

THE UNIVERSITY OF MANITOBA

THE UNDERDEVELOPMENT OF NUTRITION AND HEALTH IN NORTHERN MANITOBA:
A CASE STUDY OF MODERNIZATION AND BOTTLE FEEDING

by

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ABSTRACT

THE UNDERDEVELOPMENT OF NUTRITION AND HEALTH IN NORTHERN MANITOBA: A CASE STUDY OF MODERNIZATION AND BOTTLE FEEDING

This study develops a theoretical/conceptual framework for examining the underdevelopment of the nutrition and health of an impoverished and disadvantaged people living in the midst of an affluent, advantaged society. This thesis addresses four main problems. The first problem examined is whether modernization and socio-economic development contribute to or detract from human well-being in the form of good nutrition and good health. The second problem is the need to develop a theoretical perspective where nutrition and health, which inherently belong to the ecological paradigm, can be related to the modernization/underdevelopment paradigm, which is inherently sociological and economic in orientation. The third problem concerns the mechanisms by means of which the modernization and underdevelopment processes generate the structures which are expressed in the nutritional and health status of an impoverished people. The fourth problem is to determine whether northern Manitoba fits the Third World paradigm or if it exhibits the characteristics which make the region and its people a unique case of underdevelopment.

The historical process-structure method is used to identify the historical processes of underdevelopment and the contemporary processes

of modernization which generate structures of poverty, malnourishment and ill health. Secondary data sources from the Third World supplement existing historical and contemporary studies and published data on the Inuit and the Canadian and Manitoba Indian people to assess the impact of underdevelopment and modernization on Indian nutrition and health.

This study identifies the modern market economy as the principal agent of the modernization process. The concept of nutritional shift is developed to examine how the modern market economy has penetrated the indigenous Indian food system in a series of stages beginning with the fur trade era. The nutritional shift is then related to changes in the Indian disease burden. The concept of the modernogenic disease burden is developed to demonstrate how modernization and underdevelopment has changed the nature of the diseases affecting the Indian people.

The case study on bottle feeding provides a near ideal example of how modernization, nutrition and health interact in the infant. Bottle feeding is examined from an ecological perspective to identify environmental, nutritional, medical, social, cultural and economic mechanisms which interact to generate appallingly poor nutrition and health among impoverished people who are modernizing without leaving their poverty behind.

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CHAPTER I

INTRODUCTION

A geographic inquiry into the problem of modernization and underdevelopment in the Third World has the benefit of a long history of inquiry into the relation of man to the environment. It is only recently, however, that geographers have turned their attention to the nutrition and health component in this relationship. Little study has been directed toward an ecological interpretation of nutrition and health from the modernization and underdevelopment perspective. What studies exist tend to be focused on the tropical Third World. Little such work has been directed toward the Canadian "North" as a paradigm of the Third World.

This thesis sets out to bring the study of nutrition and health in northern Manitoba to the geographer's perspective on modernization and underdevelopment. The aim of this study is to assess the impact of the modernization and underdevelopment processes on the nutritional and health status of the Indian people as an impoverished and disadvantaged people living within an affluent and advantaged society. A further objective is to integrate the study of underdevelopment in northern Manitoba into the mainstream of Third World studies.

A. THE PROBLEM

This thesis addresses four main problems. The first problem examined is whether modernization and socio-economic development contribute to or detract from human well-being in the form of good nutrition and good health. The second problem is to develop a theoretical perspective where nutrition and health, which inherently belong to the ecological paradigm, can be related to the modernization/underdevelopment paradigm, which is inherently sociological and economic in orientation. The third problem addressed is to determine by what mechanisms the modernization and underdevelopment processes generate the structures which are expressed in the nutritional and health status of an impoverished people. The fourth problem is to determine whether northern Manitoba fits the Third World paradigm or if it exhibits the characteristics which make the region and its people a unique case of underdevelopment.

B. METHODOLOGY

The methodology employed in this study is theoretically and conceptually oriented. As a theoretical basis for examining the impact of modernization on nutrition and health is only in a nascent state of development, it was considered preferable to extend the theoretical framework before embarking on a field study to test the apparent relationships elucidated in this study. The theoretical approach is based on the process-structure method suggested by Wilkie (1974) while the conceptual framework is based on the "well-being" approach provided by Smith (1977).

The central assumption undergirding the process-structure approach is that:

"The process of change . . . cannot be understood without first establishing what the structures are that are changing, nor can we understand the laws behind the structural systems without studying the processes and forces that are shaping and changing them."

(Wilkie 1976: 11)

It is assumed that poverty, malnourishment and ill health do not occur isolated from the historical processes which generated them. These conditions are expressions of processes which generate debilitating spatial, psycho-social, economic and cultural structures. The underdevelopment theme is directed toward elucidating the historical processes which generate the contemporary processes which perpetuate the historical modes of underdevelopment.

The well-being approach provided by Smith (1977) assumes that good health (Dubos 1968) is essentially an expression of physical (Rogers 1960), psychological (Najman 1980), social (Illich 1976) and existential (Powles 1973) well-being, in which "functional nutritional well-being" (Jerome *et al.* 1980) plays a central role. How modernization processes enhance or debilitate well-being is a persistent theme in this study. A geography of nutrition, health and well-being is essentially interdisciplinary and holistic (Wisner 1976). Such an approach has been found to be particularly appropriate for examining the many processes of modernization, nutrition and health.

To integrate these two approaches, this study focuses on the nutritional component of what Hunter (1974) calls the "spatio-environmental system." The thesis examines how the modern market economy, as

the principal component in the modernization process, exerts a profound influence on nutritional structures, or what Jerome et al. (1980) call the "ecology of nutrition". The ecology of nutrition refers to the cultural, social, political, economic and environmental systems of food production (or procurement), distribution and consumption which are constantly being changed by the modernization process.

Whereas the nutrition and health themes are approached from an ecological perspective, the modernization and underdevelopment themes are essentially process oriented. The ecological theme is inherently systems and structures oriented. The process-structure method allows for an integration of the two perspectives, while the well-being approach provides the evaluative framework. This approach is understood to be unique in the study of nutrition, health and underdevelopment in the Third World.

This study follows three basic procedures. First, a theoretical framework is developed on the basis of available literature on modernization, underdevelopment, nutrition and health. Second, the validity of this framework is tested by using: (a) general examples from the Third World, and (b) specific examples from northern Manitoba. Third, a case study of bottle feeding infants is employed to further test the validity of the theoretical generalizations. The northern Manitoba example is used throughout, both to retain a focus on the real world and to elucidate the problem of the "North". A broad range of apparently disparate literature has been surveyed to develop an interdisciplinary, integrative approach to the underdevelopment of nutrition and health.

C. CHAPTER OUTLINE

This thesis is divided into nine main chapters. The first three, excluding the Introduction, are theoretically oriented. The next four provide real-world evidence to test the validity of the theoretical base. The last two, excluding the Conclusion, are comprised of a case study of bottle feeding infants which draws together the generalizations presented earlier together.

Chapter two discusses the problem of modernization and underdevelopment. The question of whether modernization represents development or underdevelopment is raised. A socially sensitive concept of modernization is developed to establish a theoretical premise which can guide the remainder of the thesis.

Chapter three defines and describes the northern Manitoba study area. The focus is on northern Manitoba's history of underdevelopment. The spatial, economic, political and social structures which identify the North as a paradigm of the Third World and as a "colony within" are examined. Current social and economic conditions are also described. This chapter provides a structural outline on which the remainder of the thesis is built.

Chapter four develops the ecological approach to nutrition and health and integrates this theme into the modernization/underdevelopment theme. Nutrition, health and disease causation are discussed in order to develop a theoretical basis for examining the underdevelopment of nutrition and health. This chapter raises the possibility of considering the modernization process itself as a causal agent in generating malnourishment and ill health.

The fifth chapter uses evidence from the Third World to establish a basis from which to analyse the underdevelopment of nutrition and health in northern Manitoba. As few studies have been done from this perspective on northern Manitoba, Third World case studies--including studies on the Inuit of the Canadian Arctic--provide a rich source of information to both test the theoretical framework and to help fill some of the gaps in information on the North.

Chapter six begins the discussion on nutrition and health in northern Manitoba. First, it describes how the fur trade integrated the Indian people into the network of international merchant capitalism. It examines how the exploitation of their natural resources and the expropriation of social and cultural wealth was linked to epidemics of European diseases which threatened to decimate the Indian population. This chapter explores the relationship between the underdevelopment process and the loss of the Indians' psychological, social and physical well-being, and their subsequent experience with disease and starvation.

The seventh chapter examines the impact of modernization on nutrition. The evolution of the Indian diet is described in terms of the nutritional shift, which is further seen as a concomitant of modernization and acculturation. The dietary consequences of the nutritional shift are discussed in order to form the basis for examining changes in the Indian disease burden discussed in chapter eight.

Chapter eight assesses the impact of modernization on Indian health. Data on Manitoba and Canadian Indians is used to ascertain the origins of the Indian disease burden and to discern the changes in the disease burden. This chapter considers whether or not modernization has had a negative impact on Indian health status.

Chapters nine and ten form a case study to draw all the aspects of modernization, nutrition and health together. The study of infant bottle feeding presents a good example of how modernization, nutrition and health interact. These two chapters explain the extent of the bottle feeding problem in Manitoba, and describe its impact on Indian nutrition and health. The role of the modern market economy in creating and perpetuating the ill health and malnourishment of impoverished infants is assessed. These chapters integrate the ecological and modernization/underdevelopment paradigms as they were developed in the thesis.

D. PERSONAL CONSIDERATION

The motivation for this study arises from a longstanding experiential and academic interest in the Third World as well as in nutrition and health. This thesis is written from the perspective of Third World studies. A strong motivation for carrying out this study was to integrate the concern for the impoverished people of Canada's North into the mainstream of Third World studies. In that sense this study does not concern itself as much with the debilitating effect of underdevelopment in specifically northern Manitoba alone as it does with the underdevelopment of nutrition and health among all impoverished peoples.

CHAPTER II

MODERNIZATION AS DEVELOPMENT OR UNDERDEVELOPMENT:

A CRITIQUE

A. INTRODUCTION

A study of health and nutrition from a geographer's perspective on modernization and underdevelopment poses some unique theoretical problems. First, a theoretical base for studying nutrition and health as the central focus rather than as a secondary sub-system of economic or sociological study is only in a nascent state of development. Second, concepts such as development, modernization and underdevelopment have no uniform definitions. How nutrition and health have been viewed in literature has depended largely on the writers' ideological points of view. To eliminate the confusion of conflicting definitions, these three terms will be defined (as they are used in this study) as follows:

(a) The term "development", coming out of the economist's perspective, is defined to mean the initiation of socio-economic processes, whether from within or from outside designated population, directed toward eliminating conditions of poverty, oppression and human degradation. Development means providing the disadvantaged with the means of meeting basic human needs, to enhance self-esteem, and of seeking freedom and liberation from oppressive structures (Goulet 1971).

(b) The term "modernization", taken from a sociological perspective, is used in a restricted sense to refer to processes whereby "the institutional and cultural concomitants of economic growth under conditions of sophisticated technology" are diffused from western cores to Third World peripheries (Berger 1976: 34). The basic elements on which modernity is structured are seen to be social, political and economic institutions dominated by a technocratic and bureaucratic mindset. The diffusion of modernity is considered to mean not only the transfer of modern institutions but also of modern consciousness. The terms development and modernization have frequently been seen as synonymous by those who see development and modernization as westernization.

(c) The term "underdevelopment", coming out of the radical-alternatives perspective to either development or modernization, refers to an historical process of interaction between centres of economic and political power and less advantaged regions. The term describes how unequal relations generate a loss of the internal wealth of disadvantaged regions and the deterioration of its social, economic, political and environmental integrity. Underdeveloped, in contrast to undeveloped, implies a process as opposed to a state of being. The term is derived from the assumption that poverty is not the initial state, but that poverty is created through a process of impoverishment (de Souza and Porter 1974; Frank 1970). Proponents of this term, labelled by Berger as counter-modern, consider the modernization process itself to constitute a major part of contemporary underdevelopment processes.

The purpose of this chapter is (a) to review geographic literature on modernization and underdevelopment from a critical perspective to assess its relevance to a study on health and nutrition, and (b) to

establish a theoretical perspective on modernization, development and underdevelopment which will be used in this study. The first section develops a "basic human needs" approach to well-being in order to establish a basis against which the efficacy of modernization and development can be assessed. Second, modernization geography literature is reviewed to sharpen the focus on the problem of modernization seen as development. Third, literature from the "geography as social relevance" perspective will be reviewed to formulate the theoretical base on which this study is built. Finally, a discussion of modernization as underdevelopment will bring into focus how the concept "modernization" is used throughout this study.

B. DEVELOPMENT GOALS: A BASIC NEEDS APPROACH

To be healthy and well nourished constitutes one of the basic human needs. One of the principal goals of development is to provide the means whereby a healthy, well-balanced diet can be achieved and maintained, and whereby the goal of good physical and psychosocial health can be pursued. The pursuit of the "good life" is fundamental to all people. To define the "good life", however, has been problematic, particularly when those who are the "beneficiaries" of development efforts are coerced into accepting notions intrinsically alien to them. In recognizing this problem, development agencies have attempted to define basic human needs which find universal acceptance. From the basic needs approach one can establish a criteria against which to determine whether development or modernization processes succeed or fail to meet their objectives.

Basic to defining human needs is a concept of what it means to be human. In Smith's (1977) approach to welfare geography, the concepts "human being" and "well-being" are fundamental to defining the purposes of studies in human geography:

"What is it to be human? What is human being? These may seem philosophical questions quite beyond the traditional realm of geography, but if human geography is to be truly concerned with individual or group well-being, then the nature of human being is a necessary starting point. Theory in human geography must be seated in the reality of human existence."

(Smith 1977: 27)

Like higher abstractions such as "happiness" or "fulfillment", the notion of "well-being" derives its meaning from a state of consciousness which can be only individually perceived.

The concept of well-being--vis a vis the basic human needs approach--as a development objective needs to be defined in order to give it substance. Several attempts have been made to establish a fundamental, universally acceptable definition of basic needs which are the aspirations of all human beings. The International Labour Organization defines five development objectives based on human needs: (a) The core of development planning should be meeting basic needs. (b) Basic needs are not only material needs (food, shelter, clothing) but also human rights (justice, freedoms, participation, self reliance).

(c) Basic needs are not only static in nature, but evolve over time with economic growth and changing aspirations. (d) The core materials of basic needs are food, health, education, housing and sanitation.

(e) There is no single path for achieving these objectives (Ghai 1977: 14). The Organization for Economic Co-operation and Development also

defines similar needs, however with the addition of the need for time and leisure, the need to be able to have command over goods and services, and the need to be able to enjoy social opportunity and participation (Smith 1977: 34).*

Goulet succinctly states that the goal of development is to:

(a) provide more and better life-sustaining goods to members of societies, (b) create or improve material conditions of life related in some way to a perceived need for esteem, and (c) free men from servitudes (to nature, to ignorance, to other men, to institutions, to beliefs) considered oppressive. The goal of development is to heighten the opportunity for self-actualization, however perceived (Goulet 1971: 94). Objectives meet not only material, but also metaphysical needs. Development objectives are pointless, says Berger (1976: 185), "unless they preserve the meanings by which men live, or provide satisfactory substitutes for old meanings. The human need for meaning is a historical and cross-cultural universal." Hence, if man's existential needs are not met, material advancement is futile.**

The well-being approach to basic human needs provides a normative base against which modernization processes can be measured.***

*Smith (1977: ch. 2) lists several different methods for quantifying and measuring basic human needs.

**Berger's point is a corrective for the tendency to attempt a totally materialist definition of the nature of human "being, having and becoming".

***According to Smith (1977: 16), "Who should get what where is a normative question, subject to positive analysis only when the ethical assumptions have been made clear." According to Berger (1976), development is a moral category. The significant questions he asks are "Who benefits? Who pays the cost?"

Though all aspects of well-being are not easily quantifiable, there are measures available which can reflect metaphysical states of well-being or ill-being. A good example would be relating suicide to despair. The basic human needs approach provides a theoretical basis for analysing the structures of well-being. The issues pertinent to this study are: whose well-being, where, how is it pursued, and why do all not have equal opportunities to pursue it? These questions are fundamental to a study of the underdevelopment of nutrition and health. The next analytical stage is to ask the question: what are the processes which enhance or impoverish human well-being? More specifically: does the modernization process contribute to or detract from well-being?

C. THE GEOGRAPHY OF MODERNIZATION: MODERNIZATION AS DEVELOPMENT

In the history of geographic thought, the geography of modernization is a recent addition. The quantitative revolution in the 1960's made techniques of spatial analysis available to geographers such as Friedmann (1966); Gould (1960, 1970), Mabagunje (1973), Riddell (1970) and Soja (1968), who were keen on applying them to the study of Third World modernization. New techniques for analyzing spatial diffusion, regional development and innovation diffusion gave geography a mode of analysis they thought were uniquely geographical in spite of the fact that most of their assumptions were based on economic and sociological models of development and modernization (Slater 1974).^{*} Modernization geography has, however, made unique contributions to the study of

^{*}See Brookfield (1975: 110-116) and de Souza and Porter (1974: 174-180) for a good review of modernization geography.

modernization. The contribution has been classified by Slater (1974) and Browett (1980) into three modes of analysis: (1) spatial diffusion; (2) spatial integration; and (3) spatial differentiation. A brief review of these three modes of analysis will form the basis for defining the "classical" understanding of modernization. The understanding of modernization is seen to be classical in the sense in which it is most often used in modernization geography.

1. The Spatial Impress of Modernization

Geography's contribution to the economist's concept of development and the sociologist's notion of modernization is its unique perception of the spatial component of human activity. Economic and social activity is translated and transformed into various spatial structures and patterns, each with their peculiar meanings and uses. According to the recent thinking of Soja (1980: 210),*

"The spatial organization of human society is an evolving product of human action, a form of construction arising within the physical frame of ubiquitous, contextual space but clearly distinguished from it."

Soja's concept of spatial organization embodies the fullness of human activity influencing space and spatial structures, and influencing the organization of human activity.

2. Modernization as Spatial Diffusion

Spatial structures are not static, but are continually evolving. Diffusion processes are influenced by existing spatial patterns but at

*Soja (1979) recently converted to Marxism.

the same time influence the evolution of spatial structures. Geography's contribution to modernization study was to take the modernization concept out of the time and space dependent structures which had characterized the non-geographic formulations of modernization.

According to Mabogunje (1973: 74),

"Modernization is a process, not a structure. As such it has both a spatial and a temporal dimension. It is transmitted over space by identifiable agencies and at any point in time it has an identifiable spatial configuration."

The spatial diffusion paradigm focused on "modernization surfaces", which came to mean the location and spread of modern institutions across the traditional landscape (Riddell 1970). The focus of the early modernization literature was on urban places as centres of modernity. The spatial "agents" of modernization were understood to be transmitted through urban cores interconnected by transportation and communication links. Diffusion was facilitated by the penetration of indigenous social systems by western elements of modernity. This trend in modernization geography's mode of analysis is clearly summarized by Riddell (1970: 45):

"Modernization is a spatial diffusion process, assuming patterns of varying intensity and rate. Its origins are localized to specific regions or zones, indexing a contact situation, and the patterns of change move like waves across the map, and cascade down the urban hierarchy as they are funneled along the transportation system. . . . While the growth of the transportation system is part of the modernization process, it is also much more. The spreading network of rail and roads continually redefines the spatial fabric of the country in which health services are located, schools are opened, communications are structured, ideas spread and new ways of life emerge."

The idea of modernization embodied a hopeful enthusiasm that the underdeveloped traditional societies would achieve a rapid rate of progress after they had been transformed by western institutions and values. Total societal transformation was seen to be a necessary concomitant for sustaining industrialization and economic development (Inkles and Smith 1974). The diffusion of institutions, technology, capital and cultural values to the Third World constituted the essence of development and modernization. According to Soja (1968: 1), "The essence of this diffusion process is change--psychological, social, cultural, economic, and political--and its composite impact has been labeled 'modernization'."

3. Modernization as Spatial Integration

Geography's regional development models also provided fruitful contributions to the study of modernization. Regional integration models, as refined by Friedmann (1966), provided good examples of how integrationist theory uses a structural approach to examining interactions between dominant centres (or cores of modernization) and weak, rural peripheries. Structural relationships between core and periphery areas define the path of modernization described by the students of spatial diffusion. Friedmann (cited in Brookfield 1975: 120) clearly describes the relationship between the centre and periphery:

"Major centres of innovative change will be called core regions: all other areas within a given spatial system will be defined as peripheral. More precisely, core regions are territorially organized subsystems of society that have a high capacity for innovative change; peripheral regions are subsystems whose development path is determined chiefly by core region institutions with respect to which they stand in relation of substantial dependency. Peripheral regions can be defined by their relations of dependency to a core area."

It is assumed by the modernization geographers that economic development will eventually lead to a convergence between the centre and the periphery.* The goal of development, then, was seen to facilitate the building of an infrastructure which would fully integrate isolated, traditional and stagnant peripheries into the dynamic modern market economy located in the core.

4. Modernization as Spatial Differentiation (or Innovation Diffusion)

Whereas spatial diffusion and regional integration studies focused macro-scale analysis, innovation diffusion studies concentrated on micro-analysis. Innovation diffusion is a natural outgrowth of the spatial diffusion/integration approach to modernization (Blaikie 1978; Walker 1977). Innovation diffusion models rested heavily on sociological theories of social change. The problem of spatial diffusion, then, was to locate the mechanisms of social change. Innovations were seen to be one of the prime agents of change. Berger (1976), in fact, calls innovations "vectors of modernization". The innovation diffusion geographers concentrated on how innovations diffused over space and through time. They also studied how social networks impede or facilitate the diffusion process. These innovation studies contributed to social change theory's speculations on the character of the traditionalist's propensity for change.

The geographers of cross-cultural innovation diffusion have been heavily influenced by Rogers and Shoemaker's (1971) models of innovation diffusion (Blaikie 1978). According to Rogers and Shoemaker (1971: 18),

*Friedmann himself does not agree. Instead, he sees the unrestrained forces of the market economy working against convergence.

the

"crucial elements in the diffusion of new ideas are (1) the innovation (2) which is communicated through certain channels (3) over time among members of a social system."

Innovations are ideas, practices or objects perceived as new by an individual. Communication involves four elements: the source, the message, the channel and the receiver. These elements function within the social system, which Walker (1977) calls the "socio-spatial network".

Innovatability, or the propensity to innovate, was measured by locating an individual's or group's place along the tradition-modernity continuum; the most innovative are the early adoptors whereas the least innovative are traditionalist laggards. The measurement of innovatability was represented on the bell-shaped frequency curve and the S-shaped cumulative curve for adopter distribution (Rogers and Shoemaker 1971: 177). The goal of development, then, was to remove the blockages hindering the diffusion of innovations (Soja 1979).

The innovation diffusion model fits into the spatial differentiation paradigm suggested by Slater (1974) and Browett (1980). The spatial differentiation paradigm perceives development occurring when the characteristics of underdevelopment are eliminated through socio-economic change. Smelzer (1968), the differential-integration theorist, considered traditional standards to be amongst the most intransigent obstacles to modernization.

In spite of its heavy reliance on borrowed theoretical premises, the micro-level study of innovation diffusion has added a significant component to the macro-level study of spatial diffusion/integration.

5. Common Assumptions Underlying Modernization Geography

One of the strongest criticisms leveled at modernization geography is that it has relied almost exclusively on sociological and economic theory to explain the existence of spatial disparity and to propose the means of eliminating it (Browett 1980; Slater 1974). In spite of modernization geography's unique capability to analyze and describe spatial disparity, it has failed to contribute significant new insights into the processes which generate and perpetuate it.

Through examining some common assumptions underlying modernization geography, further insights into the problem of modernization can be gained. This critique asks three questions: (a) how does modernization geography explain the existence of disparity; (b) how does it perceive disparity will be eliminated; and (c) does it have the theoretical capacity to take seriously the problem of the internal contradiction within the "modern" core? (i.e. the presence of disparity within its own boundaries).

(a) Explaining the Existence of Disparity

Modernization geography has uncritically borrowed the sociological "tradition-modern" dichotomy to explain the existence of spatial disparity (Ettema 1978; Slater 1974). It was already previously described how it was understood that the traditionalist periphery was slow to innovate and therefore slow to modernize. This understanding, based on social dualism, classified societies according to their place along the continuum from traditionalism to modernity.

The theory of tradition-modern dualism was first advanced by Boeke and later refined by Talcott Parsons. Parsons was among the more

influential of the modernization sociologists. He put forward five contrasting "pattern variables" which compared simple to complex characteristics of traditionalism and modernity. They are: (a) affectivity versus affective neutrality; (b) self-orientation versus collective orientation; (c) universalism versus particularism; (d) ascription versus achievement; and (e) specificity versus diffuseness (Goldthorpe 1975: 9). Parsons combined "evolutionary and comparative perspectives in analysing changes in the social structures of societies, ranging all the way from extremely small-scale primitive societies to the new super-national societies of the United States and the Soviet Union." (Goldthorpe 1975: 10). The most important attribute for modernization was seen to be a society's adaptive capacity, of which the leading feature was differentiation.

Whereas Parsons' theory was intended to represent a scale between the poles of traditionalism and modernity, a dichotomous notion of homogeneity and mutual exclusiveness came to dominate modernization theory (Ettema 1978). According to Bauer (1971: 46), the dualist view became "a major factor in building up a picture of the underdeveloped world as a substantially homogenous and stagnant mass, sharply distinct from the developed world." Not only were the rich and poor considered to be homogeneously distinct, it was also assumed that there was no conflict between them. They were seen to coexist in fundamental harmony; they had mutual interests in development goals (Browett 1980). This view blocked a realistic understanding of the diffuseness and heterogeneity of the Third World.

The blame for spatial disparity was laid on those traditionalist societies who were intransigent to modernity. Poverty and disparity

came to be equated with traditionalism and well-being was associated with modernity. The vicious circle theory was invoked to explain why the poor were poor. This "blame the victim" (Loxley 1978) form of dualism attributes the causes of disparity to a never-ending circle of ignorance, economic stagnation, social malaise, disease and malnutrition. Winslow (cited in Myrdal 1957: 11) succinctly applies the vicious circle theory when he says:

"It was clear . . . that poverty and disease formed a vicious circle. Men and women were sick because they were poor; they became poor because they were sick, and sicker because they were poor."

Not only was the blame for disparity laid on "pathogenic traditionalism", but also on the "fact" that the poor were isolated, unintegrated and undifferentiated (Smelzer 1968). In accordance with the previous discussion, the aim of modernization was to remove the traditionalist blockages to modernity. The problem was to determine "how the modern sector is to expand while the indigenous sector contracts" (Meier 1976: 57). This reductionist (Bernstein 1971) view of poverty predominated modernization geography's explanation of disparity.

Geography's uncritical acceptance of the dualist paradigm was sharply criticized by Slater (1974: 333). He argued that dualism "presupposes the existence of a traditional society that has always been stagnant and backward." Geographers neglected to discern the historic relationships between advantaged and impoverished regions. Moreover, they had failed to recognize the internal contradictions within the core itself.

Gusfield (1967), Knight (1974) and T.R. Berger (1977) found that in India, Tanzania and northern Canada there was no real world evidence to justify the dualist explanation. Bauer (1971) and Bernstein (1971) charged that the dualist view is little more than an ethnocentric and neo-colonialist justification for western economic supremacy and socio-cultural imperialism. The notion of dualism represents trivial, artificially induced dichotomies (Singer 1970) which are perceptual, ethnocentric and time dependent (Brookfield 1975: 83). Modernization geography, it is argued, has failed to develop a theoretical explanation for the existence of spatial disparity.

(b) The Diffusion of Well-being and the Elimination of Disparity

The concept of modernization as development flourished with theoretical vigour when contemporary theories of economic development were borrowed to explain how poverty and disparity could be eliminated. The basic assumption underlying the "modernization as development" approach was that the modern market economy was the prime carrier of modernity and the central engine of progress. According to Berger (1976: 74), "modernization refers to the institutional and cultural concomitants of economic growth under the conditions of sophisticated technology." Modernization was seen to occur as the modern market economy penetrated and integrated the traditionalist periphery into a world dominated by a technocratic and bureaucratic form of industrialism. Modern relations of production, exchange and modern patterns of consumption were seen to constitute the goal of modernity. Notions of growth and progress were uncritically accepted by geographers to represent

the ideals of becoming modern.*

The association of modernity (and well-being) with economic growth is based on the idea of single-path evolution (Brookfield 1975). All societies are assumed to have begun at the same level of "modernity", but that due to a variable distribution of human and natural resources some societies advanced more rapidly than others (Smith 1977). The idea of unilinear development assumed that all societies must eventually converge into one unified, modern whole. Economic "stages of growth" theory (Rostow 1958) was invoked to describe where societies were located on the development continuum. The progress of the underdeveloped Third World's efforts to modernize was measured against the achievements of the developed, industrialized West. The inference is clear enough, say de Souza and Porter (1974: 9), that "the history of the West will be repeated in the underdeveloped world." The same myth of progress which dominated western notions of "bigger and better" and "upward and forward" was applied to encourage the poor of this world to aspire to the prosperity of the West.** Westernization, with its institutions, technologies and socio-economic values was seen to constitute the essence of what it means to be modern and what it means to achieve well-being.

When the modern market economy establishes the criteria against which development and modernization are measured, the most important values are placed on growth, productivity and consumption. The goal of modernity was to create an industrial, economic man who will be a good

*For an excellent critique of modernization seen as the diffusion of development see Osborne and Rogerson (1978).

**See Berger (1976) for an excellent discussion of the mythical nature of western notions of growth and progress.

producer and a good consumer of goods and services (Inkles and Smith 1974). Nash (cited in Brookfield 1975: 80) capsulizes this spirit in his comment that "Modernity is the social, cultural, and psychological framework which facilitates the application of science to the processes of production." Likewise, health and nutrition were seen to be merely a necessary contribution to enhance the production and consumption processes. Since health and nutrition were considered to be only a subset of the market economy, it was assumed that economic growth would ensure the eradication of ill health and malnutrition. Health policy (Christian *et al.* 1977) and nutrition policy (Berg 1973) were developed not on the strength of health and nutrition for their own sake, but for their contribution to economic growth (Meier 1976: 496-518).

Growth is not possible without production, and production is pointless without consumption. The economic orientation of modernization (defined as technocracy and bureaucracy) has engendered a faulty association between well-being and consumption. Standard of living indices, for example, imply assumptions that well-being can be measured by levels of consumption (Schumacher 1973: 47). The tendency has also been to turn health and nutrition into commodities which can be produced, exchanged and consumed (Renaud 1978). Critics of modern scientific medicine (Berliner and Salmon 1980; Illich 1976; Powles 1973) charge that it has become so entrenched in the modern market economy that health care has come to ultimately serve not the population's well-being but the well-being of the economy. Hence, the diffusion of consumer-oriented medical institutions has served to displace "traditional" holistic notions of well-being with modern commodified notions of well-

being.* Furthermore, under the modern market economy the distribution of modern health care services have tended to be determined by relations of production and exchange, with services being consumed by those who already are in a position of advantage (Navarro 1976; Paul 1978).

The association between modernity and a commodified notion of well-being constitutes one of the major failures of the modernization theory. It allowed for an uncritical acceptance of the myth of growth, progress and production to define modernization as development. The fallacy that modernization, disguised as progress, eliminates spatial disparity, ill health and malnutrition will become apparent in the following chapters which assess the impact of modernization on health and nutrition.

(c) The Relevance of Modernization Geography

One final critique of modernization geography relevant to this study is that it has no theoretical base for examining the internal contradictions within the so-called developed world. Notions of single-path evolution leave room for the possibility for territorial disintegration and loss of wealth. In short, when historical processes are elucidated, the notion of unilinear development falls apart. A loss of well-being, then, is a central feature of underdevelopment. From this point of view, the tables on the notion of modernization as development are turned; it opens the door to think about modernization as underdevelopment. It also opens the possibility of speculating whether or not modernization helps to perpetuate ill health and malnutrition rather

*Various issues of Social Science and Medicine have dealt with this problem.

than to eliminate it.

D. "SOCIAL RELEVANCE" GEOGRAPHY: MODERNIZATION AS UNDERDEVELOPMENT

As it became more apparent that modernization was not stemming the growing disparity between the rich and the poor, and between the industrialized West and the underdeveloped Third World, several major rifts in the modernization geography school developed. Early objections were raised by Harvey (1973) and Slater (1974). The influence of Frank's (1969) dependency theory, which essentially relied on geographic perceptions, profoundly influenced the development of a radical, socially conscious geography. Diffusion theory and the policies associated with it were being abandoned (Browett 1980). The disaffection with modernization became so great that indices of "progress" came to be regarded by some as indices of underdevelopment. The "underdevelopment of development" perspective was introduced (Frank 1970). The perspective of the "counter-modern" way of thinking is well summarized by Frank (cited in Blaikie 1978: 280):

"The centuries-long contact and diffusion between the metropolitan countries and the now underdeveloped ones has failed to result in the economic development of the latter. Nor has any diffusion from the capitals to the provinces of the underdeveloped countries brought about the development of these hinterlands. New technology may have increased diffusion beyond that of certain times in the past but surely not beyond the diffusion of initial contact times which, far from initiating the development of, initiated the underdevelopment of the now underdeveloped countries. More diffusion, per se, does not generate more development. . . . Often it has helped to sink them into even deeper and more hopeless underdevelopment. . . . Development, underdevelopment, and diffusion are all a function of the social structure . . . the structure of the system itself on all these levels determines the amount, nature, direction, and consequences of the past and present diffu-

sion--a diffusion which has so far produced development only for the few and underdevelopment for the many, and by all indications will continue doing so. Consequently, the structure of the system has to change in order to permit the development for all and to permit diffusion to contribute to that development."

It had become apparent that the great ascent was failing. Traditional societies were being changed, but, according to Goulet (1973: 107), "not enough to become modern except in a socially pathological manner." Out of the disaffection with modernization geography came the "relevance revolution" (Smith 1977).

In "social relevance" geography, a great interest in the causes of spatial disparity developed. This interest is expressed in what could be classified as three approaches--human welfare geography (Smith 1977; Coates et al. 1977), dependency/world systems geography (Brookfield 1975; de Souza and Porter 1974; Ettema 1978; Frank 1969; Obudho and Taylor 1979; Osborne and Rogerson 1978; Slater 1974), the so-called radical geography (Crush 1980; Peet 1977, 1980; Slater 1978; Soja 1979, 1980). Of these three, the welfare approach takes the least "radical" stance. Whereas radical geography seeks to revolutionize the structures, the non-radical approaches seek structural reform. In spite of their differences, these three approaches each make a significant contribution to developing an indigenous geographical theory of disparity and poverty. The new body of theory gives indications of being more universally relevant, whether on an international, national or regional scale of inquiry (Slater 1978).

1. The Welfare Approach to Disparity

The welfare approach to disparity and poverty contributes a multi-disciplinary, holistic methodology of defining and measuring well-being. As Smith (1977) has argued, the well-being approach is a fundamental beginning to any study in human geography. The best contribution of the welfare approach is its theoretical capability to assess the structures of well-being, which is a necessary component in assessing the structures of "ill-being" generated by underdevelopment. The systems approach, described by Smith in Fig. 2.1, illustrates the derivation of human well-being.

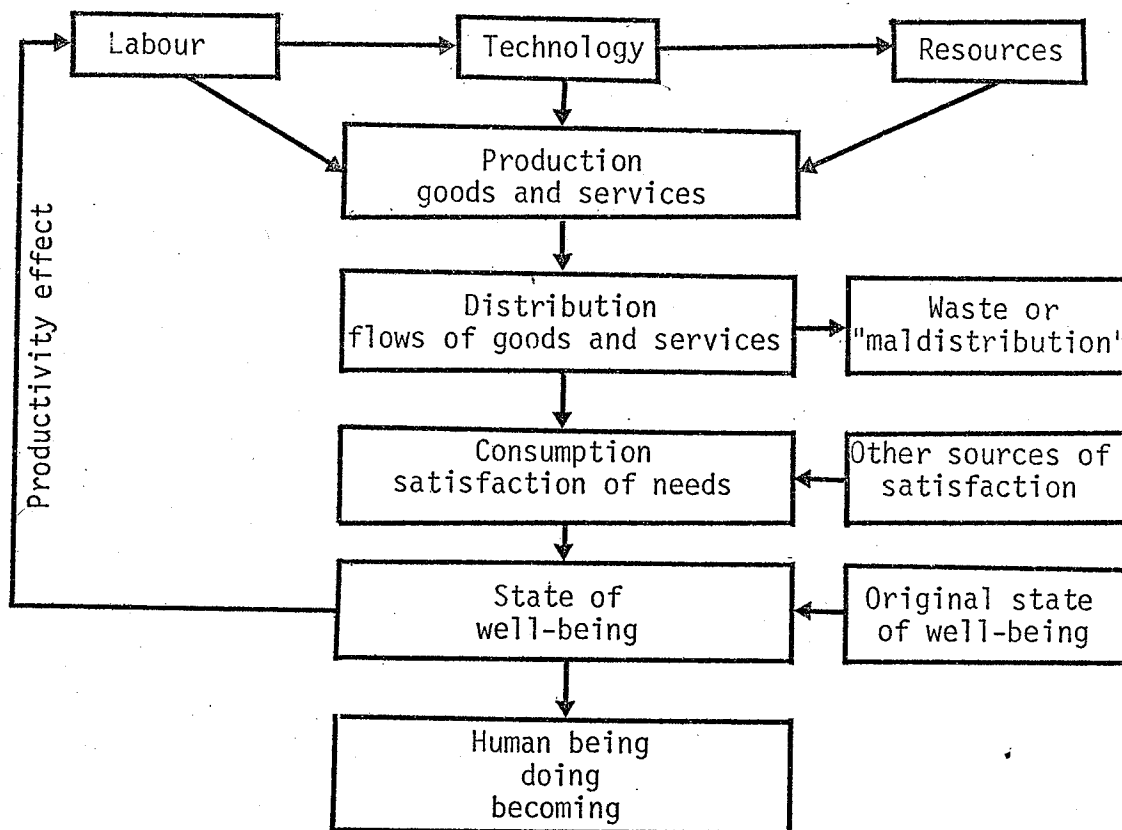


Fig. 2.1 The derivation of human well-being.
(Source: Smith 1977: 38)

This diagram, though somewhat limited by its materialistic production/consumption approach to well-being, effectively illustrates the inter-relating factors which produce well-being. A breakdown in any one of the central components of the system results in a loss of well-being. This model provides a good theoretical basis for determining at which level processes of underdevelopment and modernization disturb the flow of well-being production.

The utility of Smith's "geography of welfare" approach is somewhat limited to elucidating the structures of well-being (or ill-being). As an internally consistent system it is useful in assessing the location and distribution of well-being. However, it is inadequate to explain the maldistribution of well-being resulting from a conflict of interest which occurs when structures of unequal relations begin competing for each other's internal wealth. Therefore, it could be argued that the welfare approach is strongest in discerning the structures of impoverishment and weakest in discerning the processes of impoverishment.

2. The Dependency and World Systems Approach to Disparity

A more radical approach to spatial disparity is reflected in the dependency and unequal structural relations theory employed by Frank (1969), Brookfield (1975), de Souza and Porter (1974), Slater (1974), and Osborne and Rogerson (1978). This perspective, which was heavily influenced by Frank's metropolis-hinterland theory of underdevelopment, assumes that poverty and disparity are not a pre-existent state, but are the consequences of the underdevelopment process. A strong feature of this mode of analysis is the historical process method. Underdevelopment is considered as "the very same historical process which also

generated economic development, the development of capitalism itself" (Frank 1970: 9). Though this approach is heavily influenced by Marxist analysis, it is rejected by Marxists for its lack of a consistently doctrinaire approach to class analysis (Laclau 1971).

In developing his dependency theory of underdevelopment, Frank (1970) posited six hypotheses to illustrate how unequal relations between metropolises and their satellites are the cause of disparity and underdevelopment. First, metropolises tend to develop while their satellites underdevelop. Second, national and subordinate metropolises (such as urban centres in the Third World) are restricted by their relations of dependency to the world metropolises (such as New York, London, etc.). Third, satellites tend to experience their greatest economic development when their ties to the metropolises are the weakest. Frank argues that this hypothesis contradicts the "myth" that close contact with the metropolises and their modern institutions results in development. Fourth, regions that are the most underdeveloped today are the ones which had the closest ties to the metropolises in the past. This hypothesis contradicts the myth that the source of a region's underdevelopment is its isolation and traditional institutions. Fifth, the latifundium (feudal-like land holdings which could in a remote way be likened to the "modern enclave" of development in the Third World) was born as a commercial enterprise which responded to increases in world demand for its product by expanding its influence and holdings. Sixth, the "modern enclaves" which appear isolated and subsistence based today saw their demise as a result of a loss of the demand for their products or of their productive capacity (Frank 1970: 9-14). This last hypothesis is consistent with Slater's (1974: 350) view that "regions that previously

had enjoyed close and mutually beneficial links were in many cases separated economically and socially--they became internally disintegrated."*

Dependency makes the hinterland extremely vulnerable to fluctuations in the metropole's economy. Unequal relations result in the hinterland losing control over its means of production and means of exchange. The hinterland is then held in perpetual subordination to the metropole. The consequences of territorial subordination and dependency are that the hinterland becomes increasingly marginalized in relation to the centres of control in the metropolis. As the hinterland is penetrated by the market economy, the political control over its resources and its surplus value gradually passes into the hands of the few whom the system favours with powers of appropriation. The structural relations between metropolises and hinterland are clearly illustrated in Figure 2.2. According to de Souza and Porter,**

"In a world viewed as a set of von Thünen rings, they [the marginalized] peasantry exist at its outer fringe--poor and discriminated against with respect to use and control of the world's resources. . . . So long as the process of appropriation operates through the market economy within a socially stratified world, imbalances in people and resources will continue to be reflected in the organization of space and in the quality of human life."

*These hypotheses are very appropriate for analyzing the underdevelopment of northern Manitoba, as will be demonstrated in the following chapter.

**The metropolis-hinterland paradigm has been effectively applied to describe the stratified class structure both within the metropolis and the hinterland by A.K. Davis (1971).

