings" (see Barker and Wright, 1954) with time budgets (see Sorokin and Berger, 1939). From this Fox links resources (which include "time," "health," and "sexuality" as well as Parsons' generalized media of exchange) to specific activities (e.g., economic activities, food preparation, and eating) with the participants in the activities and their social characteristics.

Fox's approach would be particularly useful in dealing with village-level behavior, and could be combined into broader studies of village conditions such as malnutrition and the factors producing them. Here the village could be divided up into the concrete settings in which the institutionalized activities such as the economic, familial, and religious are carried out. Thus, economic activities would be examined in the fields as well as around the household, religious activities would be examined in the temple and those places beyond the temple which serve religious functions (e.g., Bunnag, 1973), and familial activities would be largely studied within the household. More precise activity settings could be defined within each of these concrete areas around the functions of the institution or around division of labor. Figure 12 is designed to illustrate the type of activity settings which are apparent from the structure of villages in Laos and Thailand.

Once the institutional activity settings were outlined, participants and resource commitments could be obtained using participant observation modes of time series studies.

As experimental and limited such intensive studies as the one just outlined would be, these might eventually provide the means for selecting

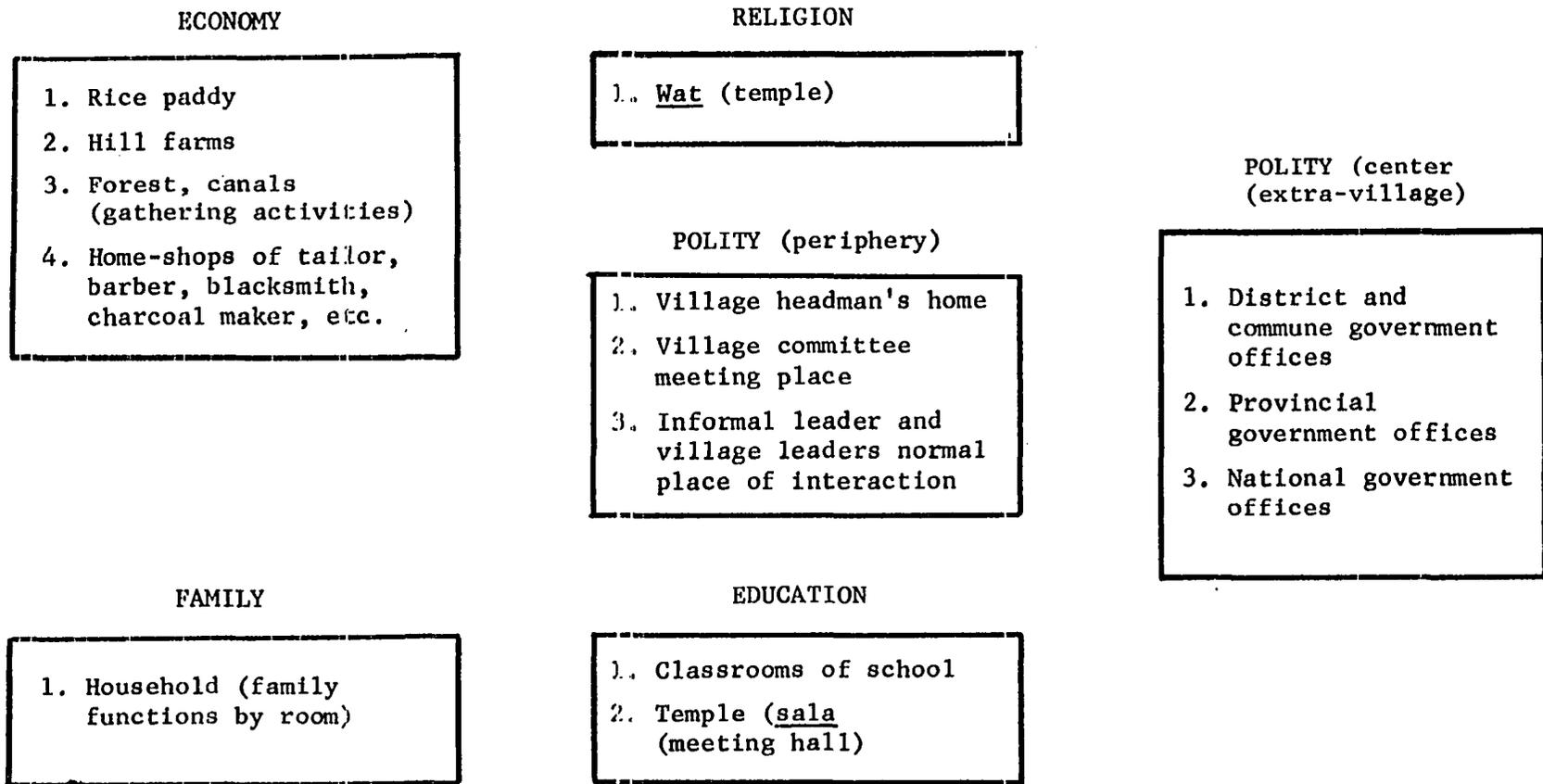


Figure 12. Institutional spheres and behavior settings for Thai-Lao villages

among variables those most useful for societal monitoring. Also, social values, especially those relating to food, might become more clarified through this approach.

In conclusion the data sources upon which societal monitoring depend are many and varied. As has been noted micro and field studies will be required to supplement and fill the gap in the macro or aggregate statistics concerning society. As Fallers (1974) concludes in his attempt to deal with the totality of the nation-state as a social anthropological unit of analysis, much of the description of society and societal events will lie with aggregate statistics that portray society holistically, while explanations of societal events will ultimately depend on village-level studies.

#### Data generating mechanisms

Perhaps the greatest impediment to the institutionalization of social indicators into normal governmental activities is the lack of sufficient integration among statistical, policy, planning, and other agencies. Many current data needs go unfilled, and large amounts of data are not utilized, as has already been mentioned, because of this lack of link-up of function and need.

A remedy suggested by several observers may at least partially reduce the lack of coordination among these agencies, facilitating the institutionalization of societal monitoring. Centralization of statistical agencies, forcing the administrative linkage among the various data producing agencies is thought to be more conducive to both responsiveness to data needs and to data quality (Shiskin, 1973; Novak, 1973).

This entails either the creation or strengthening of a central statistical office, which would set the standards for and direct, in part, the work of other specialized statistical agencies.

As for the improvement of communications and coordination among statistical and policymaking and planning agencies, this will require a different approach. In order to produce social indicators, national political commitment must be forthcoming. The highest level political figures and bureaucrats must agree to actively support and pursue, where necessary, the development of social indicators as national policy. From the level of support will come the authority necessary to require that lower level statisticians and policymakers and planners work with sufficient harmony to evolve, implement, and institutionalize social indicators.

With the authority of national commitment a broader range of research resources will be potentially more available for integration into national social indicator efforts. Not only will various government agricultural, population, and health statisticians and planners be enjoined in their efforts, but their counterparts in the nation's universities and private organizations will be drawn into the total effort. Some of the steps necessary to broaden the participation of researchers and planners into the efforts to improve and expand national statistical series have already begun in countries such as Thailand, where a high proportion of university researchers are involved in a number of governmental statistical projects (McIntosh et al., 1974).

As the last column of Table A-1 indicates, a great deal of cooperation among governmental, private, and university personnel will be

required in order to implement such social indicators as the division of agricultural or food behavioral innovations, and time resource allocation to food preparation and child care. Many of the indicators that must be developed to measure individual, institutional, and societal well-being will require the creative efforts of inter-disciplinary teams of nutritional scientists, anthropologists, sociologists, economists, and others. Experiments with special surveys, sampling designs, participant observation, aerial photography, and other techniques will undoubtedly be necessary before societal monitoring becomes a reality.

The lessons gleaned from the field experience of the various scientific disciplines represent a valuable library of approaches to the measurement of societal problems and societal production. Several examples are appropriate. First, mini-censuses or "intensive studies of small sample communities" (Colson, 1967), can be used not only to verify national census results but can also serve as a means of obtaining information of greater detail concerning family and household characteristics, societal values, and food behavior. A second technique which has seen use in several disciplines is aerial photography. Photos taken from aircraft or satellites have been used to locate mineral deposits and water sources. Recently photographs of villages taken at various point in time have been found useful in the measurement of village growth and differentiation (Maynard and Kraiboon, 1969; Young, 1972; Sternstein, 1965).

Baker, an economic adviser to the United Nations Asian Institute of Economic Development and Planning, has employed a potentially useful

approach to ascertain the relationship between socio-economic status and the level of health in rural Thai villages is also potentially useful. Baker's research is the longitudinal study of villager morbidity patterns and the behavior engaged in to rid themselves of the ailment. The data from such a survey would demonstrate the change, if any, in villager utilization of "modern" cures such as visits to clinics or pharmacies as opposed to more traditional techniques such as amulets or visits to shamen. Similar studies could be made of malnourishment and the victims' dietary patterns.

The village headman system In a number of countries, the government traditionally has relied upon the village headman or chief as its primary data generating mechanism, and today, while the role has been diminished by the introduction of population and agricultural censuses, the headman continues to provide a number of important types of data. This sort of mechanism has been referred to elsewhere as the "headman system (McIntosh et al., 1974).

The headman system basically involves the keeping of records by the headman of certain important events that occur in the village such as childbirths, deaths, estimates of the amount of land planted and the yield at harvest, in-out migration, the amount of livestock kept, and so on. Such data are transmitted monthly to district officials, who aggregate the data for their district and then forward the totals to the provincial level. The aggregation-forwarding process continues until the data reaches (both physically and as an aggregate) the national level. These national figures provide central government officials with a good deal of the data they must rely upon for policymaking and planning.

The headman system in its current state provides limited, inaccurate data. The potential of this mechanism for providing data for societal monitoring should not be overlooked, however. The data gathered by the headman could be vastly improved by instituting several measures. First, the headman's status and salary should be raised, however slightly, and done so with explicit reference to the responsibility of data collection. Several observers in the Social Development Division (U. N. Economic Commission for Asia and the Far East)<sup>1</sup> felt that headman data quality had been reduced largely because of the headman's diminution in status relative to the central government. Second, in order to provide more precision and accuracy to headman data, the village school teacher, agricultural extension agent, or community development agent could be appointed as the headman's "secretary," after receiving specific training in the measurement of the size of fields planted, yield samples, and morbidity and mortality causes.<sup>2</sup>

#### Using Table A-1

Before going on to discuss the measurement of human nutrition, a prime concern in the development of the social indicator taxonomy contained in Appendix A, a summary of that taxonomy or Table A-1 by way of examples is in order. Here the table will be examined as a whole rather than as a set of distinct parts.

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<sup>1</sup>As reported in McIntosh et al., 1974.

<sup>2</sup>Suggested by the Director of the National Research Council (Thailand) during an interview, as reported in McIntosh et al., 1974.

The table in Appendix A begins on the left-hand side of the page with elements drawn directly from the various phases of the model of societal production of human nutrition. These elements are further specified conceptually, and these specified elements are then followed by master and derived social indicators. Finally data sources and generating mechanisms complete the table. To use the table, then, the reader would start on the far left side with column 1 and read across horizontally through columns 2 to 5.

For example, if researchers' interests lie in the man/land relationship as it pertains to the societal production of human nutrition, the man/land relationship, located in column 1, page 1 of Table A-1, should be consulted. More specific aspects of the man/land relationship, as it affects agricultural output, are contained in column 2. These specific components consist of population density and population growth, both important aspects which constrain the level of agricultural output obtained.

Master social indicators reflecting the state of and change in these two components then follow in column 3 and are "number of persons in a given territorial area" and "per cent change in the number of persons in a given territorial area," respectively. The indicator of population density can be easily obtained from existing statistical series, while the growth of the population in given territories must be derived from several existing series, namely birth, death, and migration rates.

The sources of these indicators are the National Population Census and where this national survey is incomplete the needed supplementary

data can be obtained through the use of Colson's (1967) Anthropological Census, carried out by anthropologists, or by use of the headman system.

Coordinating the collection of the necessary data series concerning population size and growth in given areas is the National Statistical Office, which in the case of incomplete national statistics would require the aid of university anthropologists and/or the village headman of the nation or their equivalent.

A second example of usage of Table A-1 is drawn from the consumption phase (refer to page 13 of Appendix A). Interest in monitoring the effect of culture on the physical consumption of food would lead the reader to examine column 1 of Table A-1. Here culture is listed as the first input/constraint or output under the consumption phase section of the table. Reading across the table, the reader would find in column 2 as subcategories of culture values (religions; prestige), technology, and knowledge. If the researcher were most concerned with values, continued movement across the row of the table in which values fall would be in order. Under column 3, master social indicators, the measures for values include "name, type, and nutrient quality of potential food prohibited by religion" and "name, type, and nutrient quality of potential foods which are maintained (e.g., cattle) but are not consumed as food." Examinations of columns 4 and 5 for the origin of these indicators reveal that special village surveys, designed and carried out by an interdisciplinary team of nutritional scientists, social scientists, and ecologists, under the supervision of the National Statistical Office would be required.

### Nutrition status

As was discussed in Chapter 1, current proposals for social indicators of nutrition status are based on weak data sources which give no information concerning the population-territorial distributions with respect to nutritional deficiencies. A review of a portion of the vast literature concerning human nutrition and the assessment of nutritional status shows, however, that there are a number of techniques available which, if applied, could give an indication of the nutrition status by subgroup, community, and territorial area. These techniques include both direct and indirect methods.

A number of these techniques will be discussed and recommended as indicators of nutrition status. Unfortunately, it is not possible, based on current literature, to select a single indicator of nutrition as each seems to have its own limitations. None of the existing measures of nutrition status appear capable of serving alone (Berg and Muscat, 1973; Wilson, 1973). Measuring accurately the nutrition status of individuals, and thereby determining the various levels of well-being, is a difficult task to begin with, owing to the various genetic and health factors that so closely interrelate with the symptoms of malnutrition; thus a clear assessment of nutrition status is confounded (Committee on Procedures for Appraisal, 1970:807). A number of direct assessment techniques (ones which assess the actual nutrient levels in the human body at a particular point in time) as well as several of the more intensive indirect methods, clearly delimit the malnourished among those examined. The more precise the technique, however, the more difficult it is to

deal with samples large enough to be representative of any significant portion of the societal population's various subgroups because of the financial and technical requirements involved (Pekkarinen, 1970:146; Latham, 1972:84-85). This feature clearly limits the utility of such precise measures as the 1) clinical (evaluation of physical signs of nutritional health); 2) biochemical (measurements of the level of nutrients or their metabolites within the body); and 3) food weighing (amount of food physically consumed over a period of time) (Christakis, 1973:1; Pekkarinen, 1970:150; Committee on Procedures for Appraisal, 1970:808).

The indirect, and often less precise, methods consist of such techniques as anthropometry and dietary studies of lesser detail than food weighing, and use of secondary sources concerning mortality by cause for infants and small children. The indirect methods are probably of greatest interest to the policymaker and planner wishing to determine the nutritional, programmatic needs of the societal populations. As a consequence of their lack of precision, the indirect methods require, generally, less skills and money for their implementation than do the direct.

Anthropometry This method assesses actual physical body growth as compared with standards of growth at proper levels of nutrient intake (Latham, 1972:85). Anthropometry includes measurement of height, weight, head and chest circumference, and skinfold thickness of various parts of the body (Robson, 1972:403-12; Jelliffe, 1966a:7). A recent example provided by Khanjanasthiti and Wray (ca. 1973) demonstrates the use of

weight of children from several socio-economic classes as compared with expected values for healthy children. Figure B-1 of Appendix B reproduces data from this study which treats the 50th percentile for North American children as the reference standard. Boys whose weight falls below 85 per cent [3rd percentile] of this standard are considered to be significantly retarded in growth, and the boys from the slum and rural portions of the sample are consistently below the 3rd percentile while those of urban middle class origin are well above the retardation level.

Robson (1972) and others have urged that such measures must be used with extreme caution because of the confounding influences of genetics, illness, socio-economic class, and family size. A clear relationship between the size of families from different socio-economic (occupational) classes both height and weight is provided in Figure B-2. Not only does class origin make a difference in the height and weight of children, but as families get to be larger than four in number, in most cases, the child's stature is reduced.

Bengoa (1973) has recently suggested, on the strength of other evidence, that height is sufficiently free from exogenous influence so as to provide an excellent indicator of human nutrition. Wilson (1973) and others point out, however, that retarded physical growth can be caused by infection or genetic failure and that acceptable height-weight standards for all ethnic groups have yet to be developed. A final disadvantage of some anthropometric indicators is that they reflect past levels of nutrient intake and status rather than present (Wilson, 1973:130), although Scrimshaw (1964) argues that weight indicates present status rather than past.

Mortality statistics In those rare instances in the LDCs where the vital statistics registries and records are well kept and accurate, mortality by cause can be highly useful for making broad assessments of the nutritional status of infants and children (Bengoa, 1971:270). Because of the general practices associated with the reporting of the causes of deaths and because of the nutrition-health synergism, both the associated and underlying causes of infant-child deaths must be studied.

Among the underlying causes, infectious diseases such as measles and diarrheal disease have clearly been shown to be responsible for a large proportion of the deaths of young children. However, the analysis of multiple causes using evidence obtained from clinical and autopsy records and from interviews in the homes of deceased children, combined with the data from medical certificates of death, implicates nutritional deficiency as the most important contributor to excessive mortality in the 13 projects of the Investigation in Latin America (Puffer and Serrano, 1973:161).

Examples of deaths due to malnutrition as a primary, associated, or related cause are presented in Tables B-3 and B-4 for a selected sample of countries. Malnutrition clearly contributes greatly to infant and young child mortality either directly or indirectly. In Chile the five causes of childhood death that are commonly related to malnutrition account for 43.3 per cent of all deaths in infants 0 - 1 years old, and 53.3 per cent in children 1 - 4 years of age. Furthermore, in Santiago, Chile, malnutrition is the primary or associated cause of 40 per cent of all deaths in children under five years of age.

The problem with vital records in many LDCs, however, is that the reporting system still requires considerable upgrading in order to become efficient and effective enough to be complete in coverage and

sufficiently accurate. As Table B-3 illustrates, in many countries vital statistics such as infant mortality rates are usually available only from urban centers and for those statistics that are recorded, neither do they reflect all infant deaths in urban areas nor is their reliability known. What is striking about Table B-3 is less the statistics themselves than the total absence of even incomplete, inaccurate estimates for several countries, particularly their rural regions.

Despite their often extreme under-reporting and urban bias, cause-specific mortality rates, when considered in terms of the statistical population they actually represent and are cross-checked with the results from other estimating techniques, are a relatively inexpensive means of estimating portions of national malnutrition incidence.

Apart from the concern with mortality by cause, there has been a continuing debate in recent years among nutritional scientists concerning the indicativeness of the various age-specific mortality statistics in reflecting nutrition status. Selecting the most valid indicator is a critical concern, for the causes of most mortalities in the LDCs are either poorly specified or inaccurate. As described by Bengoa, the limitations inherent in vital statistics occur because of "the difficulty to define malnutrition, the multicausal origin of many deaths particularly in early childhood, the lack of medical certificates, errors in diagnosis, failure to state the true cause of death, incomplete or vague statements of the cause of death and under-registration of births and deaths" (1971:270). In order for mortality to serve as an indicator of malnutrition, a rate specific to an age at which a high proportion of

deaths are due to malnutrition and the causes of which are fairly easily separable must be found.

For a number of years the mortality rate of the age group 1 - 4 has been considered a sufficiently valid indicator of the overall nutrition status of a particular society. Wills and Waterlow refined this indicator into a ratio (deaths 1 - 4 years/deaths 1 month - 1 year) in order to remove the effects of gastro-intestinal and respiratory infections caused by poor sanitation which affect both groups equally (1958:170) (see Table B-4 for empirical examples). Uttley has more recently supported the 1 - 4 year death rate as an indicator of malnutrition as opposed to the 0 - 1 year rate, as infants in countries with characteristics similar to Jamaica and Antigua are well-protected up until the time they are weaned (usually at age 9 months), and because those infections which are the chief causes of death during this period are fatal due to the underlying state of malnutrition among the victims (1963:41).

More recent attempts to refine the mortality rate as an indirect indicator of nutrition status has lead to proposals for the 1 - 2 or second year mortality rate. In particular Gordon and his colleagues have argued that the second year rate is more useful than infant mortality rates or the Wills-Waterlow index, for the "second year has an individuality distinct from all others of early childhood, to an extent presumably determined by host-factors, but more likely by social and hygienic features of the environment" (1967:366). In data from four LDCs and one MDC, Gordon found that in the four LDCs between 46.0 and

70.0 per cent of all deaths within the 1 - 4 year period occurred in the second year. Even in Sweden, which is considered to have higher standards of living and health than most LDCs, deaths during the second year accounted for 35 per cent of all deaths in the 1 - 4 years age bracket (see Table B-5).

Other researchers have utilized pre- and post-natal mortality rates to study malnutrition. The compilation of Latin American studies by Puffer and Serrano (1973) reviewed earlier used both these rates to study the causes of malnutrition. Also, the conclusions of the recent Conference on Nutritional Assessment that neonatal, post-natal and infant mortality rates are good "gross indicators of need for better health and nutrition services" (Christakis, 1973:5).

Dietary intake Measuring dietary intake can involve a wide range of survey types which vary in their accuracy and feasibility (Pekkarinen, 1970; Marr, 1971; Christakis, 1973). These survey types are summarized in Table 9, which includes an assessment of their representativeness, validity, accuracy, and feasibility.

As the table indicates the more accurate types of surveys, such as food weighing, require more skills and funds than do the less accurate methods such as food balance sheets or food accounts. Food balance sheets are notorious for their inaccuracy in that they consist of aggregate estimates of per capita consumption. Food balance sheets are prepared using aggregate data concerning food supply size, food use (e.g., consumption vs. export), and population size. After removing the amount of food exported and stored, the remainder of foodstuffs thought to be

Table 9. Dietary surveys<sup>a</sup>

Survey type	Description	Representativeness, accuracy, validity	Feasibility
Food balance sheets	National population and adjusted national crop yield totals are drawn from secondary sources. Usually done annually.	Give an inaccurate total view of country's food supplies; give an inaccurate portrayal of actual food consumption by region or within family, or of wastage, etc.	If secondary statistics available, requires low technical skills and minor funding.
Food accounts	Weight of food purchased produced or obtained by other means and number of persons present at meals recorded daily by members of household. Usually a 2 - 4 week survey on each respondent; can be extended to longer time periods.	Large samples, but difficulty in persuading respondents to record weights and literacy requirements introduce significant biases; also, respondents tend to commit various errors in weighing and recording; cannot measure distribution within the family or season variations.	Requires only few skilled personnel even for large sample. Funding requirements largely depend upon the time period for the survey chosen.
Diet recall	All foods actually consumed recalled in interview with each family member. Amounts consumed estimated using "models" of measured quantities of different foods. Recall over 12 - 24 hour period, with several re-interviews over 2 - 4 week period possible.	Large, representative samples possible; but meals recalled may be atypical. Model estimates may be inaccurate.	Large number of semi-skilled interviewers required. Funding depends on sample size and number of returns to respondents.