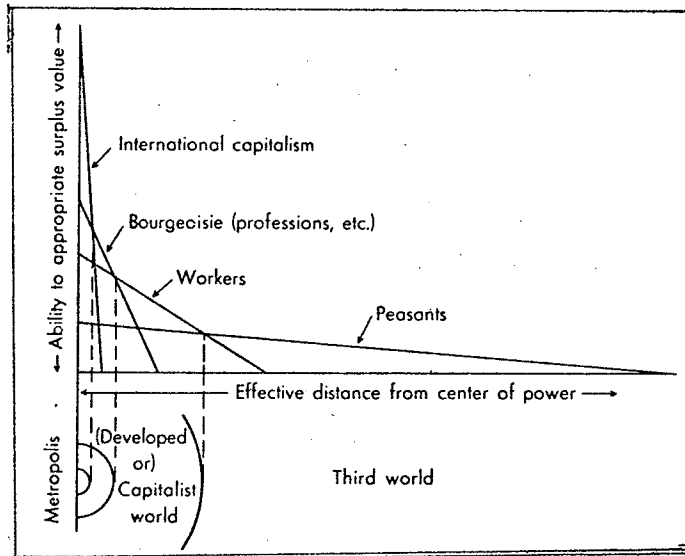


Fig. 2.2 The world's stratified society.
(Source: de Souza and Porter 1974: 81)

One weakness of the dependency theory of underdevelopment is that it tends to focus primarily on exchange relationships (Crush 1980). Whereas it clearly elucidates the structures of resource appropriation and consumption, it fails in clarifying relations of production (Laclau 1971), and particularly the social relations of production (Arrighi undated). As a corrective, we need to turn to the radical geographers' (Blaikie 1978; Slater 1977; Soja 1979, 1980) perception of the social relations of production.

3. The Socio-Spatial Dialectic and Disparity

The essential theme undergirding the "socio-spatial dialectic" (Soja 1980) is that social origins of human activity are expressed in a social organization of space. Spatial structures and spatial relations are the product of social relations of production (Blaikie 1978; Slater 1977). It is argued that once the idea is accepted that spatial organization is a manifestation of the social relations of production, other structural relations within any given mode of production (capitalist, socialist, mixed) can be analysed. This argument is succinctly summarized by Soja (1980: 210):

"Whether it be the form, content, and distributional patterns of the built environment, the relative location of centers of production and consumption, the political organization of space into territorial jurisdictions, the uneven geographical distribution of income and employment, or the ideological attachments to locational symbols and spatial images, all organized space will be seen as rooted in a social origin and filled with social meaning."

General relations of production are simultaneously social and spatial. Both Soja and Blaikie describe the evolution of spatial relations as a two-way "process generating structure" and "structure generating process" relationship.* The process is seen to be distinctly social. The class structures of a given society determines the processes which in turn cause particular patterns to evolve in a manner consistent with the process. Therefore, it is argued, spatial disparity is a consequence of capitalist social relations of production which

*This idea is consistent with Amedeo and Golledge's (1975) process-form theory.

requires a particular spatial configuration in order to function.* It is also argued that spatial structures also generate particular modes of production. The physical geography of a region (contextual space), with its given resources and capital, will determine the relations of production appropriate to the area (Blaikie 1978: 269). Some areas such as ports are more likely to become metropolises whereas others seem to be destined to remain hinterlands. This relationship too can be altered, however, as social relations of production change. As we shall see in the next chapter, this happened in northern Manitoba during the fur trade era.

An essential component in analysing the evolution of social space within the radical perspective is a concept of social change. Innovation diffusion theory, though largely abandoned by "social relevance" geography, was revitalized by Blaikie (1978) to provide a micro-level analysis of social change. Blaikie accepts the essential components of the Rogers and Shoemaker (1971) model of innovation diffusion, but he reinterprets it to fit the socialist paradigm.

The basic element in Blaikie's thinking is that the diffusion process, being both spatial and social in nature, is determined by social structures of relationships rather than by the agents (the transmitter, channel, receiver) of diffusion themselves. Patterns of innovation diffusion are determined by the structural relations between the transmitter (of information, or of an innovation), the channel and the receiver. These structural relations are, moreover, determined by the dominant political economy of a region. Blaikie plays down the role of

*Peet (1980) admits that spatial disparity is a problem within socialist societies as well.

information and of the communication process in the diffusion of innovations. Rather, he argues that the essential determinant is access to resources. He maintains that "An historical approach to time could add that benefits accrue to some before others, and therefore never to others." (Blaikie 1978: 279).

The political nature of innovation diffusion is evident in the radical critique of the innovation of western institutions and technology in the Third World. Examples of the association between health care and the modern market economy in the Third World were given earlier. Slater (1974) argues that since geographers accepted the fallacy that innovations equalled modernization (which was equated with progress), the focus was placed on the innovation rather than on its effects on the population. The possibility that the impact of innovations on well-being could be degenerative was never entertained.

Critics such as Bader (1976) argued that the diffusion of consumer goods was associated with a revolution of consumer values, which he calls cultural imperialism. According to Bader (1976: 617), patterns of consumer tastes reflect

"the configuration of ideals and values, styles and fashions, generally associated with the system of global capitalism . . . Multi-national corporations aim to facilitate the spread of a preference for their output throughout the whole of the local economy . . . this practice is cultural imperialism, or the destruction of local autonomy; it is often called the "coca-colonization" of the world."

*The notion of "coca-colonization" is after the Buchanan *et al.* (in Coates *et al.* 1977) comment that "the penetration of the world by a commodity like Coca-Cola represents a good index of Americanization."

Bader's study of a multi-national company's promotion of infant formula feeding in Latin America is a good example of the deleterious aspects of innovation diffusion. He demonstrates that the diffusion of formula milk is a function of the social relations of production and exchange between an advantaged and a disadvantaged economy.*

Each of the three "social relevance" modes of analysis contribute to the theoretical framework of this study. The welfare approach makes possible the measurement of well-being. This mode of analysis is particularly appropriate to the study of health and nutrition. The dependency approach makes possible an analysis of the evolving exchange relationships between the Manitoba Indians and the fur trade. The socio-spatial dialectic approach contributes to an analysis of evolving spatial patterns in northern Manitoba which reflect changing social relations of production. The innovation diffusion approach is used in discerning the nature of the market economy's effect on changing consumption patterns. This is of special interest to the study of bottle feeding in the last chapter.

The social relevance "school" of geography makes possible an approach to underdevelopment which takes seriously the notion of human well-being. It also provides a theoretical base on which to assess processes and structures which create and perpetuate inequality and disparity. The social relevance approach is particularly appropriate for assessing the impact of modernization on the health and nutrition of marginalized, impoverished people.

*This theme will be fully explored in Chapter X.

E. CONCLUSION

The foregoing discussion of modernization and underdevelopment theory identified the presuppositions which form the basic approach to the problem of poverty and disparity taken in this study. In the course of the discussion a concept of modernity and modernization has emerged. Since these concepts are retained, along with the concepts of development and underdevelopment, I shall briefly clarify my use of the word "modernization".

At the outset it appears that "modernization" and "underdevelopment" represent contradictory processes. If modernization is seen as development, then the contradiction would be apparent. However, sufficient doubt has been cast on this association that the contradiction has been placed rather on the association between modernization and development. Moreover, there is sufficient evidence which demonstrates that modernization can in fact be associated with underdevelopment.

Modernization is a useful concept in the study of underdevelopment. It embodies the character of the contemporary western world which is a reality for the non-western world as well. This study applies Berger's (1974, 1976, 1977) concept of modernity to convey a particular characteristic of the contemporary western world. According to Berger (1977: 61), the main components of modernity are a capitalist market economy, a centralized bureaucratic state, progressive technology unleashed by industrialization, rapid urban growth and urbanism and mass media communication. A vital component of modernity is a modern consciousness which both determines and is determined by the modernization process. Modernization means that not only are material "goods" diffused, but also a modern consciousness. This consciousness is domin-

ated by a bureaucratic and technocratic mindset. The dilemma of modernity is that it purveys "modern" attributes characterized by the ideals of abstraction, futurity, individuation, liberation and secularization (Berger 1977: ch. 6). Therefore, where societies "modernize" (in the sense of westernizing), they acquire not only the benefits of technology but the problems of bureaucratization. Smith (1977: 209) argues that if people want a way of life without the supposed benefits of industrialization and without its negative side effects, they may be better off without it.

Modernity represents as much a world view as it does a technological, bureaucratic form of institutionalism. This idea is essentially incompatible with the Marxian type of materialism which associates modernization with capitalism. The fact that the problems of technocracy and bureaucracy is also associated with socialism is studiously avoided. The problem of modernization is not as much its materialism as its world view. According to Berger (1974: 40, 139):

"Like other fully developed world views, the world view of modernity takes on a dynamic of its own. Not only is it no longer directly dependent upon specific institutional processes, but it can itself influence or generate such processes."

"Yet on the most elementary levels of human experience, modernization is associated with the expectation of being delivered from hunger, disease and early death. Thus modernity has about it a quality of miracle and magic which, in some instances, can link up with old religious expectations of delivery from the sufferings of the human condition."

This notion of modernization reflects the power of the western "images of modernity", and of western ideals of "the good life".

Modernity is a reality for those who enjoy its benefits and also for those who do not. Therefore, it must be taken into account when the impacts of modernization on health and nutrition are assessed. Perceptions of health and nutrition are particularly susceptible to "modern" perceptions of "the good life". When modernity comes to represent deliverance, the type of well-being it represents may in fact lead to even greater entrenchment in poverty when it is uncritically accepted.

This study incorporates the concept of modernization into the study of underdevelopment. The term modernization cannot be used in an historical analysis of underdevelopment, but it is appropriate for an analysis of contemporary underdevelopment processes. The next chapter profiles the historical processes of underdevelopment and the contemporary conditions of underdevelopment in northern Manitoba. It utilizes the theoretical perspectives set forth in this chapter to describe the processes and structures of poverty and disparity which contribute to the state of health and nutrition among Manitoba's Indian people.

CHAPTER III

THE COLONY WITHIN: A PROFILE OF THE NORTH

A. INTRODUCTION

Since the earliest period of contact with the fur trade in the early 1600's, northern Manitoba has been integrated into the world system of economic expansion. Two hundred years of fur trade history heralded profound changes in the Indian way of life. For a short time the Indian people benefited from their integration into the world system of mercantile capitalism. However, as their social and economic advantage--based on their ability to exploit and trade their fur resources, and on their intimate knowledge of the environment--was gradually eroded by encroaching commercialism, they became increasingly marginalized and impoverished. This profile briefly surveys the Indian people's place in the same underdevelopment processes which marginalized what is commonly known as the Third World. The purpose of this chapter is to establish a context for the subsequent discussion on the impact of underdevelopment and modernization on Indian nutrition and health.

The approach taken is to elucidate the processes and structures (a) which have created the northern Manitoban character as it appears today; (b) which have placed the North into a similar context of underdevelopment operative in the Third World; and (c) which currently

exert a profound influence on conditions of nutrition and health. This chapter profiles six aspects of the North and its people. First, the evolution of northern spatial structures and relations is discussed to determine how historical centre-periphery relations have influenced the current isolated and disintegrated character of the North--which is the theme of the second profile. Third, a discussion of the historical roots of current political relations of power will profile the structures of marginalization and dependency. Fourth, economic structures are examined to illustrate how the processes of resource exploitation have established current conditions of social and economic malaise in the North. Fifth, the Indian population structure is profiled to illustrate the social character of socio-economic impoverishment. Finally, a review of the social infrastructure is reviewed to describe the socio-environmental conditions which profoundly effect conditions of nutrition and health.

B. THE EVOLUTION OF SPATIAL STRUCTURES: THE NORTH AND THE WORLD

MARKET ECONOMY

Two and one half centuries of fur trade activity in western Canada wrought profound changes in the socio-spatial character of the indigenous Indian territories. The fur trade, from its first period of contact in the early 1600's, facilitated the penetration of world capitalism into the furthest reaches of the western Canadian hinterland. As a result the Indian territories became fully integrated into the worldwide expansion of mercantile capitalism.*

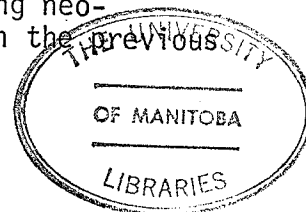
*The following discussion is based on Innes 1956; Ray 1974, 1976; Rothney 1975.

The evolution of spatial patterns in the North was determined by two principal factors. First, the environment and ecology of the North exerted a dominant influence in shaping the character of economic activities for as long as the fur trade remained the dominant activity. Second, the network of metropolis-hinterland relations between both European metropolises and Canada, and between trading post sub-metropolises and the trading area hinterland determined the processes which integrated the Indians into the world market economy.*

Almost two centuries of fur trade activity was oriented toward exploiting the boreal forest and subarctic forest regions. A significant factor was the European preference for beaver pelts coming from the northern forest; the pelts coming from the more temperate south were considered too coarse and too light in colour. It was not until the northern fur resources became depleted that new phases in economic expansion turned the colonialists' attention toward the parkland belt and grasslands region (see Fig. 3.1).

For most of the duration of the fur trade York Factory, which was located on the Hudson's Bay, dominated the boreal forest, and indeed the whole of the Canadian West, in a typical metropolis-hinterland fashion (see Fig. 3.2). York Factory was established as the Hudson's Bay Company headquarters and consequently was the principal port of call for Company ships arriving each summer from England. Other ports such as Ft. Churchill and Ft. Albany were only secondary in importance to York Factory. After the fur trade was opened up for

*The development of metropolis-hinterland relations in the North conforms closely to Frank's six hypotheses explaining neo-colonial relations in Latin America--see the discussion in the previous chapter.



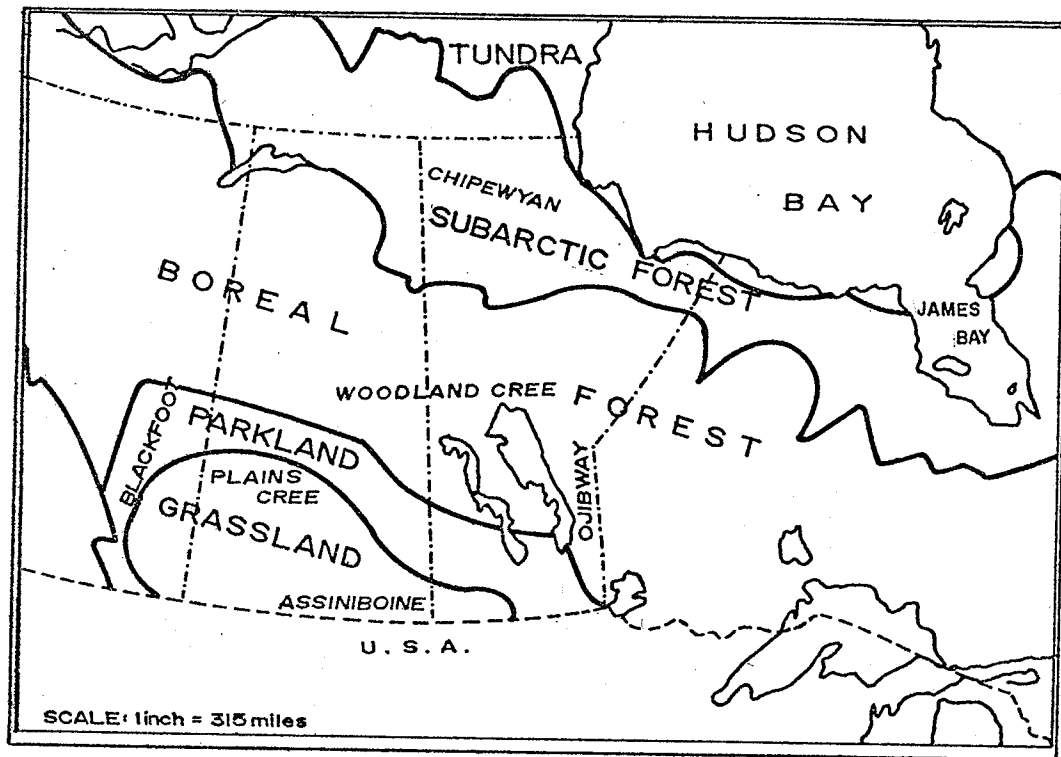


Fig. 3.1 Major Vegetation Belts in Western Canada and the Location of Major Indian Tribes in the mid-1800's.

competition in 1763, a series of trading posts developed along the southern edge of the boreal forest to exploit ever more remote sources of fur. Selected posts such as Norway House (see Fig. 3.3) became sub-metropolises to York Factory to function as supply centres and staging centres for the trips northwestward. As long as the York Factory-Norway House axis retained its dominance, the whole of the boreal forest region remained integrated into Britain's worldwide network of mercantile capitalism.

After fur resources in the boreal forest became depleted, York Factory gradually lost its pre-eminence. The Red River colony eventually replaced York Factory as the hub of western Canadian activity. Consequently, the North became essentially irrelevant; what little interest was left was integrated into the newly developing metropolises in the South.

Between the rise and decline of York Factory, the Indians' way of life had undergone some profound changes. Their integration into the world market economy predisposed them to the full effects of capitalistic influence. The same processes which had integrated them into the world market economy later rejected them when their usefulness had come to an end. With the disappearance of their fur resources and the demise of the fur trade, the Indians' territorial integrity and way of life virtually disintegrated and collapsed.

The evolution of the Indians' territorial integration and disintegration went through four major phases.

- 1) The first phase falls between the time of initial contact and 1670. The trade patterns between the Indians and the French were generally oriented east and west, as illustrated in Figure 3.2. The

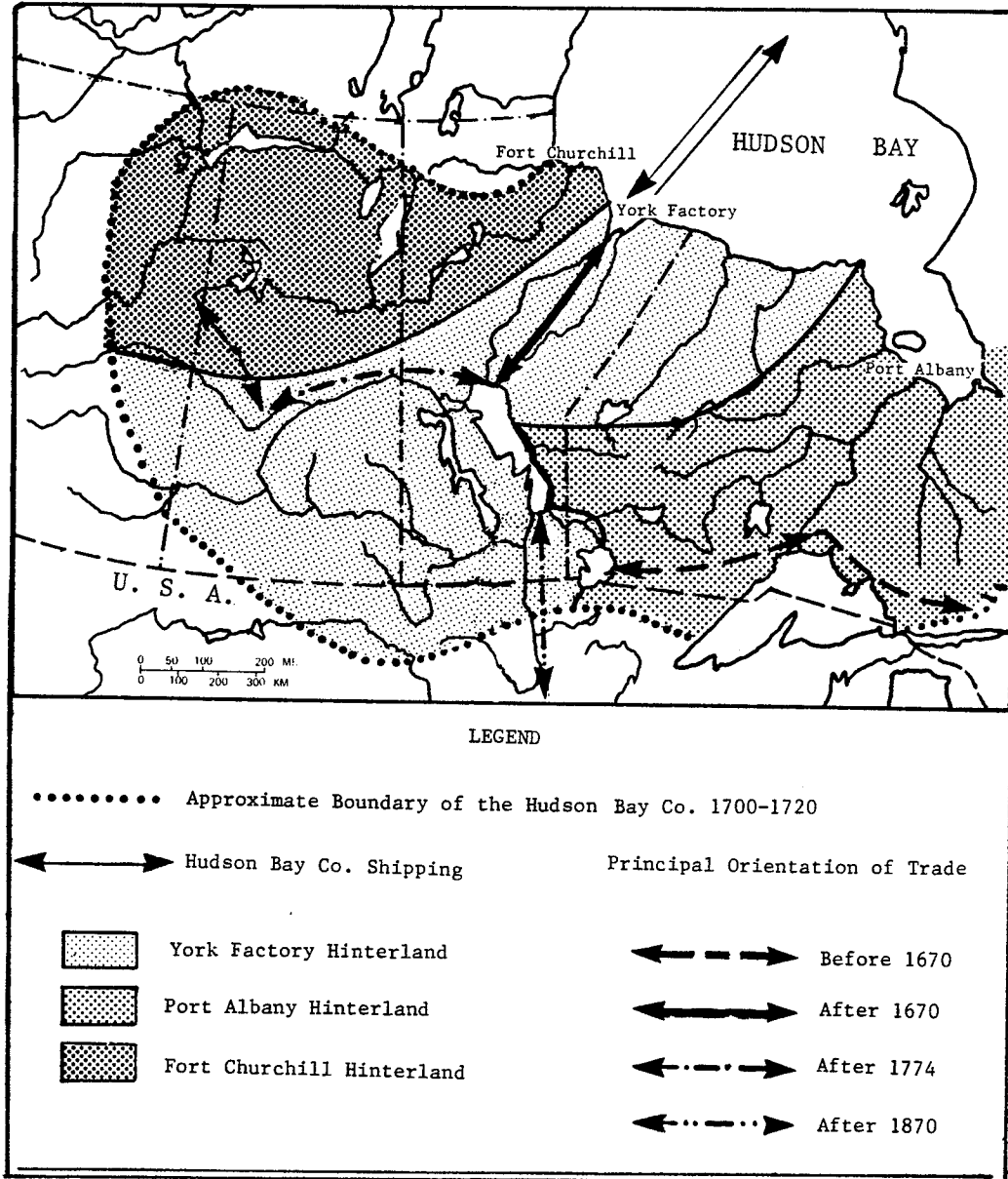


Fig. 3.2 Orientation of the Western Fur Trade
 (Source: adapted from Ray 1974)

French traders developed the first trade links with the southern parkland and plains Indians. They transported their furs to Rainy Lake, after which they were expedited along the "Montreal Route" to Montreal. The traditional Assiniboine and southern Cree tribal territories expanded in response to new opportunities offered by the nascent fur trade.

2) The second phase began with the establishment of the Hudson's Bay Company in 1670, and ended with the opening up of fur trade competition in 1763. The Hudson's Bay Company had vied with the French for control over York Factory for several decades. They finally were able to secure York Factory through the Treaty of Utrecht in 1713. This date also established the Company's monopoly over the vast western Canadian trading hinterland with York Factory as its centre. In this period the general orientation of commerce shifted from the Montreal Route to the York Factory route. Consequently, the Indian territorial patterns were altered once again in accordance with new opportunities offered by the British. This period represented a steady northward and westward expansion of Cree and Assiniboine territories.

The strength of York Factory's dominance rested on the outward expansion of Indian middlemen who traded European guns, knives, kettles and cloth to Indians who had never before set eyes on the white man. Hence the furthest reaches of the Canadian hinterland was being penetrated by merchant capitalism without even coming into direct contact with most of its subjects.

3) The third phase, which began in the 1770's and ended in the 1820's, was a critical period for the Indians. It represented both the most intense period of expansion and integration as well as the begin-

ning of disintegration. In 1763 the Hudson's Bay Company monopoly was broken when competition was opened to the North West Company. In response to competition, the Hudson's Bay Company built the first of its inland posts at Cumberland House in 1774, which initiated the building of a whole chain of trading posts stretching eventually to the MacKenzie River delta (see Fig. 3.3). These posts were situated along major canoe transport routes which were confined largely to the boreal forest regions. Some posts, like Hudson House, became important as centres for trading in provisions (meat, grease, pemmican, etc.) from the Indians to fuel the fur traders and their employees.

This period of internal expansion brought with it the penetration of European economic values. Liquor, credit and extortionate rates of exchange were used to gain an edge in competition. These practices eventually led to the decimation of fur bearing animals, the impoverishment of the Indians and the demise of the fur trade. In this period the Indians of the boreal forest saw the benefits of European contact come to an end. They were left starving, sick, and totally dependent on the Hudson's Bay Company for basic survival.

4) The fourth phase was initiated by the establishment of the Red River colony in the 1820's and closed with the signing of the treaties and the demise of York Factory in the 1870's. With the decline of the fur trade and a new interest in agriculture and settlement, the whole orientation of Euro-Canadian influence shifted westward and southward. Numerous posts in the boreal forest were closed and new ones opened in the parkland and grassland areas (see Fig. 3.3). Indians in the grasslands, hitherto left relatively independent, were subdued and exploited. In the boreal forest numerous epidemics of smallpox, influ-

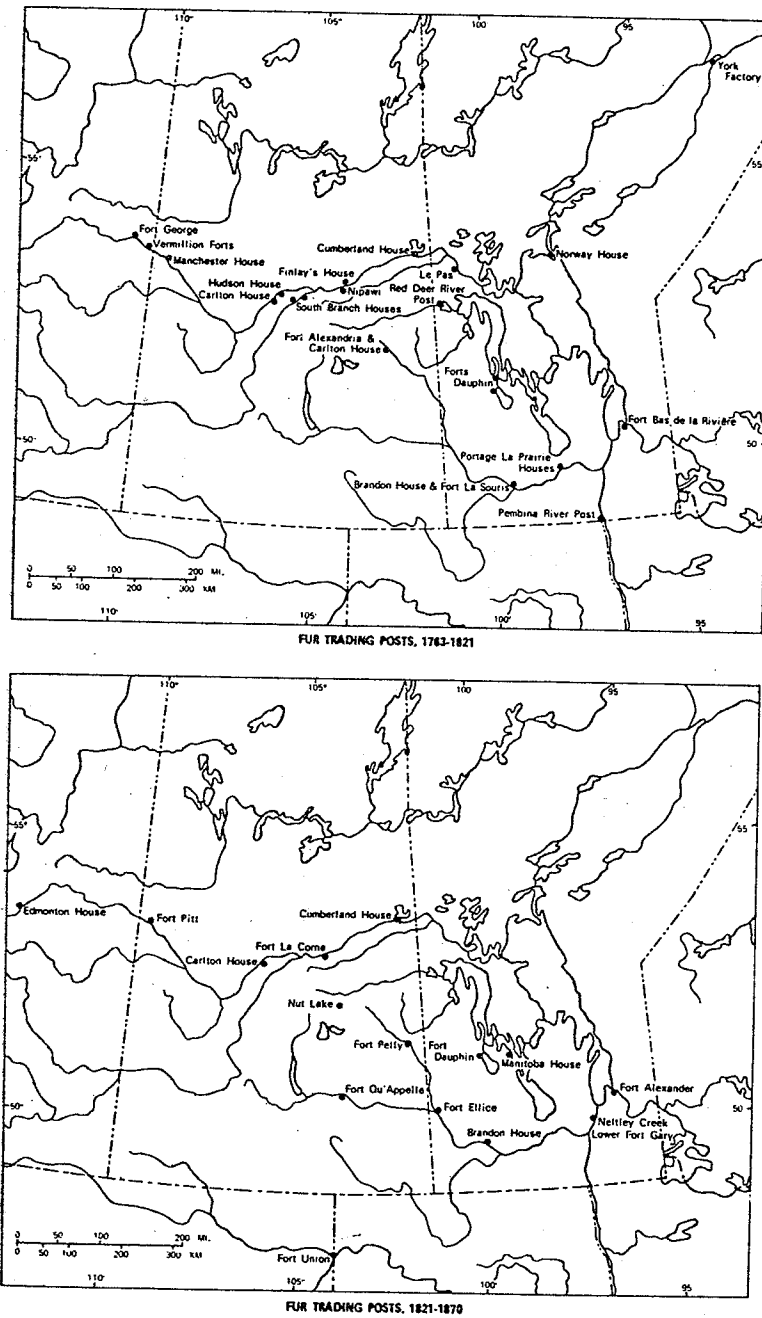


Fig. 3.3 Fur Trading Posts (1763-1870)
(Source: Ray 1974: 127, 201)

enza and measles decimated the Indian population. Their weakness and lack of resistance culminated in their signing treaties with the government of Canada which finally alienated them from their land and isolated them onto reservations.

The importance of the York Factory-Norway House axis came to an end in 1878 when the Company moved its headquarters to Ft. Garry in the Red River colony. It had become cheaper to utilize the new transportation corridor southward through St. Paul and on to the new economic metropole in Chicago. Some goods continued to come inland through York Factory, but none were sent out. For all intents and purposes, the North had become isolated and irrelevant.

This historical summary has demonstrated how the Indian people, who were once central to the success of the fur trade, eventually became marginalized and irrelevant entities when their usefulness to capitalist expansion came to an end. Their economic relevance had become limited to the supply of furs, provisions and services. They remained integrated into the world market economy as long as there was an abundance of natural resources. When the resources dried up and demand fell, the changing political, economic and social structures prohibited their diversification and autonomous development. Consequently, the North disintegrated and became one of the poorest of the poor regions in Canada today. Since the signing of the treaties, there have been virtually no major changes in the spatial structures affecting the Indian people. The same spatial processes which created disparity in the past are still operating to perpetuate disparity today.

C. THE CURRENT SPATIAL STRUCTURE: CONTINUED DISINTEGRATION

Since the end of the fur trade era the patterns of spatial organization in the North have changed very little. Except for the development of the modern "developed" enclaves, the North is still basically disintegrated and unorganized. In many respects the northern spatial organization resembles that of the colonized Third World. Existing spatial patterns are organized around the development of modern enclaves and transportation systems oriented toward resource extraction. In the interim, Indian communities have remained largely isolated and unintegrated.

Manitoba's North has been regionally classified in numerous ways, depending on political and/or economic administrative priorities. The Manitoba Department of Northern Affairs defines the North as the territory demarcated by a line beginning at the 51st⁰N in the eastern part of the province, and angling in a northwesterly direction along the southern edge of the boreal forest to about the 53rd⁰N at the western boundary (see Fig. 3.4). This department has jurisdiction over Crown lands not covered by local government districts (LGD's) or by Registered Indian Reserves (I.R.) (see pp. 56 following for a clarification of Registered Indians). The local government districts comprise the ten modern enclaves, while most of the 78 Indian Reserves and other unorganized communities comprise the remainder of the underdeveloped, disintegrated North.

A typical feature of the northern economy is the enclave of modernization organized around the exploitation of minerals, forestry and hydro-electric generation. The spatial pattern associated with enclave development is also typical of the Third World. There are ten

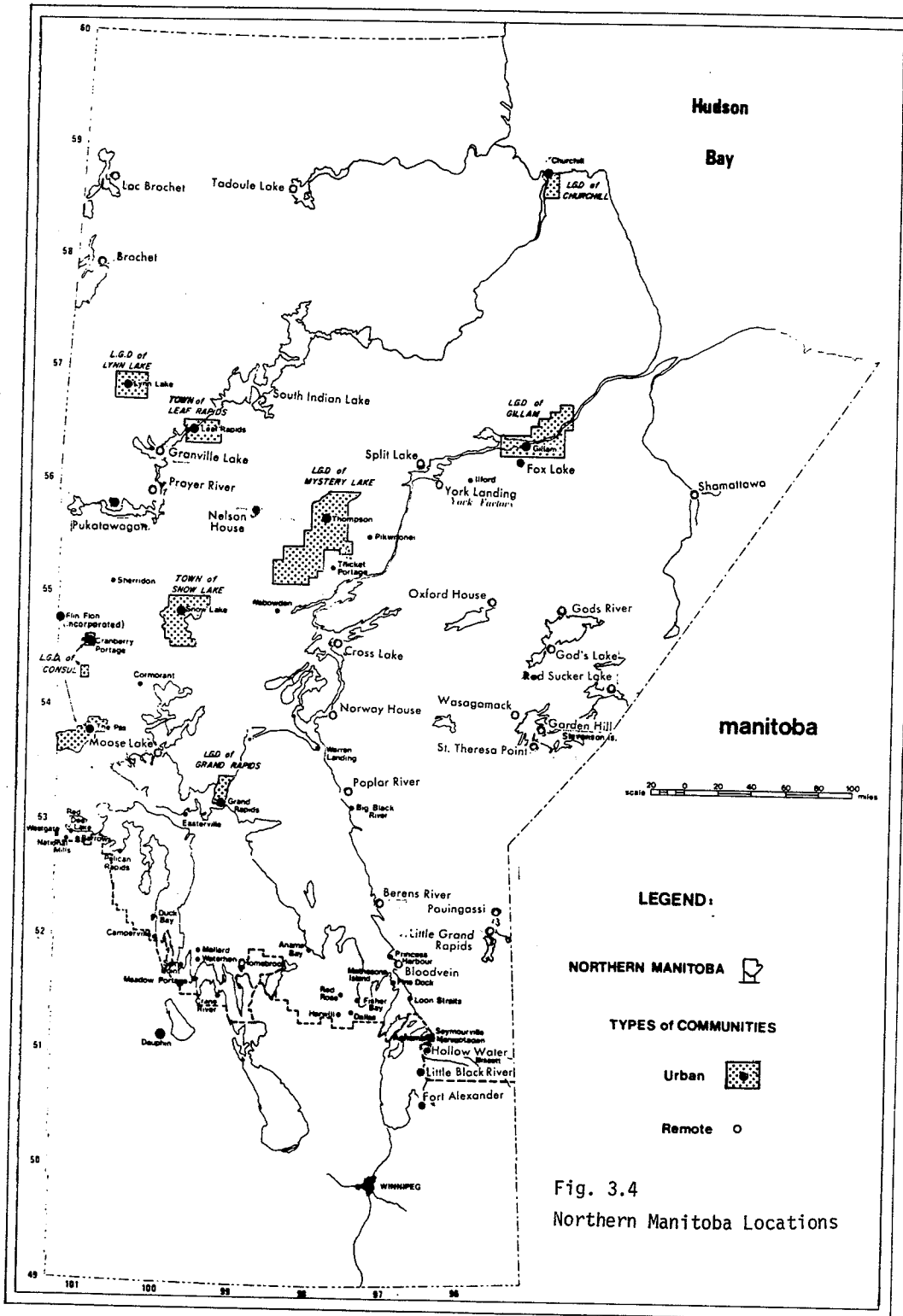
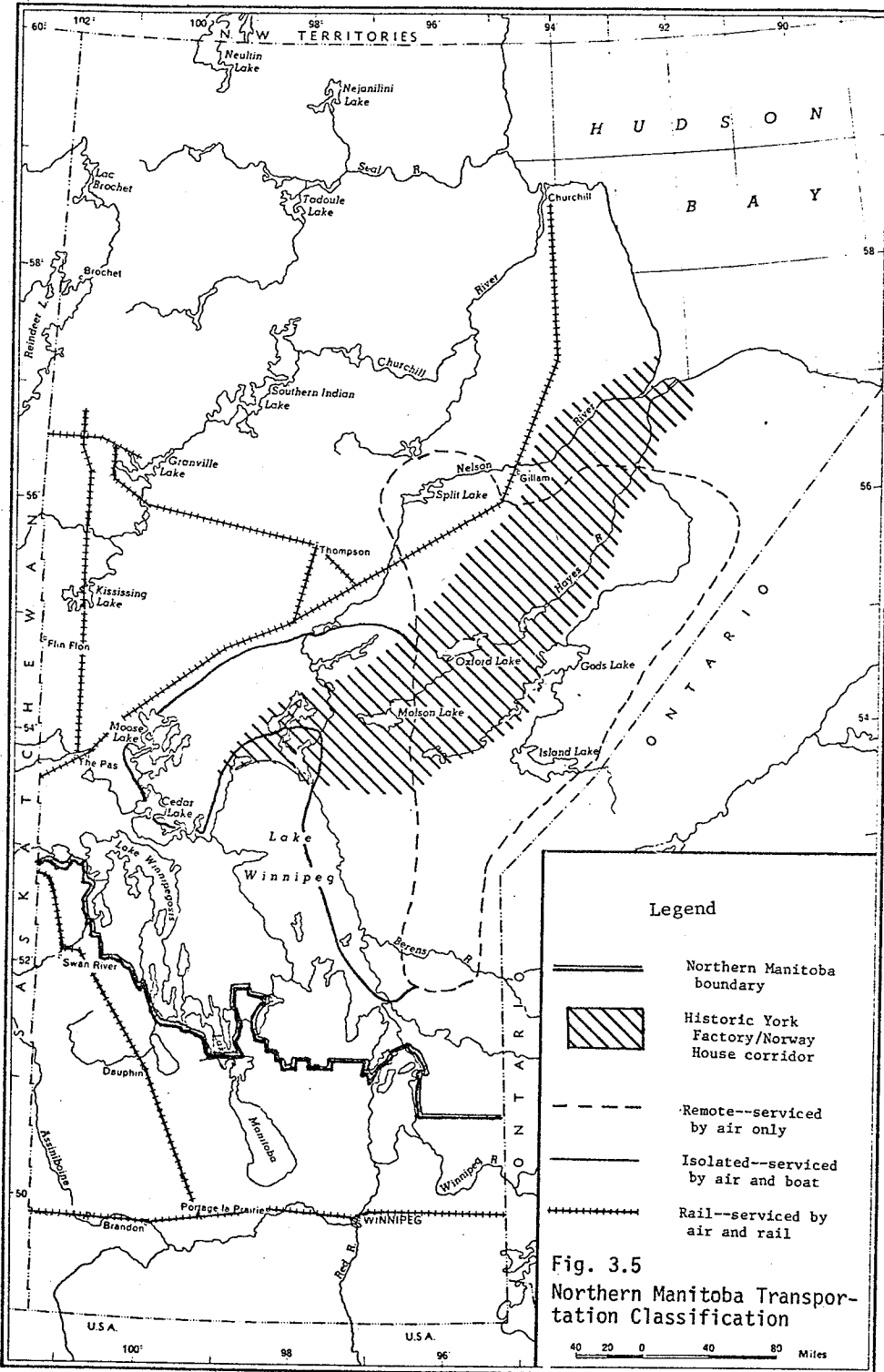


Fig. 3.4
Northern Manitoba Locations

such enclaves: Thompson, Churchill, Gillam, Lynn Lake, Leaf Rapids, Snow Lake, The Pas, Consul, Grand Rapids and Pine Falls (see Fig. 3.4). Of a total northern population of 96,000 (1976), the enclaves contain more than half (55,300). This represents 9 percent of the Manitoba total. The remaining 40,700 live in the 78 smaller northern communities (Henderson 1977). The urban enclaves are comprised largely of non-native residents who have migrated from the South or from other regions in Canada to be employed. The northern enclave is frequently referred to as the "White North".

The modern enclaves are serviced by a transportation network oriented toward extracting their natural resource products. In a pattern typical of Third World transportation patterns, rail links were built to service the mining centres from the South and to evacuate primary products to the seaport at Churchill (formerly Ft. Churchill). Roads have also been built primarily to integrate the modern enclave into the South.

The Northern Transportation Study (Hickling and Johnson 1975), a government report on northern development, has classified all of Manitoba into four major categories according to transportation access. The classifications are: road, rail, isolated and remote (see Fig. 3.5). Whereas all the modern enclaves have year round road access, only 38 out of the 78 Indian and Metis communities have road access. Indian communities typically have received road service only if they are situated near existing service roads. The historical trading centre of Norway House only received road access in 1978. Rail service has benefited few Indian communities as well. Eleven communities which have no road access receive only rail plus air service. The Indian communities



receiving rail service do so only because they either happened to lie near the line or because they were later established near the line. Thirty communities fall into the "remote" and "isolated" class: they have year-round access only by air. In the winter, remote communities are serviced by "winter roads", which are constructed over frozen bogs and lakes with hard packed snow. Most heavy transport must await the arrival of winter. The isolated communities rely on summer boat service to meet heavy transport needs. About two-thirds of these communities were once located on or near the main York Factory-Norway House transport corridor linking western Canada to the whole world. Today it is the most isolated and remote area in Manitoba.

In comparison with other Canadian Indian communities, Manitoba has a larger percentage of remote communities than the Canadian average. A study (Siggner 1980) indicates the distribution of Registered Indian Reserves by type of location.

Table 3.1 Distribution of Registered Indian Bands by Type of Location

	Total	Urban		Semi-Urban		Rural		Remote	
		No.	%	No.	%	No.	%	No.	%
Manitoba	57	1	1.8	5	8.8	26	45.6	25	43.9
Canada	573	49	8.6	118	20.6	242	42.2	164	28.6

- * Urban - centres of 10,000 and over with urban economic characteristics
- Semi-Urban - located within 40 commuting miles, on all-weather roads, from an urban centre
- Rural - located over 40 miles of an urban centre, and having at least one road access
- Remote - communities lacking a reasonable means of access (no road). (Source: Siggner 1980: 20)

Table 3.1 shows that about 44% of Manitoba's reserve communities are remote compared to 28.6% for all Canada. Whereas the rural distribution is similar, Manitoba has far fewer urban and semi-urban Indian reserves (19.6% vs. 29.2%). This table illustrates that Manitoba's North shows more characteristics of remoteness and disintegration than is true for most other Canadian Indian territories.

The spatial character of underdevelopment in the North has historically been a major factor in the continuing patterns of disparity between the industrialized South, the "modern" North and the "Indian" North. The spatial patterns characteristic of the North reflect a type of resource development whose benefit accrues to external metropolises at the expense of the impoverished hinterland.

D. POLITICAL STRUCTURES: THE COLONIAL PATTERN

The current spatial patterns in northern Manitoba are continuing manifestations of a colonialist process of exploration, exploitation and economic expansion. A policy of "divide and rule" subjugated the Indian people and kept them marginalized from developments in the South. The political structures of colonialism which have kept the Indian people subdued and irrelevant were entrenched in the Treaties which deprived them of their aboriginal rights to land.

By the end of the fur trade the native people had been effectively alienated from their resource base and from their land. In 1875, Treaty Number 5 was signed between "her Majesty the Crown and the Chiefs and Councilors of the Indian Bands of the Swampy Cree of Northern Manitoba" (Inter Church Task Force 1975). By this treaty the Crown (Canada) became the titular owner of the reserve lands on which the

Indians were placed. It also became the appointed trustee and guardian of Indian treaty rights. The Indians surrendered forever all rights, privileges and title to the land they previously occupied. In return they were guaranteed a parcel of land on which to live, hunting and trapping rights and an annual payment of "treaty money". They also were to receive a few ammenities such as ammunition and medicines for survival (Rothney 1975). The Indians initially believed that the reserves were set aside for residency only. However, in time, they found out that they had neither economic nor political privileges outside the reserve (Indian Act 1975). It was not until 1952 that the Manitoba government gave them the right to vote. The federal government gave them this right in 1960. Until this time they were not even rightfully considered full citizens.

The reserves were designed to remove the "Indian problem". Before they signed their land away the government felt they had no legal right to expropriate land for settlement and resource exploitation (Rothney 1975). According to Sanders (1973: 30), the reserves "were developed as a piece of social planning designed to shift the economic base of native people to facilitate non-native settlement." The treaties and the Indian Act combined to create an oppressive political structure under which the Indian people still suffer.

The political organization of the North is highly complicated by the fact that the Indian Act divides the native population into three groups (Indian Act 1975). The Treaty Indians (or Registered Indians) are settled on reserve lands and address their needs to the federal government. Today, an Indian is classified as Treaty if the individual's bloodline can be traced through the father to the 1875 treaty.

A second classification is made up of non-treaty Indians, who cannot trace their bloodline through their father to a treaty. They do not have treaty rights and live on Manitoba Crown land. They relate to the Manitoba government. In a third category are the Metis (of mixed Indian and white parentage), who are essentially on the same legal ground as non-treaty Indians. Essentially, non-treaty Indians and Metis are squatters on the Manitoba Crown lands and have few land rights other than concessions given by the provincial government.