Diet history	Respondents questioned concerning general food habits during past year. Cross-checks made using food weighing and food account surveys. One day sufficient for each respondent.	Only a rough estimate of nutrient intake; large representative samples possible; cannot measure distribution of food within family; may serve as means of measuring food values and their changes with time.	Requires small number of semi-skilled interviewers and funding again dependent on sample size.
Ethnographic methods	Combination of participant observation and survey techniques to ascertain type and amount of food consumed. Observers spend a year in village; carried out every 5 - 10 years.	Food-related beliefs, values, technology and knowledge ascertained; rough estimates of consumption and comparative estimates of food distribution within the family possible.	Requires highly trained observers and researchers. Funding requirements high because of skill levels and length of time in the field.

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<sup>a</sup>Source: Adapted from Pekkarinen, 1970; Marr, 1971; Christakis, 1973; and the author's suggestions.

eaten by the total population is divided by the population size. An average consumption of proteins and calories is thus obtained. Even were the data of the size of harvest more exact than most present figures, the influences of the various stratification-distribution system factors, which mediate conversion-consumption, are ignored in this method, thus distorting its results.<sup>1</sup> As Farnsworth (1961) and Berg and Muscat (1973) observe, neither the accuracy of the population or crop yield data warrant their use in the construction of such a broad index. For instance, estimates made of the per capita net food supply made by FAO, the United States Department of Agriculture, and the Nigerian Agricultural Census based on the 1950 cassava root crop in Nigeria, ranged from a low of 630 to a high of 2180 calories per day (Farnsworth, 1961:188).

Dietary assessment through food weighing, food accounts, dietary recall, and dietary history all have various strengths and weaknesses from the point of view of societal monitoring, as Table 9 suggests. For example, food weighing is the most accurate, and when used for each family member's meal portion, the distribution of nutrition status

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<sup>1</sup>The ramifications for policymaking and planning in countries utilizing food balance sheets are by no means trivial. In an interview conducted by Dr. Leslie D. Wilcox and the author at the Anemia and Malnutrition Research Center (Chieng Mai, Thailand) with Dr. Ousaw Thanangkula (Assistant Director of the Center), it was learned that the Thai government, for a number of years, was under the impression that Thailand had no significant malnutrition problems. This impression was largely due to FAO's balance sheet calculations for Thailand. Dr. Ousaw later demonstrated using clinical evidence that this conclusion was both erroneous and dangerous, and that a serious prevalence of several deficiencies characterized Thailand's Northern Region.

within the family can fairly accurately be estimated. Unfortunately, this method is also the most costly, as it requires numerous trained field interviewers and supervisors for fairly extended periods to provide reliable data. Furthermore, the population sample is usually small and unrepresentative as it is difficult to obtain respondents who will voluntarily accept the inconveniences and intrusion by the researchers to carry out the food weighing (Pekkarinen, 1970:155).

Several investigators have attempted to assess both the validity and reliability of those dietary survey methods considered to be less accurate. The validity of some of the methods was assessed treating results obtained from more accurate methods as criteria in what Nunnally (1967) refers to as a determination of predictive validity. Pekkarinen (1970) compares data obtained through both recall and weighed intake methods in the study of 48 Finnish families and finds no statistically significant differences between the results obtained by both methods across a wide range of foods. (These data are reproduced in Table B-6). While the difference in the mean intake of a foodstuff is not significant, the range or variation of differences indicates that diet recall survey data must be interpreted with extreme care. Pekkarinen finds essentially the same results when comparing diet history and weighed food data; that is, the difference in mean values of intake across foods are, for the most part, non-significant but almost all of the results from the diet history are over-estimates. Furthermore, several of these differences are significant, and again the ranges in the differences are high.

Reliability can be partially determined by the stability of the measuring instrument through use over time on the same sample of respondents. In one instance a diet history was performed twice on 60 subjects in Israel, the time interval between the two interviews ranging from 6.5 to 8.5 months (Reshef and Epstein, 1972:91). Using a t-test the means of the nutrient intake at the two points in time were compared and no significant difference was found for any nutrient. (These data are reproduced in Table B-7, Appendix B).

A second example concerns the differences in nutrient intake of various groups whose food was weighed over a one-week period at an initial point in time and then, some time later, the food of these groups was again weighed for one week. Marr correlated the average intake for each point in time. The measurement intervals ranged from one month to three years in the various studies examined (1971:141). The correlation among average intake at two points in time (see Table B-8) range from 0.30 to 0.90. These coefficients are generally larger than .60 from intervals no longer than 12 months, but the study of adult men replicated after the passage of three years had correlations as low as 0.24, 0.29, and 0.30 for various nutrients. Marr gives no indication of the significance of any of the correlations presented, making further assessment of stability difficult.

These various examples of reliability and validity presented do indicate that the less rigorous methods are valid and at least as stable over time as are more precise methods. When used with caution or in combination with more precise techniques such as food weighing,

it would appear that such methods as diet recall and diet history can be used to obtain adequately accurate and valid results

Conclusion As there are pitfalls associated with many of the indirect methods and both the indirect and direct methods require certain levels of skill and fund commitment, the LDCs may find it useful to rely on several types of nutrition status assessment techniques in order to maximize accuracy and representativeness within the bounds of feasibility. Berg and Muscat (1973) suggest a mix of food balance sheets, vital statistics, and anthropometric-clinical examinations. Pekkarinen (1970) concludes that a combination of the various types of dietary surveys is in order. The utility of these combinations is that broad portions of the population may be sampled using the less accurate means, the more accurate techniques serving as cross-check and correcting devices.

Societal monitoring of human nutrition The problem in determining the utility of the various devices used to ascertain nutrition status is that they appear largely designed for assessing population aggregates no longer than those contained in communities, not countries. This also applies to those studies reviewed in Chapter 3 which seek to relate nutrition status to various factors in the physio-socio-cultural environment. A review of the methodological discussions in these articles, where present, finds no expressed concern for choosing a survey sample generalizable to larger population groups or geographical areas. The recent study by Mora and colleagues (1974) is a welcome exception to this deficiency, in that this South American study was

carefully designed to be generalizable beyond its focus on three small communities.

The ideal strategy for monitoring nutrition so as to reflect nation-wide conditions would be the use of "National Nutrition Surveys" which combine dietary, clinical, anthropometric, biochemical, and dental examinations for the study of carefully selected population samples drawn from national population census results. National nutrition surveys have been carried out successfully in a number of countries including Thailand, the Philippines, and Taiwan (Interdepartmental Committee on Nutrition for National Defense, 1962; Pascual et al., 1959; and Chen and Huang, 1959). Furthermore, both Canada and Japan have institutionalized this method in order to carry out national assessments on a periodic basis (Carson and Nargundkar, 1972; Orita, 1973), when combined with more detailed household surveys, food accounts, food weighing, and social science village studies, a national nutrition survey performed every five to ten years should readily provide the information necessitated in the monitoring of the societal production of human nutrition. Thus distribution, consumption, status, and consequences would be covered. (Conversion phase information is expected to come from social indicator research performed by persons involved in the agriculture sector of the national government.

Institutionalizing national nutrition surveys and accompanying smaller sample surveys may be an ideal beyond the economic capabilities of many LDCs, who may perceive that other activities have a higher priority, and thus scarce funds may not be so readily allocated for the

study of national nutrition as external observers might prefer. Also, national nutrition surveys may make excessive demands on scarce skill resources. In such a likely situation, mortality rates and combinations of the various devices for community nutritional assessment, based on a carefully selected sample of communities will have to suffice. Starting with second year mortality rates to estimate prevalence, greater details concerning the subpopulations and areas affected as well as their accompanying factors (e.g., food habits, family meal portion distribution, etc.) will depend upon the number, type, and accuracy of the sample surveys a given LDC is capable of and interested in instituting.

### Conclusions

The theoretical frameworks and methodological procedures presented in this dissertation for the purpose of improved societal monitoring for better societal control over nutritional and other social problems in a very great sense represent a research proposal for future research. Before a system of social indicators of human nutrition are operationalized into a national monitoring system, much research will be required to improve upon the societal process model, the model of societal production of human nutrition, and the taxonomy of social indicators.

Thus, in terms of the first general objective of this thesis, while a general theoretical perspective that can include such social concerns as nutrition, housing, and social welfare as parts of a unified whole

has been outlined, this perspective represents only the bare skeleton of a theory that provides the social context of individual and other social needs. Much future conceptualization and research will be required to flesh out this perspective and determine its usefulness. In particular more conceptual work that would provide for the linking of the various parts played by the general media of exchange, which serve both as resources of exchange among the various classes of the stratification-distribution system and as the means of inter-institutional interaction. The conceptual work contained in the second chapter of this dissertation is currently deficient in this respect. Future efforts by the author will include the further specification of exchange media as social resources and goals, especially as these media affect the degree of well-being achieved at all levels in society.

A second aspect of the theoretical perspective which requires further development is the interrelationship among the levels of well-being themselves. Some of the consequences of the degree of well-being achieved at the aggregate individual level for the institutional and societal levels were related with respect to human nutrition in Chapter 3, but it would be far more useful for the continued development of the theoretical perspective to identify the general theoretical relationship that holds among these levels.

The objective of the third chapter was to apply the general theoretical perspective to a specific social concern, human nutrition, in order to determine its social nature and consequences. Focusing the general perspective on the variety of findings of various research

efforts in human nutrition, an extensive, detailed model of the social factors producing and produced by human nutrition was constructed. While the model appears to fully cover all of the aspects involved by the production and consequences of human nutrition, the model may prove too unmanageable as either a theoretical or applied device. What the model does serve at present is as logical organization of the various factors thought to be related to human nutrition. Specific research, however, ought to be instituted aimed at streamlining and simplifying the model of the societal production of human nutrition.

As far as the methodological objectives of this dissertation are concerned, the development of the procedures necessary for constructing social indicators of human nutrition has taken a small, hopefully not negligible, step forward. All of the proposed indicators and methodological procedures such as the identification of data sources and data generating mechanisms are highly tentative if not purely speculative, suggestions. The theoretical framework and the taxonomy of indicators are intended as one alternative among a number of possible devices that can be used to organize data collection, select priorities among data items required for policymaking and planning, and identify gaps in current data series.

The methodological procedures for operationalizing social indicators of human nutrition are even more experimental and speculative than the taxonomy of indicators. The proposals concerning the combination of various existing data sources as well as the integration of new sources into one were largely made to underline and illustrate the need to

understand social problems or the state of society and its subunits as wholes, or in terms of what Coleman (1969) refers to as "combined" conditions. Malnutrition and the various levels of societal well-being as they relate to human nutrition must be considered in terms of all of the factors which produce or are a consequence of human nutrition. Thus, the indicators of conversion, distribution, consumption, and consequence phases as well as the indicators within these phases must be linked together to provide a complete picture of the conditions of social groups and territories. Such a broad view will facilitate policymaking and planning, and would be highly compatible with the trend toward the use of comprehensive planning in societal guidance.

Related to the need for a set of social indicators that describe in gestahlt fashion the state and change of the social or territorial unit of interest is the need for coordination in the compilation of societal information. In far too many countries construction of a broad view of a particular societal problem or set of social problems is not now possible in that data collection is an uncoordinated, decentralized activity. Statistical agencies with similar and differing purposes have proliferated often at a great rate with no concern for the larger purposes of data utilization. Data problems are thus less often problems of unavailability, but locatability and similarity in terms of unit of measurement. The institutionalization of some central authority, referred to here as a Central Statistical Office, would appear to be a major means of facilitating not only the location of needed data, but far more importantly organizing data collection,

collation, analysis, and storage so that gestahlt pictures or measures of combined conditions can be constructed for desired groups and units.

Finally, while each country concerned with the societal monitoring of the problems that stand between it and adequate well-being at all levels will have to assume a major responsibility in identifying that country's set of indicators and methodology, the United Nations and other internally oriented organizations have a significant role to play. Many of the LDCs cannot afford to experiment to any great degree, and will have to rely on the theories and methodologies proposed by others more economically capable of performing the research.

The United Nations family of organizations have demonstrated their commitment to social indicators through their various attempts to construct social indicators and systems of socio-demographic statistics. Unfortunately this commitment has been limited to the individual level of well-being despite the United Nations' professed interest in societal structure. It is hoped that the rather modest contribution contained in this dissertation as well as the research carried out under the auspices of the Indicators of Social Development Project will provide some of the necessary stimulus to expand international social indicator research to encompass more of the "social" of social indicators than at present.

## CHAPTER 5. SUMMARY

## Introduction

There recently has been increased pressure from the realms of policymaking and planning for better social information. Much of the responsibility of the burden falls squarely on sociologists. The demand for social indicators is actually an extension of the recurrent frustration in sociology over the inability to measure greater portions of social life.

Chapter 1 describes the response to this increased demand for more and better social information. Reflective of this response is the formation in recent times of the social indicators movement which includes among its participants sociologists, statisticians, economists, and policymakers and planners. Among the major proposals concerning the part social indicators might play in policymaking and planning, efforts include the setting of goals, the determination of social costs and benefits of programs, the evaluation of policies and projects, and the description and the monitoring of social problems and the state of the nation in general.

Recent reassessments of social indicator proposals demonstrate that most of them are either beyond the scope of social indicator capabilities or represent future potentialities that may possibly be attained once more basic problems confronting the measurement of social phenomena are successfully resolved. One of the more basic problems with which social indicator researchers must grapple is the lack of an essential theoretical basis for social indicator derivations. It is the link between

theory and social indicators that gives social indicators meaning and validity. Furthermore, the requirement that social indicators be reflective of social change means that serial data of sufficient duration must be available or feasibly generatable so as to reflect actual trends. Most social indicator research efforts to date have given inadequate attention to either or both of these requirements. In particular the theoretical and data requirements of social indicators are conspicuously absent in a number of the current social indicator research efforts. Studies of the so-called social concerns reflect these weaknesses, and nutrition, the social concern which is the subject of this dissertation, is no exception. Nutrition and other social concerns have apparently been assumed as social because they are components of human welfare. The research emphasis has been most decidedly directed at individuals, thus calling into question the appropriateness of the "social" of social concerns.

This dissertation attempts to demonstrate that social concerns are indeed social because they are both the product of and have consequence for organized social life. In fact much of social life is founded on the organized attempt to meet the basic needs of human beings which are reflected in lists of social concerns. Nutrition, or the need for nutrients, is seen as an object of many of the activities associated with the economy and the family. In accordance with the view that nutrition is social in nature is the need to measure and monitor nutrition as a social rather than simply an individual characteristic. Social indicators should not only reflect the nutrition status of social

groups, but should also measure the social antecedents and consequences of those states. In line with these concerns the general objectives of the dissertation are as follows:

1. To outline a theoretical perspective by which the social nature of social concerns such as human nutrition may be ascertained;
2. To apply the theoretical perspective to human nutrition to determine its social nature and consequences;
3. To develop the methodological procedures necessary for constructing social indicators of human nutrition.

#### Societal Process Model

In order to deal with nutrition as an object of social theory and measurement, the first step was to develop a theoretical basis which deals with nutrition and other social concerns in the Durkheimian sense in that they are characteristic of social groups, consisting of both social causes and consequences. Chapter 2 outlines in abstract terms the societal components and their relationships of society when society is viewed as a process system. A model of this process system was thus constructed.

The fundamental premise of the process model is that societies are organized around basic human needs but the very act of social organization creates additional needs at higher levels of organization which also must be taken into consideration. Society is a process system from this point of view in that it produces outputs for the fulfillment of needs at all levels of society.

The levels of society which have needs basic to societal viability and which themselves contribute in various ways to the fulfillment of

those needs include the societal population, institutions, and the stratification-distribution system, as well as society itself. The societal population is the aggregate of the individuals that normally reside within the territorial boundaries of society, and is characterized by age, sex, and other demographic criteria. Associated with the societal population are biological, psychological, and social needs which are grouped into the categories of basic, derived, and acquired needs. The basic are the biogenic requirements of biological survival of the human body, and include the need for nutrients, water, oxygen, and so. The derived are those needs which have evolved as individuals have participated in group life over time and include the need for orderly and predictable relationships, affection, and esteem or self-worth. Needs which appear in the form of habits such as the use of tobacco, alcohol, or musical preferences make up the acquired needs. Habits as such have little bearing on the viability of the individual or other levels of society, and were thus not taken into consideration in this dissertation.

The societal institutions consist of the family, economy, polity, education, health, and others. Societal institutions are made up of roles which are governed by social norms, and these institutions are associated with the basic perennial problems of human existence such as the need for food, employment, and protection from the elements. Institutions thus contribute to individual well-being, and by virtue of their interrelatedness, affect their own as well as societal well-being. Institutional needs include the requirements of loyalty, motivation,

and competence from those individuals that fill various institutional roles.

The stratification-distribution system represents the societal means of reward distribution, and is made up on one hand of various social classes, and on the other, of territorial populations. An important subsystem here is the center-periphery which separates societal elites from the majority of the populace by territory, monopoly over the exchange and exchange rates of various desirables such as power, prestige, and money, and by the ability of the elites to conform closely with the so-called sacred values of society. The existence of a stratification-distribution system means that the states of well-being achieved by members of the population will vary with the social and territorial characteristics of those members.

Finally, the society itself represents a level of organization with needs salient for societal well-being. Society is defined as that minimal level of social organization that is able to achieve self-sufficiency with reference to its cultural, physical, and other environments. In most cases, self-sufficient societies are the analytical equivalent of the nation-states and are so considered here. Societal needs include the requirements of maintaining the culture, allegiance to the concept nation-states, a reasonable balance between the size of the societal population and resources, the capacity to achieve societal goals, control over societal resources, and stable relationships with other societies.

### Nutrition and Societal Processes

The societal process model demonstrates generally that health, nutrition, and shelter are social in nature as they form components in the structure of well-being that socially organized individuals collectively seek to sustain and improve. Furthermore the state of nutrition and other concerns have consequences for societal viability. Nutrition and malnutrition were defined and discussed as problematics in the general sense, and were then analyzed in terms of the societal process model in Chapter 3.

States of human nutrition are produced via phases of production contained in society. These phases include the conversion, distribution, and consumption of foodstuffs. A fourth phase called the consequence phase considers the part nutrition plays in determining the level of well-being achieved at the institutional and societal levels. The production of nutrition and its consequences involve the institutions of family, economy, and education, the physical environment, the stratification-distribution system, and culture. Basically, foodstuffs are produced from environmental resources by agricultural (conversion) activities, and are distributed in accordance with the outcome of conflicting demands of the family, the polity, and the stratification-distribution system. Once foodstuffs reach the family, further stratification factors affect its distribution among family members.

Each phase is considered in terms of the constraining inputs from various elements of the societal process model which limit the quality and quantity of food physically consumed by each member of society.

Included among these constraints are the quality of farm land, size of farm units, climate, income, education, technology, cultural values, knowledge, family size, sanitation, family solidarity, and so on.

Among the effects of nutrition are the acquisition of competence, role performance, and overall societal adaptability. Malnutrition can adversely affect the social competence of individuals through retardation of brain growth, reduction of interest in learning, interference with working efficiency, and contribution to high fertility rates.

#### Social Indicators for the Monitoring of Human Nutrition

Social indicators are viewed, in Chapter 4, as a recent outgrowth of general societal evolution toward conscious control over the states of well-being achieved by the various levels of society. Control is attained through the acquisition and use of information by the polity, and the degree of control accomplished varies directly with the complexity of information obtained. The means of control by the polity are policymaking and planning.

Social indicators, not only evolved out of the need for more information, but also out of the recognition that current information sources and their generating means are inadequate for current and future levels of societal control. Problems associated with current statistical sources include over-abundance, irrelevance, inaccuracy, unreliability, invalidity, and ungeneralizability.

Social indicators were then defined as statistics which describe the state and changes of the various levels of well-being of society as well as the elements that constrain or facilitate the attainment of states at

each of those levels. Social indicators for the present are descriptive rather than analytical, and are generally in the form of rates, ratios, means, and simple correlations. Furthermore, social indicators are feasible statistics which can be institutionalized within the social, technical, cultural, and political constraints posed by society. The role of social indicators in policymaking and planning, for the present, is restricted primarily to background enlightenment. Finally, social indicators involve time series statistics, can be aggregated or disaggregated to represent various social or territorial subunits, and are comprehensive yet limited in their coverage of society.

Applying the definition of social indicators to the production process of human nutrition resulted in a taxonomy of indicators for all levels of well-being as they relate to human nutrition. Master social indicators as well as derived subtypes for the measurement of relevant subunits were specified in Appendix Table A-1. Also, the sources and generating mechanisms for these indicators are considered.

Table A-1 consists of a series of columns. Column 1 contains 26 input/constraints or outputs derived from the model of the societal production of human nutrition. Column 2 consists of 37 subcategories of input/constraints or outputs, and 97 master social indicators were derived for these subcategories based on the dissertation's theoretical model of human nutrition and on past research findings. Social indicator derivations which would provide aggregations at appropriate social and territorial levels follow in column 4. Nearly 20 types of social and territorial classifications representing groups and areas of

concern for policymaking and planning are utilized in various combinations in column 4. Suggested data sources are listed in column 5, followed by the proposed administrative combinations that might prove useful in generating the required data in column 6.

The measurement of nutrition status received special attention as there is no consensus among nutritional scientists as to the best single indicator. Direct and indirect methods of assessment, including biochemical, anthropometric, clinical, and dietary measurement techniques were considered. Empirical illustrations of possible social indicators derivable from these methods are found in tabular form in Appendix B. The conclusion is that some mix of these, as well as consideration of national nutrition surveys, will be required to adequately measure nutrition status.