The land issue is further complicated by the fact that most native communities are made up of both treaty and non-treaty natives. That means each community has two levels of government (Department of Northern Affairs Community Profiles). The treaty Indians are represented by a Chief and a band council under the jurisdiction of Ottawa, and the non-treaty people by a Mayor and councillors answering to Winnipeg. The two bodies are obligated by law not to work together. This arrangement of divide and rule makes cooperation a most difficult task.*

Not only are the political structures reminiscent of colonialism, but the political approach to the North reflects every characteristic of neo-colonialism. The government's attitude is reflected in the "Two-North" concept. Loxley (1978: 7-8), in lifting out excerpts from a government sponsored study on northern transportation, illustrates the colonial nature of the dominant political attitude:

"There is not one North, but two. There is clearly an industrial north demonstrating characteristics which are distinctly different from the second north--the

*As we shall see, this arrangement also makes data collection on the North an extraordinarily difficult task.

Native North (which is) culturally distinct, attitudinally divorced and there is little if any interest in interaction by either culture. . . . Climatic conditions are not favourable to development in face of the reality that the industrialization of the modern world has taken place in more temperate climates . . . traditional value systems may be in conflict with modernization ideals . . . (and become) inhibitions and obstacles to planning . . . It is unlikely that this fact is unique to any particular culture or regions more likely that the Northern Manitoba Native People, and in fact all Native People (!) encounter such conflicts which may be largely responsible for the current stage of under-development and the particular difficulties they encounter in trying to develop."

The northern native people are put in the worst possible light--they are responsible for their own poverty because they encourage rapid population growth and fail to acquire modern western attributes.

The northern Manitoba political structure generally conforms to Gonzales-Cassanova's characterization of an internal colony. Whether a colony is external or internal, he says that it is characterized as a territory: (a) without self-government; (b) in unequal position with respect to the metropolis; (c) where administrative responsibility lies in the government which governs it; (d) where inhabitants do not participate in the election of their own government (this was the case until 1952 in Manitoba); (e) where rights, economics and social privileges are regulated by the state (here the federal government); and (f) where the inhabitants belong to a race and culture different from that of the dominant people (Gonzales-Cassanova 1969: 123). Gonzales-Cassanova argues that in cases of internal colonialism, foreign exploiters are substituted by national exploiters. The contemporary political situation in the North is well summarized in his statement that the

"psychology of colonialism, with complicated rules of treatment, with prejudices, and perceptions of the colonized man as a thing, is linked to the internal policy of the colonial society, to a policy of manipulation and discrimination which appears in the juridical, educational, linguistic, and administrative order which tends to sanction and increase the social dichotomies and the relations of domination and exploitation characteristic of colonies."

(Gonzales-Cassanova 1969: 230)

The characterization of the North as a colony within goes beyond the political structures; economically and socially the North is colonized as well. Loxley (1978: 19) argues that "Northern native people are colonized and their economy bears all the characteristic traits of a colonial economy." Furthermore, like the patterns of Third World colonialism, these structures are deeply embedded in the history of exploration, exploitation and expansion.

E. ECONOMIC STRUCTURES: CONTINUING RELATIONS OF EXPLOITATION

The current economic structures and their spatial manifestations reflect the three century-long underdevelopment processes which are the heritage of the North. The structures of present-day economic development are characteristic of colonial and Third World-type patterns of resource exploitation (Berger 1977; Davis 1971; Elias 1975; Loxley 1978; 1981; Watkins 1977). Loxley (1981, forthcoming) has argued that "structurally the economy has much in common with that of the fur trade era." In the same way that the fur trade exploited the Indian people, northern development projects today tend to perpetuate processes and patterns of underdevelopment. According to Loxley lecture (1977), modern development projects continue to be: (a) highly capital intensive;

(b) extensively disruptive of the landscape as well as social infra-structures; (c) in demand of high levels of technical skills; (d) highly dependent on imported labour largely to the exclusion of native labour; (e) primary export based (geared to the U.S. market); (f) dependent on the importation of capital goods and operating inputs (from eastern Canada and the U.S.); (g) state supported monopolies (Abitibi, Manfor, INCO and Manitoba Hydro); and (h) oriented toward the export of surpluses. The colonial patterns of exploitation are established in (1) the northern patterns of resource development and (2) the employment and income characteristics of the northern native residents. This discussion will briefly profile both patterns.

1. Patterns of Resource Development

The pattern of development in the North has been largely extractive and export oriented. Exploration and exploitation "took off" during the depression years and during World War II. The renewed interest in the North was oriented toward forestry, fishing and some mining.* The discovery of nickel in the Thompson region in the 1950's initiated a new era in exploration for minerals and the subsequent development of the modern enclave organized around mining. The development of hydro-electric potential, which also began in the 1950's and burgeoned in the 1960's and 1970's, has been the only resource development to directly affect the Indian people. The development literally changed the courses of rivers, flooded communities and threatened well established fisher-

*See Rothney and Watson (1975) for a good discussion of this period of resource development.

ies, traplines and hunting areas (Lake Winnipeg, Churchill and Nelson Rivers Study Board 1975).

Northern development patterns have been characterized by capital intensive development in natural resource extraction. Exporting semi-refined staple goods such as lumber, nickel ingots and electricity has generated huge profits for southern metropolises. Between 1968 and 1970 the mining companies earned about \$192 million in profits. In the same period Manitoba Hydro retained \$70 million in profits. Between 1970 and 1978 Manitoba Hydro achieved a surplus of \$450 million (Loxley 1981).

In spite of impressive growth rates in northern investment and returns, little benefit has accrued to the Indian hinterland from which the profit was extracted. Even though most of the northern communities are served by diesel generated electric power, few have been serviced directly by hydro-electric power generated from northern rivers. The diesel generated electricity is not of a high enough amperage to do more than "light up the town".

Very little of the profit generated in the North has been retained for northern development. Rothney and Watson (1975) report that, for example, INCO (the nickel mining company) retained only 10.4 percent of their northern surplus, most of which accrued to Thompson in the form of wages and salaries. The multiplier effect of this meagre retention is also very small, since most of that money finds its way to southern banks or is spent on consumer goods imported from the South. There is little evidence that the large industrial staple producers have been successful, or have even attempted to develop economic linkages in order to retain some of their surpluses for northern development.

One can argue that ever since the fur trade era, economic structures have been transformed only to the extent that an increase in economic rents for the southern and American metropolises is assured. These colonial structures have resulted in socio-economic characteristics which have perpetuated the impoverishment of the northern hinterland.

2. Employment and Income Characteristics

During the early period of northern development there were numerous employment opportunities for the Indians in mining, forestry, cottage industry, farming, fishing and transportation. For a limited time the North was not attractive to southern labour. However, as technological advances made "frontier" life more compatible to southern lifestyles, the North became a valuable employment opportunity for southern labour. Hence, as technology advanced and the southern labour force became more competitive many of the native people were forced to return to their "traditional" pursuits of hunting, fishing and trapping (Rothney and Watson 1975).

Employment and income figures for northern Manitoba reflect a high level of social and economic malaise. Unemployment figures for Indian reserves are not systematically kept and what data there is tends to be sketchy and unreliable (Siggnier 1980). Unofficial estimates, however, put general unemployment in the wage labour sector at 85% to 90%. A 1979 figure for on-reserve Indians places unemployment at 71% (Siggnier 1980). Employment figures are difficult to substantiate due to the seasonality of much of the wage labour, and the extent that "traditional" pursuits such as fishing, trapping, hunting and wood

gathering influence overall rates. These skew income figures as well. According to Loxley (1981), however, it can be ascertained that 80% of the jobs in the North are located in urban centres. Furthermore, in 1975 only 5% (900) of all jobs in the North were filled by native people. Employment opportunities for the native people are further eroded by a high birth rate and the large numbers of youth entering the labour force each year.

Income figures tend to reflect the employment conditions. The per capita income for native communities averages less than \$1,000 per annum while the urban enclave per capita income is over \$4,000. Native income is a scant 25% of the Manitoba average and well below the poverty line. An estimated 84% of all income generated in the North is accrued to 64% of the population. That leaves 16% of the income for the remaining 36%, who are made up largely of native people (Stefansson 1980).

A breakdown of incomes in some selected communities indicates that anywhere from 15% to 35% of the income is derived from the "traditional" economy in the form of income-in-kind.* From 35% to 55% of the income comes from the wage economy. These figures are highly influenced by short-term seasonal labour characteristic of Manitoba Hydro employment, for example (Lake Winnipeg, Churchill and Nelson Rivers Study Board, Technical Report 1975). Transfer payments (or social assistance) are becoming an increasingly important component of the total income. In the 1972-1973 fiscal year, 43% of reserve income came from social assistance. By the 1978-1979 year, the figure rose to 57%, or an

*Income-in-kind refers to a calculation of estimated replacement costs on goods procured through hunting, trapping, fishing or wood-gathering at a rate that would be paid had they been purchased.

increase of 37% in six years (Siggner 1980). Some reserve communities report social welfare payments of more than 80%.

This profile of economic structures reveals a pattern of northern development processes which in fact has resulted in the underdevelopment of the native people's spatial, economic and social integrity. Not only are they excluded from the benefits of resource exploitation, but they are also required to pay the social costs of development (Watkins 1977). Their exclusion from long-term, effective participation in the wage economy has, according to Elias (1976), marginalized them even out of the "reserve army of labour". With few exchangeable commodities outside of labour, the native people have become a permanently underemployed class subsisting on social assistance. Furthermore, the process of economic underdevelopment has created social structures which have tended to perpetuate the spatial, economic and social underdevelopment process.

F. POPULATION PROFILE: A THIRD WORLD TYPE

A profile of northern socio-economic conditions reveals a way of life set in poverty and disadvantage. Social conditions reflect the spatial and economic disparities which have already been highlighted. Furthermore, the spatial and economic structures themselves are reflections of the social conditions. A profile of the northern Manitoba Indian population structure reflects similar disparities found between the underdeveloped and the developed world. This section profiles Indian population distribution, population growth, age-sex structure, mortality and fertility characteristics.

1. Population Size

The Manitoba Health Services Commission sets the total provincial Indian population count at 53,280 (1977). Of these, 41,050 (or 76.9%) live on Indian reserves, and 12,234 (or 23.1%) live in unorganized territories, which represent unregistered northern Indians not living on Indian reserves.* Of Manitoba's total 1977 population of 1,083,509, the Indian population comprises about 5%. About 40,800 (or about 76.5%) of the native population resides in the North (Henderson 1977).

The Indian population is distributed in communities which tend to be larger than the Canadian average Indian community. A majority (56.1%) of Manitoba's Indians live in communities in the 300 to 1,000 population range. Table 3.2 illustrates the population distribution according to Indian Reserve Band size. There are six remote communities which have a population size greater than 1,000, two of which have more than 2,000 (Norway House and Cross Lake). The smallest remote community is God's River with a population of about 300 (Indian and Inuit Affairs Program Statistics Division 1977). Table 3.2 indicates a proportion of Manitoba bands with over 300 members (84.2%), which is twice that of Canada as a whole (42.2%). This figure indicates that there are larger

*There is a major data problem inhibiting any accurate assessment of demographic structures. Because of the different regional subdivisions and different data collection methods employed by provincial and federal levels of government, the possibility of encountering gross inconsistencies must be expected. This data will pertain, in some instances, only to registered Indians, other data represents all Indians; yet in other circumstances, Indians in northern Manitoba alone are included. The type of data will be duly identified. In a majority of cases, the figures given in this discussion should represent at least three quarters of the total Indian population living in the North.

concentrations of people in Manitoba Indian communities than is typical for all Canadian Indian communities.

Table 3.2 Registered Indian Population Distribution According to Band Size

Band Size	Canada		Manitoba	
	Number	Percentage	Number	Percentage
0- 100	95	16.6	3	5.3
101- 300	179	31.2	6	10.5
301-1,000	224	39.1	32	56.1
1,001-2,000	59	10.3	12	21.1
2,000+	16	2.8	4	7.0
Total	573	100.0	57	100.0

(Source: Siggner 1980: 18)

2. Population Growth

The overall growth rate of the Indian communities suggests a rapidly increasing youth population. Between 1971 and 1976 the total northern population grew at 2.1% per annum growth rate. The Indian reserve population, however, showed a phenomenal 7.5% growth rate (Henderson 1977). Reasons for this phenomenal growth rate are not readily apparent, as births alone cannot account for such an increase. However, as the population age-sex structure illustrates, just under one half of the Indian population is under 15 years of age.

3. Population Age-Sex Structure

The population pyramid (Fig. 3.6) illustrates a demographic structure most reminiscent of a Third World type.

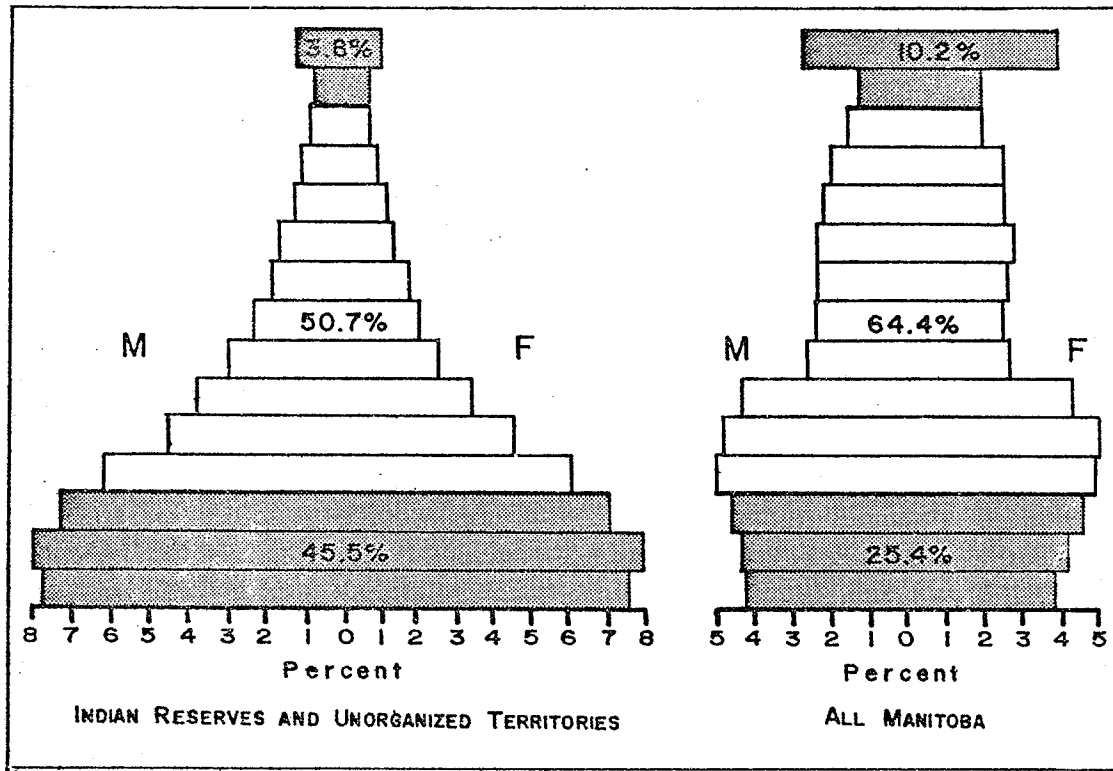


Fig. 3.6 Indian and Manitoba Age-Sex Structure (1977)
(Source: Maternal and Child Care Vital Statistics)

The age-sex structure of the Indian reserves and unorganized territories demonstrates a pyramid shape typical of populations with high birth rates, high death rates and impoverished living conditions. The Manitoba pyramid illustrates a shape typical of an industrialized, urbanized society.

Forty-five percent of the Indian population are under 15 years of age compared to only 25.4% for all Manitobans. This figure, however, represents a drop from near 50% five years previously. A large number of these youth enter the labour force each year, while the remainder place a heavy strain on educational and recreational facilities geared

for the youth.

4. Mortality Characteristics

In 1976, the average life expectancy for all Indians in Canada was 63 years versus 72.5 for all Canadians. The average age of death in 1974 was 42.5 years for Indians and 66.5 years for whites. Many Indians die at a very young age compared to the rest of the population (Health Data Book 1978). Figure 3.7 illustrates the age-standardized death rates for Canadian Registered Indians, Manitoba Registered Indians, and all Manitobans.

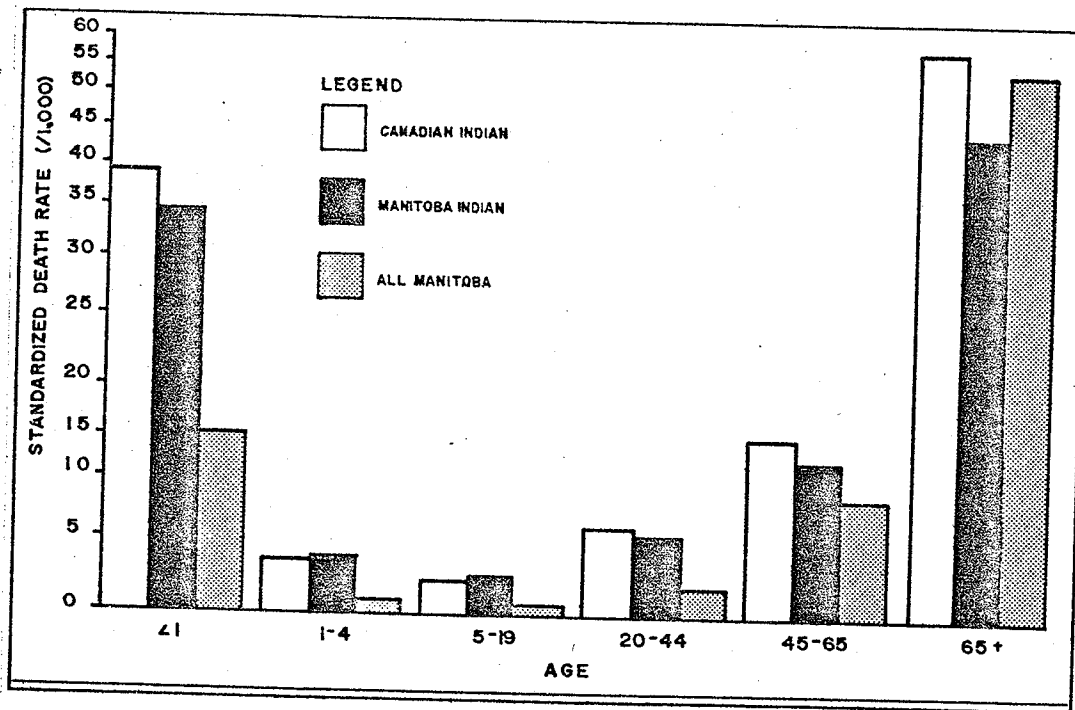


Fig. 3.7 Canadian and Manitoba Registered Indian Age Standardized Death Rates

(Source: Siggner 1980)

Figure 3.7 indicates that the greatest differential is in the infant mortality rate. The 1973-1976 average infant death rate was 34.1 per thousand live births for Indians and 15.7 for Manitobans. By 1978, the rate had dropped to 23.7/1,000 and 13.2/1,000, respectively.* The figure also indicates a higher death rate for Indians in all ages except in the 65 plus cohort. The lower rate among the elderly indicates that fewer Indian people than all Manitobans reach old age. The overall age-standardized death rate for Manitoba Registered Indians is 10.2/1,000 (1976) and for all Manitobans, 8.3/1,000 (1974) (Signer 1980).

5. Fertility Characteristics

The bottom-heavy population age structure makes continued rapid population growth inevitable. In spite of a rapidly declining crude birth rate in the last five years, many more Indian infants are being born per thousand than for all Manitoba. Since 1967 the crude birth rate has dropped from 48.4/1,000 (versus 17.8 for all Manitobans) to 23.3/1,000 in 1978 (versus 15.0). Figure 3.8 illustrates a substantial decline between 1976 and 1977. What reason there is for such a decline is only open to speculation. A rapid drop could indicate either better reporting, a change in methods of documentation, or an actual decline.**

The general fertility rate ($\frac{\text{pop. 0-4}}{\text{females 15-44}} \times 1,000$) indicates that Indian families tend to be very large. A rate of 0.846 suggests that there are an average of 8.5 children under five years of age for

*Infant mortality will be fully discussed in Chapters VIII and IX.

**A similar decline was registered for infant mortality in the same years (see Fig. 6.).

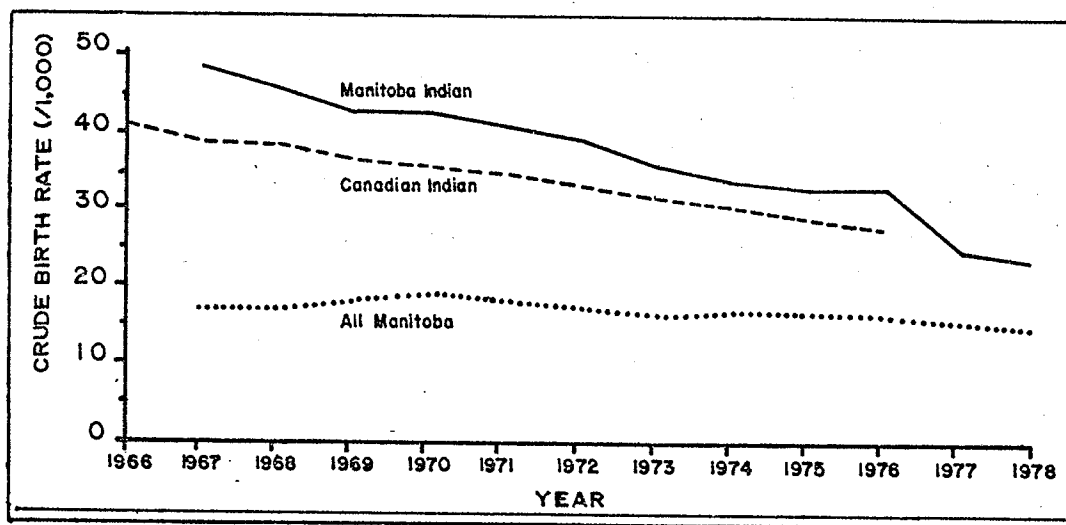


Fig. 3.8 Canadian and Manitoba Registered Indian Crude Birth Rates

(Source: Piché and George 1973 (1960-1970); Siggner 1980 (1971-1978)).

all mothers of child bearing age (Henderson 1977).

In spite of the substantial decline in birth rates, the population boom of recent years will continue to add a large number of women to the child bearing group. Between 1966 and 1976, the number of women age 15 to 44 increased from 5,441 to 8,570. The forecasted decline in live births is offset by an increasing number of women entering the child bearing years (Siggner 1980).

In the last several years Manitoba has suffered from a population loss and an increasing old age dependency ratio. For Indian communities, however, a fast growth rate and a large youth dependency ratio has put a strain on the health of mothers, on the provision of social services and on the creation of employment. Overall, inadequacies in the provision of services and the inadequacy of socio-economic development has created living conditions not conducive to good nutrition nor to good health.

G. SOCIAL CONDITIONS: A THIRD WORLD WITHIN?

The social conditions in the North are indicative of the spatial, political and economic disintegration which underdevelopment has perpetuated. Furthermore, they are aggravated by a population structure which continuously adds pressure to conditions which already are not conducive to good physical and psycho-social well-being. A review of education, housing, water and sanitation illustrates the extent of the insalubrious conditions of life in the Indian hinterland.

1. Education

The level of education attained by northern native people lags far behind the rest of the province. In 1971, 19% of the native people

had never gone to school (Loxley 1981). In 1976, only 48% of the adult population had completed grade nine, while only 18% had completed secondary school (Stefansson 1980). General enrollment figures for public schools show a general drop between 1966 and 1976. In 1966, 94% of children between ages 5 and 13 were enrolled; by 1976 the figures dropped to 86%. For youths between 14 and 18, 18% were enrolled in 1966 and 38% in 1971. In 1976, enrollment was again as low as 30%. In post secondary schools, however, there was a significant increase in enrollment. It rose from 4.9% in 1968 to 33.9% in 1975 (Siggner 1980). In the public school sector a poor educational standard, insufficient attendance, poor facilities and a culturally irrelevant curriculum impede attaining a good, functional level of literacy (Robert Bell, personal communication 1980). Literacy has been shown to be correlated with achieving good health standards among the Inuit (Hobart 1976).

2. Housing

Since the sedentarization of the Indian people, they have been confined in southern type housing in southern type settlements. Housing styles and construction quality have been largely inappropriate for northern lifestyle and northern climatic conditions (Fred Gudmunsson, personal communication 1978). A 1977 housing survey (cited in Stefansson 1980) indicated that 44.5% of the housing is in need of major repair or replacement. A majority (83.8%) were occupied by one family. Family sizes are large, however, and the average dwelling has an average of only 3.74 rooms. To achieve relief from over-crowding, 20.3% more units are needed. For a majority of houses (72.6%), a single smokey wood-burning stove supplies the only source of heat. About 90%

of the houses have electricity, but it is used for heating in only 14% of the houses.

Poor, crowded housing has been associated, for the past century, with high levels of disease among the Indian population (Bryce 1922; Moore *et al.* 1946; Vivian *et al.* 1948).

3. Water

Indian communities have been denied access not only to good housing but also to clean, safe water. In recent years resource developments and expanding settlements have begun to pollute traditionally safe water supplies. A survey of household water conditions (cited in Stefansson 1980) found access to safe, clean water to be grossly deficient. Also, whereas 44% of the 78 remote reserve and non-reserve communities surveyed had access to an outdoor standpipe, only 3.8% were found to have access to indoor plumbing services (see Table 3.3).

Table 3.3 Water Access in 78 Northern Manitoba Communities (1980)

Water Access	Number
Piped to homes	3
Trucked	9
Wells	6
Individual collection - more than 1 standpipe	6
Individual collection from pumphouse or 1 standpipe	28
Individual collection from lake or river	20
No information	6

(Source: Stefansson 1980: 88)

Of these 78 communities, over 25% have to rely primarily on river and lake water. In the winter the rate of river or lake water use rises considerably as outdoor water systems often become frozen.

4. Sewage and Garbage

Inadequate sewage and garbage disposal has been found to strain the safety margins of water supplies and general community hygiene. Maintaining marginal levels of sanitation is severely hampered by rapid population growth and generally poor soil conditions for optimal disposal. The same survey cited earlier also examined access to sewage disposal services in Indian communities (see Table 3.4).

Table 3.4 Sewage Disposal in 78 Northern Manitoba Communities (1980)

Sewage Access	Number
Pit privies	47
Septic tanks	4
Sewage lagoons	1
Treatment plant	1
Septic tanks and pit privies	4
Sewage lagoons and pit privies	1
Trucked and pit privies	1
Individual disposal	8
Pail collection	3
Nil	1
No Information	6

(Source: Stefansson 1980: 90)

A recent survey showed that in Ste. Theresa Pointe, where 75% of the population uses lake water, coliform bacteria (related to fecal contamination) levels were 3.8 times the acceptable levels (Winnipeg Free Press Nov. 19, 1980: 2). Clean, safe water is essential to good health. This is particularly critical for communities with large populations and inadequate services.

This brief review has illustrated that Indian communities are risky and hazardous places in which to try to maintain good health. The high levels of ill health, which will be discussed in Chapters VII and VIII, indicate this fact to be true.

H. CONCLUSION

This chapter set out to profile the northern Manitoba region and the sons and daughters of its original inhabitants. The main approach taken was to use the process/structure method rather than a purely descriptive method to understand the origins of northern poverty conditions. It was demonstrated how historical processes and structures continue to perpetuate conditions which are intolerable even by Third World standards. The evaluation of spatial relations was examined to demonstrate how current spatial patterns of underdevelopment are linked to the historical process of metropolis-hinterland power relations. The discussion of political structures demonstrated how colonial-type relations continue to determine patterns of power relations today. The economic structure theme illustrated how political and economic power relations, characterized by the 19th century spirit of exploration, exploitation and expansion, continue to facilitate exploitative development patterns today. In the discussion of contemporary social conditions, parallels

between the North and the Third World were drawn.

The overall purpose of using the process structure method is twofold. First, it links northern Manitoba to the Third World patterns of underdevelopment. Drawing this parallel helps provide a solution to a special problem. Relatively few studies on Indian health and nutrition have been done from the underdevelopment/modernization perspective. Therefore, numerous studies on health and nutrition drawn from African and South American sources are required in this study to develop a theory of the underdevelopment of health and nutrition relevant to the North.

The second purpose for using this method was to lay the groundwork for developing the hypothesis that conditions of ill health and malnourishment do not exist in isolation, but that they are in fact manifestations of the historical processes of underdevelopment. Conditions of ill health and malnourishment become critical when they occur within constrictive and oppressive political, economic and social structures. This theme will be fully developed in the succeeding chapters.

This chapter has provided the historical and contemporary descriptive framework onto which the succeeding chapters are built. The next chapter explores the problems in relating conditions of ill health and malnourishment to the processes of underdevelopment and modernization. A general paradigm of health and nutrition in the Third World will be developed in order to place the discussion of Indian health and nutrition within a theoretical context.

CHAPTER IV

THE ECOLOGY OF NUTRITION, HEALTH AND MODERNIZATION

A. INTRODUCTION

The conditions of poverty, ill health and malnourishment evident in northern Manitoba today reflect a long history of colonial exploitation. The Indian's integration into the fur trade determined how diseases were introduced and determined the patterns of disease diffusion. Historically, the processes of underdevelopment, which resulted in the Indians losing their viable social and natural resource base, unleashed devastating epidemics of smallpox, influenza, measles, scarlet fever, tuberculosis, venereal disease and starvation (Ray 1976). Current processes of modernization have unleashed new epidemics of heart diseases, diabetes, gall bladder disease and cancer (Schaefer 1971a). In spite of the fact that modern medicine has reduced the virulence of epidemic diseases and malnutrition, the same processes of underdevelopment and modernization serve to perpetuate ill health and malnourishment today.

A study of nutrition and health is best approached from an ecological perspective; indeed, this is the most common approach. However, to also examine nutrition and health from a perspective of underdevelopment and modernization requires developing a unique theoretical perspective. To understand how ecological systems and modernization processes relate invites the application of what Hunter (1974: 3) calls the

"spatio-environmental" approach:

"By 'environment' we holistically embrace its diverse physical, biological, social, cultural, and economic components. By 'space' we signify a prime interest in the spatial dynamics of man-environment phenomena."

This perspective is exemplified in a study by Laurell et al. (1977) who, in establishing a theoretical basis for examining the underdevelopment of nutrition and health, posit the following three basic assumptions:

(a) Specific historical patterns of a society result in social structures which express themselves in particular health and nutritional situations, and that transformations in the structures result in changes in health and nutrition;

(b) The cumulated effects of socio-economic and environmental-ecological factors are greater than biological factors alone in the processes generating disease and malnutrition; and

(c) Socio-economic conditions are not direct causal agents, but they interact in such a way as to determine the structures that unleash and transform the biological phenomena.

Laurell et al. (1977: 421) argue that "The economic structures and social relations of production and exchange present in a society, and not biological phenomena by themselves, determine the character of the relationship between man and nature and, consequently, the type of pathology afflicting him."

This chapter establishes the basis for taking an ecological approach to the problem of underdevelopment and modernization. A holistic concept of well-being (Smith 1977; Wisner 1976) provides the conceptual orientation for examining this ecology of nutrition and health.

The first part examines the ecology of nutrition to lay the basis for subsequent discussion on the consequences of the modernization-induced nutritional shift on health and well-being. The second part examines the ecology of health to establish how nutrition and health interact to contribute to, or detract from, well-being. The third part examines the ecology of etiology (the causal explanation of ill health) to elucidate the larger socio-environmental interactions which influence nutrition and health. Finally, a discussion of modernization as an etiological factor will establish the validity of using the "spatio-environmental" approach to nutrition, health and modernization.

B. TOWARD AN ECOLOGICAL CONCEPT OF NUTRITION

The common saying "We are what we eat" reflects a strong social, psychological and physical identification with food. Food and food habits are so closely tied to human existence that George Orwell wrote, "I think it could be plausibly argued that changes of diet are more important than changes of dynasty or religion." (cited in Berg 1973a: 1). Food not only fulfills nutritional needs, but also plays a significant role in the organization of social, religious, economic and political structures. A holistic, ecological understanding of nutrition, then, embraces the totality of human existence.

On the most basic, biological level, nutrition is "the sum total of all the operations whereby a living organism takes from the environment what it needs for fuel, growth and repair of its tissues." (May 1974: 32). The most common measurement of nutritional adequacy is the daily intake of calories and proteins. Precise definitions of "good nutrition" may be possible when limited to specific people at a specific

stage in life carrying out specific activities and under specific stress conditions. A general definition of good nutrition, however, is virtually impossible as nutritional status is buried in an individual's adaptive and maladaptive response to various environments. There is no universal nutritional standard. India's standard of daily food requirements for the "reference man"--25 years, 65 kg., doing light activity--is 2,400 calories and 55 grams of protein (Young 1964: 323). Nutrition Canada (1975) recommends 3,000 calories and 86 grams of protein daily. Some tribes from Papua, New Guinea have been known to perform amazing physical feats with only 1,600 to 1,900 calories daily (Robson and Wadsworth 1977). Even the Basal Metabolic Rate, which defines the number of calories (1,600 recommended) necessary to fulfill only the most basic of body functions is questioned. Basic nutrient requirements, therefore, are a factor of age, sex, activity, race and ecological adaptation.

Precise definitions of good nutrition are not possible. However, whereas health was defined in functional and existential terms, likewise an adequate definition of nutrition can be found in Jerome, Kandel and Pelto's (1980) term "functional nutritional well-being". This term does not attempt to define an ideal, or potential of nutrition, but reflects rather optimal nutrition in the context of ecological adaptation.

Malnutrition is more easily defined than nutrition. Quite simply, malnutrition is a "pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients." (Scrimshaw *et al.* 1968: 19).* Scrimshaw and Behar (1969) classify mal-

*See Scrimshaw and Behar (1969) for a full description of nutrition and nutritional diseases.

nutrition into five categories: starvation, undernutrition, overnutrition, specific deficiency and imbalance. The pathological state may be manifest overt signs of definable illnesses (e.g. marasmus, kwashiorkor, beriberi, pelegra, etc.) or in subtle forms such as obesity, hypertension, depression, etc. It should be noted that both the hungry of the Third World and the overfed of the industrialized world manifest the symptoms of malnutrition. In this study the term "malnourishment" is used in preference to malnutrition, as it implies a less clinical notion of faulty nutrition.

The ecology of nutrition is best defined within a particular system of food production or procurement. In their ecological model of nutrition, Jerome et al. (1980: 14-15) classify the food system into five component parts. At the heart of the model are individual biological requirements for nutrients and psychological needs for nurture. Surrounding the individual are:

(a) the physical environment which establishes the conditions of food production;

(b) social organization, which includes economic and political structures related to food production and distribution, division of labour and household structures;

(c) technology which embraces the tools and techniques of food production and distribution, processing, storage, transportation and food preparation;

(d) cultural and ideological beliefs which include ideas about the role of food in health, religious beliefs involving food preferences and restrictions, and the use of food in social interaction and religious practices;

(e) the social environment, which encompasses other societies whose food production and behaviour can have profound effects on the society in general.

In short, the ecology of nutrition encompasses a complex array of interrelated and interdependent factors of which the supply of nutrients to the body plays only a minor role.

Functional nutritional well-being is an achievement of environmental adaptation. Nutritional adaptability is expressed

"in the ability of the human body to rally or respond positively to the insults of nutritional stress by altering physical or metabolic activity while maintaining function . . . Nutritional adaptiveness also reflects the change in individual nutrient requirements in response to age, sex, activity, stress, disease, climate, altitude and a wide range of socio-environmental factors."

(Jerome et al. 1980: 16)

A population that is well adapted to its own ecosystem and exhibits functional nutritional well-being might well soon exhibit malnutrition should it be transferred into another ecosystem. More often than not nutritional maladaptation is a function of "accumulated environmental effects" resulting from nutrient deficiency or dietary excess. Maladaptation is a typical response to either of two processes: (a) a shift in food practices or changes in the food production/distribution system--especially when experienced as a result of the modernization process, and (b) continuous exposure to nutritional hazards present in the form of nutrient deficits or excess in specific food items, intentional food additives (e.g. flavourings, emulsifiers, preservatives, stabilizers, etc.) or accidental additives (e.g. pesticides, herbicides,

antibiotics, hormones, toxic metals, etc.) and components used in food processing and packaging. These hazards are a particularly significant factor when assessing cumulative maladaptation in the etiology of ill health.

When man leaves his natural, ecologically sensitive food system, nutritional well-being is invariably compromised. Moreover, drastic changes in the nutritional ecology have strong implications for health and general psycho-somatic well-being. The next section develops the ecological concept of health as well-being.

C. TOWARD AN ECOLOGICAL CONCEPT OF HEALTH

An all-embracing concept of "good health" is reflected in the holistic notion of "well-being" and "wholeness". The preamble to the World Health Organization charter conveys a rather utopian ideal in the following definition: "Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." (Dubos 1968: 88). Dubos suggests a more readily attainable definition which aims at achieving a "rewarding and not too painful existence" while coping with an "imperfect world". A concept of "wholeness" in health does not rule out pain and suffering, but implies maintaining the social, psychological and biological integrity (equilibrium) to cope with illness-producing stresses (Berliner and Salmon 1980). Ill health can then be defined as the result of a fragmentation and fracturing of wholeness (Wisner 1976) and hence a loss of integrity. Disease shatters wholeness by challenging biological, emotional and existential well-being (Powles 1973). Biologically, good health can be achieved by maintaining the physiological capacity to lead a fulfilling

life, to accomplish goals and, in the words of Audy, to have the "ability to rally from insults, whether chemical, physical, infectious, psychological or social" (cited in Jerome et al. 1980: 16). Emotionally and existentially, good health means to "feel alive in pleasure and in pain", as well as being culturally equipped to make pain tolerable, sickness or impairment understandable and death meaningful (Illich 1976: 129-131). The holistic concept of health as "well-being" is a basic principle in defining the underdevelopment of health, which challenges, and often results in a loss of, well-being. This concept is particularly appropriate for associating dependency and marginalization with a loss of well-being and ill health.

The intrinsic relationship between the physical environment and states of health was already conceived by the ancient philosophers and practitioners of health. The Hippocratic tract "Airs, Waters and Places" laid the groundwork for the modern science of epidemiology 2,500 years ago:

"(The physician who is an honour to his profession is one) who has a due regard to the seasons of the year, and the diseases which they produce; to the states of the wind peculiar to each country and the qualities of its waters; who marks carefully the localities of the towns, and of the surrounding country, whether they are low or high, hot or cold, wet or dry; who moreover takes note of the diet and regimen of the inhabitants, and, in a word, of all the causes that may produce disorder in the animal economy."

(cited in Powles 1973: 225)

An epidemiological explanation of ill health (see Johnson (1969) for a detailed discussion) assesses the interaction between the trillogy of host (the ill person), agent (e.g. bacillus) and environment. Ill health (or injury) is produced only when the host is susceptible, the

agent virulent, and the environment amenable to the interaction (Rogers 1960; Scrimshaw *et al.* 1968). An epidemiological explanation attempts to discern which environmental factors determine susceptibility and virulence. The environmental explanation includes genetically determined susceptibility, the psycho-social setting, the natural habitat, and significantly, man's artificially created environment. This includes the creatures of industrialization; air and water pollution, machines, synthetics, and radiation (Johnson 1969).

The environment can affect health in two ways: it may act upon or within the body as a material agent, or upon the mind and emotions as a non-material agent (though sooner or later this may produce a material effect) (Rogers 1960: 168). The environmental variables can be further classified into (a) man's intrinsic environment and (b) man's extrinsic environment. Rogers (1960: 169) develops the classification in the following schema:

ENVIRONMENTAL FACTORS HAVING POSSIBLE EFFECTS ON HEALTH STATUS

I. The Material Environment:

- A. Intrinsic (somatic) factors: age, sex, hereditary characteristics.
- B. Extrinsic Factors:
 - 1) Physical environment: topography, climate, occupation, housing, other physical aspects of both macro and micro environments in which man lives.
 - 2) Biological environment: food, sanitation, infectious disease agents, vectors of disease producing agents.
 - 3) Social environment: man's relations with man in terms of his manner and conditions of living.

II. The Non-material Environment:

- A. Intrinsic factors: inherent mentality and temperament
- B. Extrinsic factors: affecting man's conscious and/or unconscious behaviour: notions, beliefs, and ideologies;

values and goals; social norms; life experiences such as socialization, education, trauma and stress, satisfactions and rewards; other cultural factors.

On the simplest level of explanation, good health is a maintenance of a homeostatic equilibrium within the inner and outer environment (Dubos). However, since conditions are continually in flux and change, the key to good health is adaptation, or the maintenance of a dynamic equilibrium (Hughes and Hunter 1970). Rogers (1960: 165) argues that these concepts are too simplistic and static. Health is determined by what he calls the "net balance of accumulated environmental effects". Having surpassed the peak load of tolerable stresses, the host may exhibit pathologies with no discernable causes, and with "inappropriate" manifestations. Ill health--or injury for that matter--can then be defined as maladaptation rather than loss of equilibrium. The diseases of civilization, many of which are nutritionally related,* and the underdevelopment of health have common origins in maladaptive responses to accumulated environmental stress. In the long run adaptation may be less successful than commonly assumed (Renaud 1978). In the words of Dubos, "Disorders may be secondary and delayed consequences of adaptive responses, useful at first, but faulty in the long run." (cited in Renaud 1978: 103). The ecology of health implies not only a static interaction of environmental effects, but also an historical process which in itself becomes a determining factor in the manifestation of ill health and loss of well-being.

*Ischemic heart disease, cancers, hypertension, diabetes, mental illness, and social pathologies such as suicides, crime, family breakdown, etc. are some examples.

D. TOWARD AN ECOLOGICAL EXPLANATION OF ETIOLOGY

In the last century modernization has brought with it a phenomenal reduction in mortality and morbidity. It has also been responsible, however, for greatly altering the nature of disease, and in fact, has even produced its own peculiar array of diseases. Hence, it could be argued that "under conditions of affluence and crowding the products of man's technology may be inducing a selective method of population control just as micro-organisms are the main agents of death under conditions of poverty." (Furnass 1970: 98). In light of this statement, we can define two broad categories of disease: diseases of poverty and diseases of affluence. With the increasing complexity of social, economic and political organization, explanations of ill health also become increasingly complex.

Any one pathology can be the manifestation of numerous disease-causing processes. This is particularly true when one takes into account the net balance of accumulated environmental effects (Rogers 1960). Moreover, any one disease inducing process may also give rise to a number of pathological manifestations (McDermot 1969). Therefore, a multifactorial explanation of disease is needed (Dubos 1968). A single-cause explanation of ill health is appropriate in only the most narrowly defined context of infectious and parasitic disease. Most episodes of morbidity, however, are an expression of a wide array of interactions within man's total health ecology.

In the interest of clarity, disease etiology can be broken down into five broad categories: infectious/parasitic; chronic/degenerative; psychosocial; accident/trauma; and diseases of no specific origin. The first three categories are of special interest in this discussion. In

conditions of poverty, a bulk of the disease burden is made up of infectious and parasitic diseases (Scrimshaw et al. 1968). For a majority of diseases in this category, single cause agents can be identified, but their interaction with the host and the environment is not always explainable nor predictable. The most pernicious culprit in this category is the gastro-enteric/respiratory complex, most of which is made up of specific and non-specific diarrheas, influenza, pneumonia, bronchitis and tuberculosis (McDermott 1969). This complex still accounts for a majority of morbidity in both the Third World as well as northern Manitoba.

Nutrition and socio-economic conditions are the two most serious factors which account for the harshness of infectious disease among the poor. In conditions of impoverishment, malnutrition is frequently chronic as well as hidden. Though a direct association between malnutrition and disease is not easily made, studies have shown that malnutrition is the underlying cause of 50% to 60% of deaths in children aged one to four in underdeveloped countries (Berg 1973a; Scrimshaw et al. 1968). According to Berg (1973a: 4), "Malnutrition causes otherwise minor childhood diseases to become killers." The interaction between malnutrition and disease is synergistic. Whereas malnutrition impairs both the host's resistance to disease and the host's disease combatting mechanisms, disease complicates the host's ability to absorb and utilize the few nutrients available (Scrimshaw et al. 1968).

Today it is taken for granted that impure water, poor sanitation and bad hygiene, crowded housing and poor working conditions are key components in explaining the etiology of infectious and parasitic disease. The role of medical technology in reducing morbidity and

mortality in infectious diseases occurred before the discovery of antibiotics (McDermott 1969; McKeown and Lowe 1966; Powles 1973). In turn-of-the-century New York, for example, the pneumonia/diarrhea complex accounted for a bulk of infant mortality. Between 1900 and 1930, before the advent of antibiotics, the infant death rate dropped from 75 to 17 per thousand (McDermott 1969: 12). In England, the majority of morbidity and mortality reduction at the turn of the century can be attributed to the work of social reformers who pressed for improvements in sanitation and general socio-economic reform. Scientific medicine, however, has preferred to attribute this reduction to medical advances following the exposition of the germ theory by Pasteur and Koch (Berliner and Salmon 1980; Powles 1973; Renaud 1978).

In spite of the advances in environmental conditions, it has been argued that nutrition is just as significant, if not more so, than sanitation and hygiene. Studies have shown that where nutrition is good, regardless of the presence of parasites (Berlin and Markell 1977), squalid living conditions (Schaefer 1971a; Sinclair 1953), or absence of health care (Grosse 1980; Laurell *et al.* 1977; Valverde *et al.* 1980) health status has been determined to be adequate. Sanitation and socio-economic factors become most important when losses in ecological integrity have already occurred.

The categories of ill health which include chronic disease, psycho-social illness and diseases without specific attributable causes are generally described as diseases of affluence, civilization or lifestyle (Berliner and Salmon 1980; Najman 1980; Powles 1973). In industrialized societies infectious and parasitic diseases are largely under control, as indicated by low mortality levels in this category.

Though scientific medicine has been successful in dealing with many of the symptoms and aftermaths associated with illnesses such as cancer, cardiovascular disease, obesity, diabetes, mental illness, etc., their causes and the biochemical/surgical means of their prevention and control still remain, to a large extent, unknown. It has been suggested that malnourishment and "modern" lifestyles play a significant role in the causation of these illnesses (Powles 1973; Schaefer 1971a). According to epidemiologists and critics of modern scientific medicine, explanations for the diseases of civilization lie deeply embedded in factors of environmental and psycho-social maladaptation (Dubos 1968).

An attempt to account for ill health of nebulous origin is made by general susceptibility theory, as presented by Najman (1980). This theory attempts to correlate modern problems such as stress, unhealthy lifestyles and ill health with the psycho-social environment. Variables such as marital status, religion, class, occupation and experience with trauma are shown to be clearly associated with episodes of "lifestyle" diseases. In general susceptibility theory, two explanations dominate. The psycho-somatic explanation relates the impact of stress on lowering host resistance to disease and to the social resources the host has to resist the impact of stress. The socio-somatic explanation focuses on lifestyles, where "All health problems may, to a greater or lesser extent, be related to precipitatory situations in the environment, in behaviour or in the individual's perception or reaction." (Najman 1980: 234). This idea is consistent with Roger's (1960) notion of "accumulated environmental effects". Intolerable stress and unbalanced lifestyles contribute significantly to maladaptive responses which result in the diseases of civilization.

E. MODERNIZATION AS ETIOLOGY

Major changes associated with modernization are particularly disturbing to health and nutrition (Dubos 1968). Forces which result in social fragmentation and ecological debilitation not only create new disease patterns but also undermine society's ability to cope medically and socially with the new pathologies (Heller and Elliot 1977). Hunter (1974: 3) summarizes well the ecological impact of maladaptive responses to change:

"It follows that any processes of change, whether of the environment per se or of man's adaptational behavior, will disrupt the balance and, among other consequences, new diseases or health patterns will emerge. Such adaptational reactions follow when: carriers regionally introduce 'new' diseases to susceptible hosts; major environmental changes are affected, and human lifestyles are significantly altered."

Though the processes of modernization and development bring many potential benefits to improved nutrition and health, their deleterious effects must be carefully weighed. Hughes and Hunter (1970) have found that many development projects in the Third World have increased the disease burden of those whom the projects were intended to benefit. Development projects which radically altered ecosystems were also found to introduce entirely new patterns of disease into an area. Hughes and Hunter (1970: 481) have called development-related diseases "developogenic diseases".

Diseases of civilization induced by the modernization process have a significantly different etiology than developogenic diseases. Developogenic diseases are generally of the infectious/parasitic type which are diffused through migrating vectors, and occur as a result of

the altered external environment. Diseases of civilization, on the other hand, are born by the modernization process and occur as a result of both the altered external and internal environments (i.e. psychosocial environment). Modernization-induced disease burdens could be called "modernogenic diseases".

The classification of "modernogenic diseases" is used to describe the nature of the disease burden of impoverished people living in what has earlier been described as "the Third World within" (e.g. northern Manitoba). The term describes a disease burden which has a significant composition of both the diseases of poverty and the diseases of civilization. Developogenic diseases, when occurring within a relatively unimproved socio-economic environment, merely intensifies the infectious/parasitic burden of disease. Modernogenic diseases, however, occur when impoverished populations undergo radical socio-economic change without necessarily experiencing an improvement in well-being, and when they assume elements of the "modern" lifestyle without regaining control over their social, economic and natural environment. Hence, when a modernizing society in effect continues within the forces of the underdevelopment process, they tend to carry a double burden of disease. The differentiation between developogenic and modernogenic disease burdens will be clarified in the subsequent analysis of the underdevelopment of nutrition and health.

F. CONCLUSION

The ecological perspective on health, nutrition, etiology and modernization is important in determining, in the words of Rappaport, whether "behavior undertaken with respect to social, economic, political

or religious conventions contributes to or threatens the survival and well-being of actors and whether this behavior maintains or degrades the ecological systems in which it occurs." (cited in Jerome *et al.* 1980: 15). This chapter has established a basis for examining the relationship between nutrition, health and modernization from the ecological perspective. The basis for integrating the ecological theme into the underdevelopment and modernization themes has also been developed. The next chapter will examine more fully the impacts of development and modernization on nutrition and health in the Third World to test the theoretical base established in this chapter, and to develop a point of departure for analysing the underdevelopment of nutrition and health in northern Manitoba.

CHAPTER V

THE UNDERDEVELOPMENT OF NUTRITION AND HEALTH: AN APPROACH DEVELOPED FROM THIRD WORLD EXAMPLES

A. INTRODUCTION

The spatio-environmental approach suggested by Hunter (1974) invites a search into studies of Third World nutrition and health to develop an approach to the underdevelopment of nutrition and health. As a theoretical approach from this perspective is in a nascent state of development, and since few investigations into Canadian Indian nutrition and health have also been made in this perspective, it will be necessary to utilize examples from the Third World.

The purpose of this chapter is twofold. First, it attempts to apply the premises established in the previous chapter to the real world. Second, it establishes the basis from which to examine Indian nutrition and health. The chapter is in two parts. The first part examines the impact of the modern market economy on the nutrition and health of Third World agricultural societies. This part can be seen as a case study of "developogenic ill health" discussed in the previous chapter. The second part examines the impact of modernization on hunter-gatherer societies, of which the Indian people traditionally are a part. A special study will be made of the Inuit in the modernization process, as their ecology has much in common with Indian ecology. This part can be

seen as a case study of "modernogenic ill health". Together, these two parts lay the groundwork for a spatio-environmental approach to Indian nutrition and health.

B. RURAL TRANSFORMATION: THE IMPACT ON NUTRITION AND HEALTH

A small but growing number of studies are beginning to reassess the impact of rural transformation on the health and nutrition of peasant agrarian societies. In order to expand the theoretical basis of the underdevelopment of nutrition and health theme as it is applicable to northern Canada, one must rely on agrarian studies for the essential social, economic and political processes involved. Assuming that these processes are somewhat universal, irrespective of whether agrarian peasants or hunter-gatherers are affected, studies on rural transformation can be used as a surrogate information source in the absence of similar studies on Indian or Inuit populations. It will become apparent that even though the details are different, the processes are in principle the same.

Although much could be said about the specific impact of cash cropping on peasant agriculture (Dema 1969; Dewey 1979; Fleuret 1979); the focus of this study will be on elements of modernization involving access to land, socio-economic structures, dependency, income and wage labour, ecology and the nutritional shift. Whereas a majority of the available studies concern themselves with nutrition (Salimano and Hakim 1979; Taussig 1978; Valverde et al. 1977), some do lift out the implications to health (Laurell et al. 1977; Takemoto et al. 1981; Valverde et al. 1980). All the studies agree that modernization generally lays the conditions for worsening health and nutritional status in societies

undergoing rapid transformation. Ill health and malnourishment are embodied in the institutional changes which create new patterns in the production (or procurement), distribution and consumption of goods and services (Fleuret 1979; Laurell *et al.* 1977).

Studies which utilize disaggregate, non-linear methodologies have been most enlightening. Where assumptions based on the notion that so-called homogeneous groups (e.g. poor, Third World, rural peasant, Indians, etc.) exhibit similar health and nutrition characteristics were challenged, it was shown that in fact they do exhibit a broad range of different characteristics. Valverde *et al.* (1977) demonstrated this by stratifying a rural Guatemalan population by occupational and land accessibility/control variables. A later study in El Salvador (1980) categorized ecological zones according to the dominant economic activity. Rao and Satyanarayana (1976) differentiate between income, house quality and nutritional level. Laurell *et al.* (1977) use socio-economic indicators related to land access, and social and economic structures to analyse two demographically similar but economically disparate villages to identify strata of morbidity. Taussig (1970) differentiates income, land use and labour to analyse the efficiency of energy consumption in low income groups and relates it to national development. Berg (1973a) analyses categories of food expenditure by income levels to elicit consumption patterns. All these studies reveal the importance of disaggregating data to elicit horizontal relationships in social, economic and ecological structures. In this way varying patterns of ill health and malnutrition brought about by modernization/underdevelopment are more accurately examined.

1. Pre-Transformational Agrarian Diet

In assessing the impacts of modernization, it would be logical to begin with a brief discussion of traditional, or "pre-transformational" agrarian diets. Studies have demonstrated diets to be rational, well balanced and adapted to the limitations of their environment and technology (Dewey 1979; Fleuret 1979; Jerome et al. 1980). The well known squash-bean-maize triad of ancient Mesoamerica is a good example (Sanders and Price 1968). Fleuret points out that studies on nutritional regimes based on rice, cassava, sorghum, yams or bananas "show that when these indigenous food production systems are undisturbed by exogenous forces they can be quite capable of producing the correct assortment of nutrients in sufficient quantity to meet the requirements of human populations." (Fleuret 1979: 5). These traditional food systems depend on a wide diversity of wild and domesticated plants and animals in order to both achieve nutritional balance and to even out large seasonal fluctuations in supply (Doughty 1980; A. Fleuret 1980). However, lest it be thought that traditional, peasant food systems are ideal, their experience with malnutrition and starvation is far more intensive than would be acceptable. Traditional agriculture has typically had problems of food storage resulting in periods of scarcity. It also tends to exhibit cultural modes of food allocation which result especially in infant and maternal malnutrition. Nevertheless, traditional food production and distribution systems are oriented around maintaining the viability of the society as a whole.

2. The Rural Integration into the Modern Market Economy

Though rural transformation does not necessarily result in a deterioration in health and nutrition, it lays down conditions for maladaptive change which often results in a loss of the system's ability to tolerate health and nutritional stress. The purpose of this review is not to detail the mechanisms whereby malnutrition and ill health occur.* Instead, the modernization processes associated with rural transformation are analysed to assess their impact on nutrition and health. Six such processes have been identified.

(a) Ecological Disruption

Rural transformation dramatically alters the "ecological contract" man has with his environment. Whenever modernization causes environmental degradation, ill health and malnutrition ensue until a new equilibrium can, if ever, be reestablished. Three basic types of ecological disequilibrium are caused by rural transformation. First, there are dramatic environmental disruptions through flooding, deforestation, the introduction of irrigation, or massive resource development projects. Hughes and Hunter document a large range of diseases associated with development projects. These include schistomomiasis, transmitted by a snail-born liver fluke, associated with irrigation, river blindness associated with watercourses, and sleeping sickness associated with land clearing. Not only are new vectors of disease introduced, but changes in life patterns of the populations involved increase host susceptibility to disease.

*See Laurell et al (1977) and Valverde et al. (1977, 1980) for a discussion on these mechanisms.

Second, changes in land use patterns, particularly as they relate to cash cropping, may have profound ecological ramifications. Dewey (1979: 270) reviews three ecological impacts of modern agriculture. (i) A reduction of fallow periods in ecologically sensitive areas results in deteriorating soils and declining yields. (ii) Each cropping involves extensive monocultures requiring large inputs of fertilizers and pesticides resulting in greater pest resistance, destruction of trophic levels in the food chain and directly related chemically induced ill health. (iii) The cash economy "tends to promote the over-exploitation of resources for short-term gain, which can ultimately result in declining yields." (See also Takemoto et al. 1981). The ecological consequences for diets and nutrition include a reduction in the amount of food harvested over time.

Third, changes in settlement patterns move people from ecologically familiar to unfamiliar zones, increases population concentrations, and extends the migratory range of people, all of which increases the potential for the transmission of existing disease and the introduction of new ones (Sorkin 1976: 53-54).

In summary, rural transformation implies changes in man's relationship with the environment. In the words of Hughes and Hunter (1970: 480),

"Programs of economic or agricultural development, population relocation, industrial construction--any program which either deliberately or inadvertently changes pre-existing relationships between man and any aspect of his environment (geographic, biological, social or psychocultural)--must be viewed from the outset in terms of an ecological framework. They must be viewed as the forging, as it were, of a new "ecological contract" between man and his surroundings, a contract which usually has hidden costs."

(b) The Commercialization of Agriculture

The commercialization of agriculture generates social and economic structures characterized by: (i) type of productive activity; (ii) control over economic surplus; (iii) migratory status; (iv) family organization; and (v) nutritional status. These socio-economic factors are shown to have greater influence over morbidity than environmental factors such as housing, water, quality, sanitation and even access to medical facilities. Laurell *et al.* (1977) found that in Mexico, a subsistence based village with strong social cohesion and relatively autonomous control over production exhibited lower morbidity rates than a more modernized but socially fragmented village characterized by wage labour and mixed peasant and commercial agriculture. Grosse (1980) substantiates the thesis that the quality of nutrition is a more significant factor than medical centres and sanitation, even though they too were found to be key components. Valverde *et al.* (1980), examining four diverse El Salvadoran regions comprising intensive agriculture, urban slums, subsistence farming and coffee plantations, found that although all regions were characterized by: lack of potable water; unsanitary waste disposal, inadequate housing, education and medical care; structural unemployment and very low income; there were strong differences in nutritional status related to income generating activities, food availability, climate, isolation, level of community organization, family composition and access to government programmes. The poorest nutritional status was found among the wage labour oriented coffee plantation region.

In all studies, wage labour classes fared the poorest. The generalization was found to apply equally where the labour market com-

petes for rural subsistence labour. A critical factor is that wage labour experiences a net energy deficit when input and output are balanced. In a study of Colombian agriculture, Taussig (1978) offers evidence that the modernized peasant farmer expends twice as many Kcals as the traditional farmer (415,000 per year vs. 173,000 Kcals) due to the fact that he must spend twice as many labour days on his farm. The plantation worker's daily calorie expenditure is twice that of both the traditional and subsistence farmer (3,500 vs. 1,700 Kcals). Furthermore, both the modern peasant farmer and the plantation workers received fewer and poorer quality nutrients.

Social and economic transformation (particularly as it creates a wage labour class), migratory labour and social fragmentation were found to be more significant in health and nutrition than environmental factors.

(c) Accessibility to Land

Among impoverished populations, accessibility to land is synonymous with control over means of production and means of exchange. A loss of control over or accessibility to land results in a loss of self-sufficiency and, hence, the ability to maintain health and nutritional well-being. Valverde et al. (1977), in their examination of the relationship between land availability and nutritional status in Guatemala, successfully test the hypothesis that the prevalence of malnutrition among 2 to 3 year old children is greatest among agricultural workers, intermediate among small scale farmers, and the least among merchants and skilled workers. They also successfully tested the hypothesis that the amount of land controlled by the peasant farmer is positively corre-

lated with the nutritional status of their children. Of the five occupational groups tested, the poorest nutritional status was found among the children of fathers who controlled (owned and/or rented) less than 1.4 hectares of land (37.8% with moderate malnutrition), while the best nourished were children whose fathers controlled more than 3.5 hectares (16.7% with moderate malnutrition).

In the Laurell *et al.* (1977) study, the less developed peasant village, which had a greater degree of independent access to land and less reliance on cash crops and credit, exhibited lower general morbidity rates than its more modern counterpart (11 vs. 15.3 per thousand). In the more developed village, only the peasant groups with similar attributes to those in the peasant village had comparably low morbidity levels.

Dewey (1979), in a study of rural development in Mexico, found that large agricultural projects tended to result in farmers losing control over their means of production and in their being drawn into patterns of unequal exchange. The consequences were compromised health and nutritional status. Dewey (1979: 288) supplements her findings by citing a study by Marchione in Jamaica which concluded that "When market conditions forced small producers to return to greater subsistence farming, nutritional status improved instead of declining." Hence, Dewey is able to make a convincing argument that in spite of stated goals of land redistribution and socio-economic development, development projects which deprive farmers of free access to land and control over their means of production, result in compromised nutritional status. This conclusion is in agreement with Fleuret (1979), who after an intensive literature review, concludes that there is a

clear relationship between access to and control over land on the one hand and constriction of opportunity and ill health and malnutrition on the other.

(d) Dependency Relations

Rural transformation tends to foster dependency relationships. Integration into regional and international market systems dictates patterns of production and exchange which enforce an increasing reliance on imported technologies and commercial inputs. Innovations such as credit, fertilizers, pesticides, herbicides and certain new crops put the small producer into a high risk position. For the small producer, unequal exchange relations tend to erode any marginal gains made (Dewey 1979: 267). To use Fleuret's (1979) words, the "downward cycle of diminishing production resources" tends to marginalize the petty producers, transforming them into a class of unskilled labour.

Consumption patterns are also influenced by dependency on external market economies, which dictate what products are both desirable and available (Bader 1976; Finney 1965). The marginalized poor tend to emulate the consumption patterns of the rich. They can least afford lavish expenditures on prestigious foods which result in an unequal return of nutritional value for money spent. The consequences of dependency relations are a loss of control over means of production and exchange and a loss of choice in determining consumption patterns.

(e) Income Increments

Economic development which merely results in increments in income has been shown to not necessarily lead to improvements in health

and nutritional status. In some of the poorest segments of the population an increment in income will result in a larger percentage of income being spent on food (Berg 1973a: 40-42). However, monetization of petty production which increases incomes has been shown to have little beneficial, long-term effect on nutrition (Dema 1969). Where cash income is seasonal, it tends to exaggerate the seasonality of want and plenty. Cash income is frequently diverted away from better nutrition. According to Fleuret (1979), the sudden arrival of cash also tends to drive up food prices, while inequities in the structure of credit and savings facilities diverts money away from better consumption. Furthermore, the food available for purchase may be scarce or of inferior quality, or cash income must be allocated among many non-food needs. Monetary increments, therefore, are frequently illusory.

Studies in India have shown that income increments initiate a nutritional shift away from wholesome "traditional" foods in favour of status laden refined foods (Berg 1973a: 44-45; Jerome et al. 1980). People may be spending more and eating more, but at the same time be left with a nutritional loss. Fleuret again argues that there is no necessary relation between commercialization, growth in real income and improved nutritional status. Income allocations tend, rather, to reflect the socio-economic malaise brought about by poverty. The importance of status laden non-food items and nutritionally inferior refined foods tend to entrench dependency relations.

(f) The Nutritional Shift

The nutritional shift which generally accompanies modernization results in a deterioration in the quantity, variety and quality of

nutrients available. Dietary habits which are subject to external influences are the first to be compromised.

Diversity and variety are the guardians of good nutritional health. Diversity is the safeguard against adverse conditions and severe fluctuations in supply. Nutrient balance is highly probable when a wide variety of cultivated and wild food sources are utilized (Doughty 1979; Fleuret 1979). With the introduction of modern agriculture and with integration into the modern market economy comes a heightened reliance on a centralized system of world trade which is dependent on uniformity and limited variety. Consequently, the diversity of available foods is diminished. Whereas in prehistoric times five million people at one person per 25 sq. km selected their foods from about 5,000 edible plants, today 4.5 billion people (at 25 persons per sq. km) are reduced to choosing about 150 varieties, of which only 15 foods account for most of the basic energy requirements (Doughty 1979: 279). While modern agriculture concentrates on only a few modern food crops, diets become monotonous and dependent on the dictates of the market economy.

Not only does the market economy reduce the varieties available, it often dictates basic changes in the types of staples consumed. Berg (1973a) described what happened when, in India, there was a change from the use of pulses to the use of wheat as a staple food. Whereas both have a similar caloric content, pulses have twice the protein, which is also of much higher quality. Furthermore, they are much richer in other nutrients, particularly iron. The nutritional effect of making this shift depends on the consumers being able to make up the deficit with a variety of other foods. Among the impoverished, this is highly unlikely

to happen.

With a focus on processing and refinement, the market economy tends to dictate a shift in food preferences, from nutritionally superior "traditional" diets to diets saturated with refined sugars, carbohydrates, and fats. Furthermore, valuable nutrients are lost in the refinement process (Bader 1976; Berg 1973a; Jerome et al. 1980). The effects of income increments tends to encourage and accelerate the shift from "vulgar" traditional foods to prestigious status foods. In East Africa, a change in the name for a local type of spinach, from mchicha to sukuma wiki (meaning literally "to push to week until the next pay" in Swahili) illustrates that a shift in preference for nutritionally inferior cabbages and lettuce has occurred. Mchicha has been relegated to being a poor man's food. Berg (1973a) illustrates the same phenomenon when preferences shift from sorghum to home pounded rice to commercially polished rice which occurs with each increment of income. Furthermore, he states that "a statistically significant drop in protein intake has been discerned as incomes rise and cereal diets are 'upgraded'." (Berg 1973a: 44). The same process can be observed in European cultures where preferences shifted from heavy, dark breads to super refined white breads with a long shelf life. Where such a shift in food preference occurs among nutritionally marginal populations, the consequences to health are grave.

It could be argued that the transition from subsistence to commercial food production may result in only a temporary phase of hardship which will be dissipated with more economic development. Fleuret (1979: 18), however, argues that what he calls "transitional malnutrition" is rarely transitional. Instead, "much more frequently attendant institu-

tional changes embed malnutrition in the new patterns of production, distribution and consumption." The nutritional shift, then, does not occur independently but occurs as a facet of general socio-economic change.

Maintaining a good diet is dependent on maintaining control over what is produced and consumed. Mead (cited in Lee and DeVore 1968: 50 ff.) argues that when a culture is no longer self-contained but becomes a part of a larger political system, dietary patterns become externally controlled by systems of land tenure, trade patterns, labour markets and restrictive legislation. Where a group loses self-sufficiency and internal integrity, diets become rigid, monotonous and deficient. Furthermore, marginalized, dependent people become less prone to make positive shifts toward better food habits.

This section has examined how integration into the world market economy has marginalized the nutrition and health of agrarian people. The next section examines how the modernization of hunting and gathering societies, of which the Indian people are a part, jeopardizes their nutrition and health status.

C. FROM HUNTING-GATHERING TO THE MODERN MARKET ECONOMY

Surveying the history of man's relationship with his environment, Lee and DeVore (1968: 3) comment that "To date, the hunting way of life has been the most successful and persistent adaptation man has ever achieved." The transition from the hunter-gatherer to the modern market economy is proving to be paradoxical; in the transitional periods man has continually exchanged components of good physical health for opportunities to live an easier life and to increase cultural complexity

(Cassidy 1980).

The transition from hunter-gatherer societies to the modern industrialized society can be described as taking two streams. First, the vast majority of the earth's population has developed into an agrarian society out of a hunter-gatherer base. The adaptation to the agrarian diet has been very gradual. The section on rural transformation described the transition into the market economy from within the agrarian context. This discussion focuses on the second stream--the direct transition from hunting and gathering into the modern market economy. This stream totally bypasses the agrarian phase providing little opportunity for adaptation. This second stream is developed to represent a paradigm which relates particularly to Indian health and nutrition.

An examination of the hunter-gatherer ecology of nutrition and health forms a theoretical basis for approaching the impact of modernization on hunter-gatherer societies. Since today very few good, detailed accounts of the ecology of traditional Indian health and nutrition exist (Ray 1974; Rich 1976), this study makes available a surrogate example from which generalizations can be derived. The discussion of Inuit nutrition and health provides a particularly useful paradigm, as there are many similarities between the two ecosystems (Berkes and Farkas 1978). It challenges the presumption that traditional diets are monotonous and nutritionally deficient, and that life must be wrested with a great agony from an ungiving environment.* Furthermore, it exposes the misconception that the poor are poor, malnourished and unhealthy because they always have been poor, malnourished and unhealthy,

*See Cassidy (1980) for an excellent argument for studying hunting-gathering food ecology.

and that they must be lifted out of their misery through modernization.

1. The Inuit Example

The Inuit people of the Canadian Arctic have demonstrated a remarkable adaptability in procuring a livelihood from a harsh environment. In the past, they were able to maintain good health and nutrition until contact with the Canadian south dramatically altered their lifestyles. The case study of the Inuit transition from a nomadic, hunting-gathering lifestyle into the twentieth century Canadian way of life offers a textbook-perfect example of what happens when there is a rapid shift in nutritional and health maintenance systems (Schaefer 1971a).

(a) The Environment as Provider

The high Arctic is one of the world's most delicately balanced ecosystems.* Although the production of food is tediously slow and the conditions of existence are harsh, the Arctic has been able to support life in full abundance for its inhabitants. The Inuit, who inhabit the Canadian portion of the Arctic have adapted to the seasonal offerings of what the environment produces. Since plant production is low, a bulk of their sustenance, including nutrient requirements, is derived from animal sources (the following description is taken from Sinclair 1953). Among the coastal Inuit, most of the winter provisions are supplied by the seal: fuel for lighting and cooking; food; skin for boots, clothing and containers; sinews for thread and intestines for clothing and windows. In the spring the walrus and the whale supply food as well

*See T.R. Berger (1977) for a good discussion of the impact of development on Arctic ecology.

bone for tools. The diet is supplemented by polar bear and muskox. In the summer, caribou, wolves, hares and wild fowl provide a more varied diet. Fish is utilized extensively in all seasons.

A limited amount of vegetation supplies an important, if small supplement to the Inuit diet in spring and summer. Berries, the stalk of the aromatic angelica, algae, seaweed and the buds and leaves of willow provide the most direct source of absorbable carbohydrate. Some berries and leaves are dried and stored for winter use. An important source of plant material is provided indirectly through eating the fermented contents (mostly mosses and lichens) of the caribou stomach. In the spring the Inuit also enjoy the contents of the walrus stomach, especially when it contains the feet of the bivalve Cardium groenlandicum. Whereas the coastal Inuit depend heavily on sea life, the inland Inuit rely much more on the caribou for their basic provisions.

In spite of the nutritional adequacy when food is available, the environment is limited in the numbers of people it can support. Starvation can be frequent, particularly when weather is bad or when migratory animals vary their patterns. Hence, social organization has historically included measures of voluntary population control such as infanticide and geronticide. Nevertheless, strong taboos against food hoarding assured optimal distribution of available food. Though the environment is harsh, it has been demonstrated to be able to sustain good health and good nourishment (Sinclair 1953).

(b) Environmental Adaptation

The Inuit are highly adapted to subsisting in the Arctic. They are physiologically and metabolically adapted to deriving almost their

entire nutrient requirements from animal sources.

For a majority of the world's population, energy requirements (calories) are made up of carbohydrates. The Inuit, however, traditionally derived 40% of their calories from protein, 55% from fat and 5% from vegetation (Clements 1970: 111). About one half of the calories were drawn from glycoproteins which are bound to protein molecules. Glycoproteins are abundant in caribou liver (Schaefer 1971a). Another major source of energy is glycogen found in surface and gut epithelial (skin) layers, which are avidly consumed by humans and animals alike (Schaefer 1977). These carbohydrate sources are complex, difficult to digest and not readily absorbed.

Though their body build is much leaner and smaller than the European's, their nutrient requirements are much higher. Due to the cold, their basal metabolic rate is about 26% higher than "normal". Beyond the daily 3,000 Kcals required for basic metabolism, an additional 1,100 Kcals daily is needed to heat and humidify inhaled air (at -40° C). It requires yet an additional 300 Kcals to heat up the average daily consumption of 4 kg of meat which is eaten frozen (Sinclair 1953). Hence, the quantity of food required to sustain the Inuit way of life is proportionally large. Sinclair cites reports that up to 15 kg of meat has been eaten on occasion, but none has surpassed the proverbial 16 kg of meat and 8 kg of butter (providing 112,000 Kcals) reportedly eaten by each of two Siberian Yakut (Sinclair 1953).

The Inuit food habits are also naturally adapted to optimize the food resources. Fish and meat are preferred putrified. Particularly favoured is caribou liver fermented inside the moss filled caribou stomach. Putrification and fermentation is known to break glycogen down

into a more easily digestible form. The custom of eating raw flesh, skin and viscera is known to provide a higher content of ascorbic acid (Vitamin C). The habit of nibbling on frozen food all day rather than at one time requires less energy for thawing and heating once the meat is ingested. The consumption of seal liver as well as the lichens and mosses in the caribou stomach supplies usually adequate quantities of Vitamin A. The true Inuit, according to Sinclair (1953: 78), has "adapted with extraordinary efficiency to subsisting in the Arctic".

(c) Traditional Inuit Health and Nutrition

Little evidence of malnutrition and ill health is found among traditional Inuit (Schaefer 1971a, 1977; Sinclair 1953). Sinclair, in compiling the nutritional data which is presented in Table 5.1, compares traditional Inuit dietary intake with the Oxford Nutrition Survey standard. He demonstrates that in each nutrient category, the Inuit diet is more than adequate. The importance of seal meat in the coastal Inuit diet cannot be overestimated. The presence of bread, barley, coffee, etc. indicates a certain amount of modernization has taken place, but the proportions are relatively insignificant. Though Table 5.1 demonstrates adequacy, Sinclair has some reservations about the adequacy of ascorbic acid and riboflavin.

The health status of the Inuit has also been shown to be adequate. Though their lifestyle tends to be highly unhygienic, there is relatively little evidence of infectious disease among the more traditional Inuit. Among those not adopting western lifestyles there is an almost total absence of cardio-vascular-renal disease, tuberculosis, diabetes mellitus, appendicitis, cancer, or dental carriers (Schaefer 1971a;

Table 5.1 Nutritional Value of the Adult Inuit Daily Diet in 1885

Foodstuff	Wt. of Edible Portion (g)	Calories (Cal.)	Total Protein (g)	Animal Protein (g)	Carbohydrate (g)	Fat (g)	Iron (mg)	Calcium (mg)	Phosphorus (mg)	Vit. A (i.u.)	Carotenoids (g)	Vit. D (i.u.)	Thiamine (mg)	Nicotinic Acid (mg)	Riboflavin (mg)	Ascorbic Acid (mg)
Seal flesh	860	1686	163	163	26	103	23.2	95	1686	7740	0	0	0.95	42.1	1.2	69
Other flesh	225	441	43	43	7	27	6.1	25	441	2025	0	0	0.25	11.0	0.32	18
Capelin (salmon)	620	645	105	105	0	19	6.2	155	1500	508	0	6144	1.30	46.1	0.87	56
Other fish	370	444	61	61	0	11	3.3	67	699	56	0	0	0.15	8.5	0.18	7
Eggs	5	8	1	1	0	1	0.1	3	10	35	30	3	0.01	0	0.02	0
Berries	50	14	0	0	3	0	0.6	30	22	0	27	0	0.02	0.2	0.02	45
Bread	27	64	2	0	13	0	0.3	6	20	0	0	0	0.01	0.2	0.01	0
Barley and peas	6	14	1	0	2	0	0.4	11	19	0	0	0	0.03	0.1	0.02	0
Sugar	6	24	0	0	6	0	0	0	0	0	0	0	0	0	0	0
Coffee	6.5	19	1	0	2	1	0.3	9	10	0	0	0	0.06	0.6	0	0
Total		3359	377	373	59	162	40.5	401	4407	10364	57	6147	2.78	108.8	2.64	195
Oxford Nutrition Survey standard		3000	72	36	432	102	10	750	1000	833	3000	200	1.2	12	1.8	30
Proportion of standard met (%)		112	524	1036	14	159	405	54	441	1244	2	3074	232	907	147	650

(Source: Sinclair 1953: 74)

Sinclair 1953). Sinclair notes that parasites are very common, but their effect on health is minimal. This observation is consistent with that of Berlin and Markell (1977), who explain that among the Aguaruna Indians of Peru nutritional sufficiency adequately mitigates against the effects of parasites.

One can conclude that in the traditional, hunting-gathering lifestyle, the Inuit demonstrate adequate health and nutritional status.

(d) Nutritional Shift and Maladaptation

Until the 1950's, the Inuit of the central Arctic in contrast to the coastal Inuit, were living totally traditional, nomadic lifestyles. Except for the occasional use of bannock bread (flour, lard and baking soda), sugar, tea and tobacco brought by traders and trappers, they had seen virtually none of the southern lifestyle. After World War II, the airplane and the northern military installations (D.E.W. line) brought rapid integration into the mainstream of the modern market economy. Their rapid modernization has demonstrated what happens to health and nutrition (T.R. Berger 1977; Schaefer 1971a, 1971b).

The greatest impact of acculturation has been on changed eating habits and food preferences. Whereas in the past the Inuit ate one big meal a day while in the meantime nibbling on frozen car or caribou; today, they eat three rich meals while continuing to nibble, but on chocolate, candies and soft drinks. Moreover, they also have taken to a more sedentary lifestyle. The most important change is reflected in the rapid growth in the consumption of refined sugars and a decline in the consumption of protein. Table 5.2 illustrates how in eight years sugar has come to contribute 44% of the total carbohydrate intake.

Table 5.2 Annual per Capita Consumption of Rapidly Absorbed Carbohydrates in Pangnirtung-Cumberland Trading Area 1959-1967

Year	SUGAR IN ALL FORMS		CEREALS AND FLOUR		
	Per Capita (lbs)	% of Total CHO	Per Capita (lbs)	CHO Content (lbs)	% of Total CHO Consumed
1959	26	18.1	156.3	117.2	81.9
1960	37.6	22.4	173.5	130.1	77.6
1964	65.5	30.2	201.3	151.0	69.8
1967	104.2	44.2	175.9	131.9	65.8

*CHO content of cereals and flour varies somewhat, but averages 75%, taken here as basis for calculation.

In Canada (1960) 46.7% of calories derived from carbohydrates were consumed in form of sugar and sugar products.

(Source: Schaefer 1971: 10)

In eight years, sugar consumption quadrupled while the more complex carbohydrates contributed by cereals and flour dropped from 82% to 52%. Much of the added consumption is in the form of soda pop. In Barrow, Alaska, it is estimated that people consume an average of seven, 10 fl. oz. cans of soda pop per person per day (T.R. Berger 1977: 153). Whereas in former times up to 95% of the calories were derived from animal sources, almost one half come today from refined sugars. The nutritional, metabolic and health consequences are manifest in the symptoms of severe maladaptation.

Nutritionally, acculturation results in a decrease in overall calories, proteins and fats while carbohydrate consumption is increased. In the following table, four Inuit communities, at different levels of acculturation are compared with traditional Inuit diet compiled by

Table 5.3 1964 Daily per Capita Consumption of Major Nutrients in Four Canadian Inuit Settlements vs. Traditional Inuit Diet 1885

	Total Calories	Proteins (Gms)	Fat (Gms)	Carbohydrates (Gms)
Holman Island	2,859	280	79	230
Coppermine	2,536	271	64	213
Pangnirtung and Cumberland Sound	2,788	318	53	254
Frobisher Bay	2,097	128	57	254
Traditional*	3,359	377	162	59

*Sinclair (1953: 74)

(Source: Schaefer 1971a: 11)

Sinclair. Holman Island is the least acculturated and Frobisher Bay is urban and hence the most modern. The most striking difference between Sinclair's data and Schaefer's Holman Island data is the virtual absence of carbohydrates, and that 15% more calories, 26% more protein and 51% more fat is consumed by the traditional Inuit studied by Sinclair than the most traditional of Schaefer's communities. The nutritional costs of substituting imported meats for traditional meats is reflected in the fact that traditional meats supply on the average 40% more protein while imported meats contain eight times more fat (Schaefer 1977).

The metabolic consequences of maladaptation are most apparent in the Inuit intolerance for rapidly absorbed carbohydrates. Robson and Wadsworth (1977) report a general carbohydrate intolerance among protein-based hunter-gatherers who are acculturated to western diets. Whereas

traditional diets do not challenge the biological endocrine-metabolic stabilizing systems, the modern diet, high in refined carbohydrates, causes wild fluctuations in the blood sugar levels (Robson and Wadsworth 1977; Schaefer 1971a). When refined sugars are ingested, the result is overstimulated insulin production, growth hormone production (in children) and in the catecholamine and glucocorticoid producing glands.

The consumption of alcohol creates the most impelling impact on carbohydrate intolerant systems. None of the studies reviewed reported any use of alcoholic beverages in traditional hunter-gatherer diets. Whereas alcohol is a very rapidly absorbed carbohydrate (ethanol = C_2H_5OH ; glucose = $C_6H_{12}O_6$), it has been argued that carbohydrate intolerance is essentially responsible for the especially debilitating effect of alcohol on Inuit and Indian social fragmentation (Schaefer lecture 1977). Originally, the taste for sweets and alcohol saved costly biochemical conversions of glycogen which took longer to digest. Today, with easy access to sugar and alcohol this taste is atavistic and potentially harmful (Schaefer 1977). According to Schaeffer (1971a: 16), "the metabolic turbulence created by a shift in diet is largely responsible for the less than pleasant outlook."

The consequences of maladaptation are rapidly becoming evident in the Inuit health status. The modernization-induced changes in dietary patterns are being manifested in a rapid rise in the diseases of civilization. It can generally be assumed that a rapid increase in diabetes rates will follow twenty years after acculturation (Schaefer 1971a). In ten years, episodes of diabetes have tripled. Episodes of gall bladder disease are steadily increasing as well. In Inuvik, gall bladder operations outnumbered all other operative procedures in the

mid to late sixties. The phenomenal increase in dental carries, an accurate measure of the "sugar climate" as well as acne vulgaris, is directly related to sugar consumption. Atherosclerotic disease and the classic degenerative diseases are also on a dramatic upswing. Also common are obesity and hypertension, which have long been associated with rapid modernization (Robson and Wadsworth 1977). Changes in infant feeding practices--from breast to bottle feeding--have led to increases in otitis media (middle ear infection) and respiratory and intestinal infections. Changing patterns of fertility have been observed where bottle feeding has been practiced. Breast feeding has an ovulation-inhibiting effect which is lost when bottle feeding is adopted (Hildes and Schaefer 1973).

Whereas Euro-Canadians have had over a century to adapt to changing dietary patterns, the Inuit have had a mere thirty years. However, the question of overall maladaptation is raised by Schaefer. The Inuit experience has telescoped the general experience of agrarians into a very short time period. Schaefer posits the possibility that the Inuit experience is a paradigm for the European's long-term maladaptation to the modern diet.

2. From Hunting-Gathering to Agriculture

The Inuit example focused on a specific case study of hunter-gatherer adaptation, modernization and maladaptation which is in many respects similar to the Indian experience. On the basis of a broader literature review of nutrition and health among hunter-gatherers,*

*Barnes 1970; Berkes and Farkas 1978; Berlin and Markell 1977; Burgess and Dean 1962; Cassidy 1980; Clements 1970; Dewey 1979; Doughty

four generalizations can be made. These generalizations function as a surrogate to supplement information on health and nutrition lacking for the Indians of northern Manitoba.

(a) The Ecological Determinant in Food Systems

Hunter-gatherer food systems are determined by the ecosystems which they occupy. The two basic food systems are: (i) the protein-meat based systems, for example, Inuit (Sinclair 1953), Indian (Berkes and Farkas 1978), Guanyarki (Jerome et al. 1980), and (ii) carbohydrate-plant based systems (also including meat), for example, !Kung (Lee 1968), Tswana (Grivetti 1979), Aguaruna (Berlin and Markell 1977). What both have in common is that their food is stored in the environment and its retrieval depends on their intimate knowledge of the environment to accurately predict the food's whereabouts. General principles have been established that whether the environment is abundant (e.g. Kalahari Desert or Zaire rainforest) or harsh (e.g. Arctic tundra, boreal forest), a well balanced diet can be achieved. Rich environments are complex, diverse and very productive. Harsh environments are simple, lack diversity and can support only smaller populations. Whereas rich environments produce a broad range of edibles (the Tswana utilize 240 species of plants, 23 of which make up 90% of their diet--Grivetti 1979), they also host many more disease agents than do simple environments (Dunn 1968).

A comparison of the productivity of plant material in various

1979; Dubos 1968; Dunn 1968; Furnass 1970; Jerome et al. 1980; Grivetti 1979; Lee and DeVore 1968; Robson and Wadsworth 1977; Schaeffer 1971a, 1977; Sinclair 1953; Yesner 1980.

ecosystems is illustrated in Table 5.4.

Table 5.4 Variations in Primary (Plant) Production in Various Terrestrial Ecosystems

Ecosystem	New Primary Production (Dry Matter) Mean ($\text{g}^2/\text{m}^2/\text{yr}.$)
Tundra and Alpine	140
Boreal Forest	800
Temperate and Deciduous Forest	1,200
Tropical Rainforest	2,000

(Adapted from Berkes and Farkas 1978: 157)

The less productive the ecosystem is in plant materials, the less diversity there is in the diet and the greater the reliance on a few essential components. Generally, the less productive the environment, the greater is the reliance on animal resources. The Indians inhabiting the boreal forest thus demonstrate a greater nutritional diversity than do the Inuit (Berkes and Farkas 1978).