The conclusion at the end of Chapter 4 emphasizes the experimental nature of the theoretical model, indicator taxonomy, and data sources and generating mechanisms. Attempts to institutionalize monitoring systems of human nutrition and other social concerns may result in conceptualizations and measurement schemes far different and hopefully more rigorous than the ones proposed here.

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The theory developed in Chapter 2 is largely an extension of several of the initial models considered by Dr. Leslie D. Wilcox, Kerry J. Byrnes, and myself in late 1972 for the Indicators of Social Development Project. Although the present societal process model goes far beyond these early paradigms, the present model owes its existence to these earlier efforts. Also, I began to formulate the present societal process model in the summer of 1974 in a paper co-authored by Dr. Leslie D. Wilcox and John Callaghan for presentation at the Eighth World Congress of Sociology. The suggestions of Dr. Wilcox and Mr. Callaghan have proved invaluable in the development of this model.

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APPENDIX A

Table A-1. A social indicator methodology for monitoring the conversion, distribution, consumption, and consequence phases of the societal production of nutrition

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>I. Conversion phase</u>		
A. Man/land relationship	1. <u>Demographic</u>	
	a. Population density	a) Number of persons in a given territorial area
	b. Population growth (rate of natural increase) in area	b) Per cent change in number of persons in a given territorial area (derived from birth, death and migration rates)
	2. <u>Ecological</u>	
	a. Proportion of agricultural land under production	a) Per cent hectares under cultivation (by crop)
	b. Amount of potential new agricultural lands	b) Number of new hectares

<sup>a</sup>United Nations (1958; 1959; 1962).

<sup>b</sup>Colson (1967).

<sup>c</sup>Refer to Table 16.

<sup>d</sup>FAO (1965).

<sup>e</sup>Basu (1970).

<sup>f</sup>Janlekha (1968).

<sup>g</sup>Committee for the Coordination (1970); Longwell et al. (1969).

Social indicator derivations	Data source	Data generating mechanism
<u>I. Conversion phase</u>		
a-b) By age, sex, income, occupation, ethnicity	a-b) National Population Census <sup>a</sup> coordinated with Anthropological Census <sup>b</sup> where necessary	a-b) National Statistical Office in cooperation with university personnel and village headmen
a) By settlement pattern, family characteristics, <sup>c</sup> territory	a) National Agricultural census, <sup>d</sup> national Farm Survey, <sup>e</sup> Land Use Survey <sup>f</sup>	a) National Statistical Office with university personnel
b) By settlement pattern, agricultural pursuit	b) Geological Surveys <sup>g</sup>	b) Appropriate governmental agency or university group

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator	
<u>I. Conversion phase</u>			
A. Man/land relationship (continued)	c. Density of agri- cultural population (on farm units)	c) Number of farm persons per hectare	
	d. Division of labor in agricultural activities	d) Number of males and females by activity; age by activity	
	e. Dependency on agriculture (for food, income, etc.)	e) Proportion of family members in non- agricultural occupations	
		f) Proportion of family members with no current occupation	
		g) Estimated size of non- agricultural population dependent upon agriculture	
	<u>3. Type of agricultural activity</u>		
	a. Primary activity 1) Horticultural (by type) 2) Animal husbandry 3) Fishing, shell fishing, marina hunting 4) Hunting 5) Combinations of these activities	a-b) Name, numbers of persons and families involved for 1-5	
b. Secondary activity (from list under 3a)			

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<sup>h</sup>Murdock (1957); Moerman (1968).

Social indicator derivations	Data source	Data Generating mechanism
<u>I. Conversion phase</u>		
c) By family characteristics, territory	c-g) National Population Census combined with the Agricultural Census	c-g) National Statistical Office in cooperation with Agriculture Ministry and appropriate university groups
d) By family characteristics, territory		
e) By age, sex, family characteristics, territory		
f) By age, sex, disability, family unit, and territory		
g) By age, sex, territory		
a-e) By ethnicity, family characteristics, and territory	a-b) National Agricultural Census, National Farm Survey, Ethnographic Studies <sup>n</sup>	a-d) National Statistical Office in cooperation with Agriculture Ministry and appropriate university personnel

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>I. Conversion phase</u>		
A. Man/land relationship (continued)	c. Principle and secondary crops (examples: rice, maize, wheat, vege- tables, fruit, etc.)	c) Name, average yield, total area planted
	d. Principle and secondary live- stock (examples: ducks, pigs, fish, cattle, chickens, etc.)	d) Name, number, weight
	e. Principle hunting and gathering acti- vities  1) Flora (e.g., bam- boo shoots, leafy vegetables, leaves, vines, lichen, etc.)  2) Fauna (birds, mammals, aquatic beings, reptiles, insects, etc.)	e) Name, types, estimated amounts, prevalence, nutrient content by proportion of weight
B. Man/land rela- tionship and stratification- distribution	1. <u>Land tenure</u> (dwelling and farm unit	
	a. Classification (own, a rent, squatter, tribal-communal combinations)	a) Size of holding by classification category, rent (where relevant) and rent type
	b. Degree of holding fragmentation	b) Number of land parcels in holding
	c.) Inheritance and other influence	c) Change in size of family holding by time units

<sup>i</sup> McIntosh et al. (1974).

<sup>j</sup> Wilson et al. (1964).

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Social indicator derivations	Data source	Data generating mechanism
<u>I. Conversion phase</u>		
c-d) National Agricultural Census, National Farm Survey, Village Headman Reports <sup>1</sup>		
	e) Land Use Surveys, Ethnographic Surveys, chemical evaluation of foodstuffs <sup>1</sup>	e) Equivalent of U.S. Bureau of Reclamation in cooperation with appropriate university personnel
a-c) By ethnicity, territory, family type	a-c) National Agricultural Census	a-c) National Statistical Office in cooperation with the Ministry of Agriculture

Table A-1 (Continued)

Input/constraint; or output o	Input/constraint; output subcategory	Master social indicator
<u>I. Conversion phase</u>		
C. Physical environment	1. <u>Climate</u>	
	a. Rainfall regime (historical pat- tern of droughts and floods included)	a) Rainfall in inches averaged for season and year
	b. Incidence and prevalence of in- clement conditions (e.g., tornados, monsoons, etc.)	b) Periodicity of inclement conditions
	c. Evapo- transpiration	c) Amount of water evapo- ration in millimeters per month; year
	d. Wind	d) Average velocity in KM/ hour for season and year
	e. Land forms (e.g., plains, hills, plateaus, etc.)	e) Distribution of land forms by sq. area (KM <sup>2</sup> )
	f. Soils	f) Type, nutrient content, drainage by local terri- torial location
	g. Water resources	g) River name, length, lo- cation, depth, velocity for season and year; reservoir/lake name and volume for season and year

<sup>k</sup>U.S. Department of Interior (1972b).

<sup>l</sup>Longwell et al. (1969); U.S. Department of Interior (1972a; 1972b).

<sup>m</sup>Longwell et al. (1969); Janlekha (1968); Committee for the  
Coordination (1970).

Social indicator derivations	Data source	Data generating mechanism
<u>I. Conversion phase</u>		
a-g) By territory	a-d) Meteorological Surveys <sup>k</sup>	a-h) National Statistical Office in cooperation with appropriate governmental agencies and university personnel (meteorologists, hydrologists, geologists, social scientists)
	f) Soil surveys <sup>l</sup> (soil maps)	
	g) Hydrologic studies <sup>m</sup>	

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>I. Conversion phase</u>		
C. Physical environment (continued)	h. Water resource use	h) Current utilization: --Number of hectares irrigated --Number of families that use for drinking, washing, bathing
D. Stratification- distribution	1. <u>Market relationship</u>	
	a. Food prices	a) Price in local currency and in U.S. equivalent of each food item by weight and/or volume
	2. <u>Participation/ social access</u> (values and access)	
	a. Participation in market	a) Proportion yearly yield sold or bartered on the market
	b. Income derived from market participation	b) Total income in local currency and in U.S. equivalent for each crop/livestock type sold
	c. Physical access	c) Distance (in kilometers and time units) to market by type of transportation (e.g., rail, water, air)
	d. Season access to market	d) Usability of the transportation by type

<sup>n</sup>Office of Accelerated Rural Development (1974).

<sup>o</sup>Office of Population Censuses and Surveys (1973).

<sup>p</sup>Committee for Coordination (1970).

Social indicator derivations	Data source	Data generating mechanism
<u>I. Conversion phase</u>		
h) Iso-Nam <sup>n</sup> and Aqua-Nam surveys		
a) By territory	a) Market surveys	a) National Statistical Office in cooperation with appropriate university personnel (economists)
a-b) By ethnicity, total income, education, family characteristics, territory	a-b) National Farm Survey, General Household Survey <sup>o</sup>	a-b) National Statistical Office in cooperation with Ministry of Agriculture
c-d) By village, by territory	c-d) Transportation studies <sup>p</sup>	c-d) National Statistical Office in cooperation with the appropriate national ministry

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>I. Conversion phase</u>		
E. Culture	1. <u>Values and technology</u>	
	a. Use of new technology (e.g., adoption of new seeds, fertilizers, insecticides, double-cropping, etc.)	a) Number of persons and families that use the item by type of technology
	b. Risk-taking	b) Proportion of land devoted to "new" varieties, inputs, or techniques
F. Personal resources	2. <u>Credit availability</u>	
	a. Location b. Interest rates c. Access	a, b, c) Physical distance to nearest source of credit by interest rate, ethnicity, etc.
	2. <u>Farmer capital</u>	
	a. Fluid	a) Amount of saving in local and U.S. equivalent currencies by family
	b. Fixed	b) Amount of fixed capital by family (e.g., number of buffalo, water pumps, plows, hoes, shovels, etc.)

<sup>d</sup>Beal et al. (1969).

Social indicator derivations	Data source	Data generating mechanism
<u>I. Conversion phase</u>		
a-b) By age, sex, ethnicity, total income, education, family characteristics, territory	a) Adoption-Diffusion Surveys <sup>1</sup>	a) National Statistical Office in cooperation with appropriate university personnel (nutritional scientists and sociologists)
	b) National Farm Survey	b) National Statistical Office in cooperation with Ministry of Agriculture
a-c) By territory	a-c) National Farm Survey	a-c) National Statistical Office in cooperation with Ministry of Agriculture
a-b) By total income, occupation, ethnicity, territory	a-b) National Farm Survey	a-b) National Statistical Office in cooperation with Ministry of Agriculture

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output Subcategory	Master social indicator
<u>I. Conversion phase</u>		
G. Agricultural task performance	1. <u>Vital rate monitoring</u>  a. Average caloric expenditure	a) Average caloric expendi- ture by task "compared with standards"
H. Motivation	1. <u>Agriculture and prestige-material goods</u>  a. Income, goods, and prestige relation- ship	a) Association between agri- cultural income prestige and the desire for more material goods
I. Social sanctions	1. <u>Presence of sanctions against innovation in the village</u>  a. Form of sanction	a) Type, incidence, and prevalence of sanctions (e.g., banishment, social rejection, snubbing, etc.)

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<sup>r</sup>Poleman (1972).

<sup>s</sup>As proposed in the text of Chapter 4.