(b) Good Health, Nutrition and Adaptation

Good health and nutritional status is evident in those pre-historic and modern hunter-gatherer populations which are stable and well adapted to their environments (Barnes 1970; Dubos 1968; Dunn 1968). Biological adaptation is oriented toward withdrawing needed nutrients in sufficient amounts from available food resources without sacrificing nutritional efficiency. Hunter-gatherers in Papua, New Guinea can

efficiently function with less than 2,000 Kcals (Robson and Wadsworth 1977) while the Inuit need up to 3,500 Kcals (Sinclair 1953). Physiological adaptations in body size, form and growth rates are responsive to environmental conditions (Yesner 1980). Hunter-gatherers generally have a smaller amount of food intake relative to physical activity than do agrarians (Robson and Wadsworth 1977).

In summary, in a natural environment, balanced health and nutrition is characterized by: (i) isolation and limited contact; (ii) small population units; (iii) comprehensive resource utilization with little permanent ecological disturbance; (iv) intimate association with fellow humans and the environment; (v) mobility; and (vi) a wide diversity in environmental inputs (Barnes 1970; Dunn 1968). Few, if any, populations today exhibit these characteristics. These characteristics, however, point out the optimal conditions for ecological adaptation.

(c) Nutritional Shift: Physiological and Social Maladaptation

Major shifts in the diet call for physiological and metabolic adaptation. When hunter-gatherer groups undergo a radical shift, the adaptation is not always biologically or culturally successful. According to Robson and Wadsworth (1977:195), "The physiological change associated with adaptation to new diets, infections, and climate may have triggered new forms of pathology. These modern diseases are proving to be equally as lethal as were trauma and infections before the era of aseptic surgery and antibiotics."

The shift from hunting-gathering directly into the modern market economy which bypasses agrarian stages represents the most radical change possible. Yet the greatest risk of maladaptation occurs when a

population shifts from a protein-meat based diet directly into a refined carbohydrate diet. Reflecting on the last 200 years of dietary change among Europeans, Robson and Wadsworth (1977: 196) even question the gradual shift they have made. "Some physiological and metabolic adaptation may have taken place over this shorter period of time but the question arises whether efficient adaptation to one mode of diet over thousands of years is inappropriate when the new and very different nutritional insults of recent times have to be faced."

In the face of continual biological maladaptation, it has been assumed that man's continuing existence has depended on cultural and social adaptation (Dubos 1968: 92 ff.). However, when a society is undergoing rapid modernization, its ability to maintain socio-cultural adaptation may also be questioned. The relationship between the Inuit metabolic intolerance to alcohol (psychic disorder-inducing food additives notwithstanding) and psycho-social trauma is a good example. Where modernization threatens or debilitates cultural and social adaptation, biological factors are unleashed. Among the Inuit, unemployment, constricted options and the loss of cultural traditions, social dignity, personal satisfaction and independence are "at the root of the huge alcohol problem inundating the Canadian North in a flood of booze, murder, suicides and accidents." (Schaefer 1977: 25).

(d) Hunter-Gatherers and Agriculturalists: A Comparison

Hunter-gatherers tend to be better adapted to their environments and are healthier and better nourished than their agrarian counterparts. In an archaeological study of two pre-historic Indian cultures in what is now Kentucky, Cassidy (1980: 118 ff.) compared nutrition and health

in an agrarian and a hunting-gathering society. He concluded that:

- (i) the hunter-gatherer is more sure of his food supply in the face of drought, floods or other natural disaster. A greater diversity and dietary selectivity reduces the risk associated with agriculture. Hunter-gatherers tend to experience more frequent and seasonal food shortages than agrarians, but they are of shorter duration and are less random in occurrence;
- (ii) the hunter-gatherer tends to suffer fewer deficiency diseases such as beriberi, sprue, pelegra, rickets and kwashiorkor. These diseases did not appear until a dependence on cereals was developed;
- and (iii) the hunter-gatherers have experienced better health due in part to their social organization. In the past they were able to avoid such crowd diseases as plague, tuberculosis, typhoid, influenza, measles, small pox. These were rare or non-existent until contact was made with "crowd cultures".

Cassidy contrasted the health status of the two types of society. The agrarian society gave evidence of lower life expectancy, higher infant mortality, more children's infectious diseases, rampant tooth decay (which was unusual among hunter-gatherers), higher mortality among children aged 2 to 4, and more severe food shortages. Malnutrition among weanling children accounted for the increased mortality in that age group. Whereas it can be conclusively argued that agrarians who are relatively unaffected by modernizing influences exhibit better health and nutrition than their "modernized" counterparts, the hunter-gatherers (now hypothetically) exhibit the most ideal levels of health and nutrition (Dubos 1968).

In summary, the hunter-gatherer has been shown to reflect optimal ecological equilibrium in his relationship to the environment and to

exhibit characteristics closest to a hypothetical ideal of health and nutrition. Though man is highly adaptable, the process of modernization and underdevelopment has been shown to debilitate and degrade the integrity of the Inuit way of life by threatening their very existence. Their integration into the modern market economy of the South, with all its institutions, consumer goods and resource needs constitutes part of the general process of underdevelopment. Moreover, when the integrity of the Inuit way of life conflicts with the reality of the modern way of life, the consequences to health, nutrition and the social fabric may literally be life threatening. Examining the Inuit experience, which occurred with an almost instantaneous nutritional shift, opens the possibility of questioning the consequences to health and nutrition of agrarian people as well. In the words of Cassidy (1980: 142), "we are only now, as we come out on the other side of what might be called 'agricultural-superiority ethnocentrism', in a position to realize the fatal bargain we, as agriculturalists, seem to have made." The point of this discussion is to be neither pessimistic nor fatalistic, but to place modernization and underdevelopment on a block for closer scrutiny in order to better understand the dynamics which perpetuate poverty, ill health and malnourishment.

D. CONCLUSION

Underdevelopment and modernization processes tend to impoverish the health and nutritional well-being of marginalized people. This chapter has demonstrated, through the use of holistic, ecological models, that the maintenance of good health and nutritional well-being depends on maintaining control over means of production, exchange, and

maintaining the freedom to choose consumption patterns. It was shown that people sacrifice their independence, their health and their nutritional well-being when modernization forces a society to be transformed from one mode of life to another and when that society is integrated into the modern market economy. The blame for ill health and malnourishment is often placed on the impoverished people's failure to adapt to the new conditions. This discussion has shown them to be maladaptive responses to cumulated environmental effects of modernization, over which they have no control. Modernization was seen to generate maladaptive responses not only among the impoverished and marginalized, but also among the beneficiaries of the modern way of life.

The ecological approach demonstrates that biological forces are not alone responsible for ill health and malnutrition. Economic structures and social relations of production, exchange and consumption determine the character of the relationship between man and nature and consequently the type of pathology affecting him. Socio-economic conditions interact in such a way as to determine the structure that unleashes and transforms the biological phenomena. The explanations available in the ecological approach offer a valuable contribution to explaining the underdevelopment of health and nutrition.

In the next chapter, the Manitoba Indian's interaction with the fur trade will be examined to demonstrate how an elucidation of the historic process of underdevelopment and contemporary processes of modernization can help to explain conditions of appalling ill health and malnourishment today.

CHAPTER VI

THE INDIANS AND THE FUR TRADE: FROM INDEPENDENT SELF-SUFFICIENCY TO IMPOVERISHMENT, DISEASE AND MALNUTRITION

A. INTRODUCTION

A hunting-gathering society which is ecologically well adapted has a store of social, cultural and natural resource wealth to sustain a satisfactory level of well-being. The previous chapter demonstrated that adequate nutritional and health levels could be achieved under very rigorous conditions. This chapter will describe how the traditionally well adapted, self-sufficient Indian way of life became impoverished through contact with the fur trade. This discussion emphasizes the importance of the social, cultural, economic and environmental resource base for sustaining good nutrition and health. Through the use of the historical process method, it will be demonstrated how the loss of self-sufficiency and how the degradation of the resources necessary to sustain well-being resulted in hunger and disease.

This chapter is in three main parts. The first part describes the wealth of resources which presumably sustained the Indians in pre-contact days and how this wealth became indispensable to the nascent fur trade. The second part examines how this wealth was expropriated by the merchant capitalists, and how this loss resulted in the Indians being ravaged by epidemics of European diseases. Finally, this chapter dis-

cusses the impact of resource exploitation on nutrition and health to establish the hypothesis that a society's good nutrition and good health are inextricably linked with maintaining control over the wealth of its indigenous resources.

B. THE INDISPENSABLE INDIGENOUS RESOURCE BASE

Life for the original inhabitants of the boreal forest was harsh and demanded an intimate understanding of the resources the environment had to offer. Nevertheless, the Indian people had evolved the social, cultural and economic resources to derive from it an adequate level of subsistence. Not unlike the Inuit, who occupied a yet harsher environment, the Indians were known by the early fur traders not to have suffered either from malnutrition nor from many of the diseases known to the Europeans (Ray 1974; Rich 1976). The Indians were so successfully adapted to the northern environment that they provided a wealth of cultural, economic and technological resources (not to speak of food and furs) which the European fur traders found to be indispensable to their trade. This section briefly describes the wealth of indigenous resources which the Indians can be assumed to have enjoyed before they were contacted by the fur traders.

1. Environment

The Indian tribes of the Manitoba region were well adapted to utilizing a variety of ecosystems. The Cree, who predominantly occupied the boreal forest, were among the more adaptable of the Indian tribes. In their seasonal migrations they regularly exploited the environments of the Chipewyan in the North and the Assiniboine in the South (see

Fig. 3.1). From the Chipewyan, who exploited the southern fringe of the Arctic tundra, the Cree learned the ways of the caribou. From the Plains Cree and the Assiniboine, who occupied the parklands and grasslands, they learned the ways of the buffalo. In the winter the Cree moved out of their northern environment into the parkland belt in the neighbourhood of the Assiniboine who moved north for the winter. According to Ray (1974) it was through the overlapping economic systems that the tribes of the grasslands, forests and parklands came into contact with each other. This contact encouraged an exchange of ideas and technology. Their ability to exploit all of these ecological zones gave them a great deal of resource flexibility. According to Leacock (1973: 88), "intimate knowledge about animal habitats in relation to types of terrain applies widely and affords a large number of alternative choices of hunting, and greater flexibility in responses to changes in animal population." An elderly hunter, whom she interviewed in the 1960's, could detail a map covering more than 40,000 square miles of hunting territory. He also knew precisely where the most abundant resources were located; he was not considered atypical of many elderly hunters she interviewed.

2. Diet

The diet of the traditional Cree has been assumed to have been adequate in all known respects (Berkes and Farkas 1978; Sinclair 1953). A recent study of the wild food inventory harvested by the Eastern James Bay Cree has indicated that the northern environment produces a wide variety of animal and vegetable food resources (cited in Berkes and Farkas 1978). The contemporary "traditional" Cree harvest 15 species

of mammals (out of 28 available), 20 out of 90 species of birds and nine species of fish (Berkes and Farkas 1978; Rogers 1963). The animals considered most important in the diet are caribou, moose, bear, muskrat, beaver and also fish (Feit 1973).

The big game animals, along with beaver, were the most preferred, as they are the most efficiently harvested. They supply the most calories of food energy for the energy put out to harvest them.* One moose can supply 100,000 Kcals per man day of labour. In seasonal averages, moose supply 16,000 Kcals/man day, fish 10,000/man day, and small game 3,000/man day (Feit 1973). According to a 1976 study (Berkes and Farkas 1978), the animal categories supplied the following percentage of the total harvest: big game 36.3%, fish 25.3%, water fowl 23%, fur mammals 17.4%, small game 5.5% and sea mammals 2.5%. In spite of the calory efficiency of big game, they could not always be relied upon. In times of a big game shortage, the Indians relied on what Berkes and Farkas (1978) called the "fish-hare economy". The fish-hare economy is made up of the more diverse and abundant, if less energy efficient, smaller animals, birds and fish which occupy a lower trophic level in the animal ecosystem. For the traditional Indian, the fish-hare economy formed a significant buffer against hunger.

One way in which the Indians guarded against hunger was by preserving meat as pemmican, which was made of dried, pounded meat, animal fat and berries. Pemmican was one of the most important Indian food contributions to the fur trade, as it was nutritious, it stored well, and it was easily transported.

*See Pimental (1979: 29) for a discussion of food energy yields.

Plant material supplied a small yet significant source of calories, vitamins and minerals. Like the Inuit, the traditional Indian considered the contents of the caribou stomach a delicacy. However, unlike the Inuit, the Indians had a larger variety of plant foods to supply their carbohydrate needs. In the lakes region east and south of Lake Winnipeg, there was an abundance of wild rice (Ray 1974). Where wild rice was not available, berries, leaves and syrup made from birch, pine and maple was consumed. Teas made from juniper and pine needles provided a valuable source of Vitamin C. Labrador tea, also high in Vitamin C, was extensively used as a remedy for scurvy. In fact, scurvy-ridden sailors who arrived in North America after the lengthy sea voyage quickly recovered after being given labrador tea. Labrador tea was also known to be an effective sedative (Rich 1976).

3. Health

Little can be said with certainty about pre-contact health except that if one can assume an adequate diet, good health should follow suit (Cassidy 1980). Rich (1976) documents evidence from early fur trade journals which indicated that little sickness other than colds, chest pains and some consumption was observed among the Indians. They were considered to be a hearty, robust breed. According to Rich (1976: 50), when they did fall ill, "they showed great powers of recovery unless some psychologocial factor upset them; and they wrought some notable cures from time to time." With the meagre evidence from early contact journals, supplemented by studies on hunting-gatherer health and Inuit health, one can assume that there was relatively little mortality from infectious or nutritional diseases. Much of the mortality was

probably from frequent periods of starvation or from degenerative diseases.

4. Periodic Hunger

In spite of good general nutrition, starvation was frequent, imminent and a constant source of anxiety to the Indians (Feit 1973; Leacock 1973; Rogers 1963). Changes in moose or caribou migratory patterns, inclement weather or changes in water levels affecting the muskrat and beaver frequently threatened their food supply. December through January were particularly strenuous months. Many of the Indians' adaptive responses were oriented around counteracting the constant threat of food shortage. Their profound knowledge of the environment, their social organization, economic structures and technological ingenuity were oriented toward maximizing their resource potential and minimizing the threat of hunger.

The Indian social organization was highly flexible in the face of hardship. When starvation was impending they divided their bands into units of two to four families and redistributed themselves throughout their hunting territories.* This allowed them to shift into lower trophic levels of resource use, such as the fish-hare economy, to stretch meagre food supplies.

5. Economy and Technology

The Indians had little reason or scope to accumulate surpluses for personal aggrandizement. Their nomadic lifestyle limited the amount

*See Leacock (1973) for an excellent discussion on pre-contact band organization.

of food that could be stored or transported. Reinhard (1976) likens their knowledge of surplus stored in the environment with the availability of cash and credit surpluses in the market economy. Much of the exchange which did take place took the form of ceremonial gift-giving.* The means of exchange was based on the principle of "balanced reciprocity" (Elias 1975). An equal redistribution of meagre resources was instrumental in sustaining life for the majority of Indian society.

The technology of production and food procurement, though simple and often crude, was well suited for the harsh conditions of the northern environment. In fact, the Indian technology of transportation (canoe, snowshoe, travois), housing (teepee, wigwam), food preservation (freezing, drying, pemmican), leather clothing, and hunting (traps and snares, bows and arrows) was so well adapted that it was to become absolutely essential to the success of the fur trade (Ray 1974; Rothney 1975).

6. The Indispensable Indian

When the fur traders first made contact with the western Indians, they became totally dependent on the Indian's lifestyle. Many Euro-Canadians joining the fur trade themselves had to adopt Indian ways to survive (Innes 1956: 131-134). Until the 1800's the fur traders had only sparse provisions of European foods. Flour, oatmeal, rice, raisins, butter, cheese, beef and pork were supplied mainly for Christmas and special occasions (Rich 1976). Otherwise they had to survive on what the Indians had to offer by way of fresh provisions. Rich (1976) notes

*See Ray (1974: 65-68, 137-139) for a good discussion of the role of ceremonial gift-giving in the fur trade.

that whites living on this natural diet, in spite of the fact that many of them were sickly when they first arrived from Europe, experienced better health and used fewer medications than those living off European provisions.

The fur traders apparently had few medical concerns. Rich (1976: 53) maintains that the journal writers were more interested in food than in health, which was "faithfully reflected by the predominance of dietary documentation over medical." The traders considered that a surgeon was worth his salt only if he came as a trader or a traveller. One trader at Rainy Lake was cynical about doctors when, in an 1825 report, he wrote:

"[T]here had been no kind of sickness till Doctors were imported by the Hudson's Bay Company and the late Earl of Selkirk: since then sickness increases in proportion with the number of Doctors."

(cited in Rich 1976: 53)

The success of the fur trade depended first of all on the Indian hunting-gathering lifestyle. They were willing to travel immense distances at great risk and hardship; they knew how to survive in the wilderness, and they intimately knew their environment. The fur trade depended on the Indians not only as providers of furs, but also as the chief provisioners of food. They supplied meat, fish, waterfowl, wild rice, berries,* and some medicants. John Ogilvy, an agent of the Northwest Company wrote, "They alone supply all the food on which the

*Among the numerous berries available were: blueberry, raspberry, mossberry, bakeappleberry, huckleberry, strawberry, goosebeadberry, and Saskatoon berry.

company's servants subsist; without which they could be compelled to abandon three fourths of the country, and all the valuable part of the trade." (cited in Innes 1956: 236). Furthermore, without their services as guides, porters, voyageurs and interpreters, the fur trade could not have been carried out. The Indian lifestyle and mode of production was so essential to the fur trade that it persisted for almost two hundred years of fur trade activity.

C. CONTACT: THE LOSS OF SELF-SUFFICIENCY

The traditional self-sufficiency of the Indian provided a constant dilemma for the nascent eighteenth century fur trade. The Indian way of life was so central to the success of the fur trade that in western Canada it became a barrier to the ascendancy of merchant capitalism. For the market economy to work, the fur merchants needed to be able to control exchange relations (which they could) and the mode of production (which they could not). The fur merchants' dilemma was to get out from under their dependence on the Indians' control over production without having the fur trade collapse around them. The Indians were quick to recognize that the fur trade depended on their voluntary cooperation; they also learned to be adept at using their self-sufficiency to extract beneficial terms of trade (Ray 1974: 134, 207). However, in time the tables were to be turned.

Until the late 1700's, most of the Indian tribes, with the exception of the Woodland Cree, were still happily independent. The Chipewyan Indians of the North, who Samuel Hearne observed to be spared close contact with the fur trade, had little need for European goods. In his journal, he commented that it was "well known that those who have the

least intercourse with the Factories, are by far the happiest." (cited in Rothney 1975: 65). The plains Indians retained a fierce independence well into the 1800's. They also had little need for European provisions (Innes 1956: 236). The Woodland Cree, who were the first to be exploited, were also the first to give up their independence. Their role as middlemen in the fur trade facilitated their rapid integration into the market economy. Until the decline of fur productivity they virtually controlled the trading of furs in the York Factory hinterland. Consequently, they were left very vulnerable to the vagaries of the fur market and depended on the continuing productivity of the fur bearing animals. The Woodland Cree, in their role as middlemen, came the closest of all the tribes to resembling what merchant capitalism could recognize as a dependent labour class.

The usual colonial methods of creating a dependent labour class which would be available to merchant capitalism elsewhere was not available to the fur merchants in western Canada. They could neither make the Indians into slave labourers, as they could in the West Indies, nor into currency-dependent labourers, as they could in Africa or Latin America. The Indian role in extracting and transporting fur, as well as supplying the fur trade with food and back-up services, was too central to the functioning of the fur trade system. The only real means of control at the merchants' disposal was through terms of trade, consumer goods and diplomacy. They were able to successfully use liquor and credit to achieve control. However, what finally reduced the Indians to a state of dependency was their role as single-commodity producers. This coincided with the deterioration of their resource base. Whether or not the use of these mechanisms to create dependency was

always consciously intentional, they ultimately were successful.

Rum and spirits, along with tobacco, firearms and ammunition, were the chief commodities traded with the Indians to make them dependent on other European goods (Innes 1956: 235). Liquor was particularly favoured as a trade item. It could be carried in concentrated form and be diluted for sale. One canoe could carry £50 worth of rum and return with £500 of furs for a ten-fold profit (Rothney 1975: 97). Furthermore, it was the piece de resistance for the Indians. With their addiction to rum effectively incapacitating their ability to bargain, the traders were able to capitalize by trading at extortionate rates of exchange.

In the period of the Hudson's Bay Company monopoly, rum and spirits served essentially as an enticement to trade. However, after competition was opened in 1763, rum became a high demand item. Indians began to refuse to trade without it. The peak in the trade of rum and spirits was between 1790 and 1820. Between 1802 and 1804, when rum consumption peaked, an average of 19,400 gallons were traded annually (Innes 1956: 269). At the height of competition, many traders advocated that rum and tobacco be used to make the Indians dependent on European goods (Innes 1956: 236; Rothney 1975: 97). By the 1820's, however, it was widely recognized that liquor was destroying the Indians' usefulness to the trade. After Lord Simpson became governor in 1822, he attempted to regulate liquor and return it to its former role as enticement and for competition (Ray 1974: 198; Rothney 1975: 100). However, liquor had already done its work.*

*The fur trade's use of liquor is similar in many ways to the East India Company's use of opium. Whereas rum was produced by West

The Hudson's Bay Company's introduction of credit became another effective tool for creating dependency. Whereas rum was most efficient in subduing the fiercely independent plains Indians, credit came into use initially to alleviate the starving Woodland Cree. The fur trade had already seriously disrupted their delicately balanced lifestyle. Consequently, they began to experience severe hardship. It was soon recognized that credit could also be used to hold the Indians in perpetual debt to and dependence on their trading post. The Indians were outfitted on credit with goods, increasingly consisting mainly of food items, for the coming winter. The practice of basing credit on the following year's harvest forced the Indians to return year after year to the same trading posts. They were virtually denied the possibility of bargaining for a better rate of exchange, or accumulating any surpluses.

The oppressiveness of credit was recognized by the Aboriginal Protection Society. In one of their reports they claimed that "To complete their entire dependence on the company, they are, by the custom of giving all the articles supplied to them on credit, invariably kept in debt--another powerful means of repressing the energies and advancement of any people, whether barbarous or civilized." (cited in Rothney 1975: 86).

The use of rum, tobacco, ammunition and credit in creating dependency became more coercive in the period from 1820 to 1870. The fur merchants now became much more explicit in their goals of manipulating, cajoling or forcing the Indians into a position where they would

Indies slave labour to be used in Canada, opium was produced by slave labour in Bengal to be used in extorting silks, tapestries, teas and spices from China. According to Rothney (1975: 100) the use of liquor reflected a global, capitalistic outlook.

better suit the economic interests of merchant capitalism. In an unsigned letter written in 1827 from Fort Garry, it is evident that credit, ammunition and rum had taken on a coercive role:

"Their immediate wants have been fully supplied, but of course the scenes of extravagance are at an end, and it will be a work of time to reconcile them to the new order of things. . . . I have made it my study to examine the nature and character of Indians and however repugnant it may be to our feelings, I am convinced they must be ruled with a rod of Iron to bring and keep them in a proper state of subordination, and the most certain way to effect this is by letting them feel their dependence upon us. . . . In the woods and northern barren grounds this measure ought to be pursued rigidly next year if they do not improve, and no credit, not so much as a load of ammunition, given them until they exhibit an inclination to renew their habits of industry. In the plains however this system will not do, as they can live independent of us, and by withholding ammunition, tobacco and spirits, the Staple articles of Trade, for one year, they will recover the use of their Bows and spears, and lose sight of their smoking and drinking habits; it will therefore be necessary to bring those tribes round by mild and cautious measure which may soon be effected."

(cited in Innes 1956: 287)

In this letter, it is apparent that the fur merchants still feared that the plains Indians could regain their independence and become self-sufficient. This was to be avoided at all costs.

Reducing the Indians to the role of single commodity producers ultimately resolved the problem of turning the Indians from self-sufficient independence into a state of almost total dependence. In this role as hunters and trappers for the trading posts they had little time or opportunity to engage in other subsistence activities. According to John Ogilvy, the fur merchant,

"The sole employment of these plains Indians is to kill the large animals with which their country abounds; to select particular parts of their flesh and tallow; and prepare it in the usual manner and deposit it at the posts where the Company's servants will find it . . . As these Indians are not like those of the cold and mountainous regions in want of manufactured goods, their principle inducement to perform the services we have enumerated is the present of rum, which they received at stated periods."

(cited in Innes 1956: 236)

Whether the Indians were employed to provide the fur trade with food or with furs, their natural economic cycles had been disrupted. The hunters in the employ of the trading posts were particularly vulnerable, as they could no longer hunt for their own needs. After the bison--on which the plains Indians wholly depended--were decimated, the Hudson's Bay Company became their sole provisioner of goods, including food. By the late 1700's the Woodland Cree had virtually become the employees of the Hudson's Bay Company (Ray 1974: 213). Neither liquor nor credit were as effective in creating dependency and totally disintegrating the Indian way of life as was their relegation to playing a role as a producer of a single commodity.

The processes of underdevelopment which integrated the Indians into the market economy differed little from the processes which created dependency in the Third World. One of the colonialists' first economic tasks was to create a reliable, dependent class of cheap labour. Due to the peculiarities of fur extraction and transport, this was not easily achieved in the conventional ways. The fur merchants applied great ingenuity to solve their problem. The only way merchant capital could exert control over production was to entice and coerce the Indians out of their self-sufficient lifestyles. This process took

two to three generations. The end result was dependency, hunger and disease. There were few moral constraints to limiting the vices of the fur trade and the maximizing of profits.* The Aboriginal Protection Society, in an 1857 report, soundly indicted the Hudson's Bay Company for their exploitative practices:

"We have given unlimited scope to the cupidity of a company of traders, placing no stint on their profits, or limits to their power, the unhappy race we have consigned to their keeping, and from whose toil their profits wring, are perishing miserably by famine . . . [the Company's] treatment of the Indian is as considerate and humane as is consistent with the interests of a body having the primary question of a profitable trade as object of association."

(cited in Rothney 1975: 112)

When the animal resources were depleted, and the viability of the fur trade as the central economic activity waned, the interests of the merchant capitalists turned to other economic activities. In the meantime, the social and economic resources of the Indians had been so debilitated, and their way of life so disrupted that they had virtually no resistance left to face the onslaught of almost a full century of famine and disease.

D. RESOURCE EXPLOITATION AND EPIDEMICS

The Indians experienced their most radical and permanent shift in lifestyle in the period 1820 to 1880. The gradual disappearance of

*From 1690-1800, the annual profit margin was 60% to 90%. After 1750, dividends paid to share holders never fell below 7% per annum for about a 150 year period. During this period the fur trade yielded a profit of £20 million for British interests (Rothney 1975: 124-131).

fur and game resources undermined social and economic structures which had heretofore sustained a viable way of life. It was in this period of socio-economic fragmentation and demoralization that successive waves of epidemics followed by hunger finally broke the Indian resistance to colonization. Furthermore, the Indians became increasingly irrelevant to the Euro-Canadians whose interests shifted from the fur trade to settlement and economic expansion. The treaties signed in the mid-1870's deprived the Indians of land rights and placed them on reserve land (see pp. 55 ff.). Reserve life put an end to their migratory way of life and made them virtually sedentarized wards of the state. This period climaxed their pauperization and disadvantage. The Indians were to remain highly vulnerable to disease and malnutrition for the next century.

1. The Decimation of Fur and Animal Resources

The Woodland Cree and Ojibway were the first of the Indians to suffer the consequences of resource depletion. By the 1820's the fur bearing animals in the whole boreal forest region were reported to have almost disappeared (Ray 1974: ch. 6). Declining figures for trade in marten pelts between 1817 and 1821 were indicative of the decline in all fur bearing animals. In 1817, 2,196 marten were traded, 1,430 in 1819, 513 in 1820 and 366 in 1821. The latter figure represents one-seventh of the 1817 total (Ray 1974: 117). The parkland belt likewise was losing its productivity. Fur bearing animals like beaver and muskrat had not only been over exploited, but a whole series of abnormal natural calamities had struck as well. A number of new animal diseases never seen before by the Indians began to decimate the beaver and cari-

bou (Martin 1978: 129-144). Tuleremia, a zootic disease which was killing off the beaver population, also infected the Indians with a typhoid-like illness. Periodic droughts and fires were also said to have killed large numbers of beaver and muskrat (Ray 1974: 120). A depopulation of big game in the southeastern districts of Manitoba was also observed. Big game was becoming so scarce, in fact, that the Indians lacked sufficient skins to make clothes and moccasins. Even the trading posts were experiencing shortages. By the mid-1820's, as a result of the shortages, the eastern Woodland Cree had become virtually dependent on the Hudson's Bay Company for their supply of food and clothing (Ray 1974: ch. 12).

The parkland-grassland Indians were able to resist change somewhat longer than their woodland relatives. They were still supplying the Hudson's Bay Company with meat, grease and pemmican. The bison were plentiful and agriculture had not yet given the Hudson's Bay Company self-sufficiency in food (Ray 1974: 204-214). In fact, their independence and the Hudson's Bay Company's reliance on them for provisions greatly displeased Lord Simpson, the Company's governor. This is evident in a letter of 1823, where he wrote:

"The Plain Tribes . . . continue as insolent and independent if not more so than ever; they conceive that we are dependent on them for the means of subsistence and consequently assume a high tone, but the most effectual way of bringing them to their senses would be to withdraw the Establishments / particularly those of the Saskatchewan / for two or three years which . . . would enable us to deal with them on fair and reasonable terms . . . This however cannot be affected until Red River settlement has the means of furnishing us with a considerable stock of Provisions for our Transport business."

(cited in Ray 1974: 207)

Simpson hoped to alleviate his reliance on the Indians through agricultural development. The entry of the Metis (of Indian and white parentage) into the fur trade provisions market helped solve his dilemma.

As the game animal population decreased in the boreal forest, the Company's orders for buffalo meat and pemmican from the plains increased. However, as agricultural production in the Red River colony improved, the demand for bison meat declined. The disappearance of the buffalo was the result not of the provisions market, but from a sudden upsurge in the buffalo robe and hides market. In southeastern Manitoba the buffalo herds began diminishing in the 1820's. By the 1870's they had virtually disappeared from the plains. Subsequent to the disappearance of the buffalo, the plains Indians were, according to Ray (1974: 213), "reduced to the same state of economic dependency as their woodland relatives had begun to experience some fifty years earlier."

The safety valve which the rich parkland belt had provided for many centuries was also no longer viable. With the cessation of the annual winter buffalo pound, to which even the Woodland Cree had made annual migrations, the Red River colony became the new winter "safety valve" for Indians seeking food and shelter. Many Indians were still attempting to eke out an existence on a modified form of subsistence hunting and trapping, but it was becoming increasingly apparent that the traditional way of life was no longer viable.

2. A Profile of Disease: 1780-1870

The disappearance of the buffalo was accompanied by widespread famine and disease.* In 1885, the Metis leader, Gabriel Dumont,

*Aside from an article by Rich (1976) there is little documenta-

described the social and psychological demise which accompanied the end of the Indian's self-sufficiency:

"You would not know the Canadian Indian. He is all changed. Pride, vigour and sturdy independence are gone. The loss of the buffalo made the change. His living is gone. His very life is gone. He does not like the rotten pork the government gives him. He is sick! Smallpox and other white men's diseases kill them in hundreds. He talks of uprisings but he does not have it in him any more. He is just full of grievances."

(cited in Rothney 1975: 154)

In the twenty year period 1830 to 1850, 15 serious epidemics, 9 of which spread through more than two districts, began decimating the Indian population. In some years, as Table 6.1 demonstrates, several diseases coincided, creating a double jeopardy.

The epidemics of smallpox in 1781-82, influenza in 1835, smallpox again in 1837, and measles in 1846-47 caused heavy losses of life in the affected areas. The scarlet fever epidemic of 1843 caused heavy losses both among Indians and Europeans. Most of the other epidemics, however, were said to have taken light to moderate tolls (Ray 1976).

Smallpox was the most dreaded of all the diseases. It was introduced on the east coast of the Americas early in the seventeenth century. In the three year period following the arrival of the Pilgrim Fathers in 1621, a smallpox epidemic decimated an estimated 90% of the population among the coastal tribes (Rich 1976). Indians fleeing the

tion outside of Hudson's Bay Company journals before 1830; the 1830-1850 period has been thoroughly documented by Ray (1974, 1976). The period following 1850 awaits detailed study. Hence, this review will cover only the documented period with comments about preceding and succeeding periods.

Table 6.1 Epidemics in Western Canada 1780-1870[†]

Year	Disease Epidemic	Year	Disease Epidemic
1781-82	smallpox	1843	influenza
1819-20	measles and whooping cough	1844*	mumps
1834*	whooping cough	1845*	whooping cough
1835	influenza	1845*	dysentery
1837	influenza	1845	influenza
1837-38	smallpox	1846*	dysentery
1841*	mumps	1847-47	measles
1843	scarlet fever	1847	influenza
1843*	whooping cough	1869-70	smallpox

[†]Documentation for the period 1780-1830 and 1850-1870 is not complete.

*localized epidemics

(Source: Ray 1974, 1976; Rich 1976)

dreaded disease merely diffused it deeper into their territories.

The smallpox* epidemic of 1781-82 was the first major incidence of European disease recorded in western Canada. It entered Canada from the South via the American fur trade. In two years it had spread like wild-fire to the furthest northern Indian tribes. It decimated some Indian tribes. About 90% of the Chipewyan were estimated to have died (van Stone 1965). Among the plains and woodland Indians, David Thompson estimated losses of one half to two thirds (Ray 1974: 105). Smallpox was not solely responsible for the heavy death toll, however. Starvation followed the epidemic due to a lack of hunters (Rich 1974: 60). Though the populations affected suffered heavy losses, they were able

*For an epidemiological description of smallpox, see Christie (1977).

rebound quickly and still quadruple in 30 years. Their independent self-sufficiency and integrated lifestyles can probably account for their resilience. The epidemics of later periods had much more serious long-term effects.

Whereas smallpox tended to originate south of the border, epidemics of influenza, measles, and scarlet fever originated from within the York Factory/Norway House transportation corridor. Quite possibly the August arrival in York Factory of the annual Hudson's Bay Company ship from England coincided with outbreaks of these diseases. From York Factory diseases spread via the transportation networks throughout the York Factory hinterland in a hierarchical contact-diffusion fashion (see Fig. 6.1).*

The influenza** outbreak in 1835 rivalled the smallpox epidemics in the extent of its diffusion. On June 22 it was reported simultaneously in York Factory and Norway House. The Athabaskan Boat Brigade then carried it to Fort Chipewyan where it was reported on October 23. Here the Caribou Indians from the forest tundra zone had gathered to trade. They carried the epidemic with them after dispersing to their home areas for winter. By January 22, 1836, it was reported in the Peace River District. Except in this district and in Ft. Athabasca, where malnutrition had reduced resistance to disease, this epidemic resulted in few deaths (Ray 1976).

*Diffusion was hierarchical in that the first stages diseases were transmitted from one centre to another, after which it diffused by contact over a period of time.

**For an epidemiological description of influenza, see Schild (1977).

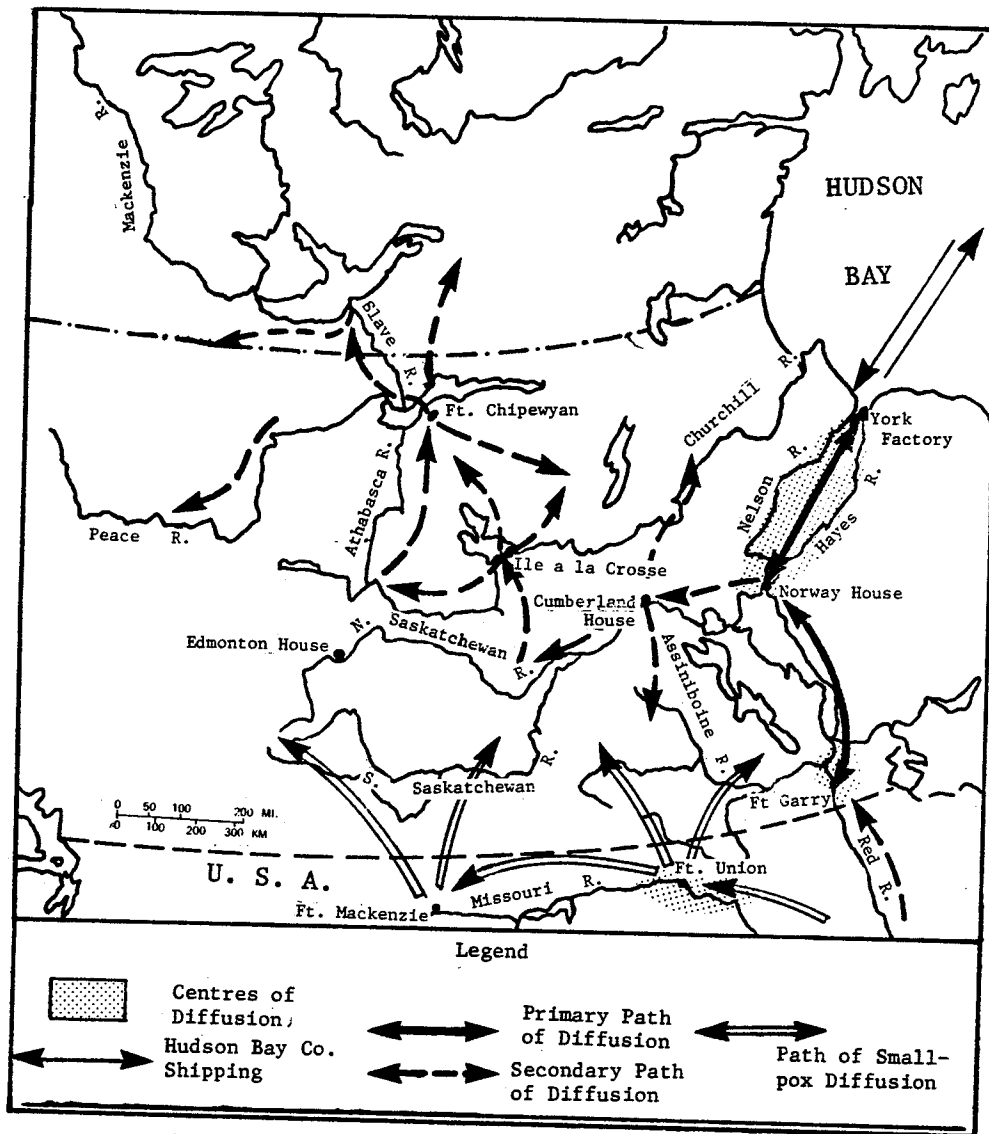


Fig. 6.1 Paths of Epidemic Diffusion 1830-1850
(Source: adapted from Ray 1974, 1976)

The measles* epidemic of 1846-47 began in the Red River colony and spread northward to Norway House, from where it was diffused outwards. It was widespread and took a heavy toll in life. In York Factory about one third of the Indians perished. It was so devastating that not enough transport crews could be made up to haul cargo inland from York Factory (Ray 1976).

*For an epidemiological description of measles, see Ball (1977).

The 1837-38 smallpox epidemic, the first since the 1781-82 outbreak, also took a heavy toll. Ray estimates that up to three quarters of the Indians affected had died. This epidemic was brought to Ft. Union, just south of the border, by the American Fur Company. From Ft. Union it spread via the plains Indians into the forest regions.

The patterns of disease diffusion were quite regular and predictable. However, not all diseases followed the same patterns, as the map might suggest. Some were highly localized and others had a limited range. The York Factory/Norway House axis was the main diffusion centre. Out of this hub of economic activity and transport radiated one epidemic after another. The most consistently ravaged region was the Norway district, which suffered ten epidemics in 20 years. With the exception of smallpox, virtually all the epidemics were diffused from Norway House. The epidemics followed the transportation routes to Cumberland House, Carlton House, Edmonton House along one path, and from Cumberland House to Ille a la Crosse, Ft. Chipewyan, Ft. Resolution, Ft. Simpson, and Ft. Dunvegan along another (see Fig. 6.1). It is interesting to note that, with the exception of smallpox, most of the epidemics were confined to the boreal forest regions and to the Red River valley.

It may be mere coincidence that the epidemics were confined largely to the boreal forest. On the other hand, it is also open to conjecture that the diseases spread along paths of least resistance, created by the loss of resource viability among the Woodland Indians. It is conceivable that a loss of resource viability would result in greatly increased vulnerability to disease. It is clear that the plains Indians who had an abundance of resources and were still fiercely independent were hardly affected by the diseases which crip-

pled their northern neighbours.

Several factors account for the rapid diffusion of disease. During the period examined, there was considerable population movement and commercial interaction between the various regions of the Hudson's Bay Company's Northern Department. Ray (1976) lists three main diffusion factors attributable to population movement. First, there was considerable interaction between Indians during their traditional, seasonal migrations. Ample opportunity would have been given to come into contact with infected hosts. The Chipewyan, for example, picked up disease agents while they wintered in the South and transmitted them northwards while following the migrating caribou herds. Second, there were seasonal variations in spatial population concentrations. While in the winter the woodland Indians would be scattered about in small concentrations of 20 to 30 people, they congregated in summer trading camps in villages numbering up to 1,000 people. In these camps disease spread like the prairie fire. Third, as was already mentioned, the prime carriers of disease were the transport brigades who travelled an extensive network of posts linked by boat, canoe and cart. Most of the disease transmission took place in the summer months when transport was moving and populations were concentrated. Few epidemics which began in fall or winter diffused very far because freeze-up halted transport and the coming winter dispersed the Indians.

One factor Ray (1976) avoids in his discussion is the "coincidence" between the Indian loss of self-sufficiency, the depletion of resources and the rapid spread of disease. Even though it is difficult to establish a causal link without access to better data, from an ecological and epidemiological point of view such a correlation seems

plausible. Where the environment plays a critical role in the interaction between agent and host, a debilitated environment weakens host resistance to disease. The extent of environmental debilitation was greatest in the areas of greatest fur trade activity.

Proponents of the ecological school of epidemiology (Reinhard 1976; Schaefer 1971a; Sinclair 1953) are placing increasing emphasis on the correlation between dramatic changes in lifestyle and disease. Among them the general consensus is that changes in lifestyle and debilitating social and economic conditions are more significant factors than the physiological conditions in the transmission of disease. Dr. Wm. Saunders (cited in Obomsawin 1978: 7) reflects this opinion when he says, "Indians fell prey to the white man's diseases not upon contact, as the germ theory would require, but after they changed their lifestyle." This opinion was clearly elucidated and supported in the study on Inuit acculturation and morbidity. If the Inuit experience has any validity in explaining the Indian experience, then the apparent coincidence between their radical lifestyle change, deprivation and disease is too strong to be dismissed.

E. LAND LOSS, SEDENTARIZATION AND DISEASE

The Indian people were slowly transformed from a proud, independent people into an unhealthy, subdued folk who could no longer resist the advances of Euro-Canadian civilization. First, their fur resources ran out. Then, their sources of food and clothing were depleted. The Indians had been fully exploited for their economic value and had lost many of their social resources as a consequence. Finally, they were exploited for their land.

Land was ultimately the Indians' most valuable resource. The land not only sustained their physical needs; the land also embodied the essence of their religion and their culture. It could not be violated without violating their spirituality. Martin argues that European diseases, the fur trade and Christianization were the three dominant features of the white man's coming that caused the Indian to apostatize his relationship to the land. Of these, the European diseases were the most difficult to understand and to cope with successfully. Martin (1978: 53) maintains that:

"Alien disease did more than decimate the native population; it effectively prepared the way for subsequent phases of European contact, by breaking the native morale and, perhaps even more significantly, by cracking their spiritual edifice. It is my contention that European disease rendered the Indian's (particularly the shaman's) ability to control and otherwise influence the supernatural realm disfunctional--because his magic and other traditional cures were now ineffective --thereby causing him to apostatize (in effect); this in turn subverted the "relationship" principle of taboo and opened the way to a corruption of the Indian-land relationship which soon gathered momentum under the influence of the fur trade."

By 1870 the land could no longer support the Indians. However, it was still essentially theirs--they were free to move about and use it as they saw fit. The fur trade made no demands on the land itself as an economic resource. Hence, there was no pressure to officially deprive the Indians of it until expanding interests in settlement and mineral exploitation imposed a new value on land (Watkins 1977). Though by the 1820's and 1830's Lord Simpson had already made moves to restrict the Indians to certain trapping areas and to trade at designated trading posts, it was not until the signing of the treaties in

the mid-1870's that they finally lost their rights to the land. By this time they had become too impoverished and weak to resist, or even to negotiate better terms (Ray 1974). By this action of the colonial government, they were deprived of the opportunity to develop adequate alternative resources. They had become socially and economically irrelevant to the westward expansion of eastern economic interests. By being confined to the reserve lands they were relegated to attempting to continue in their "traditional" pursuits of hunting, trapping and fishing on a resource base that was at best marginal.

Sedentarization on the reserves did little to improve the conditions of ill health. In fact, it could be argued that it entrenched disease as a permanent feature of Indian life. Reinhard (1976) argues that the sedentarization of subsistence hunters introduces a new disease burden (see also Cassidy 1980). Diseases of crowding, such as tuberculosis and malnutrition, which had no place in the life of subsistence hunters, began to make up the main disease burden of the Indians. Poor sanitation, crowded and inadequate housing, few economic opportunities and social depression took an ever increasing toll in morbidity and mortality.

F. RESOURCE EXPLOITATION, DEPRIVATION AND DISEASE

The correlation between disease and socio-economic deprivation was established in the previous chapter. In this chapter the relationship between diseases and resource exploitation has been examined. In Reinhard's (1976) study of the relationship between resource exploitation and disease in the western Arctic, he attributes increased morbidity and mortality to: (a) the exploitation of resources necessary for

the subsistence of indigenous peoples; (b) the incomplete industrialization of the native economy; (c) increasing urbanization (or sedentarization); (d) surges of immigration; and (e) economic inflation. The net results, he says, "have been a de facto pauperization of most of the indigenous population and degradation of their life style, producing greatly increased morbidity and mortality with social depression." (Reinhard 1976: 626).

The overall impact of resource exploitation on disease can be expressed in two ways. First, ill health is a manifestation of the cumulative environmental effects (Rogers 1960) of a given lifestyle. The role of food quality and quantity in maintaining good health is a crucial lifestyle variable, as we shall see in the following chapter. Second, the existence and perpetuation of ill health among marginalized people is the product of the underdevelopment process. These two points are illustrated in Figure 6.2, inspired by an idea from Reinhard (1976). The four waves of resource exploitation which result in accumulation of factors leading to loss of well-being (or what Reinhard (1976) describes as disadvantage) illustrates the cumulative effects of the underdevelopment process.

Figure 6.2 illustrates the debilitating impact which the overwhelming Euro-Canadian social and economic system had on a well balanced yet fragile Indian system. Through successive waves of resource exploitation the Indians were steadily integrated into the expanding system of world capitalism. Each wave had a severely debilitating effect on Indian self-sufficiency, social and economic self-determination and, significant to this study, overall health and nutrition. The Indian system steadily lost its ability to adapt and maintain integrity

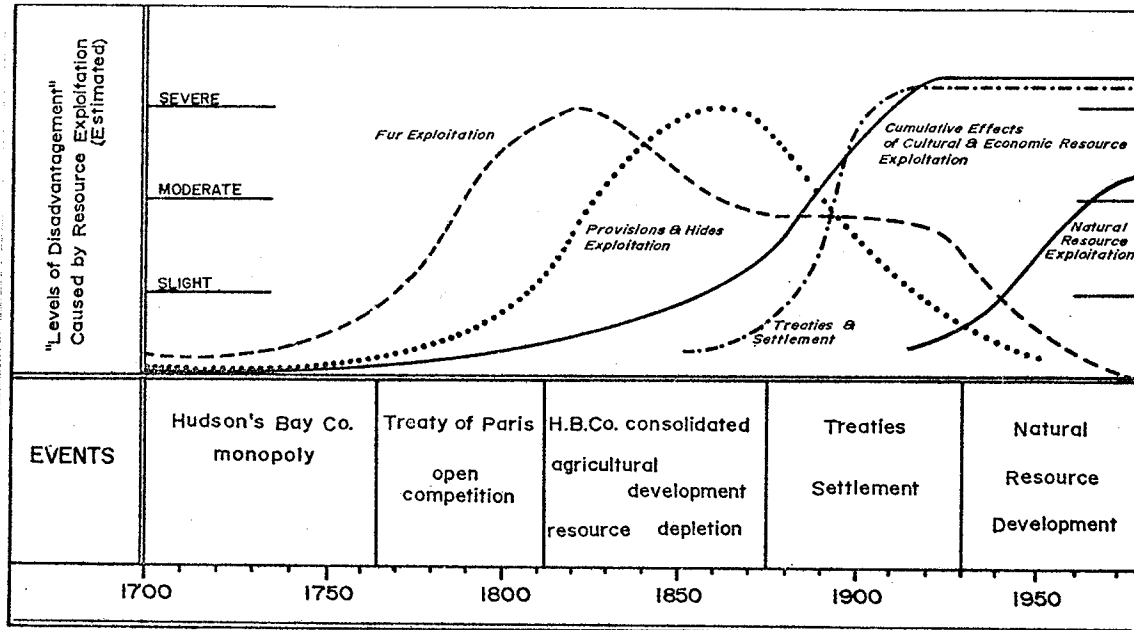


Fig. 6.2 The Impact of Resource Exploitation on General Levels of Disadvantage*

at the expense of contributing to the impetus of westward expansion.

The first wave of exploitation occurred with the fur trade, the impact of which peaked in the early 1800's. As the fur bearing animals were decimated, the fur industry waned and trapping took on a much more peripheral role. Today, trapping plays a very small role as an economic activity but a vital role in helping to maintain the thin thread tying the Indians to their traditional values and way of life.

*This diagram is not a self-contained model and does not represent a quantitative relationship between the four waves of resource exploitation and the S-curve of cumulative effects. It serves merely to diagrammatically illustrate an historical process.

The trade in provisions and hides peaked in the mid-1800's, after which the decimation of the bison left the plains Indians in a debilitated state. The debilitating effects of fur and big game exploitation culminated in the loss of land rights and sedentarization on reserves. Even though the Indians were able to rebound from localized and periodic debilitation (i.e. epidemics, starvation, etc.), the cumulative effects left them impoverished, socially and economically demoralized and no longer relevant to the processes of western development.

In this century the development of forestry, mining and hydro-electric generation is represented by the latest wave of exploitation (see pp. 59 ff.). Though the overall impact is lessened somewhat by the more humane attitude of southern interests, the general impacts have tended to further debilitate the native people. The overall process of exploitation has varied little from the first period of fur extraction (Loxley 1981). Hence, contemporary resource exploitation can also be said to contribute to the cumulative effects of underdevelopment. According to Reinhard (1976), resource exploitation has left the Indian with excessive levels of morbidity, mortality and socio-economic depression.

G. CONCLUSION

This chapter elucidates how the process of underdevelopment generated ill health and malnutrition in the past, and how it formed the basis of continuing disparity in health conditions today. The same processes which were shown in the previous chapter to generate morbidity, mortality and malnutrition in the Third World and among the Inuit were seen to generate ill health among the Indian people. Processes which

resulted in dependency, social fragmentation, loss of control over the means of production and exchange, loss of access to and control over land, a broken "ecological contract", integration into the world system of capitalism, commercialization of resources and a radically altered lifestyle were shown to play a significant role in the etiology of disease and malnutrition. The significance of the historical approach employed in this chapter was demonstrated by elucidating the interactions between social, economic and environmental factors which, over time, culminated in the unleashing of biological and social phenomena over which the Indians had no control. The method served to illustrate how these processes have a cumulative effect which can be manifested in a burden of ill health whose causes are often neither apparent nor easily comprehended. If the theoretical basis for placing the role of modernization in the etiology of ill health and malnourishment (as laid down in the previous chapter) has any validity, and if it can be accepted that the modernization of hunter-gatherers and of agricultural people provides an appropriate paradigm against which to compare the Indian experience, then it can be concluded that the conditions of ill health and malnourishment today are rooted in the processes of underdevelopment and are perpetuated by the processes of modernization.

The next chapter isolates the nutrition variable from the whole range of resource variables discussed in this chapter. The basic stages of the nutritional shift, as an aspect of the Indians' integration into the modern market economy, will be described.

CHAPTER VII

THE NUTRITIONAL SHIFT: MODERNIZATION AND DIETARY CHANGE

A. INTRODUCTION

Whether changes in values and institutions fostered by modernization are beneficial or not is determined largely by the ability of the receiving culture to withstand and absorb the system shocks which change generates. It has already been demonstrated that the fur trade left the Indian people dependent on their colonizers, socially fragmented and vulnerable to the insults ravaged on them by the "modern way of life". The diet of the Indian people was, and still is, particularly susceptible to value changes in food habits and food preferences.

Rapid changes in food values compromised their well-adapted social and economic systems of food production (or procurement), distribution and consumption as well as cultural values. These changes accelerated as the Indians came in increasing contact with the modern market economy.

The purpose of this chapter is: (a) to highlight the nutritional component of the interaction between resource degradation, and (b) to establish the basis for describing the impact of dietary change on Indian health. This chapter on modernization and dietary change focuses on the nutritional shift, the nutritional sacrifice and the role of the modernization process. Three basic stages are described. First, the late fur trade diet is described. Second, the semi-traditional diet,

which involved few drastic lifestyle changes, is described. Third, the settlement diet, which involved a dramatic change in lifestyle, is detailed. An examination of the nutritional sacrifice assesses the consequences of the nutritional shift both in terms of nutrient quantity and of nutrient quality. Finally, the nutritional shift is viewed as occurring as a part of the modernization process, which includes the pressures to integrate and incorporate the Indian way of life into the modern market economy and into the mainstream of southern Canadian way of life.

B. THE LATE FUR TRADE DIET

Before the decimation of fur and game animals, the Indians used relatively little by way of agrarian foods. Some Indian corn from the Michilimackinac Indians in the East may have found its way into the plains and boreal forest.* Ray (1974) reports that the Assiniboine made annual trips to the Mandan Indians to the southeast to trade meat for corn. The Homeguard Cree around York Factory are also known to have been given rations of oatmeal from time to time right from the beginning of Hudson's Bay Company occupancy (Moodie, personal communication). The carbohydrate component in the Indian diet, however, remained relatively insignificant (except for the copious consumption of fur trade liquor!) until the late 1800's.

In the fur trader's diet the European component also remained relatively insignificant until the 1800's. Packing lists for canoes making the journey northward indicate that only a small proportion was

*See Moodie (1980) for a discussion on Indian corn in the fur trade.

made up of flour and other European foods. A 1785 packing list for a canoe travelling from Montreal to Michilimackinac shows that out of a 5,540 lb load, rum and wine made up 1,120 lbs, butter 70 lbs, flour 400 lbs, and for comparisons sake, 480 lbs of gunpowder (Innes 1956: 216). Another list from a 1800 canoe trip into the North indicates 90 gallons of wine, 100 lbs of flour and one keg of sugar (Innes 1956: 228). In an 1818 trip to Athabasca, the list shows that only one third of the load was made up of provisions (food contents not detailed). For daily consumption the traders had to rely on Indian food, reserving European foods for special occasions.

The Hudson's Bay Company encouraged all the posts to attempt agricultural self-sufficiency, particularly in garden produce. But for obvious reasons of climate, soil and unadapted seeds, this policy was not always too successful. It was not until Lord Simpson's arrival in 1822 that a concerted effort was made to make the Red River colony agriculturally self-sufficient (Ray 1974: 206-207).

By the late 1820's self-sufficiency had been achieved. The Red River colony successfully produced potatoes, turnips, barley, wheat, oats, beef, pork, poultry; it also produced eggs, butter and cheese. Thereafter, a small surplus was available for trade to the Hudson's Bay Company. Initially it consisted largely of flour. Until 1870 the demand from the Company was not large and it fluctuated a great deal. A list of goods requested from the Red River colony, presented in Table 7.1, illustrates what was moved through the Company network.

It is interesting to note that Table 7.1 shows pemmican to be in importance as late as 1870. Conceivably this increase could reflect the increased dependence of the Indian on the Company for provisions.

Table 7.1 Hudson's Bay Company Provisions Orders for the Northern Department

	1830	1840	1850	1860	1870
To be supplied by Red River:					
Barley (bushels)	300	30	45	60	70
Corned beef (cwt.)	-	12	6	40	40
Biscuit (cwt.)	-	30	30	45	46½
Butter (firken†)	-	40	40	46	50 + 2 salted
Butter (½firken†)	-	10	10	10	16
Butter (maccarons)	-	6	8	-	6
Cheese (lbs.)	-	80	300	360	230
Eggs, preserved (kegs)	-	-	12	10	16
Flour, 1st grade (cwt.)	500	650	300	10	50
Flour, 1st & 2nd grade (cwt.)	-	-	900	1,700	1,410 + 10 coarse
Hams	-	70	50	40	56
Hogs lard (100 lbs.)	-	-	4	5	3
Dried onions (bushels)	-	3	4	2	-
Potatoes	-	40 (kegs)	24 (bu.)	20 (bu.)	20 (bu.)
Pemmican, common (90 lb. bags)	-	400	650	600	750
Pemmican, fine (45 lb. bags)	-	-	-	-	-
Grease, common (cwt.)	-	-	-	-	-
Dried meat (100 lb. bales)	-	50	100	-	-
Tongues, Buffalo	-	-	-	-	-
Salted pork (cwt.)	-	45	60	80	-

† A firken was equal to a quarter barrel. (Source: Ray 1974: 209).

However, what proportion of the Company's request would have been consumed by Indians is not known.

Bannock began to appear as an Indian staple in the late 1800's. Though a precise time of introduction has not been established, it conceivably could have happened in the 1850's or 1860's. Berkes and Farkas (1978) estimate the time of bannock introduction in the East James Bay region to be between 1890 and 1900. The Company's request for flour (the main ingredient of bannock) rose sharply between these years. Hogs' lard, the other important ingredient, was introduced to the request list in 1840 and held steady until 1870. By the turn of the century, flour and lard comprised a small but important part of the Indian diet.

The introduction of bannock signifies the first nutritional shift away from a largely protein based diet. Though consumption of flour was small in the initial stages, it increased steadily as availability and access improved.

C. THE SEMI-TRADITIONAL DIET: THE FIRST NUTRITIONAL SHIFT

The little information available on turn-of-the-century Indian diet indicates that southern provisions like flour, sugar, lard and tea were slowly being incorporated. A report of a 1942 medical survey conducted in the Norway House District by Moore and others (1946) included a small study of foods purchased at the Hudson's Bay Company store from the early 1900's to the early 1940's. They noted that Norway House was virtually the only supply centre for southern foods. Norway House, being situated at the north end of Lake Winnipeg, had direct boat access to southern supplies. Because of Norway House's central location, trappers and traders from outlying areas relied on its trading post to

supply them with foods for the coming year.

The search by Moore et al. (1946) into the records indicated that the most common foods purchased were: white flour, lard, sugar, tea and oatmeal. They noted that in the early 1900's a trapper with a typical family of six purchased 100 lbs of flour, some lard and a few pounds of tea and sugar for luxury consumption. The records show that forty years later, the same typical trapper would carry away 600 lbs of flour, 130 lbs of lard, 50 lbs of sugar and 25 lbs of tea. Whereas the variety of goods had not increased substantially, the quantities purchased increased sixfold.

In the early 1900's not all trappers had as much access to southern goods as the report by Moore et al. might indicate. Tom Linklater, an 81 year old trapper from Nelson House (near Thompson), reported that the diets of trappers at the turn of the century were, at best, frugal (Lowrey 1980: 2). Their typical diet consisted of fish, rabbit, mink, otter or porcupine,* with a small piece of bannock constituting a Sunday treat. Lowrey reports that "Another treat was syrup made from the sap of birth trees. [Linklater] said his father would boil the sap along with a muskrat paw and some of the animal's flesh. The paw and flesh were removed and more sap poured into the pot until the mixture turned to a syrup as thick as carmel." (Lowrey 1980: 2). The availability of flour for bannock was too precarious to supply them with more than an occasional treat. Frequently, the trader who bought furs at Nelson House would have only 50 kg of flour to sell to

*The utilization of the fish-hare trophic level indicates that the large game animals must not yet have recovered from their depletion.

as many trappers. Sometimes there would be none. When flour supplies became more secure, however, bannock became significant enough in the Indian diet to be incorporated as a "traditional" food.

The Moore et al. (1946) study observed that where dietary habits were strongly influenced by imported food, the physical condition of the Indian deteriorated. Based on an examination of changes in the average sizes of clothing sold at the Company store, they claimed that Indians were not growing as large in 1940 as in 1900. They reported that "The shirts sold then were sized 16 to 17, now the common sizes are 15½ to 16; the pants were sized 38 to 44, now 34 to 38." (Moore et al. 1946: 231). They noted that older white inhabitants of Norway House had also observed that the Indian's general physical condition was deteriorating.

Most likely the increasing consumption of southern food worked in conjunction with an inadequate supply of traditional foods, as the reliance on the fish-hare economy would indicate, to produce the deteriorating conditions observed in the Moore et al. (1946) study. Vivian et al. (1948), in their study of the Eastern James Bay Cree, reported numerous cases of starvation and chronic food shortages until the 1940's. Moore's concern with the increased consumption of refined carbohydrates is consistent with Sinclair's (1953) observation of the Inuit made at about the same time. In fact, Sinclair accompanied Moore and others on a later survey in Norway House and remarked on the similarity in conditions.

The Moore et al. (1946) and Vivian et al. (1948) studies of Norway House and four Eastern James Bay communities, respectively, report on the consumption levels of southern foods. Moore et al. (1946) esti-

mated that the Indians of Norway House purchased on average 1,470 Kcals per day, or about one half their total consumption. About 85% of this purchase was made up of flour, lard, sugar and jam. Vivian et al. (1948) observed that in Attawapiskat, the poorest of the four communities, flour, sugar, jam and butter also made up 85% of an average daily purchase of 1,915 Kcals. This would represent 64% of the total of 2,546 Kcals consumed daily. In Rupert's House, the better off of the four communities, the same shopping list made up 86% of the 2,387 Kcals purchased daily (or 66% of the 3,103 Kcals consumed daily). Both studies indicated that by the mid-1940's up to two thirds of the Indian diet consisted of imported food. Furthermore, about 85% of these purchases were made up of refined carbohydrates.*

In spite of generally inadequate nutrition, Indian people have exhibited little evidence of the classical nutrient deficiency diseases.** Both the Moore et al. (1946) and the Vivian et al. (1948) surveys came to this conclusion in the 1940's. Later studies in Saskatchewan (Best and Gerrard 1959; Best et al. 1962) also came to the same conclusions. The Nutrition Canada survey (1975) is also consistent with these findings. There has appeared to be little change in the Indian's nutritional status over the last 30 to 40 years.

Even though there has been little evidence of the major classical nutrient deficiency illnesses, all the studies identified chronic

*The reader should recall the impact of the carbohydrate intolerance factor on the general health of people whose diets are protein-based.

**This fact distinguishes Indian nutritional status from that found typically in nutritionally marginal Third World areas where protein-calorie malnutrition (PCM) predominates (Berg 1973a).

vitamin deficiencies which produced minor symptoms. Moore et al. (1946) reported that every Indian examined exhibited some abnormality either of the conjunctivae (Vitamin A deficiency), or swelling and bleeding gums (Vitamin C), or ocular limbic blood vessels (riboflavin), or a fiery red tongue colour (niacin). Vivian et al. (1948) included evidence of extremely high levels of dental carries. They identified hard candy as a worse culprit than raw sugar. In Attawapiskat, where sugar consumption was higher than in Rupert's House, 50% of the people between ages 13 and 25 had no decayed, missing or filled teeth (DMFT). In Rupert's House, where candy consumption was three times as high as in Attawapiskat, only 24% of the males and 9% of the females had no DMFT. The same deficiencies and excesses were observed by the subsequent surveys as well.

In the post fur trade era dietary change was confined more to an increasing consumption of refined carbohydrates than increased variety in consumables. However, with increasing consumption came an increasing reliance on food supplies imported by the trading post, and a decreasing dependence on country food.

D. THE SETTLEMENT DIET: THE NUTRITIONAL SACRIFICE

The post World War II era inaugurated a period of rapid changes in the northland. It was the era of the bush plane which facilitated the final break with isolation and integrated many native communities into the modern market economy. The government had been awakened to the plight of the Indian and had initiated a more humane approach directed primarily toward food rations and family allowances. This action vastly increased food availability as well as the purchasing power of

the people (Berkes and Farkas 1978).

1. Social Change and the Settlement Diet

Another period of rapid social change was inevitable as numerous modernizing processes emanating from the South broke through the isolation of the North. The first carriers of modernization were Hudson's Bay Company store employees and medical services personnel. With an increasing focus on northern resources came frequent visits by representatives of industry. Civil servants, who were concerned with reserve administration and social welfare, also came. They were also interested in concentrating Indians in white-style settlements to facilitate social infrastructural development and reduce its costs. This development heralded new ways of thinking and living together. Improved air transport also facilitated a much higher level of migration to and from urban centres. Furthermore, modernization was not brought to the Indians; they were being brought to "civilization" as well. A major source of change was compulsory schooling. Most of the Indian children who were to be educated were transported off the reserve into more "civilized" settings to be educated in southern ways (Berkes and Farkas 1978).

With changes in lifestyle came changes in dietary habits and food preferences. Before World War II, many Indians spent a good portion of the year in the bush trapping, hunting and fishing. The Indian purchased his flour, sugar, lard, etc. (in increasing quantities), and carried them into the bush in one or two trips annually. These foods were convenient as they were easily transported and stored. The transition to a settlement way of life, however, inaugurated the settlement

diet.

The settlement diet, in contrast to the semi-traditional diet, became composed increasingly of semi-processed and processed foods. The refined foods such as flour, sugar, lard, etc. gave way to processed foods such as bread, cakes, cookies, etc. (Berkes and Farkas 1978; Bossenmaier 1974). New values were also placed on meats from the South which not only came in the familiar "raw" state, but more importantly came preserved by canning, smoking or curing. Processed meat became a symbol of the modern diet.

In the light of a narrow traditional food supply base, southern food supplies may in fact have retrieved a semblance of good nutrition for many Indians suffering chronic food shortage. It brought a wider variety of foods which could also have increased the potential for an improved diet. The social welfare system certainly could have made this possible. However, according to Woolcott (1974) the greater diversity in the diet did not ensure a better nutritional status. In fact, it has been the general consensus of some nutritionists such as Berkes and Farkas (1978), Bossenmaier (1974) and Woolcott (1974) and of medics such as Ellestad-Sayed *et al.* (1979), Moore *et al.* (1946), Schaefer (1977) and Sinclair (1953) that abandoning the traditional diet in favour of the settlement diet has represented an unfortunate nutritional sacrifice.

Lest it be misconstrued that the traditional diet has been totally abandoned, nutrition surveys in northern Manitoba have found ample evidence of traditional food use (Bossenmaier 1974; Ledermann 1974; Social Impact Study Group 1974). There are wide regional differences in usage, depending on the extent of a community's isolation or

its access to a major urban centre. It has been proposed that the proportion of imported food versus traditional food in the diet could be used as a measure of the level of modernization in a community (Woolcott 1974). The studies found that the more isolated communities depended on country food for as much as one third of their intake. More integrated communities were shown to have reduced their consumption of wild foods to only one eighth of the total consumption (Social Impact Study Group 1974).*

2. The Nutritional Sacrifice

The shift to the settlement diet has involved a major change in food preferences. An increasing prominence of processed foods in the stores has generally turned the Indian preference away from "country food" in favour of southern food. A particular concern is expressed by Berkes and Farkas (1978) for the consumption of pre-packaged dinners, white bread, jam, processed meats, flavoured crystal drinks, carbonated drinks, confectionary, infant foods and infant formula milk.

The switch to the settlement diet has been shown to result in a nutritional sacrifice (Berkes and Farkas 1978; Schaefer 1971a, 1977). The nutritional sacrifice in substituting processed foods for natural foods involves: (a) the quality of nutrients available; and (b) the absorption (or utilization) of these nutrients.

Research into the nutritional quality of country food has shown that nutrients are much more concentrated in the bush foods than in

*See Bossenmaier (1974) and Lederman (1974) for an excellent description of hunting patterns, wild food availability, food preference and cooking and eating habits in selected northern Manitoba communities.

imported southern food. The most vulnerable nutrients are protein, Vitamin A and Vitamin C.

A comparison between wild game and domestic meats indicates significant differences in protein and fat content. Table 7.2 illustrates the differences.

Table 7.2 Protein and Fat Content of Commonly Eaten Meats (gm/100 gm edible portion--uncooked)

INDIAN DIET			CANADIAN DIET		
Item	Protein	Fat	Item	Protein	Fat
Ducks	24.3	3.5	Veal side	19.0	12.0
Snow goose	23.1	3.3	Chicken	20.0	13.0
Moose	25.2	1.5	Beef roast	17.0	23.0
Caribou	27.0	1.2	Beef steak	16.0	25.0
Beaver	20.4	21.4	Pork side	12.0	45.0
Hare	21.0	3.1	Lamb side	16.0	28.0
Whitefish	25.0	1.1	Hamburger	16.0	28.0
Pike	18.7	0.2	Frankfurter	14.0	21.0

(Sources: Berkes and Farkas 1978: 161; Schaefer 1977: 24)

The domestic meats were shown to contain about 30% less protein than the wild meats. If an equal quantity of all the wild meats were consumed, they would provide an average of 23.1 grams of protein per 100 grams (edible portion) while domestic meats would supply only 16.3 grams. The differences in the fat content of wild and domestic meats is the most striking. If beaver is omitted--the beaver tail provides most of the fat content--the wild meats would average 2.0 grams of fat

compared to 24.0 grams in the domestic meats. The domestic meats provide about 12 times as much fat. If beaver is included, the proportion would be about 6 times as much. The high fat content of domestic meats is alarming when one considers that a sedentary lifestyle does not justify a large consumption of fat.

A comparison between wild greens and garden vegetables also aptly illustrates striking differences between imported and traditional sources of nutrients, as shown in Table 7.3.

Table 7.3 Vitamin A and Ascorbic Acid Content of Commonly Eaten Domestic Vegetables and Edible Greens (per 100 gm)

WILD VEGETABLES			GARDEN VEGETABLES		
	Vit. A (I.U.)	Ascorbic Acid (mg)		Vit. A (I.U.)	Ascorbic Acid (mg)
Bistort	-	158	Cabbage	130	51
Dandelion	800-14,000	30-66	Celery	240	9
Fireweed	18,708	220	Spinach	8,100	51
Lyme grass	-	43	Green peppers	420	128
Mountain sorrel	8,900	40	Peas (raw)	640	27
Rose root	4,106	68	Carrots (raw)	11,000	8
Lambs quarter	11,600	80	Beets (boiled)	20	6
Scurvey grass	4,546	111	Potato (cooked)	trace	16
Willow leaves	18,300	190	Tomato (raw)	900	23
Violet leaves	8,258	210	Orange	200	50
Cloud berries	210-235	158-475	Apple	90	4

(Source: Schaefer 1977: 18)

Among the garden vegetables, only spinach and carrots were found to be comparable in Vitamin A content and only spinach, green peppers and cabbage in Vitamin C. On average, wild greens provide four times the Vitamin A and 4.5 times the Vitamin C.* Unfortunately, data on the nutrient quality of more commonly consumed berries is not available. It can be generally assumed, however, that few wild greens are now utilized; the nutritional surveys indicating Vitamin A and C deficiencies would support this assumption. With such a rich abundance of native sources of vitamins, nutrient deficiencies are not necessary in spite of the inadequacies of southern foods.

The second concern with the increasing use of highly refined and processed foods is their antagonistic effect on nutrient utilization. Though these foods are frequently fortified with vitamins, dietary deficiencies can occur due to antagonistic or competitive factors associated with excess consumption of certain food additives. Berkes and Farkas (1978: 165) have stated that the native people's conversion to processed foods "has decreased the intake of certain nutrients, placed a stress upon other nutrients, and resulted in the intake of some other nutrients." An example of the nutritional sacrifice is substituting Vitamin C fortified orange crystal drinks for traditional sources found in rose hips and Labrador tea. Natural Vitamin C is more efficiently utilized than artificial Vitamin C.

Table 7.4 illustrates some of the nutrient changes resulting from dietary acculturation. The table illustrates that with the modern diet there is a decrease in the intake of roughage, protein, Vitamins

*The Canadian minimum requirement for Vitamin C is 30 mg--one orange = 60 mg.

Table 7.4

Some Nutrient Changes Resulting from Recent Dietary Acculturation

Diet Component	Traditional Source	Source Change	Net Result
alcohol	not used in bush	used in settlement	increase
calcium	meat, fish, bones, baking powder	evaporated milk	possible decrease
fat	game fat, lard	refined fat (margarine, potato chips, etc.) processed meat fat	change: unknown effect
iron	meat, fish: organic	inorganic in enriched breads, flour, noodles	change: less well absorbed
phosphorus	meat, fish: organic	inorganic in carbonated beverages, food additives	change: antagonistic to magnesium, calcium
protein	game meat	processed meat, commercial meat, grain protein, eggs	decrease in protein content
roughage	edible vegetation, berries	canned vegetables, fruit	decrease
sugar	tree sap, sugar in tea	sugar foods	increase
tannin	tea	tea	possible increase consumption
thiamine	meat, fish	enriched grain products, peanuts	increase, also increase in antagonists
Vitamin A	vegetation, game meat, fat, fish	margarine, canned vegetables, fruit	possible decrease: increase antagonists
Vitamin C	organ meats, berries, meat, fish, vegetation, indigenous teas	orange crystal drinks, juices, some fruit, vegetables	decrease
nitrite	vegetation	processed meats	addition, increase

(Source: Berkes and Farkas 1978:166)

A and C, thiamine, calcium, magnesium and iron. On the other hand, there is an increased intake of sugar, tannin, caffeine, fluoride, inorganic phosphorus, nitrate and alcohol. In addition, substituting inorganic for organic nutrients can lead to poorer absorption of iron or increased antagonism to the utilization of other nutrients such as inorganic phosphorus antagonizing magnesium and calcium. Increase in sugar consumption has well known implications for carbohydrate intolerance (Schaefer 1971a). Magnesium contained in tea also influences the uptake of mercury, which has been found in increasing concentrations in northern waters due to industrial pollution.

A growing preference for and consumption of processed foods (which are fortified with preservatives, emulsifiers, inorganic compounds, etc.) and highly refined flours, sugars and fats represents dietary modernization in the best tradition of the modern market economy. The less isolated communities become and the more closely they are integrated into the urban world of the South, the more rapidly the well balanced traditional diets are abandoned in favour of modern "junk food" diets. Whereas elderly native people would prefer to see traditional foods in the stores (Woolcott 1974), the youth prefer the modern foods. In the words of Berkes and Farkas (1978: 160); "Despite the availability of country food, many young people pursue the worst of Southern influences." Indeed, the best potential in the southern diet is frequently lost due to high costs, transport and storage difficulties. However, to what extent demand for convenience foods and processed foods is a factor of "demand dictated by supply" can only be conjectured until further research is done.

Berkes and Farkas (1978: 169) suggest that "What is needed is a nutrition revolution that parallels various successful adaptations of the Eastern James Bay Cree society to changing conditions." This can happen in four ways. First, a rejuvenation of traditional food habits and protecting such habits as eating the internal organs of fish and game is the primary concern. Second, Berkes and Farkas recommend incorporating new native nutrient sources which would make up for the frequent shortage of fruits and vegetables. Third, they suggest improving the quality of store-bought foods and give increased attention to food and nutrition education in northern Cree communities. Fourth, the renewed availability of wild game and the maintenance of large bush harvests would only benefit the development of a mixed economy (i.e. wages plus bush harvest).

E. THE NUTRITIONAL SHIFT AND DIETARY MODERNIZATION: THE ECOLOGY OF NUTRITION RESTATED

The consequences of changing from the traditional to the white man's diet have not gone unnoticed by the Indian. In the seventeenth century a Micmac chief noted that before the Indians adopted the French lifestyle, which included consuming bread, wine and brandy, they lived healthier and longer lives (Martin 1978). This opinion ". . . is consistent with the conventional wisdom of the older Cree who regard bush food as superior to commercially available meats." (Berkes and Farkas 1978: 168). The change in diet has been occurring for several centuries. In northern Manitoba two distinct shifts are discernable. First, the introduction of bannock, sugar and tea as staple items occurred in the late 1800's. The use of fur trade alcohol is not considered an

aspect of the nutritional shift as it did not coincide with any other dietary changes. The second major shift occurred after World War II, when commercially processed foods became readily available. Each shift represented a step further removed from the Indian's traditional, protein-based diet, and one step closer to an agrarian type diet heavily dependent on carbohydrate foods.

In the aftermath of the fur trade, a dependence on southern food was virtually forced upon the Indian people because traditional food resources had almost been depleted. Their dependency on the trading post has carried through to the present--what the store supplies is purchased and consumed. The modernization process has generated a conflict between traditional and modern dietary values. For example, food portions such as the internal organs of fish and animals were once highly cherished precisely for their nutritional value. Now they tend to be abandoned in favour of beef steak and frankfurters. Modern values consider traditional practices such as eating the content of the caribou stomach as vulgar. Until very recently, the practice of breast feeding infants suffered the same stigmatization. The ethnocentrism of the modern dietary culture mitigates against retaining traditional values. It is ironic that the real diversity of the traditional diet has been replaced by the apparent variety of the modern diet concomitant with nutritional sacrifices. The modern market economy's rejection of traditional values, modes of production and consumption patterns mitigates against the development of mixed modes of production and consumption which would be much more in keeping with traditional values and the availability of local resources.

F. CONCLUSION

It was previously established that a population which is ecologically well adapted experiences nutritional stress after being transferred into an alien ecosystem. The Indian people have entered a period of high nutritional risk due to: (a) the loss of the traditional food resources base; (b) fundamental changes in food procurement, distribution and consumption systems; and (c) chronic exposure to nutritional hazards (i.e. nutrient deficiencies and/or excesses, and food additives).

The modernizing Indian diet has represented a shift into a new trophic level of food production and consumption (Martin 1978). The modern market economy represents a trophic level in the food system over which the Indian people have little, if any, control. It was argued earlier that a good diet depends on a society exercising some measure of control over the production and consumption of food. Furthermore, it was also demonstrated that where self-sufficiency was lost, diets tended to become monotonous, rigid and deficient. This discussion has illustrated that modernization strongly influences the shift into a food system over which the native people have exercised little control and how in turn nutritional well-being has been compromised.

The long-term consequence of nutritional maladaptation was described earlier as the "cumulative environmental effect". The accumulated effects of social, economic and nutritional insults which the native people have had to bear are becoming manifest in changing patterns of ill health and disease. Whereas the synergistic relationship between the modern diet and ill health has been well documented for the Inuit (Schaefer 1971a), the impact on Indian health is only now being documented. There is evidence, however, that their experiences may be

similar (Moore et al. 1946; Vivian et al. 1948). Moore et al. (1946: 233) suggest that malnourishment is a factor not only in easily identifiable manifestations of physical ill health, but also in social malaise and apathy:

"Many characteristics, such as shiftlessness, indolence, improvidence and inertia, so long regarded as inherent or hereditary traits in the Indian race, may at the root be really the manifestation of malnutrition. Furthermore, it is probable that the Indian's great susceptibility to many diseases, paramount amongst which is tuberculosis, may be attributable amongst other causes to the high degree of malnutrition arising from lack of proper foods."

The next chapter will examine the health conditions of the Manitoba Indian people. It can safely be assumed that underneath appalling conditions of ill health lies a history of malnourishment which the introduction of the modern diet has not only failed to ameliorate, but has indeed exacerbated.

CHAPTER VIII

THE INDIAN BURDEN OF DISEASE: CHANGING PATTERNS

A. INTRODUCTION

The characteristics of the native people's burden of disease has altered in conjunction with the nutritional shift. The Indians as a whole experienced extremely poor health in the period from the turn of the century until after World War II. Extremely high levels of mortality indicated that conditions had not improved substantially since the fur trade era. After 1950, medical services gradually improved and mortality rates began to drop. However, at the same time that settlement life began to drastically change lifestyles, the nature of the disease burden also began to change. This discussion on health will examine the nature of, as well as changes in, the Indian disease burden.

The purpose of this chapter is to assess the impact on the modern way of life on Indian health. On the basis of the discussion in the previous chapter, it is assumed that the nutritional shift has been a significant factor in the changing character of the Indian disease burden. To begin, the conditions of Indian health from the end of the fur trade until after World War II will be described to provide a background to current health conditions. Second, a comparison between Manitoba Indian mortality and morbidity characteristics with those of the Canadian registered Indians and Inuit and the average Manitoba

rates will be made in order to examine the components of the Indian disease burden and to assess the relative disease risk facing the native people in present-day Manitoba. Third, a discussion of deaths by accident, violence and suicide will elucidate the psycho-social components of modernogenic disease. Finally, infant mortality and morbidity, as a realistic reflection of general health conditions, will be discussed to determine the extent of the "diseases of poverty" component in the Indian burden of ill health.

B. EPIDEMIC TUBERCULOSIS: THE LEGACY OF THE FUR TRADE

In the aftermath of the fur trade the quality of life for the sedentarized Indian had deteriorated greatly. Tuberculosis had become the principle disease scourge. This disease is most commonly associated with poverty and intolerable living conditions. According to Reinhard (1976: 625), "The entrenchment and emergence of tuberculosis as the principle infectious disease correlates well in time with the increasing disjointment of the native economy and way of life." The loss of the Indian's indigenous economy and the breakdown of social and cultural values had left them highly vulnerable to infectious disease.

Tuberculosis* is a tuberculin disease which can affect almost any of the body's tissues. It is caused by an airborne bacillus which thrives in conditions of poverty. According to Moore et al. (1946) and Vivian et al. (1948) surveys, the Indians were living in such abysmal conditions that they played host to numerous infectious diseases. In the winter, most Indians lived in small, smoke-filled, one-room shacks

*For an epidemiological description of tuberculosis, see Sutherland (1977).

with poor ventilation, one smoky stove, little or no furniture and few cooking utensils. The houses were draughty; frequently the only door was an old piece of blanket or canvas to keep out the winter wind. The shacks were also dangerously overcrowded. Ten to twelve people often inhabited a 12 foot square living space. According to their reports, sanitation was virtually non-existent; they were surrounded by filth, refuse and excretia.

In the summer, however, the Indians moved out into tents to escape these intolerable conditions. They depended on the summer rains to "sanitize" their camp sites (Moore et al. 1946; Vivian et al. 1948). In the summer the Indians lived on the trap line which gave them a better chance to recover from the impact of winter diseases. According to Vivian et al. (1948: 507), "Fortunately the nomadic life of following the trap lines causes frequent shifts of camp site, except during that portion of the year spent at the posts. Here sanitary conditions are their worst, and this is where most outbreaks of disease occur."

The foregoing description refers to conditions in the mid to late 1940's. Little is published about conditions prior to this. A document written by Dr. P.H. Bryce (1922), appointed Medical Inspector to the Department of the Interior and of Indian Affairs in 1904, reports that from 1904 to 1921 tuberculosis threatened to virtually depopulate the Indians. Bryce's statistics on tuberculosis morbidity and mortality indicate conditions even worse than those reported in the Moore et al. (1946) and Vivian et al. (1948) surveys. In 1909, all of the 243 Indian children in eight Alberta schools showed evidence of harbouring tuberculosis. Furthermore, each child awaiting admission was infected. In a Qu'Appelle, Saskatchewan school in 1922, 93% of 175

Indian children showed evidence of tuberculosis. In the three prairie provinces, 24% of the enrolled pupils died over a span of 16 years between 1904 and 1920. On the File Hills reserve, at the end of the 16 years since the school began, a full 75% of the children had perished.

According to Bryce, the population of the Blackfoot Indians had decreased a full 40%, between 1904 and 1906, due to disease. These same Blackfoot had been the last to be subdued by the colonial government. In the 13 year period between 1904 and 1917, the population of Canadian Indians aged 20 and over dropped by 1,639 persons. Using a very conservatively estimated birth rate of 27/1,000, Bryce claims the population should have increased by 20,000. The highest death rate was experienced by children between five and ten years of age. The overall Indian death rate in this period was 81-87/1,000.

When the Federal Department of Health was established in 1918, Bryce and others made a concerted effort to make the new department responsible also for Indian health. Up to this time the Department of the Interior and of Indian Affairs had assumed this responsibility. In 1912, their expenditure on Indian health was only two dollars per person. For 105,000 Indians, only \$10,000 was allocated to tuberculosis control. In contrast, Bryce contended that in 1919, the city of Ottawa was given three general hospitals at a cost of \$342,860, and that \$33,364 was allocated for their tuberculosis program. Needless to say, bureaucratic red tape prevailed to block all efforts to bring medical care to the Indians, and for his efforts Bryce was dismissed from his post.*

*Over the course of Bryce's tenure, government documents covering about 30 years of reporting on Indian health were destroyed by the

By the mid-1940's, health conditions may have improved marginally. Indications are, however, that mortality and morbidity rates were still phenomenally high. Moore et al. (1946) reported that in 1942, the crude death rate for Indians was 39/1,000. The comparable Manitoba rate was 8.3/1,000. The death rate can be assumed to have been only slightly lower than the birth rate. In the same year, the infant mortality rate for Indians was 400/1,000 while for whites it was 52/1,000. Few Third World countries today exhibit such high infant mortality rates.