Social indicator derivations	Data Source	Data generating mechanism
<u>I. Conversion phase</u>		
a) By age, sex, total income, ethnicity, territory	a) Vital Rate Monitoring Studies <sup>F</sup>	a) National Statistical Office in cooperation with appropriate university personnel
a) By age, sex, income, occupation, ethnicity, territory	a) Special Village Surveys (SVS) <sup>S</sup>	a) National Statistical Office in cooperation with anthropologists and sociologists from universities
a) By income, occupation, ethnicity, territory	a) Special Village Surveys	a) National Statistical Office in cooperation with anthropologists and sociologists from universities

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>II. Distribution phase</u>		
A. Polity	1. <u>Exports</u>	
	a. Food	a) Amount (in tons), currency value, and nutrient quality per kilo
	2. <u>World Market</u>	
	a. Food prices (imported)	a) Food prices in local and U.S. equivalent curren- cies by food type and nutrient quality
	b. Fertilizer prices and imports	b) Fertilizer prices in lo- cal and U.S. equivalent currencies by weight; amount of annual imports
	c. Oil prices and imports	c) Crude and refined oil prices in local and U.S. equivalent currencies by barrel; amount of annual imports
B. Income, education, urbanization, occupation and ethnicity and food acquirement	1. <u>Food basket</u>	
	a. Content	a) Average weekly purchases of food by type, amount, nutrient quality, and income group
	b. Income	b) Proportion of income spent on food

<sup>t</sup> Asian Development Bank (1974).

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Social indicator derivations	Data source	Data generating mechanism
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II. Distribution phase

a) National economic statistics <sup>t</sup>	a) National Statistical Office in cooperation with Commerce Ministry
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a-c) National economic statistics	a-c) National Statistical Office in cooperation with Commerce Ministry
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a-b) By education, literacy, mass media exposure, occupation, ethnicity, family characteristics, and territory	a-b) General household surveys	a-b) National Statistical Office in cooperation with appropriate university personnel (nutritionists, social scientists)
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Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>II. Distribution phase</u>		
B. Income, etc. (continued)	2. <u>Change in food basket with:</u>	
	a. Change in income	a-c) Change in average weekly purchase of food by type, amount, nutrient quality, and income group
	b. Change in education	
	c. Change in residence	
	d. Change in proportion of income spent on food and total family budget	d) Change in proportion of income spent on food in local and U.S. currencies
	3. <u>Consumer price index</u>	
	a. Food	a) Food prices by item and nutrient quality
<u>III. Consumption phase</u>		
A. Culture	1. <u>Values</u>	
	a. Religious	a) Name, type, and nutrient quality of potential foods prohibited by religion
	b. Prestige	b) Name, type and nutrient quality of potential foods which are maintained (e.g., cattle) but not consumed as food
	2. <u>Technology</u>	
		a) Per cent nutrient quality lost by major types of cooking processes used (e.g., frying, boiling, parboiling, etc.)

Social indicator derivations	Data source	Data generating mechanism
<u>II. Distribution phase</u>		
a) By amount change in income & education, ethnicity, occupation, family characteristics and territory	a-d) Household surveys	a-d) National Statistical Office in cooperation with appropriate university personnel (nutritionists, social scientists)
b-d) By change in educational attainment (e.g., degree attained, years completed, etc.) and income, ethnicity, occupation, family characteristics, & territory		
a) By territory	a) National economic statistics	a) National Statistical Office in cooperation with Commerce Ministry
<u>III. Consumption phase</u>		
a-b) By ethnicity, territory	a-b) Special village surveys	a-b) National Statistical Office in cooperation with appropriate university personnel (nutritionists, social scientists, and ecologists)
a) By ethnicity, territory	a) Special village surveys	a) National Statistical Office in cooperation with appropriate university personnel (nutritionists and social scientists)

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator	
<u>III. Consumption phase</u>			
A. Culture (continued)	3. <u>Knowledge</u>		
	a. Food	a) Level of knowledge of food-value	
	b. Illness	b) Level of knowledge con- cerning food's relation- ship to illness	
	c. Sanitation		
	1) cooking facili- ties and utensils	1-4) Type location and observable uncleanliness	
	2) toilet		
	3) bathing area		
	4) garbage and waste disposal		
	B. Regional distribution of foodstuffs	1. <u>Food availability</u>	
		a. On local market	a) Amount, type, nutrient quality, and price of local foods
	b. From the environ- ment	b) Type and nutrient quality of "natural" foods	

<sup>u</sup>Wilson et al. (1964).

Social indicator derivations	Data source	Data generating mechanism
<u>III. Consumption phase</u>		
a-c) By family characteristics, education, ethnicity, territory	a-b) Special village surveys	a-b) National Statistical Office in cooperation with appropriate university personnel (nutritionists and social scientists)
	c) Household survey	c) National Statistical Office
a-b) By territory	a) Market surveys	a) National Statistical Office
	b) Chemical analysis of foods <sup>u</sup>	b) National Statistical Office in cooperation with appropriate university personnel (nutritionists)

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>III. Consumption phase</u>		
C. Resources	1. <u>Time and activities</u>	
	a. Time allocated	a) Average number of minutes allotted per day per activity
	1) Cooking	
	2) Child care	
	3) Gathering	
	4) Horticulture activities	
	a) planting	
	b) transplanting	
	c) sowing	
	d) weeding	
	e) hoeing, etc.	
<u>IV. Consequence phase</u>		
A. Nutritional status	1. <u>Clinical signs</u> <sup>w</sup>	
	a. Edema	a) Semi-permanent indenta- tion of skin on stomach
	b. Hair pluckability	b) Ten or more easily plucked hairs from head
	c. Reflexes	c) Loss of ankle and knee reflexes

<sup>v</sup>Sorokin and Berger (1939).

<sup>w</sup>Christakis (1973); Jelliffe (1966; Wilson et al. (1964).

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Social indicator  
derivations

Data source

Data generating  
mechanism

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III. Consumption phase

a) By age, sex,  
ethnicity,  
education,  
territory

a) Time budget  
surveys<sup>v</sup>

a) National Statistical  
Office

IV. Consequence phase

a-c) By age, sex,  
ethnicity, educa-  
tion, occupation,  
total income, fami-  
ly characteristics,  
territory

a-c) Clinical evalua-  
tion (also national  
nutritional surveys  
or rapid nutritional  
surveys)

a-c) National Statistical  
Office in cooperation  
with appropriate  
university personnel  
(nutritionists and  
social scientists)

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>IV. Consequence phase</u>		
A. Nutritional status (continued)	2. <u>Biochemical results</u> <sup>x</sup>	
	a. Serum protein levels	a) Number of grams of pro- tein in blood sample (gm/ml) is compared to standard
	b. Plasma Vitamin A level	b) Number of grams of Vita- min A in blood sample (mg/100 ml) as compared with 30 mg/100 ml
	c. Urea and ammonia nitrogen level	c) Proportion by volume of urea nitrogen and ammonia as proportion of total urinary nitrogen
	d. Level of minerals	d) Number of grams of each mineral (gm/ml) as com- pared with standards
	3. <u>Anthropometric signs</u> <sup>y</sup>	
	a. Weight	a) Number of pounds as com- pared with standard for age
	b. Length (height)	b) Length or height as com- pared with standard for age
	c. Skinfold	c) Triceps skinfold thick- ness in millimeters as compared with minimum thickness standards

<sup>x</sup>Bengoa, Jelliffe, and Perez (1959); Jelliffe (1966); Christakis (1973); Wilson et al. (1964).

<sup>y</sup>Sauerlich (1974); Wilson et al. (1964); Robinow and Jelliffe (1966); Jelliffe (1966).

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Social indicator  
derivations

Data source

Data generating  
mechanism

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IV. Consequence phase

a-d) By age, sex,  
ethnicity, educa-  
tion, occupation,  
total income,  
family character-  
istics, territory

a-d) Laboratory tests  
(also national  
nutritional surveys  
or rapid nutritional  
surveys)

a-d) National Statistical  
Office in cooperation  
with appropriate  
university personnel  
(nutritionists and  
social scientists)

a-c) By age, sex,  
ethnicity, educa-  
tion, occupation,  
total income,  
family character-  
istics, territory

a-c) Anthropometric  
survey (physical  
examinations) (also  
national nutritional  
surveys and rapid  
nutritional  
surveys

a-c) National Statistical  
Office in cooperation  
with appropriate  
university personnel  
(nutritionists,  
medical doctors, etc.)

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>IV. Consequence phase</u>		
A. Nutritional status (continued)	d. Head <sup>z</sup> circumference	
	e. Chest <sup>z</sup> circumference	
	4. <u>Dietary<sup>aa</sup> composition</u>	
	a. Food acquirement	a) Protein and other nutrient content of food purchased or obtained by weight (g)
	b. Recent dietary intake	b) Estimates of protein and other nutrient content of food consumed in last 12 to 24 hours
	c. Historical dietary intake	c) Type and rough estimate of quantity and nutrient content of foods consumed over past year
	d. Observed meal practices	d) Type and rough estimate of quantity and nutrient content of foods consumed during period observed
	e. Infant feeding practices	e) Incidence and prevalence of breast feeding

<sup>z</sup>Appropriate for children of preschool age, neonates, and infants only.

<sup>aa</sup>Robson (1972); Christakis (1973); Pekkarinen (1970); Marr (1971); Wilson et al. (1964).

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Social indicator derivations	Data source	Data generating mechanism
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IV. Consequence phase

a) By ethnicity, total income, education of mother, family characteristics, territory	a-c) Food accounts	a-e) National statistical Office in cooperation with appropriate university personnel (nutritionists and social scientists)
b-c) By age, sex, ethnicity, total income, education, family characteristics, territory	b) Diet recall surveys	
	c) Diet history surveys	
d) By age, sex, ethnicity, family member status, total income, education, family characteristics, territory	d) Ethnographic studies (participant observation)	
e) By age, ethnicity, education, total income, family characteristics	e) General household survey	

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>IV. Consequence phase</u>		
A. Nutritional status (continued)	5. <u>Mortality rates</u>	
	a. First year	a) 0-1 year mortality rate
	b. Second year	b) 1-2 year mortality rate
	c. 1-4 year	c) 1-4 year mortality rate
	d. Wills-Waterlow Index	d) 1-4 year/0-1 year mortality rates
	e. Mortality by cause	e) Specific --tuberculosis --measles --gastritis and enteritis --pneumonia and influenza --bronchitis --whooping cough --diarrhea
B. Brain growth	1. <u>Brain cell</u>	
	a. Size of cells	a) Total organ protein/DNA
	b. Number of cells	b) Total organ DNA
	c. Quality of brain substance	c) RNA/DNA proportion
C. Socialization	1. <u>Interaction</u>	
	a. Quality of inter- action between parents and infant	a) Score on interaction quality scale

<sup>bb</sup>Christakis (1973); Wills and Waterlow (1958); Gordon et al. (1968).

<sup>cc</sup>Winick (1972).