In 1942 tuberculosis was still the major cause of disease and death. Whereas the mortality rate for all Canadian Indians for tuberculosis was 7.3/1,000, for the Norway House area it was 14/1,000, compared to the white rate of 0.27/1,000 (Moore et al. 1946). Today far fewer Indians die from tuberculosis. However, the morbidity rate for Indians today is still 118/100,000 compared to only 12/100,000 for (1975-1979 average) all Manitobans (Siggnier 1980).

Moore et al. (1946) observed that where the Indian people were well nourished and had a higher economic status, their mortality and morbidity levels were only slightly above the levels for the surrounding white population. For the more impoverished Indians, they attributed poor housing, inadequate sanitation, the rigours of the climate and poor nutrition as the major factors accompanying excessively high morbidity and mortality rates.

The plains Indians who were spared the worst of the mid-1800's

Department of the Interior and Indian Affairs to destroy the incriminating evidence of gross neglect, considered by some to have been genocidal (Leo Waisburg, personal communication, 1981).

epidemics suffered greatly in the late nineteenth and twentieth centuries. Little, if anything, is known about the health of their woodland neighbours, who suffered so extensively in the 1800's. If the information by Moore et al. (1946) about the 1940's gives any indication, they too were suffering intensely from disease. Since resource exploitation in the boreal forest zones generated little demand on Indian land, many of the bush Indians were able to retain some semblance of the hunting, trapping and fishing way of life. The plains Indians, however, were directly in the path of westward expansion, settlement and agriculture. Hence, it could be argued that, living in the midst of Canadian "civilization", their way of life would be altered more radically than that of their northern neighbours. It could be argued, therefore, that the plains Indians' health had been more fully compromised by encroaching modernization than that of their woodland neighbours.

C. CHANGING PATTERNS IN THE INDIAN DISEASE BURDEN

Little longitudinal data on Indian health is available for the pre-1970 period.* Therefore, to establish changes in the patterns of

*Health data for Manitoba Indians is limited to several published government reports in an aggregated form. Data disaggregated by individual communities or by socio-economic variables is generally considered classified information. Aggregate data on mortality and morbidity is available by region, including Indian Reserves and Unorganized Territories, sex, age and cause. The restrictions placed on the quality of demographic data (see p. 65) apply to the health data as well. In this discussion, Manitoba Indian data is compared with Canadian Registered Indians (including Inuit) and all-Manitoba data. Three particularly useful data sets on Indians were available: (a) Canadian and Manitoba Registered Indians (Siggner 1979, 1980); (b) Indian Reserves, Unorganized Territories and Manitoba (Maternal and Child Care Vital Statistics); and (c) hospitalization data comparing the remote North and all Manitoba (Manitoba Health Services Commission 1978-1979). However, an assessment of the composition of the disease burden as well as an index of the Indians' disease risk relative to other areas or groups can be obtained from these data.

the disease burden, the general assumptions about health in the modernization process developed earlier will be used along with the Moore *et al.* (1946) survey report to establish a starting point in the analysis. This discussion will survey both mortality and morbidity to analyse the composition of the Indian disease burden.

1. Mortality Patterns Associated by Cause

Age, sex, and cause specific mortality data, though it is the most absolute and universally recorded in Manitoba, is becoming an increasingly unreliable indicator of health conditions. Because of better access to modern health care, fewer people are dying. This is especially true when one analyses death from the typical "diseases of poverty" classification (i.e. infectious, parasitic and respiratory diseases). It is still questionable whether or not the actual disease burden from these disease categories has been substantially decreased by modern medicine. Even though mortality data tend to obscure the true nature of the disease burden today, it is useful in assessing the processes of change in the disease burden.

Table 8.1, indicating the ten leading causes of death in 1946, reflects a disease burden still reminiscent of Third World poverty. The principal causes of death were tuberculosis, pneumonia and infant related illnesses. These diseases fall into the infectious, parasitic and respiratory disease classifications.

Mortality rates from tuberculosis were almost double the rates of death from pneumonia. The death rates from pneumonia in turn were more than double the rates for the diseases peculiar to the first year of life. Today, these two causes of death have lost their devastating

Table 8.1 Ten Leading Causes of Death Among Canadian Indians 1946

Cause of Death	Rate/100,000	1974-76 Average Rank Order*
Tuberculosis	761	7 (infectious)
Pneumonia	383	3 (respiratory)
Diseases peculiar to the first year of life	177	6
Violent or accidental deaths	174	1
Diseases of the heart	172	2
Influenza	126	3 (respiratory)
Diarrhea and enteritis	110	7 (infectious)
Cancer	94	4
Whooping cough	66	3 (respiratory)

*Rank order correlation is a useful way of establishing relationships when the data is not organically compatible.

(Source: Moore *et al.* 1946: 226)

virulence due to improved socio-economic conditions and a vastly improved level of medical care. The strong representation of infectious, parasitic, and respiratory diseases also reflects the Third World-type disease burden. An exception to the Third World type, however, is indicated by the strong representation of heart diseases (ranked sixth) and cancer (ranked ninth). Another exception is the particularly high risk of death by accidents, poisoning and violence, which is becoming an ever increasing cause of death.

Deaths by violence or accident have moved from fifth place in 1946 to the leading cause of death today. Dramatic changes in the levels of heart disease and cancer can also be observed. Heart disease

now ranks second (from sixth) and cancer ranks fourth (from ninth place). Only the diarrhea and enteritis (infectious/parasitic) category and the respiratory classification hold a relatively similar rank. Diseases peculiar to the first year of life have dropped from third to sixth place in importance. Tuberculosis has been virtually eliminated as a major cause of death. This comparison indicates a vast improvement in controlling death by infectious disease and causes peculiar to the first year of life.

Today, the proportional distribution of selected causes of death suggests a different composition in the disease burden. Most notable differences are deaths by violence and circulatory diseases, as illustrated in Table 8.2.

Table 8.2 Selected Causes of Death by Percentage Distribution (1974-1976 Average)

Cause of Death	Manitoba Registered Indian (percent)	Canada Registered Indian (percent)	All Manitoba (percent)
Accidents, poisoning, violence	36.1	32.9	8.7
Diseases of the circulatory system	17.5	20.5	47.4
Diseases of the respiratory system	13.1	10.7	9.2
Neoplasms	7.3	7.8	22.1
Diseases of the digestive system	3.8	4.6	3.6
Certain causes of perinatal mortality	6.7	4.4	1.5
Infectious and parasitic diseases	3.4	2.4	6.8
Total	100.0	100.0	100.0

(Source: Siggner 1980: 30)

Whereas more Manitoba Indians than Canadian Indians were dying from accidents and violent causes, fewer were dying from diseases of the circulatory system. The importance to Manitoba Indians of neoplasms (cancers) as a cause of death is also notable (7.3%). The prominence of these causes of death signifies that diseases of civilization are increasing in importance. Far more Manitobans are dying from heart diseases and cancers (69.5%) compared to Manitoba Indians (24.8%), but far fewer die from accidental and violent causes (8.7% versus 36.1%). The causes of death associated with poverty do not vary significantly between Canadian and Manitoba Indians and all Manitobans. However, certain causes of perinatal mortality are considerably more important to Manitoba Indians than for all Manitobans (6.7% versus 1.5%). This category of death will be explained more fully later in the discussion.

In general, the information on the causes of death would suggest that with the exception of deaths by accidents, etc., the typical diseases of poverty which predominated in the 1940's have virtually been brought under control. The comparison with the 1946 table would also indicate that the diseases typically associated with civilization (including death by accidents, etc.) have become significantly more predominant causes of death.

2. Morbidity Patterns Associated by Cause

An examination of morbidity characteristics based on hospitalization data tends to indicate a different composition of the disease burden than would be suggested by the mortality data. Not only does the data suggest a different disease burden composition, but it also indicates a much higher disease risk to Manitoba Indians relative to

all Manitobans.

In spite of its weaknesses, morbidity data is more enlightening than mortality data. In Manitoba, the only available source of general morbidity data is found in hospitalization records. Meaningful information can be derived from age and cause specific data, as well as hospital admissions and length of stay rates. Hospitalization data vastly under-represents the disease burden. Data can be skewed by varying availability of hospital services, ease of access and levels of utilization. In northern Manitoba, for instance, most patients are evacuated to a distant urban hospital only after their condition has reached a crisis point. The Patient Air Transport (P.A.T. services--now called Medivac), which was organized in 1972, increased Indian hospital utilization by four times, so hospitalization data before that year are not comparable (Stefansson 1980). Furthermore, hospitalization data does not account for ambulatory medical care nor for general illness which receives scanty attention due to understaffed, overworked medical personnel serving the Indian communities. Nevertheless, hospitalization data can give a reasonably accurate account, based on statistical representation, of morbidity, as compared to other communities or relative to past or future trends.

The first significant observation is that the respiratory and infectious and parasitic disease classification reasserts the predominance of the diseases of the poverty category,* as illustrated by Table 8.3.

*Some significant diseases pertinent to this study are categorized as follows: infectious and parasitic diseases including tuberculosis, venereal diseases and virus diseases; respiratory diseases including influenza, measles, pneumonia and bronchitis; nutritional-endocrinal-metabolic diseases including diabetes; digestive diseases, gall bladder diseases; mental diseases including alcoholism and drug dependency.

Table 8.3 Hospitalization Rates for Major Diagnostic Categories in Rank Order 1978-1979 (rate/1,000 population)

Disease	Northern Remote Manitoba	All Manitoba	Relative Risk*
Respiratory disease	67.15	19.5	3.4
Obstetrical conditions	50.24	21.2	2.4
Accidents and poisoning	36.46	14.2	2.7
Infectious and parasitic diseases	23.49	5.1	4.6
Ill-defined conditions	19.8	8.5	2.3
Digestive disorders	16.2	15.1	1.1
Genito-Urinary disorders	14.2	9.9	1.4
Circulatory disease	13.08	16.1	0.8
Nervous system disorders	10.97	5.8	1.9
Mental disorders	7.1	5.7	1.2
Skin and sub-cutaneous disease	6.91	2.3	3.0
Endocrine, nutritional and metabolic	5.79	2.9	2.0
Muskuloskeletal diseases	5.29	5.7	0.9
Neoplasms	4.73	9.6	0.5
Congenital anomalies	2.19	1.3	1.9
Blood disorders	1.96	1.0	2.0
Total	293.01	147.7	2.0

*Relative risk refers to the risk of northern remote Manitobans to be hospitalized relative to all Manitobans, therefore 1.0 = the same risk; 2.0 = twice the risk, etc.

(Source: Manitoba Health Services Commission 1978-1979)

The diseases of poverty category is reminiscent of the notorious pneumonia/diarrhea complex which is the principal cause of death among infants in the tropical Third World (Scrimshaw *et al.* 1968). Respiratory diseases moved in rank from the third highest cause of death to

the first cause of illness, while infectious and parasitic diseases moved from seventh to fourth. Moreover, circulatory diseases moved from the second most common cause of death to the eighth position as a cause for hospitalization. Neoplasms moved from fourth to fourteenth place. It is difficult to account for this drop. One could speculate that circulatory diseases and cancers remain hidden until it is too late, or that in the case of heart diseases, treatment often does not include hospitalization.

The hospitalization data does not indicate diabetic and gall bladder morbidity. The importance of these two diseases as indicators of nutritional maladaptation was highlighted by Schaefer (1971a, 1979). These indicators are hidden in the general endocrinal-metabolic-nutritional and digestive disease classifications. On the strength of Schaefer's study, however, the presence of these diseases in northern Manitoba can be assumed. The lack of data does not allow any comment about the prevalence, however.

A comparison between the remote North and all of Manitoba in terms of the relative risk factor is also revealing. Whereas infectious and parasitic diseases are the fourth leading cause of death for Manitoba as a whole, they represent the highest relative risk in northern remote Manitoba (4.6), followed closely by respiratory disease (3.4), then skin and sub-cutaneous diseases (3.0), which are also poverty-sanitation related disorders. The relative risk of being hospitalized for accidents and poisonings is 2.7 times that for all Manitobans and ranks third. The relative risk in being hospitalized for circulatory diseases is only slightly lower (0.8) while cancers are about one half (0.5). Whereas all Manitobans die at a much greater rate from cancers

and heart diseases, they are hospitalized only slightly more frequently. This comparison would suggest that while the Indian people carry a significantly heavier burden of the diseases of poverty than all Manitobans, they carry an almost equal weight in some of the diseases of civilization.

Hospital admissions and length of stay data also provide some meaningful information about the significance of various diseases. The remote northern residents were hospitalized at a rate of 1,998/1,000 population as compared to 1,607/1,000 Manitobans (Stefansson 1980). One can assume that a majority of Indians hospitalized are represented largely by crisis cases while all Manitobans would be hospitalized more frequently for non-crisis episodes.* Data on the length of stay in hospitals also reveals the seriousness of the diseases of poverty. For registered Manitoba Indians, respiratory diseases account for 600 hospital days per 1,000 admissions (1976), or three times the non-Indian rate. Infectious and parasitic diseases follow at 350/1,000 (still three times the non-Indian rate) while accidents, poisonings and violence account for 300/1,000 admissions (Siggner 1980: 32).

To sum up the analysis of the general mortality and morbidity data, it could be said that whereas the so-called lifestyle diseases (heart disease and cancer) and accidents, violence and poisonings predominate as causes of ill health, it can be assumed that hospitalization data by far underrates the significance of the disease burden in both categories. Hospital access is limited largely to emergency

*To reflect the relationship accurately the rates should be standardized to compensate for this discrepancy. Since the data is insufficient to apply a standardization formula, one can only assume that the standardized rate for Indian hospitalization would be significantly higher.

cases and is not easily available to less critical, yet equally debilitating forms of ill health. Some of the significant lifestyle diseases related to nutrition (diabetes, gall bladder, dental carries, obesity, etc.) are not likely to appear in mortality figures since they are rarely the direct cause of death. The bearers of these illnesses are often not hospitalized but are treated as ambulatory cases. Many of these illnesses would rarely appear as hospitalization data, but they would appear in a community's clinical data. One could assume the presence of these nutritionally related modernogenic diseases on the strength of Schaefer's (1971a) data, and on the strength of the nutritional survey which lent general support to Schaefer's conclusions. Many episodes of the diseases of poverty would also not find their way into hospitalization data. Where environmental conditions are far from salubrious, environmentally related illnesses can be assumed. The infant mortality and morbidity data which will be examined later will elucidate these relationships even further.

D. ACCIDENTS, VIOLENCE AND SUICIDE: THE NEW BURDEN OF MODERNIZATION

A significant source of ill health and death in northern Manitoba can be associated with a deleterious psycho-social environment. If the epidemiologist's assumption that loss of physical well-being can result from a loss of social and psychological well-being is correct (Rogers 1960), and if it can be assumed that the Indians' history of colonization has produced a significant level of social disintegration (Davis and Zannis 1973), then a case could be made for saying that the Indians' heightened susceptibility to illness is a function of their history of suppression and impoverishment. This hypothesis is consistent with

Najman's (1980) general susceptibility theory. The addition of alcohol to the Indian diet and way of life has undoubtedly unleashed an array of psycho-social and physical pathologies on the Indian people. Due to a paucity of significant data on Indian social pathology a more concrete statement on the relationship would have to await specific case-study research. However, there is a small amount of data available on deaths by accident, violence and poisonings as well as on suicide. Though no concrete conclusions can be drawn from this data, they do illuminate some telling relationships.

Social fragmentation, marginalization and impoverishment produced by the underdevelopment process become manifest in numerous forms of psycho-social ill health. Of these, alcoholism and depression compose the bulk of the burden. In the opinion of Davis and Zannis (1973: 127), "The prime cause of mental illness among the native people of the North is related to systematic cultural destruction and loss of identity." A loss of meaning in customs and traditions and a clash of social values produces a severe identity crisis which develops into depression and alcoholism. According to Davis and Zannis (1973: 125), "Bitterness and cynicism are very much a part of life in the North." Mental illness and social breakdown have virtually become a part of the modern way of life for the native people.

Mental illness is often manifest in forms of accidental and violent deaths which includes also suicide. According to a study on violent deaths in Kenora, Ontario, alcohol was associated with about 70% of the cases (Grand Council Treaty No. 3, undated). A similar study in Manitoba arrived at a similar proportion (cited in Stefansson 1980). About one third (36.1%) of all Indian deaths in Manitoba are be acci-

dent, poisoning or violence. According to the Manitoba study, the Indian population is at six times the risk of dying from sudden or unnatural deaths than is the Manitoba population as a whole. Furthermore, it was estimated that if the trend continues, one in three native people could expect to die as a result of accidents or violence.

Data on deaths by accident, poisoning and violence can be broken down into specific causes of death and into age specific rates. Table 8.4 illustrates the composition and percentage distribution of causes of death for the Canadian and Manitoba registered Indians and for all Manitobans.

The leading causes of Manitoba Indian deaths in this category were drowning, followed by motor vehicle accidents, burns and firearms. Motor vehicle deaths form a significantly lower portion of deaths than for Canadian Indians and for all Manitobans.

Table 8.4 Deaths by Accident, Poisoning, Violence (Percentage)

Cause	Canadian Registered Indian (1974-76)	Manitoba Registered Indian (1974-76)	Manitoba (1976)
Motor vehicles and trains	25.4	11.3	33.0
Drowning	15.0	23.4	8.2
Exposure	3.8	7.7	-
Burns	9.4	11.3	3.9
Falls	3.7	2.8	10.4
Firearms	8.1	10.1	1.1
Others*	34.6	33.4	43.5
Total	100.0	100.0	100.0

*Other includes suicides, poisonings

(Source: Health Data Book 1978; Siggner 1980)

The greatest risk of death by accident, poisoning and violence occurs to males between the ages of 15 and 44. The 1976-1978 average death rate for Indian males in this category was 5.3/1,000 compared to 1.5/1,000 for Indians of all ages. The rate for Manitoba Indian males is five times that of all Canadian males in this age group (Siggner 1980). The 1977 accidental death statistics for Manitoba Indians show that 35% of all accidental deaths occurred in the 20 to 29 age group, indicating that this group is the most prone to die violently (Medical Services Branch, personal communication).

A small proportion of deaths by accident and violence is made up of suicides (see Table 8.5). Suicide rates give a good general indication of mental health. Even though suicide forms a relatively small portion of the total death rate (0.30/1,000 versus 10.2/1,000), it warrants special attention due to the seriousness of suicide as an indicator of psycho-social well-being, as illustrated in Table 8.5.

Table 8.5 Standardized Suicide Rates 1976-1978 (per 100,000)

Year	INDIAN RESERVES AND UNORGANIZED TERRITORIES			ALL MANITOBA
	Age Standard- ized Rate		Age Sex Standard- ized Rate	Age Sex Standard- ized Rate
	Male	Female	Total	Total
1976	40.8	4.3	23.3	14.1
1977	60.3	9.7	35.9	17.5
1978	57.9	4.4	32.2	13.9

(Source: Suicide and Suicide Attempts 1980)

Table 8.5 illustrates that over the three year period the male suicide rate averaged about 8.7 times higher than the female rate. In 1978, it was 13 times as high. The suicide rates for Indians also averaged twice that for all Manitobans. Other figures on the age distribution of reported suicides indicates that 90% of the suicides occur between the ages of 15 and 30. This figure can be further broken down into three age categories, which show that the group most prone to suicides are 15 to 19 year olds (38% of all suicides), followed by 20 to 29 year olds (33%) and then 25 to 29 year olds (19%) (Suicide and Suicide Attempts 1980).

The Indian age cohort most prone to committing suicide are adolescent males aged 15 to 19. This cohort represents a group of youth who, though in the process of establishing their own identities, should be in their prime of physical and mental health. However, before the age of 15, many children already have developed severe emotional handicaps. In a report from the Shanattawa I.R., about 51% of the children have developed the habit of sniffing gasoline regularly, while 17% of these are chronic sniffers. The report goes on to say that, "Most of the people that are chronically involved in sniffing come from either physically or psychologically broken homes. A lot of this has to do with the fact that family dynamics of 25 years ago in an Indian community have certainly changed." (Post 1975: 128).

The risk to the youth of dying by violence, accident or suicide is a clear indication of a less than salubrious psycho-social environment in Indian communities. The cumulative effects of psycho-social stress and environmental stress on the Indian people places them into a vulnerable and disadvantaged position of high risk to ill health.

Modernization has not only increased the prevalence of the diseases of civilization, but also has imposed a heavy burden of psycho-social illness. Within the Indian context, psycho-social illness should indeed be categorized with the other modernogenic diseases.

E. INFANT MORTALITY AND MORBIDITY: A REALISTIC REFLECTION OF THE DISEASE BURDEN

Data on infant sickness and death reflects the disease burden of a population, as infants are the most vulnerable to environmental influences. Infant mortality rates have been dropping significantly in the last two decades. From an infant mortality rate of 400/1,000 live births in 1946, the rates had dropped to 80/1,000 (Canadian Indians) by 1960 and to 23.7/1,000 in 1978 (Manitoba Registered Indians--see Fig. 8.1). For all Manitobans, the rate more than halved between 1960 and 1978 (from 30/1,000 to 13.2/1,000) (Siggner 1970, 1980).

Comparing the causes of infant death among Canadian Indians with those of the Canadian population* reveals some striking differences. Figure 8.2 shows that about one third of Canadian infant deaths are from various causes peculiar to the first week of life as compared to almost one half for all Canadian infants. Another 20% of Canadian Indian infant deaths are from ill-defined symptoms. The main identifiable cause of death for Canadian Indian infants is respiratory diseases which claim 5.8 times as many Indian as Canadian infants. The death rate for congenital anomalies is almost equal for both groups. For Canadian infants this cause represents almost one quarter of all deaths, and for Indian

*Manitoba cause-specific infant death rates are not available.

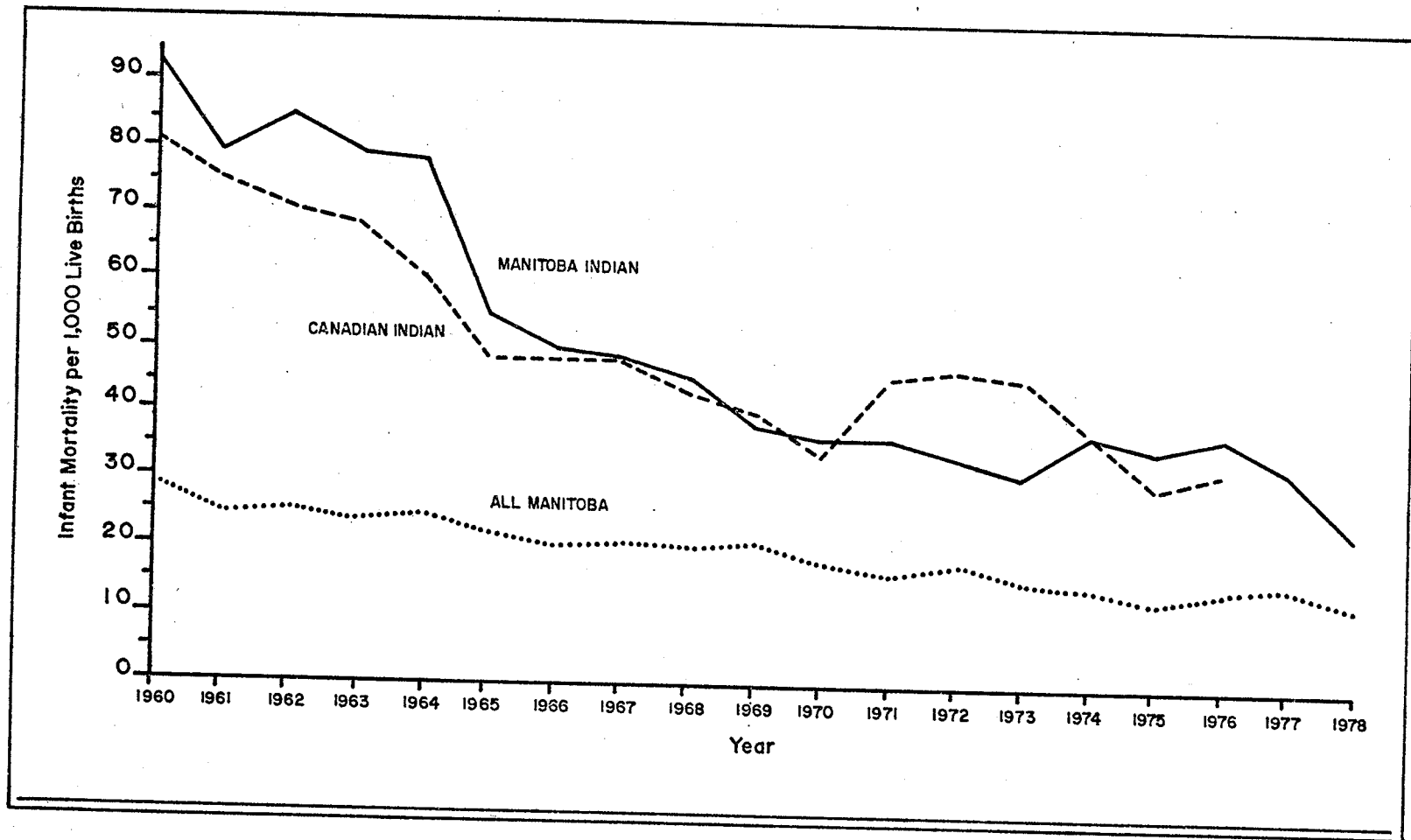


Fig. 8.1 Infant Mortality 1960-1978

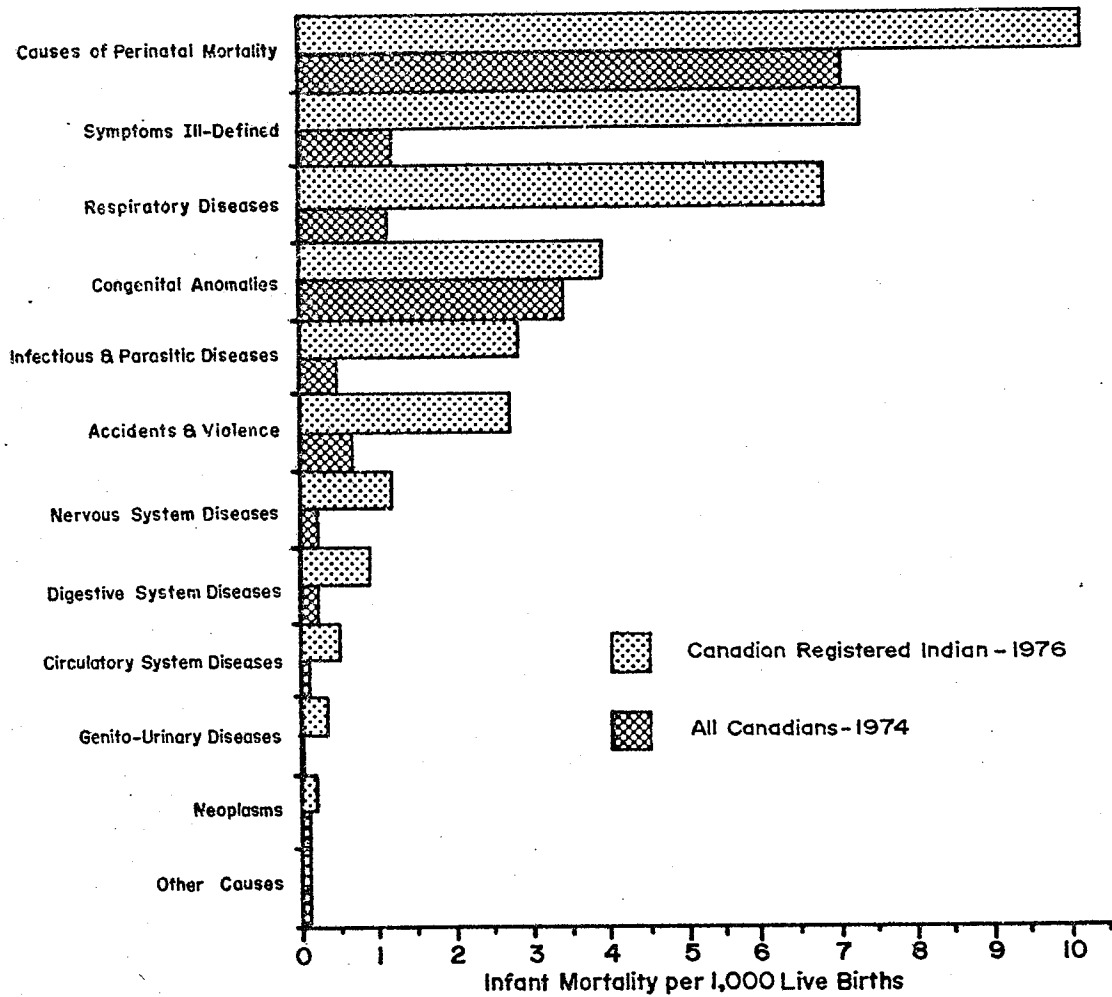


Fig. 8.2

Cause-Specific Infant Mortality

infants, about one ninth. In a setting where the social and economic environment is optimal for nurturing healthy infants, perinatal mortality and congenital anomalies account for a majority of infant deaths. These two causes of infant death account for 70% of all Canadian infant (including Indian) deaths. Respiratory, infectious, parasitic and digestive diseases account for 28.5% of Indian deaths, and only 12.6% of Canadian infant deaths. The greatest disparity in causes of death is in ill-defined symptoms (7.4/1,000 vs. 1.2/1,000) and respiratory diseases (6.9/1,000 vs. 1.2/1,000). If the Canadian infant death rate by cause represents a "normal" pattern for developed, industrialized populations, the pattern for Canadian Indian infants is abnormally skewed towards death by diseases of poverty (28.5% vs. 12.6%) and by accidents and violence (2.8/1,000 vs. 0.07/1,000).

An examination of infant morbidity also indicates a strong prevalence of poverty-related disease.* A study of hospital admissions of Indian children (under 14) in Saskatchewan (Houston et al. 1979) indicates that the diarrhea/pneumonia complex (McDermott 1969) of disease is still highly significant among Indians. The study indicated that there was a high rate of association between pneumonia and diarrhea-- five times as many Indians had diarrhea associated with pneumonia as whites, and fever persisted twice as long. Comparing Indian and white children hospital admission and length of stay rates also indicated how vulnerable Indian children are to these diseases. From a rather outdated, but still relevant statistic from 1966, they point out that hospital admissions for Indian children were 1,148/1,000 and for whites,

*A detailed examination of infant morbidity in Manitoba follows in the next chapter.

258/1,000. The rate for length of stay was 2,305 hospital days per 1,000 for whites and 12,387/1,000 for Indians (or 9 times). For the duration of their study, the average length of stay in the hospital for respiratory and gastro-intestinal diseases was 26.9 days for Indians and 8.7 days for whites or three times as long. Out of the 102 children examined, four died while none of the 64 white children died.

Houston et al. (1979) noted that chest infections, of which measles (rubella) formed a significant proportion, were commonly associated with poor housing, crowding, poor nutrition, water, smoky atmosphere and poor ventilation. A highly significant causal factor which they stressed was the practice of bottle feeding infants, which put the infants into a position of vulnerability. Only 14% of the Indian children in the study had been breastfed for longer than one month.

The infant mortality and morbidity survey suggests that poverty-related diseases are still an important component of the Indian disease burden. Whereas the nutritional factor in the etiology of modernogenic disease is more difficult to identify in adults, in infants it becomes very clear. The role of bottle feeding in infant mortality and morbidity to more clearly identify the nutritional component will be examined in the following chapter.

F. CONCLUSION

The Indian people's mixed burden of poverty and civilization diseases has made them as vulnerable to ill health as the typical Third World population. Mortality statistics indicate that the Indian death rate from poverty diseases is insignificant. These figures, however, are misleading because of the availability of good medical care (albeit

crisis care) which keeps mortality figures low. However, it has been shown that the morbidity figures and infant mortality figures strongly suggest that these diseases still form a major portion of the disease burden. The mortality figures, on the other hand, tend to indicate a much stronger diseases of civilization component in the Indian disease burden.

One could conclude, therefore, that the Indian people have been rapidly acquiring the diseases of civilization without significantly leaving behind the diseases of poverty. In terms of the typology of modernogenic diseases presented previously, the acquisition of the diseases of civilization can be seen as a concomitant of the nutritional shift. The central factor in the shift in the disease burden was not improved environmental conditions and health care (though this also has occurred), but the adoption of a maladaptive way of life, of which nutrition has become a vital factor.

The next two chapters take a case study approach to pinpoint the interrelationship between nutrition, health and modernization. A study of bottle feeding infants provides an excellent example of how the nutritional shift (from breast feeding to bottle feeding) has had adverse consequences for both infant and adult physical and psycho-social health. The case study will also examine the role of the modern market economy in creating the need for making the shift, and thereby perpetuating ill health and malnourishment.

CHAPTER IX

THE UNDERDEVELOPMENT OF INFANT NUTRITION AND HEALTH:

A BOTTLE FEEDING CASE STUDY

A. INTRODUCTION

The nutritional shift from breast feeding to bottle feeding infants presents an ideal case study of examining the impact of underdevelopment on nutrition and health. Breast feeding constitutes an ideal micro-environment involving a minimum of interactions between the infant and the hostile environment. Bottle feeding represents a macro-environment where a complex array of physical, social and economic interactions influence infant health during a highly vulnerable period of life. Furthermore, the infant feeding bottle, as a representative of modernity, demonstrates the nature of the interaction between modernization, nutrition and health.

This case study is divided into two chapters. This chapter takes an ecological, or epidemiological, approach to the infant feeding issue. It examines the micro-environmental impact of the shift from breast feeding to bottle feeding on infant health in the North. The next chapter continues the case study by examining the macro-environment of the infant nutrition problem as well as the socio-cultural and economic processes of underdevelopment which influence the spread and adoption of bottle feeding.

This chapter is divided into four parts. The first part reviews the extent and nature of the shift to bottle feeding in Manitoba. The second part examines the extent of the influence bottle feeding has had on Indian infant mortality, while the third part documents the character of bottle feeding related illness to the North. Finally, an ecological approach is used to explain the environmental factors involved in the switch from the breast to the bottle, and to show the deleterious consequences of the shift.

B. INFANT FEEDING PRACTICES IN MANITOBA

In the last six decades, mothers in the industrialized world have been steadily abandoning breast feeding in favour of bottle feeding.* In the Third World this transition has occurred with explosive swiftness in just the last two decades (Berg 1973a). The bottle feeding revolution is also of very recent origin among native Canadians living in remote areas. This section briefly examines the nature of infant feeding patterns in both the urbanized South and the rural North and differentiates between the two. The purpose of this discussion is to establish the extent of the nutritional shift from breast feeding infants to bottle feeding infants in Manitoba.

A recent study of infant feeding patterns in Canada has demonstrated that a very small proportion of mothers breast feed their children at least for six months (Myeres 1979). The patterns were found to vary significantly from region to region and from one ethnic group to

*See Hirschman and Sweet (1974) and Jelliffe and Jelliffe (1978b: ch. 10) for an historical review of the change from breast feeding to bottle feeding in America.

another (see Table 9.1). During the period of study (1965 to 1971) the Indians and Inuit had the largest percentage (8% and 13%, respectively) of totally breast fed infants. However, most Indian and Inuit infants were bottle fed at some point in the early stages of infancy. The indications are that the percentage of bottle fed infants has increased steadily since 1971.

Table 9.1 Distribution of Breast and Bottle Fed Infants in Canada 1965-1971 (percentage)

Region	MODE OF INFANT FEEDING		
	Breast Only	Breast Plus Bottle	Bottle Only
Atlantic	1	14	85
Quebec	1	11	89
Ontario	4	29	67
Prairies	0	33	67
Pacific	3	31	59
Indian	8	31	61
Inuit	13	46	51
National	2	24	74

(Source: Myeres 1979: 213)

A study of two northern Manitoban Indian communities found that 54.4% of the mothers started breast feeding, but that by one month 36.7% of them had switched to bottle feeding. Almost one half (45.6%) used only bottle feeding (Ellestad-Sayed *et al.* 1979). These figures indicate that a significant proportion (82.3%) of Indian infants were being bottle fed after the first month of life.

Infant feeding patterns in Manitoba vary significantly from one area to another. Table 9.2 suggests that breast feeding is more associated with urban areas than with rural areas or Indian reserves.

Table 9.2 Breast Feeding at Hospital Discharge in Manitoba 1979-1980 (percentage)

Region	1979	1980
Winnipeg	66.0	66.6
Rural	47.0	48.4
Indian Reserves	39.0	39.1

(Source: Manitoba Paediatric Society 1981a)

A recent study of infant feeding practices in southern Manitoba (Clark 1981b) also found that there was a distinct, and growing, urban bias to breast feeding. This pattern is in direct contrast to the abandonment of breast feeding in the Indian areas.

In the industrialized world there is a distinct urban bias to breast feeding, in contrast to the urban bias to bottle feeding in the Third World. The urban bias in breast feeding was illustrated in a recent study of the socio-economic characteristics of mothers with newborns in southern Manitoba (Clark 1981b). Some of the findings are illustrated in Table 9.3, which relates breast and bottle feeding to the mother's age, education and socio-economic status. These data illustrate that in the "developed" areas breast feeding increases with the age of the mother, with education, and with socio-economic status. These data are consistent with the findings of Jones and Belsey (1977)

Table 9.3 Socio-Economic Characteristics of Breast Feeding and Bottle Feeding Mothers in Manitoba 1977-1978 (percentage)

Socio-Economic Characteristic	MODE OF INFANT FEEDING	
	Breast	Bottle
Mother's Age		
<18	43	57
18-19	37	63
20-29	57	43
30-34	71	29
35+	78	22
Mother's Education		
Elementary	37	69
High School	51	49
University	89	11
Other	64	36
Socio-Economic Status*		
Low	51	49
Average	52	48
High	73	27

*Includes husband's occupation
(Source: Clark 1981b forthcoming)

in a London borough in the 1970's and of the Hirschman and Sweet (1974) longitudinal study of the socio-economic characteristics of breast feeding mothers in the United States. In the West, it has been suggested, there is a strong relationship between breast feeding and the health food movement of the mid-1970's, which involved the counter-culture,

educated "post-moderns". Indications are, however, that the practice is losing its counter-modern character as more lower-middle class women are turning to breast feeding (Clark, personal communication). In Manitoba, the bias toward breast feeding is increasing. In 1980, 39.4% were breast feeding compared to 26.9% in 1979 (Manitoba Paediatric Society 1981b). These infant feeding patterns suggest an industrialized world pattern of infant feeding. At one time bottle feeding had an urban bias, but that over time diffused into the rural areas. Breast feeding has very recently become an innovative practice, and a reversal of the trend is beginning to take place. In the Third World, however, bottle feeding is still associated with modernization and westernization.*

The industrialized world patterns of infant feeding practices are in direct contrast to the contemporary Third World pattern, where bottle feeding is associated with urbanization (Esterik 1977; Zeitlin *et al.* 1978) and breast feeding with rural primitive traditionalism (Greiner 1977; Kazimi and Kazimi 1979). The patterns are characterized by a general abandonment of breast feeding associated with increasing "modernity". This has clearly been the pattern associated with the Indian and Inuit people as well. A study by Schaefer (1971b) of Inuit infant feeding clearly illustrates the Third World pattern characteristic of Canada's native people (see Table 9.4). Schaefer illustrates how, among the Inuit, bottle feeding has increased over time. He compared the age groupings who have ever been bottle fed, and also compared bottle feeding rates with settlement types. He observed that bottle

*See Chapter X for a detailed discussion of the association between bottle feeding and modernization.

Table 9.4 Individuals Ever-Bottle Fed According to Age Group and Community Type (percentage)

Type of Settlement	AGE GROUP				
	Adults	Adolescents	Children		All Ages
			1 mo.	12 mo.	
Hunting camps	1.0	17.7	9.8	31.7	15.1
Village type settlements	3.4	25.0	28.6	53.1	31.5
Urban type settlements	4.5	29.4	39.6	73.6	34.6
Total	2.7	21.6	23.4	49.5	22.1

(Source: Schaefer 1971b: 481)

feeding increased as the Inuit became more urbanized. Schaefer found that in urbanized settlements five times as many infants were being bottle fed as in the hunting camps.

Schaefer associated bottle feeding with increasing modernization. His findings are consistent with his study (1971a), presented earlier, that consumption of southern foods, and especially refined carbohydrates, was clearly related to settlement type and to the modernization process. The association between bottle feeding and the "nutritional shift" was clearly made in a recent study of infant feeding practices in the Northwest Territories (Spady *et al.* 1979). Thus, it can be argued that bottle feeding is an aspect of the general dietary change associated with modernization, and hence it can be analysed in the same fashion. Furthermore, it can be argued that a study of bottle feeding relating mortality and morbidity among the Indian infants is more accurately

assessed from a Third World perspective, as the native people as a whole do not exhibit the characteristics of the contemporary revolution in infant feeding practices taking place in urban, industrialized Manitoba.

C. BOTTLE FEEDING AND INFANT MORTALITY

In the last two decades Indian infant mortality rates have dropped rapidly. This change is due in part to a much improved system of crisis care for northern Indian residents. Nevertheless, the Indian infant mortality patterns still indicate a large disparity when compared with the all-Manitoba patterns.

It has been suggested that among impoverished peoples the mode of infant feeding is a more significant factor than other socio-economic variables (Cunningham 1977; Ellestad-Sayed 1979; Schaefer 1971b). This analysis will test the strength of the mode of infant feeding factor in influencing infant mortality.

With the data available, three methods of analysis can be used to determine infant mortality patterns. Age specific data can be used to analyse month-by-month mortality patterns (Maternal and Child Care Vital Statistics). Cause specific data indicates the causal factors associated with infant death (Maternal and Child Care Vital Statistics). A study of 5,598 Indian infants born in 1962 (Graham-Cummings 1962) makes available data disaggregated according to the mode of infant feeding, age specific and cause specific mortality. For comparative purposes, a study of infant mortality patterns in Liverpool from 1936 to 1942 (Robinson 1951) will be used.