Social indicator derivations	Data source	Data generating mechanism
<u>IV. Consequence phase</u>		
a-e) Sex, ethnicity, family total income, maternal education, territory	a-e) Records of doctors, hospitals, clinics, others	a-e) National Statistical Office in cooperation with appropriate national and local health authorities
a) By age, sex, ethnicity, family characteristics, territory	a-c) Autopsies <sup>bb</sup> of abortions and infant deaths	a-c) National Statistical Office in cooperation with national and local health authorities
a) By age, sex, ethnicity, total income, paternal-maternal education, family characteristics, territory	a) Interaction quality scale <sup>cc</sup>	a) National Statistical Office in cooperation with appropriate university personnel (nutritionists, social psychologists, sociologists)

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>IV. Consequence phase</u>		
D. Intelligence	1. <u>Infant intelligence</u>	
	a. General development	a) Scores on Gesell, Bayley or Griffiths "Development Quotients"
D. Intelligence (continued)	2. <u>Preschool intelligence</u>	
	a. Sensori-motor development	a) Scores on Einstein Scale; Montreal Scale of Cognitive Development
E. Role performance	1. <u>Working efficiency</u>	
	a. Work output relation to calories available for work	a) Correlation between amount work (per hours, week, or month) and caloric sources consumed

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<sup>dd</sup>Cravioto and DeLicardie (1974).

<sup>ee</sup>Ricciutti (1973).

<sup>ff</sup>Cobos and Guevara (1973).

Social indicator derivations	Data source	Data generating mechanism
<u>IV. Consequence phase</u>		
a) By age, sex, ethnicity, maternal education, family characteristics, territory	a) Gesell, Bayley or Griffiths Tests <sup>dd</sup>	a) National Statistical Office in cooperation with appropriate university personnel (nutritionists and psychologists)
a) By age, sex, ethnicity, maternal education, family characteristics, territory	a) Einstein sensori-motor development test; Montreal cognitive development test <sup>ee</sup>	a) National Statistical Office in cooperation with appropriate university personnel (nutritionists and psychologists)
a) By age, sex, ethnicity, occupation, number of hours worked, territory	a) Work efficiency studies and/or vital rate monitoring combined with dietary surveys <sup>ff</sup>	a) National Statistical Office in cooperation with appropriate university personnel (economists, nutritionists and sociologists)

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>IV. Consequence phase</u>		
F. Educational performance	1. <u>Material learned</u> a. Achievement	a) Score on achievement test
G. Contribution to economic growth	1. <u>Increased working performance</u> a. Increased perfor- mance due to caloric source intake increase	a) Regress rate of growth of work performance on rate of growth of total output
H. Societal knowledge	1. <u>Societal knowledge reduction</u>	To be developed

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<sup>gg</sup>Birch and Richardson (1972).

<sup>hh</sup>Lowenstein (1968).

Social indicator derivations	Data source	Data generating mechanism
<u>IV. Consequence phase</u>		
a) By age, sex, ethnicity, education of parents, total family income, territory	a) Wide range achievement test <sup>gg</sup>	a) National Statistical Office in cooperation with appropriate university personnel (nutritionists, educational scientists, sociologists)
a) By industry, agricultural activity, territory	a) Work efficiency data <sup>hh</sup>	a) National Statistical Office in cooperation with appropriate university personnel (economists and nutritionists)
To be developed	To be developed	To be developed

Table A-1 (Continued)

Input/constraint; or output	Input/constraint; output subcategory	Master social indicator
<u>IV. Consequence phase</u>		
I. Loss of potentially productive members of societal population	1. <u>Child wastage</u> a. Economic resource loss	a) Child <sup>ii</sup> wastage rate in local currency in U.S. dollars (number of infant mortalities x various costs of rearing, funeral, wake)
J. Population/ land balance	1. <u>Fertility reduction</u> a. Reduction of fer- tility due to reduction of in- fant mortality	a) Fertility rate, number of children in "ideal family" <sup>jj</sup>

<sup>ii</sup>Cook (1971); Berg (1970); Wilson (1973).

<sup>jj</sup>Taylor (1973).

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Social indicator derivations	Data source	Data generating mechanism
<u>IV. Consequence phase</u>		
a) By territory	a) Doctors, hospital, clinic and other records, economic estimates of infant food, burial, wake and other costs	a) National Statistical Office in cooperation with appropriate national and local health authorities and university economists
a) By age, ethnicity, total family income, maternal education, territory	a) National population census, general household survey	a) National Statistical Office

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APPENDIX B

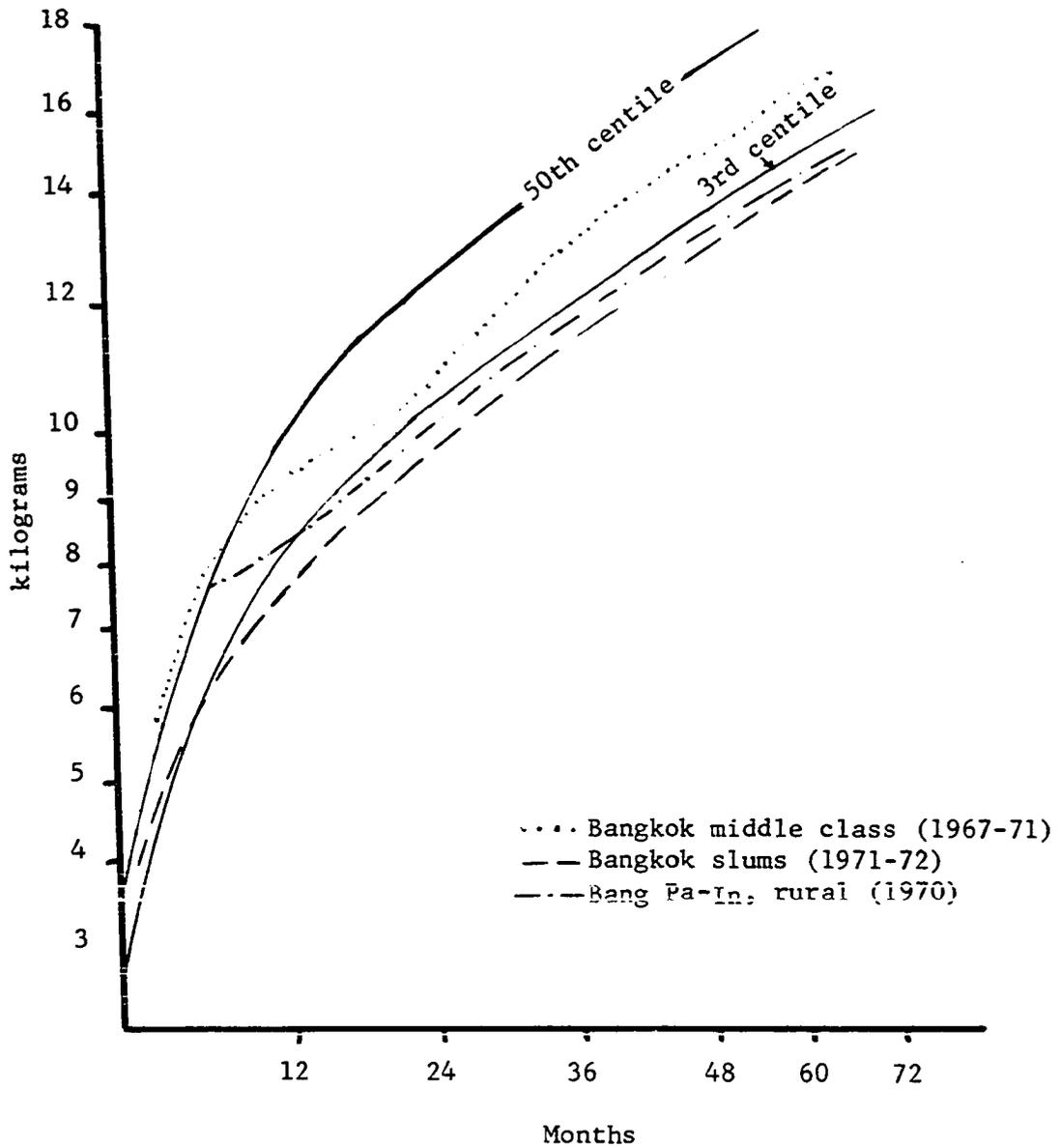


Figure B-1. Weights of boys from Bangkok middle class, Bangkok slum districts, and Bang Pa-In, plotted against 50th and 3rd percentile values for age, showing early and persistent retardation in weight gain in slum boys (Khanjanasthiti and Wray, ca. 1973:4).

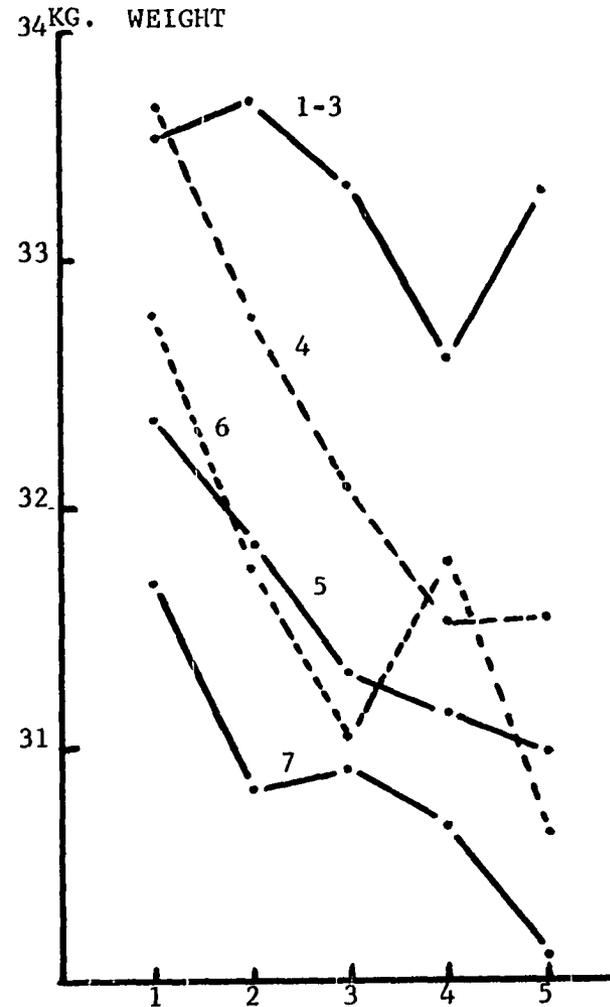
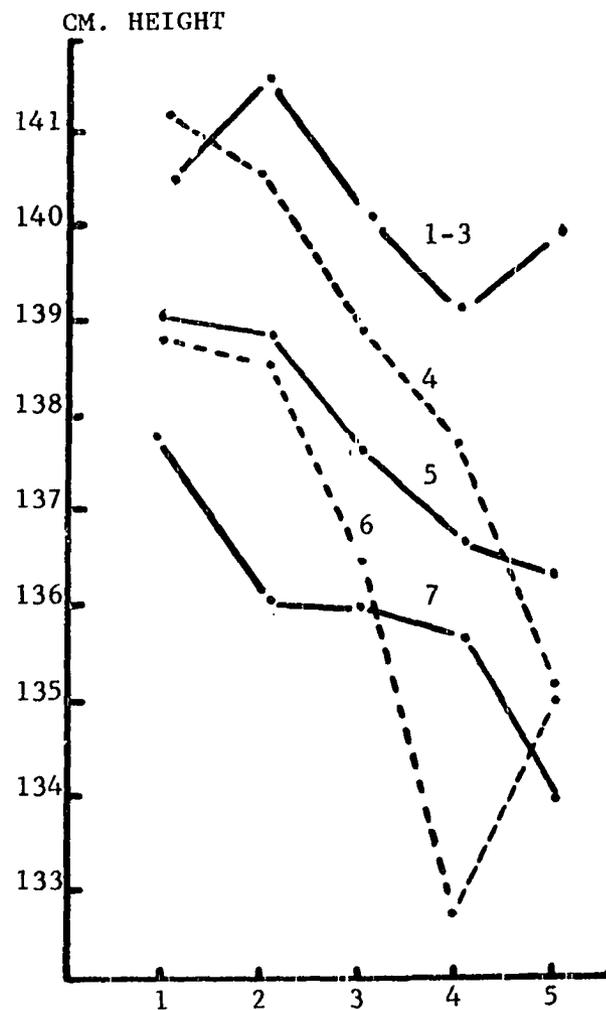


Figure B-2. Relation between height and weight of 11 year-old children and size of family in different socio-economic classes. Classes 1-3 represent professional persons, employers and salaried staff. Class 4 is made up of non-manual wage earners. Class 7 represents unskilled manual wage earners (Robson, 1972:417).

Table B-1. Childhood deaths due to causes commonly related to malnutrition, in selected countries, by age group, 1967<sup>a</sup>

Country	<u>Per cent due to</u>								
	Gastritis and enteritis			Pneumonia and influenza			Measles		
	Under 1 year	1-4 years	Under 5 years	Under 1 year	1-4 years	Under 5 years	Under 1 year	1-4 years	Under 5 years
Chile	14.9	11.4	14.5	26.2	30.3	26.8	2.2	11.6	3.5
Colombia	20.2	26.4	22.6	10.2	12.1	10.9	0.9	4.7	2.3
Ecuador	14.5	15.8	15.0	7.5	8.6	7.9	1.7	7.8	4.0
Guatemala	13.2	20.8	17.0	18.0	21.0	19.5	2.7	9.5	6.1
Japan	4.0	4.8	4.1	9.3	11.2	9.7	0.3	1.2	0.5
United States	1.3	2.2	1.4	7.2	10.7	7.7	-	-	-

<sup>a</sup>Source: Adapted from Berg (1973:224).

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Per cent due to

Bronchitis			Whooping cough			All five causes		
Under 1 year	1-4 years	Under 5 years	Under 1 year	1-4 years	Under 5 years	Under 1 year	1-4 years	Under 5 years
-	-	-	-	-	-	43.3	53.3	44.8
10.1	9.7	9.9	0.0	0.0	0.0	41.4	52.9	45.7
16.7	13.5	15.5	8.4	11.1	9.4	46.8	56.8	51.8
-	-	-	6.8	10.4	8.6	40.7	61.7	51.2
0.8	1.3	0.9	-	-	-	14.4	18.5	15.2
-	-	-	-	-	-	8.5	12.9	9.1

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Table B-2. Malnutrition as primary or associated cause in deaths of children under five, in selected areas, 1971<sup>a</sup>

<u>Per cent of deaths in which malnutrition is associated cause</u>					
Area	Measles	Diarrhea	Other infective or parasitic cause	Respiratory cause	Other cause
Argentina					
San Juan Province					
San Juan	n.a.	68	n.a.	8	33
Suburban	36	62	48	35	33
Rural	36	53	57	39	30
Chaco Province					
Resistencia	67	67	71	50	47
Rural	54	67	48	25	20
Brazil					
Recife	74	70	64	51	34
Sao Paulo	52	63	50	33	41
Ribeirao Preto area					
Ribeirao Preto	71	75	90	56	54
Franca (small town)	n.a.	69	n.a.	46	28
Colombia					
Cali	65	51	47	40	35
Cartagena	94	64	67	36	33
Medellin	84	62	74	29	45
Jamaica: Kingston	n.a.	41	36	24	31
Bolivia: La Paz	50	67	53	25	11
Mexico: Monterrey	74	70	64	51	34
Chile: Santiago	n.a.	52	52	31	38
El Salvador					
San Salvador area					
San Salvador	69	48	60	29	29
Rural	78	55	50	40	24
Average of all areas	65	61	58	36	33

<sup>a</sup>Source: Berg (1973:225).

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Percent of deaths caused by malnutrition

Primary cause	Associated cause	Primary or associated cause
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3	37	40
9	39	48
8	39	47
7	57	64
3	48	51
6	60	66
6	45	51
2	67	69
9	49	58
16	40	56
15	44	59
11	51	62
6	32	38
4	41	45
4	48	52
6	39	45
9	49	58
14	44	58
8	46	54

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Table B-3. Infant mortality rates, 1958-1968: for countries of the Southeast Asia region<sup>a</sup>

Country	Code <sup>b</sup>	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
Burma	.. <sup>c</sup>	..	..	..	..	..	..	..	..	..	..	..
Towns <sup>d</sup>	U <sup>ç</sup>	130.3	148.6	125.7	147.6	121.5	121.8	130.9	109.3	88.7	66.5	65.8
Ceylon	c <sup>ç</sup>	57.5	56.8	52.1	64.5	52.8	55.8	56.9	53.2	..	..	..
India	..	..	..	..	..	..	..	..	..	..	..	..
Indonesia <sup>e</sup>	..	..	..	..	..	..	..	87.2	..	..	..	..
Mongolia	..	..	69.0	..	..	..	66.0	..	..	..	..	..
Thailand	U <sup>ç</sup>	47.1	48.9	51.0	54.1	44.7	37.9	37.8	31.2	33.5	27.9	26.5

<sup>a</sup>Source: Adapted from WHO (1970:45-46).

<sup>b</sup>Civil registration data said to be relatively complete are coded "c" and those said to be unreliable (incomplete) are coded "U." The code does not apply to estimated data. Data tabulated by year of registration rather than occurrence are coded "ç."

<sup>c</sup>Data unavailable.

<sup>d</sup>Data are for a changing number of towns having a population of approximately 1 million for 1962, 2 million for 1958-1961 and 1963, 3 million for 1964-1966, and 4 million for 1966-1967.

<sup>e</sup>Revised data.

Table B-4. Death rates below 1 year, and from 1-4 years, in various countries<sup>a</sup>

Country	Date	<u>Deaths per 1,000 live births</u>		
		A. 0-1 year	B. 1-4 years	B./A. ratio
Trinidad	1935	99	29	.29
Trinidad	1954	60	12	.20
British Guiana	1954	73	28.5	.39
Jamaica	1951	81	35	.43
Rio de Janeiro, D.F.	1942	156	120	.77
United Kingdom	1870-72	150	99	.77
United Kingdom	1955	26	4	.155

<sup>a</sup>Source: Wills and Waterlow (1958:168).

Table B-5. Death rates per 1,000 live births per year, early childhood, by year of age<sup>a</sup>

Age (years)	Deaths per 1,000 per year	Deaths all deaths 1-4 years, %
<u>Rural Punjab, India, 1957-59</u>		
1-2	72.2	70.0
2-3	21.0	19.2
3-4	8.1	7.5
4-5	3.9	3.3
1-4	27.4	--
<u>Rural Guatemala, 1958-64</u>		
1-2	51.7	46.0
2-3	32.8	27.6
3-4	20.1	16.4
4-5	12.5	10.0
1-4	29.9	--
<u>Mauritius, 1961</u>		
1-2	16.9	46.6
2-3	9.5	25.7
3-4	5.8	15.9
4-5	4.3	11.7
1-4	9.1	--
<u>Romania, 1963</u>		
1-2	5.6	51.8
2-3	2.3	22.5
3-4	1.4	14.5
4-5	1.0	11.3
1-4	2.5	--
<u>Sweden, 1963</u>		
1-2	0.9	35.0
2-3	0.7	27.1
3-4	0.5	19.5
4-5	0.5	18.4
1-4	0.7	--

<sup>a</sup>Source: Gordon et al. (1967:363).

Table B-6. Recalled food intake as percentages of weighed food intake in the family study of 1965 in Finland (n = 24 families in each area)<sup>a</sup>

Food	East Finland						West Finland					
	1st day			2nd day			1st day			2nd day		
	Aver- age	Range	P									
Bread, dark and white	84	148	N.S.	81	121	N.S.	105	84	N.S.	89	79	N.S.
Cereals	170	150	N.S.	150	107	N.S.	265	224	0.01	230	281	0.01
Potatoes	122	64	N.S.	113	58	N.S.	106	50	N.S.	102	100	N.S.
Other vegetables	90	81	N.S.	60	138	N.S.	102	92	N.S.	129	171	N.S.
Fruit	152	106	N.S.	112	56	N.S.	134	56	N.S.	163	128	N.S.
Berries	135	157	N.S.	138	180	N.S.	158	87	N.S.	91	38	N.S.
Jams and compotes	120	131	N.S.	129	265	N.S.	188	113	N.S.	98	62	N.S.
Sugar	66	31	N.S.	93	67	N.S.	108	58	N.S.	78	141	N.S.
Milk, whole and skimmed	108	116	N.S.	106	86	N.S.	97	48	N.S.	103	72	N.S.
Cheese	124	72	N.S.	104	150	N.S.	118	107	N.S.	90	92	N.S.
Butter, margarine	102	69	N.S.	94	54	N.S.	146	141	N.S.	115	97	N.S.
Meat and meat products	117	102	N.S.	105	92	N.S.	123	126	N.S.	99	92	N.S.
Fish	116	73	N.S.	99	63	N.S.	183	55	N.S.	147	42	N.S.
Eggs	134	95	N.S.	173	147	N.S.	125	162	N.S.	117	56	N.S.

<sup>a</sup>Source: Pekkarinen (1970:45).

Table B-7. Average daily intake of 29 males, obtained in two consecutive interviews<sup>a</sup>

	<u>1st interview</u>		<u>2nd interview</u>		Significance of difference <sup>c</sup>
	Mean	SD <sup>b</sup>	Mean	SD	
Calories	2,415	875	2,213	746	N.S.
Carbohydrates, g	363	159	346	119	N.S.
Cereals	201	100	186	81	N.S.
Sugar and fruit	136	80	134	63	N.S.
Protein, g	92	35	88	32	N.S.
Animal	46	22	45	25	N.S.
Fat, g	65	47	53	29	N.S.
Animal	34	19	29	19	N.S.
SFA <sup>d</sup>	22	13	19	11	N.S.
Oleic acid	22	15	19	11	N.S.
Linoleic acid	14	8	10	4	N.S.
No. of food items	54	14	53	12	N.S.

<sup>a</sup>Source: Reshef and Epstein (1972:92).

<sup>b</sup>SD = standard deviation.

<sup>c</sup>P of difference in means by t test. N.S. = not significant =  $P < 0.05$ .

<sup>d</sup>Saturated fatty acids.

Table B-8. Correlation coefficients between two separate weeks' weighed surveys calculated from food tables (based on several research studies conducted from 1942-1966)<sup>a</sup>

	Children	Pregnant women)	Adult men	Adult men	Adult men
Numbers	21	11	39	76	42
Calories	0.68	0.90	0.78	0.73	0.30
Protein	0.80	0.78	0.70	0.74	
Fat	0.83		0.77	0.66	
Carbohydrate	0.36		0.83	0.82	
Calcium	0.70	0.69			
Percentage of calories from:					
Fat				0.71	0.24
Protein					0.29
Alcohol					0.67
Interval between surveys:	1 month	6 weeks	cons. weeks	1-12 mos.	3 yrs.

<sup>a</sup>Source: Adapted from Marr (1971:141).