Age specific infant mortality data for Manitoba covering the period 1976 to 1978 show some distinct differences between Indian and all Manitoba mortality patterns. Within the first 28 days of life Indian infants follow a pattern similar to all Manitoban infants. The graph in Figure 9.1 shows that within the first seven days of life there is a surge of infant deaths. Most infants in this stage die from "causes of perinatal mortality" (mostly endogenous causes) which account for the bulk of deaths in an urbanized industrial society. For all Manitobans, the first 28 day period presents the period of highest risk. After

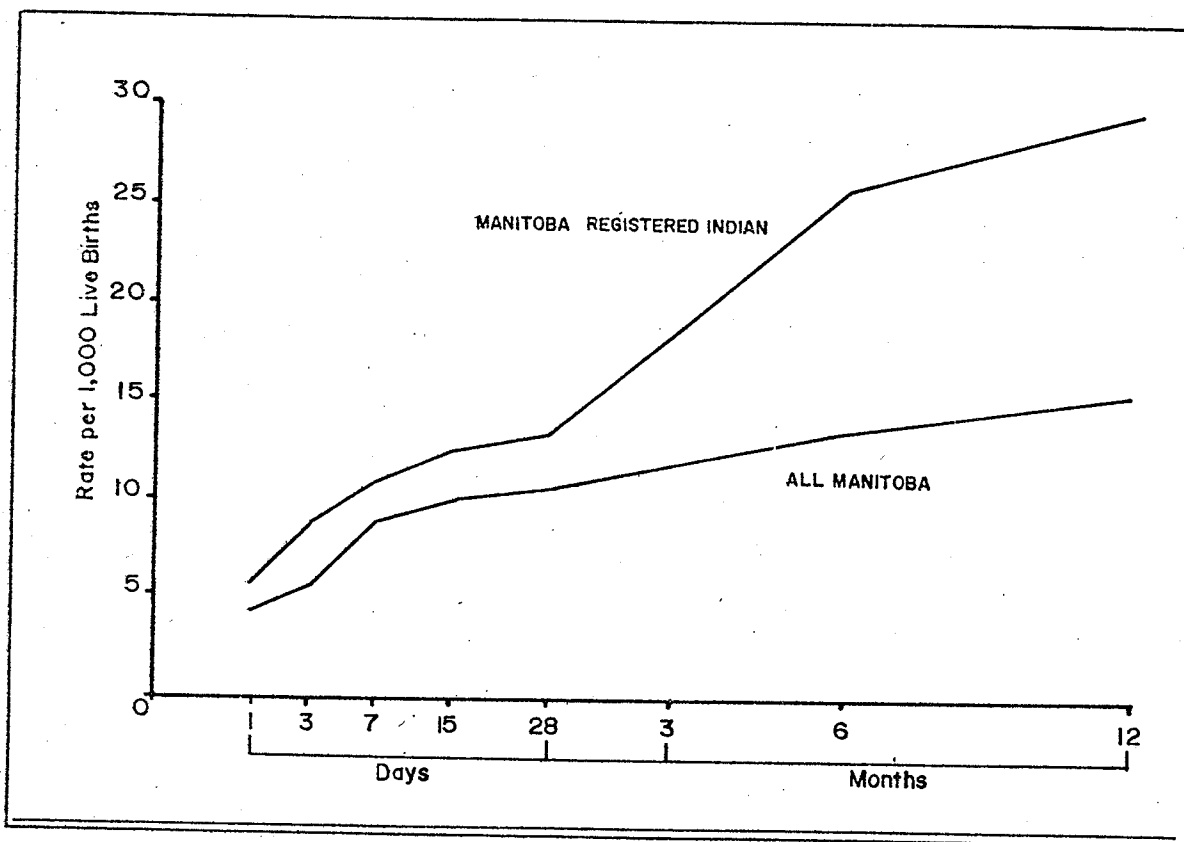


Fig. 9.1 Cumulative* Age-Specific Infant Mortality (1976-1978)
(Manitoba Infants 1976-1978)

* The age-specific rates are cumulated to show how many infants have already died in each period.

(Source: Maternal and Child Care Vital Statistics)

that the cumulated number of deaths increases at a slow rate until the end of the first twelve month period. The cumulative mortality for the second eleven month period merely doubles the rate from the first one month period.

For the Manitoban Indian infant, the period from the 28th day to the sixth month presents the highest risk. About one half of the Indian infant deaths occur in this period compared to about one quarter of all Manitoba deaths. This would suggest that the nature of the risk for Indian infants is much different than for Manitoba infants as a whole.

The sharp rise after the 28th day can be explained by the high disease risk associated with weaning practices (Scrimshaw et al. 1968). In Manitoba most infants tend to be taken from the breast and put on the bottle at one to two months (Clark 1981a). Most Indian infants also tend to be weaned at this age. The Graham-Cummings (1962) survey of 5,598 Canadian Indian infants compared infant deaths with the mode of infant feeding. He discovered a significant relationship between bottle feeding and infant mortality. His data showed that the infant death rates for totally breast fed infants was 60 per thousand live births, but that the rate for totally bottle fed infants was 86/1,000 (or 43% higher). He also found that the rate for infants fed first at the breast and then on the bottle was only slightly higher than that for breast fed infants, but significantly lower than for bottle fed infants (see Fig. 9.2).

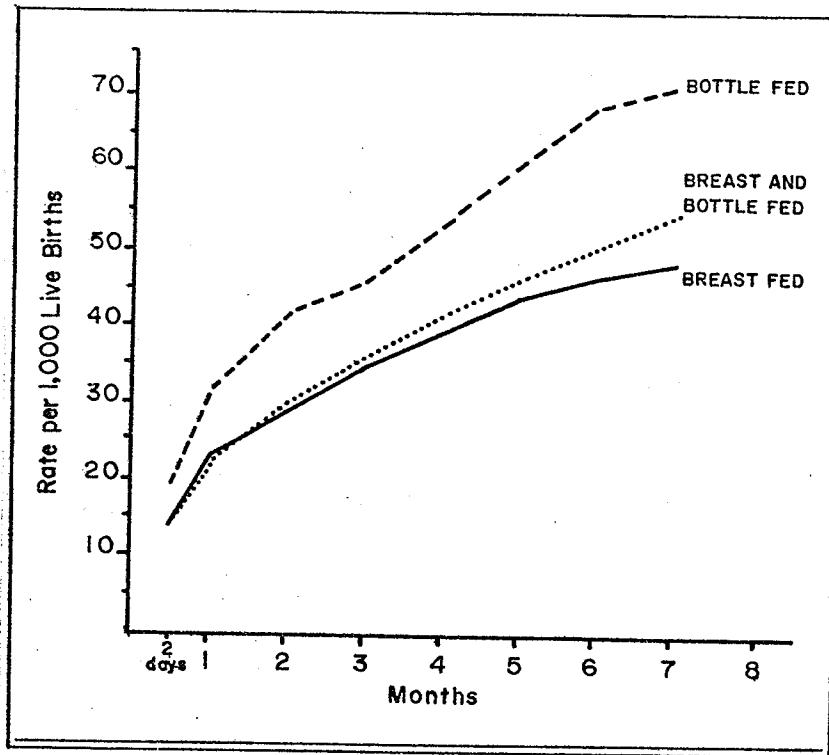


Fig. 9.2 Cumulative Age-Specific Infant Mortality According to Mode of Infant Feeding (All Canadian Indians 1962)

(Source: Graham-Cummings 1962)

Knodel and Kinter (1977), using data from an American city in the 1920's have clearly demonstrated that there is a correlation between age of weaning off the breast and infant mortality. They found that for each additional month that an infant was breast fed the month-specific mortality rate dropped. After six months the rates for breast and bottle fed infants merged. This relationship was found to be true in the Graham-Cummings (1962) survey as well. The monthly mortality rate for Indian infants breast fed for one month was 48.3/1,000 versus 67.8/1,000 for bottle fed infants (for one month old infants). However, by

the seventh month the rate had dropped to 16.0 for breast versus 16.6 (for seven month old bottle fed infants). It has been determined that after the sixth month of life the benefits of only breast feeding decline as the infant begins requiring supplementary foods and as other environmental factors predominate in determining health status (Gerrard 1974; Knodel and Kintner 1977). On the basis of the "mode of infant feeding specific" data, it can be argued that the shift from the breast to the bottle in the first three months is a strong contributing factor to the sharp rise in infant mortality for Manitoba infants shown in Figure 9.1.

An examination of cause specific mortality data further clarifies the nature of Indian infant deaths, as illustrated in Table 9.5.

Table 9.5 Post-Neonatal Mortality Rates by Cause of Death
(per 10,000 Live Births, 1976-78 average)

Causes	I.R. & U.T.	Manitoba
Symptoms and ill-defined conditions	44.08	16.5
Lower respiratory	39.87	6.53
Other causes	34.48	13.7
Gastro-Intestinal	29.05	3.2
Congenital anomalies	7.42	8.09
Birth injury	2.50	1.0

(Source: Maternal and Child Care Vital Statistics)

The categories "symptoms and ill defined conditions" and "other causes" account for about one half of Indian deaths and two thirds of Manitoba

infant deaths. Death rates from congenital anomalies are comparable for both Indian and all-Manitoba infants. The most interesting feature of the table is the difference in deaths from lower respiratory and gastro-intestinal diseases. Six times as many Indian infants die from respiratory diseases and nine times as many from gastro-intestinal diseases. These two causes accounted for 43.5% of Indian neo-natal deaths. Graham-Cummings (1962) found that almost one half of the gastro-intestinal and respiratory deaths occurred in the first three months of life.

It is widely accepted that bottle feeding is associated with gastro-intestinal and respiratory deaths (Canadian Paediatric Society 1978; Gerrard 1974; Graham-Cummings 1962; Houston 1979; Scrimshaw *et al.* 1968). The same diarrhea/pneumonia complex responsible for so many deaths in the Third World (Berg 1973a) and in turn-of-the-century Europe (McKeown and Lowe 1966) continues today among bottle fed infants in the North.

In the Third World the severity of bottle feeding illness accentuates, and in turn is accentuated by, Protein-Calory-Malnutrition (PCM). In the North, however, and indeed in all debilitating environments where the PCM factor is absent (Ellestad-Sayed 1979; Gerrard and Best 1959), bottle feeding has also been shown to accentuate respiratory and gastro-intestinal diseases in the same way as in the Third World. To illustrate the relationship between bottle feeding and these causes of infant death in a resource-poor, non-Third World environment, a study of 3,266 infants in Liverpool between 1936 and 1942 clearly demonstrated that bottle feeding was associated with a high rate of infant death (Robinson 1951) (see Table 9.6).

Table 9.6 Mode of Infant Feeding Associated Cause-Specific Infant Mortality in Liverpool 1936-1942 (per 10,000 live births)

Cause	MODE OF INFANT FEEDING		
	Breast	Breast, then Bottle	Bottle
Respiratory	84.0	110.0	370.0
Gastro-enteritis	0.0	13.0	82.0

(Source: Robinson 1951)

Table 9.6 shows that 4.4 times as many bottle fed infants in Liverpool died of respiratory illness. The most striking difference in mortality was demonstrated in the gastro-enteritis category, where none of the breast fed infants died, in contrast with 82/10,000 bottle fed infants.

The stark contrast in breast versus bottle fed infant deaths in Liverpool was corroborated in the Graham-Cummings (1962) survey of Canadian Indian infants, where he found that seven times as many bottle fed infants died of pneumonia and six times as many died of gastro-enteritis.

A review of cause-specific infant mortality differentiated by the mode of infant feeding points out three significant factors related to infant nutrition. First, bottle feeding is a significant factor in determining the nature of infant deaths in impoverished conditions. Second, respiratory and gastro-intestinal diseases account for almost one half of infant deaths in the critical one to six month period where either weaning from the breast takes place and/or non-human milks and other foods are administered. Third, the gastro-enteritis/respiratory

complex of diseases is associated not only with malnourishment, but also with conditions of poverty. According to Jelliffe and Jelliffe (1978a: 12):

"Infant mortality is the final result of numerous, often interacting pathological states, notably nutrition and infections, in turn the consequences of very many socio-economic and other environmental factors."

This infant mortality survey stresses the importance of the bottle feeding problem in the North. In the Indian communities today, however, infant mortality has been reduced significantly; consequently, significant relationships between mortality and mode-of-infant feeding can no longer be positively made. However, this does not mean that the relationships no longer exist. A survey of infant morbidity will clarify the relationship now clouded by vastly improved crisis care.

D. BOTTLE FEEDING AND INFANT MORBIDITY

The relationship between modes of infant feeding and infant morbidity is especially strong; it is far more conclusive than the data on mortality and infant feeding practices. The main information source for this review are three studies employing hospitalization data which has been disaggregated according to modes of infant feeding. The first study analyses the infant feeding factor in two northern Manitoba communities (Ellestad-Sayed 1979). The second study deals with bottle feeding associated morbidity in an Inuit population (Schaefer 1971b). Third, a study from a rural New York state community (Cunningham 1977) is used to compare bottle feeding related morbidity from a "developed" area to an "underdeveloped" area.

In a three year long study of the northern Manitoba Indian communities of Garden Hill and Cross Lake, Ellestad-Sayed *et al.* (1979) examined 158 infants to determine whether the mode of infant feeding was related to the incidence and severity of infection in the first year of life. They divided the infants into three infant feeding categories and cross-referenced their current health status with their hospitalization records. They attempted to determine whether the protection effect of breast feeding lasted after it was discontinued. Of the 158 infants, 17.7% were breast fed throughout, 36.7% switched to bottle feeding, and 45.6% were fully bottle fed. As illustrated in Table 9.7, they discovered that bottle fed infants were admitted ten times more often than fully breast fed infants, and they tended to remain in the hospital about ten times as long. They also found that

Table 9.7 Hospitalization of 158 Infants in Garden Hill and Cross Lake for Infections During the First Year of Life 1972-1975*

Hospitalization	MODE OF INFANT FEEDING		
	Breast (n=28)	Breast, then Bottle (n=58)	Bottle (n=72)
Total no. of hospital admissions	3.0	33.0	70.0
Mean no. of hospital admissions per child	0.1	0.6	1.0
Total no. of days in hospital	25.0	252.0	676.0
Mean no. of days in hospital per child	0.9	4.4	9.4

*Rates cannot be calculated as one infant may be hospitalized more than once.

(Source: Ellestad-Sayed 1979: 296)

minor infections which were not sufficiently severe to require hospitalization occurred more often among bottle fed infants. The hospitalization rate for breast, then bottle fed infants was not significantly lower than for fully bottle fed infants; however, they did spend significantly fewer days in the hospital. Table 9.8 shows that there was a significant difference in the hospitalization rate between breast and bottle fed infants.

Table 9.8 Hospitalization for Infections per Breast-Bottle Feeding Year* in Garden Hill and Cross Lake 1972-1975

Cause	MODE OF INFANT FEEDING	
	Breast	Bottle
Lower respiratory	9	63
Gastro-enteritis	1	23
Upper respiratory	0	7
Otitis media	0	5

*The breast-bottle feeding year figure is not a rate, but is a calculation to accurately reflect the groups who switched from breast to bottle feeding and also to account for multiple admissions of one infant.

(Source: Ellestad-Sayed 1979: 296)

The differences in the hospitalizations between breast and bottle fed infants are most significant for lower respiratory tract infections and for gastro-enteritis. It was argued that infant nutrition is the most important variable in determining the disease burden of Indian infants.

Schaefer (1971b) examined 536 Inuit whose infant feeding histories could be determined for otitis media, which is an inner ear infec-

tion. Otitis media leaves scarring tissue after the infection has healed, which allows it to be identified in adults. Schaefer related mode of infant feeding to episodes of Otitis media and categorized the data according to settlement types, as illustrated in Table 9.9.

Schaefer found the relationship between bottle feeding and ear disease to be of greater statistical significance than the relationship between ear disease and settlement type. The relationship between breast feeding, ear disease and settlement type was also less significant than between bottle feeding, pathology and settlement type. This means that where infants were breast fed the settlement type was less significant than where they were bottle fed. His results suggest that the mode of infant nutrition is more significant than other environmental variables associated with the different settlement types.

The greatest prevalence of ear disease was among bottle fed infants in the urbanized settlements. Schaefer reported that whereas in traditional settlements infants were breast fed for over two years, in the urbanized settlements 40% were bottle fed before the end of the first month, and 75% before the end of the first year. He also noted that the switch to bottle feeding and the shortening or abandoning of the traditional two year lactation period occurred as one of the first steps of modernization observed in the Arctic. Schaefer's study supports the argument that infant nutrition is more important than other environmental variables in determining the health status of Indian and Inuit infants.

It has commonly been assumed that there is no particular advantage of breast feeding over bottle feeding in an industrialized, "modern" society. Though the episodes of infant ill health will be

Table 9.9

Otitis Media Findings According to Settlement Type and Mode of Infant Feeding
Among the Inuit (percentage)

Settlement Type	Bottle Fed 12 mo.	PATHOLOGY					
		Breast Fed 12 mo.		Bottle Fed 12 mo.*		Total	
		Severe	Total	Severe	Total	Severe	Total
Camps and small settlements	15.1	0.0	1.5	0.0	17.6	0.0	2.8
Village-type settlements	21.5	1.7	6.8	20.0	35.0	4.4	10.9
Urbanized settlements	34.6	6.7	11.2	34.5	62.1	13.6	23.7
Total	22.1	2.0	5.2	21.2	42.4	4.7	10.4

* Bottle fed 12 months includes those who were switched to bottle feeding within the first month.
(Source: Schaefer 1971b: 483)

higher in an impoverished population regardless of mode of infant feeding, studies are demonstrating that bottle feeding in the "developed" world also initiates ill health independent of the environmental context (Cunningham 1977). Cunningham's study of 326 infants in a rural New York community lends support to this hypothesis (see Table 9.10). About one half of these infants were bottle fed upon being discharged from the hospital. He discovered relationships between bottle feeding and cause of ill health and hospital admissions which were similar to those found by the Ellestad-Sayed (1979) study.

Table 9.10 Frequency of Illness per 1,000 Patient Weeks in Rural New York State

Hospitalization Factor	MODE OF INFANT FEEDING	
	Breast	Bottle
Otitis media	3.4	6.3
Acute lower respiratory	0.3	5.5
Vomiting or diarrhea	2.0	4.9
Hospital admissions	0.3	2.9
Total illness episodes	5.8	16.8

(Source: Cunningham 1977: 727)

Respiratory, gastro-intestinal and ear disease accounted for the majority of the New York infants' episodes of illness as well. Bottle fed infants accounted for 88% of the patient weeks, 91% of the significant illnesses, and 97% of the hospital admissions. There were no life threatening illnesses among the breast fed infants. Cunningham (1977:

728) observed that "The proportion of infants suffering any significant episodes of illness increased as the extent of breast feeding declined." He also argued that socio-economic status was less of a determining factor in infant health than was the nutrition factor.

The multifactorial approach to the etiology of infant illness employed by Ellestad-Sayed et al., Schaefer and Cunningham have isolated infant nutrition as a highly significant factor among other environmental factors.* Cunningham (1977) found that higher education and economic status were positively related to breast feeding. There was no differentiation, however, between the status factor and episodes of illness related to bottle feeding. In the Inuit and in the Indian communities the etiological factors become more complex because of the harsher physical environments. Schaefer (1971b) maintains that in spite of the very sound arguments that: harsh climate leads to more upper respiratory disease; that primitive and crowded housing, poor sanitary conditions, lack of personal hygiene, delayed medical care, and increased risk of exposure are significant causal factors in the etiology of otitis media, his analysis of the infant feeding factor tends to contradict the accepted arguments. Those Inuit who maintain a traditional lifestyle, as well as those older "urbanized" Inuit who were breast fed, who were more exposed to harsh climates, who would have grown up in small, crowded and poorly heated tents and igloos, and who had limited access to medical care exhibited much lower incidents of disease than those living in urban settlements with spacious, well heated houses and

*The multifactorial approach, discussed in Chapter four, involves a study of the physical, social and psychological environment surrounding an episode of illness.

and quick access to medical care. Schaefer argues that climatic, socio-economic, hygienic and medical care factors may be significant but do not explain the remarkably higher incidence of ear disease in younger age groups living in more modernized settings.

The Ellestad-Sayed et al. (1979) study tested the relationship between hospitalization and socio-economic variables including birth statistics, housing, education, income, employment and the availability of water and refrigeration which might have contributed to infant morbidity. At the time their data was collected they found that sanitary and personal hygiene standards in Garden Hill and Cross Lake were sub-optimal. None of the houses had plumbing and few had access to piped water. In spite of the poor conditions, they found that the only factor which showed any significant relationship with hospitalization was the mode of infant feeding. They found that the breast feeding women tended to be older, had more children, had less formal education and lived in more crowded conditions than those who bottle fed. Conversely, bottle feeding mothers tended to be younger, better educated and lived in better conditions. The Ellestad-Sayed et al. (1979: 297) study concluded that the protective effect of breast feeding was "independent of family size, overcrowding in the home, family income and education of parents." They argued strongly for the primacy of the infant feeding variables to explain the etiology of ill health.

The infant feeding variable has been shown to be a highly significant factor in explaining the cause of infant ill health. Other environmental factors attain significance in relation to the mode of infant feeding. Where an infant is wholly breast fed the environment plays a relatively insignificant role. However, where an infant is wholly

bottle fed, the environmental factors are extremely important. This factor explains why bottle fed infants in disadvantageous environments fare so much poorer than bottle fed infants in advantageous environments. The environmental impact on infants who are first breast fed and then bottle fed increases inversely as the length of breast feeding decreases. These generalizations hold true for both the wealthy and the impoverished, if at different levels of intensity.

The interaction between nutrition and health has been generally described in this discussion of infant mortality and morbidity. The next section examines in more detail the role of bottle feeding in generating a loss of physical and psychological well-being.

E. THE ECOLOGY OF INFANT NUTRITION

As long as infants were nourished at their mother's breast the ecology of infant nutrition was very simple. The infant was entirely dependent on its mother, who by herself was able to adequately supply all its needs for at least the first six months.* With the introduction of artificial feeding non-human milk and other foods, the ecology of infant feeding becomes highly complex. Not only are infant nutrition and health compromised, but the well-being of the infant grown into adulthood, as well as of its mother can also suffer adverse consequences. The shift from the breast to the bottle can initiate a chain of cumulative effects leading to nutritional and psychological maladaptation.

When there is a change from breast to bottle feeding, two

*Only about 5% of all mothers of new-borns are biologically unable to lactate. Other inhibitions can be caused by certain illnesses or by a psychosomatic blockage.

principal factors dominate the interaction between nutrition and health. First, the protective factors supplied by the mother are lost when bottle feeding is introduced. Second, non-human milk and other milk substitutes alien to the infant's immature digestive system prematurely introduce provocative factors which result in ill health. This discussion will clarify some of the ecological interactions responsible for the differential infant mortality and morbidity rates discussed in the previous section.

1. The Ecology of Breast Feeding

The ecology of breast feeding is remarkably simple. Breast feeding involves few interactions between the infant and its environment. Three predominant features of breast feeding infants gives them a distinct advantage over bottle fed infants. First, the breast fed infant exists in a relatively restricted micro-environment with its mother. This restriction allows for a limited level of contamination from the outside world and limits the adaptive responses necessary for survival. Second, mother's milk is nutritionally sound, "with the finest details of the milk and of the process adjusted to the particular needs of the way of life and environmental hazards." (Jelliffe and Jelliffe 1978a: 16). Non-human milk has a significantly different nutrient composition which is entirely inappropriate for human infants (Spady 1977). Third, breast milk offers a protective factor against: (a) disease causing micro-organisms ingested while artificial feeding; and (b) provocative food antigens which upset the infant's metabolic system and allergenic control system. As was demonstrated previously, breast feeding appears to be a protective factor against respiratory, gastro-intestinal and

ear infections.

The most important non-nutritive advantage of breast milk is the passive immunizing factor it passes on to the infants. At birth the infant's alimentary canal (gut) is sterile. However, within a few hours bacterial colonization occurs (Canadian Paediatric Society 1978). An infant's independent immunological system does not become fully developed until six to nine months of age (Gerrard 1974). The newborn does not receive a full complement of antibodies before birth. The mother, however, is able to convey the missing antibodies through her milk.

Breast milk has at least four significant protective functions (Canadian Paediatric Society 1978). First, breast milk passes immunizing antibodies on to the infant. Within five days of birth the colostrum (the first stage of breast milk production) contains a variety of immunoglobulins (Ig). The most significant one is IgA, which provides the main defence against diarrheas and gastro-enteritis which are deadly in poor environmental conditions (Gerrard 1974). Second, breast milk is a source of the iron-binding whey protein, lactoferrin, which has an inhibitory effect on Escherichia Coli (E. Coli), one of the most common bacterias present in the mature adult gut. E. Coli is a highly provocative bacteria in the immature infant gut. According to Jelliffe and Jelliffe (1978b: 262), "Essentially E. Coli diarrhea in the newborn is a bottle-feeding disease." Third, breast milk also helps maintain an intestinal microflora in which Lactobacillus bifidus is predominant. L. bifidus protects the infant against the development of other provocative micro-organisms. Fourth, breast milk protects the gastro-intestinal tract from foreign food antigens at a time when alien foods provoke mal-adaptive allergic reactions. With the premature introduction of sup-

plementary milk or solid foods, the infant's intestinal flora changes to that of a normal adult flora at a time when its system is far too immature to adapt properly.

In the first six months of life the infant is entirely dependent on its mother for well adjusted development. In the words of Gerrard (1974: 762), "An important factor of breast feeding is therefore to insure a smooth transition from dependence to independence." Hence, when the delicate balance in which the newborn infant exists is upset by the ingestion of alien foods and alien micro-organisms, serious illness occurs. In the absence of breast feeding, the severity of the illness is congruent with the level of environmental inhospitality in which it exists.

2. The Ecology of Bottle Feeding

With the introduction of bottle feeding the entire ecological system of infant feeding changes. Innumerable new interactions between the infant and the environment are introduced, many of which are in reality outside the realm of the mother's control. The essential difference between breast and bottle feeding lies in the nutritional quality of the substitute food, the sanitary conditions surrounding bottle feeding and the overall health conditions of the infant's environment (Knodell and Kintner 1977). Other significant factors are changes in food habits, food values and the external influences of cultural and economic values. The more complex the interaction between the infant and its environment, the greater the risk to infant health and well-being.

Bottle feeding involves two basic feeding problems. First, the contents of the bottle determine the extent of the antagonistic effect on infant health; second, the age at which solid foods are introduced determines at which stage in the maturing system food antigens are introduced. Again, the seriousness of these two factors depends on the socio-economic environment of the bottle fed infant.

The contents of the bottle can vary tremendously, depending on the knowledge and/or economic viability of the infant's mother to bottle feed. Most infants are fed on cow's milk based formula preparations. In the 1960's it was discovered that the composition of unmodified cow's milk was not at all appropriate to the infant's needs. In the 1970's numerous attempts were made to "humanize" cow's milk by modifying it by a scientific "formula" to resemble human milk.* There is no uniformity in the use of formula milk as a substitute for breast milk, however. Lower income groups in Canada tend to use unmodified cow's milk which has yet more provocative factors than formula milk (Myeres 1979). In Indian communities the most common milk given to infants is 2% evaporated milk. This milk was among the first of the processed foods to be introduced to the North.** Formula milk is still not used extensively in the North. Besides unmodified cow's milk, it has been reported that substitutes such as tea with milk and sugar, Tang (orange flavoured crystals), and even Coca-Cola have been known to be given to infants in

*Recently, some formula milks based on soya have been developed for those infants allergic to cow's milk.

**The reason Vitamin C was added to evaporated milk was to counteract the Vitamin C shortage in the Indian diet (Clark, personal communication).

their first few weeks of life (Gardiner, personal communication). With the exception of the use of gruel, such practices have not been documented for other areas. Certainly the antagonistic effects of such bottle feeding practices could not be greater.

Formula milk has also been demonstrated to be problematic. Again, many intervening factors can take place. The successful use of formula milk depends on the facilities to boil water and sterilize utensils, knowledge of the proper method, access to appliances such as stoves and refrigerators, adequate income to maintain a hygienic environment and adequate supplies. Nutritionally, formula milk also is subject to many variables. Problems of overconcentration, overdilution, adding solids and the development of poor nutritional habits have been noted (Spady 1977). Conditions in the North tend to mitigate against successful bottle feeding.

Bottle feeding contributes to poor infant feeding practices in other aspects as well. It has been demonstrated that in Manitoba bottle fed infants were introduced to solids and other non-milk foods at about one month, which was much earlier than common for breast fed children (Clark 1981a). Normally nutritionists recommend that infants not be introduced to solids until the fifth or sixth month (Spady 1977). Hence, not only do bottle fed infants tend to be fed antagonistic foods, but they also tend to be fed these foods at an earlier age. These two factors help explain why illness and death strike bottle fed infants at a much younger age than breast fed infants.

3. Infant Feeding and Psycho-Social Well-Being

Infant feeding is not merely a mechanical fueling procedure for

supplying nutrients to the baby. According to Jelliffe and Jelliffe (1978b: 151), "All aspects of feeding of all age groups have deep and subtle psychological overtones, meanings, and consequences." Recent studies on the interaction between infant and mother have stressed the emotional sacrifice of abandoning breast feeding (Lozoff et al. 1977). Infant mother bonding is threatened by bottle feeding, which tends to diminish close physical contact and deep psychological involvement. A great number of psychophysiological (i.e. sensations relating to breast feeding resulting from hormonal stimuli) interactions have also been threatened (Jelliffe and Jelliffe 1978b: Ch. 8). In socio-economically deprived settings the deprivation of infant psycho-social development through bottle feeding contributes greatly to the sacrifice of human well-being. In the Indian North this problem merely contributes to the cultural identity crisis and the sense of psycho-social alienation.

4. The Cumulative Effects of Bottle Feeding

Bottle feeding affects not only infant health and nutrition but also has implications for adult well-being. A variety of associations between bottle feeding and adult health have been made. Coronary diseases and breast cancers have been linked to bottle feeding. Even though their etiologies are very complex, the mode of infant feeding variable has been shown to contribute (Gerrard and Tan 1978; Jelliffe and Jelliffe 1978b: 255). Dental conditions such as malocclusion (buck teeth) and a high rate of dental decay are closely associated with bottle feeding as well. The name "nursing bottle syndrome" has been applied to bottle related dental disease (Beazley 1978).

The contraceptive value of breast feeding has been established for quite some time (Jain 1970; van Ginnekin 1974). A study among the Eastern James Bay Cree (Romaniuk 1974) and among the Inuit (Hildes and Schaefer 1972) have demonstrated the ovulation inhibiting effect of breast feeding. Hildes and Schaefer demonstrate the effect of abandoning breast feeding on the spacing of Inuit births by relating the birth interval with duration of lactation (see Fig. 9.3).

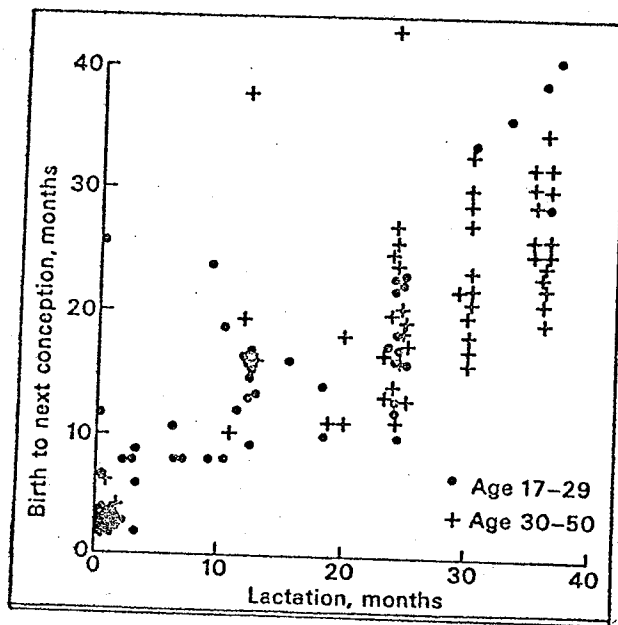


Fig. 9.3 Lactation and Fertility Among Inuit Women
(Source: Hildes and Schaefer 1973: 246)

Hildes and Schaefer found that a significant proportion of traditional Inuit women were relatively infertile due to prolonged lactation. They found a strong positive relation between birth interval and duration of lactation. The contraceptive factor, though not a reliable birth control method, is significant for the mother's health where family planning is not widely practiced.*

*Figure 9.3 indicates the increasing standard deviation in the infertile period for each successive month of lactation, indicating that the period of post-partum amenorrhea is highly variable.

F. CONCLUSION

The change from breast feeding to bottle feeding has a broad range of consequences. Bottle feeding introduces a whole array of etiological effects which complicate the explanation of ill health. The cumulative effects of bottle feeding on psychological and physical health are only now being uncovered.

Three main ecological sub-themes have evolved out of the discussion in this chapter. First, in the first six months of life the infant's interaction with its environment is characterized by a delicate, balanced system of nutrition and health. When disturbed, it places the infant at great risk. The mother, as the prime nexus between the infant and its environment, translates the environment to the infant. Whether she breast feeds or bottle feeds, she determines the nature and the complexity of the environmental interaction.

Second, the ecological consequences of the shift from breast to bottle feeding result in excessive mortality and morbidity among bottle fed infants and in cumulative effects among adults. Though the etiological factors are complex, and exact causal links cannot always be fully determined, the correlation between bottle feeding and loss of well-being is very strong. Whereas among breast fed infants the surrounding environment is relatively benign, for bottle fed infants the quality of nutritional substitutes and the quality of the surrounding environment determines the severity of the consequences. The consequences of bottle feeding are maladaptive, the extent of which has only recently begun to be determined.

Finally, the shift from breast feeding to bottle feeding represents a shift from a simple ecosystem to a complex one. It also repre-

sents a shift from an infant to an essentially adult trophic level of food production, distribution and consumption. Breast feeding involves a very basic level of food production (the mother's milk), distribution (breast feeding), and consumption (a complete blend of nutritional and protective factors). With breast feeding the nutritional system is entirely under the control of the infant-mother diad. Bottle feeding, on the other hand, involves the full complexity of the human nutritional ecosystem.

In essence, these three themes sum up the factors involved in the interaction between nutrition and health. The next chapter will discuss the role of modernization and underdevelopment in determining the quality of the ecology of infant feeding.

CHAPTER X

THE INFANT FEEDING BOTTLE IN THE UNDERDEVELOPMENT PROCESS

A. INTRODUCTION

The shift in infant feeding practices in northern Manitoba is an element of the rapid nutritional shift involving increasing reliance on commercial and processed foods. The impact of modernization on the general nutritional habits of the Inuit and the Indian people resulted in a gradual underdevelopment of nutrition and health. Likewise, the infant feeding bottle has played a leading role in this underdevelopment process, resulting in sacrificed health and nutrition.

The previous chapter illustrated the impact of bottle feeding on the health of Indian infants. This chapter focuses on the role of the bottle itself as a feature of the general underdevelopment process, as well as considering the infant feeding bottle as a problem of modernization.

The first section deals with three aspects of the infant feeding bottle in the underdevelopment process. First, the role which the infant feeding bottle plays as an "image of modernity" will be examined to elucidate the strong symbolic character of such an innocuous appearing device of western technology,* which has been able to revolutionize

*The bottle as we know it is western in origin. However, archaeological digs have uncovered a variety of clay infant feeding vessels of all shapes and configurations dating as far back as 2,500 B.C. (Lacaille 1950).

strong, culture bound practices of infant feeding. Second, the role of the bottle in the diffusion of modernity from the West to the Third World will be examined. Third, the role of the infant feeding bottle as a representative of the modern market economy will be assessed to determine how the shift from breast feeding to bottle feeding infants results in the exploitation of economic and socio-cultural wealth.

B. THE INFANT FEEDING BOTTLE: AN IMAGE OF MODERNITY

The infant feeding bottle has emerged as a product of rising socio-economic expectations supported by the modern scientific food industry. In the early days of the American feminist movement, the bottle presented women with the opportunity to be liberated from the role of house-bound mother without giving their children up to wet-nurses. It became a new status symbol which represented upward socio-economic mobility. With the medicalization of child birth and the commercialization of infant feeding, a new era of science's confident superiority over nature's ways was inaugurated in a quiet revolution of long held values and practices of infant feeding.* Bottle feeding became an integral part of the modern, western lifestyle.

In the Third World the infant feeding bottle has come to represent modernity and the western way of life. The diffusion of western type scientific medicine into the Third World initially brought the bottle as a feature of the "civilizing mission". Consequently, deeply rooted cultural systems of infant feeding came to be questioned and then abandoned by those seeking a way out of "primitive traditionalism".

*See Jelliffe and Jelliffe (1978b: ch. 10) for a good discussion on the development of bottle feeding in America.

This section discusses the bottle as an image of modernity.

First, a differentiation is made between the bottle and its contents.

Second, the symbolic value of the bottle is discussed.

Bottle feeding involves a process in which the bottle and its contents are inseparable. However, in the transition from the breast to the bottle, the key agent of change is the bottle rather than its contents. The most eloquent arguments protesting the modernization of infant feeding have concentrated on the infant formula milk manufacturers' devious methods of convincing mothers to switch (Bader 1976; Greiner 1977; Margulies 1977). Rarely, if ever, has the role of the bottle itself been questioned. Bottle feeding is usually treated as being synonymous with formula milk while the problem of non-formula contents has failed to be considered. The argument presented here is that the problem of bottle feeding is initially the bottle, and only secondarily the contents. The bottle could contain milk, or cereal gruel, or tea, or an orange flavoured crystal drink. It is argued that the source of the revolution in infant feeding habits is the bottle itself. Once the bottle has successfully conveyed an image of modernity to the user, the contents of the bottle may be more or less relevant, depending on socio-economic circumstances of the mother determining what is put into the bottle. The bottle itself comes to be seen as the ideal way of nourishing the infant regardless of its contents.

The infant feeding bottle represents what is western, what is modern, and what is good. The bottle presents what Berger (1974) calls an "image of modernity". The bottle itself is little more than a consumer good, an ingenious device of western technology. However, for the mother seeking a better way for herself and her infant, it repre-

sents a relatively painless initiation into modernity.

Modern advertising techniques depend on creating a desire to use a product for self-image enhancement on the one hand and to reinforce the self-image of the consumer on the other. This has been especially true of marketing formula milk in the Third World (Margullies 1977). Greiner (1977) outlines four principal marketing techniques which associate bottle feeding with an image of optimal health for the infant. First, mass advertising, especially on billboards and on radio, generates strong emotional responses to stimuli to "choose what is best for baby". Promotionals such as premiums and gifts are used to stimulate sales. Second, milk companies use the same channels as drug companies to generate a favourable response among health professions. "Free" technical advice on infant nutrition is directed to physicians who often receive very little training in paediatrics and infant nutrition. Furthermore, milk companies sponsor scholarships, conferences and research for health professionals. Third, health professionals are encouraged to give out free samples of infant products which give a strong "endorsement by association". Hence, medical professionals reinforce the decision to change by associating formula milk and associated information on infant care with medicine and health care. Fourth, and probably most effective, is the practice of hiring medical or pseudo-medical "professionals" to generate a market for formula milk. The infamous "commercial milk nurse", hired by companies such as Nestlé's and Abbott dresses in nurse-like uniforms and circulates in hospitals and clinics to give away free samples, infant care advice and follow-up services to encourage bottle feeding with the name-brand product being marketed. The milk nurse appears to be a medical professional, and

therefore her very presence imparts a powerful message whose meaning carries the full weight of the modern scientific health care system.

Modern marketing research has lent support to the idea that a consumer item is purchased for reasons quite different than the utility of that item. A consumer good reflects the consumer's social status as well as self-image. Sommers (1969) has argued that consumption patterns are determined by the consumer's need for self-image enhancement, which in turn is determined by the economic structures defining the image.

According to Grubb and Grathwell (1969: 68), "The essence of the object resides not in the object but in the relation between the object and the individual classifying the object." Hence the bottle, as a consumer good, has a desirable social meaning directed toward furthering and enhancing the self-image of the mother who uses it. Levy (1968: 100) adds that "Modern goods are recognized as psychological things, as symbolic of personal attributes and goals, as symbolic of social patterns and strivings." The bottle as a symbol reinforces the way in which the user thinks about herself or wants to think about herself. Because of the heavy symbolic nature of the good, Levy (1968) argues that the consumer is hardly the ideal "economic man"--many times the decision-making processes are entirely irrational and subconscious.

The decision to bottle feed an infant has been considered irrational by researchers unable to satisfactorily explain why women decide to switch from breast feeding (Jones and Belsey 1977). It is argued here that the infant feeding bottle in the Third World plays a significant symbolic role for those seeking social mobility on the one hand and a deliverance from poverty on the other.

In the Third World the bottle represent a panacea, "a sort of magic potion responsible for healthy bounding babies . . . Its connection with health professionals may have fostered the myth that infant formulas act as tonics or medicines." (Greiner 1977: 55). This statement is consistent with Berger's (1974: 139) comment (quoted previously) that:

"on the most elementary levels of human experience, modernization is associated with the expectation of being delivered from hunger, disease and early death. Thus modernity has about it a quality of miracle and magic which, in some instance, can link up with old religious expectations of delivery from the sufferings of human condition."

Ironically, the search for deliverance from poverty has in fact led to an even greater entrenchment in ill health and hunger.

The symbolic character of the bottle represents an image of modernity. It is argued here that its strong imagery, linked with an expectation of deliverance from poverty gives the bottle a message which is easily and rapidly accepted by the world's poor.

C. BOTTLE DIFFUSION IN THE UNDERDEVELOPMENT PROCESS

The modernization process in the Third World is a concomitant of technocracy, bureaucracy and institutions which diffuse outward from the developed world cores (Berger 1974). The process whereby indigenous values and institutions become disintegrated and are replaced by alien systems whose efficacy is dubious, represents the essence of cultural colonialism (Bader 1976; Slater 1974). The role of the infant feeding bottle--with its strong imagery of western modernization--in the underdevelopment process can be understood as a feature in the

diffusion of modernity. This section will analyse bottle diffusion in the light of three diffusion processes: the diffusion of the bottle as an innovative technology; the diffusion of western institutions which facilitate its spread; and the diffusion of western values which ensure its acceptance.

The innocuous bottle has diffused into the furthest reaches of the Third World. According to Schaefer (1971b), it came as one of the earliest features of modern living in the high Arctic.

Beyond its symbolic power, the bottle as an innovation has several qualities which make it easily and rapidly diffused. First, the bottle is a remarkably simple technological device. As a technology it diffuses as any other technology would (Rogers and Shoemaker 1971: 100-133). To be successful, most technological innovations require the adoption of both the object and the idea (or correct method of use). The bottle, however, is so simple that these two components can be separated by the innovator. The bottle can be adopted without adopting the correct procedures for safe use--i.e. proper hygiene, sanitation, correct concentration, or even proper contents. Hence, when the bottle is adopted as an image of modernity, it can be utilized with relatively little commitment to the appropriate method of use.

Second, the bottle requires a relatively low level of innovativeness. As a consumer symbol, its acceptance does not involve a rational adoption process (Rogers and Shoemaker 1971: 176-182). Furthermore, the bottle's low cost and ease of use, its high observability profile and its short trial-use period make it readily accessible to one who would otherwise be considered a traditionalist late adopter. One stage of innovation adoption which entirely evades the bottle adopter is the

period where the consequences of adoption are observed. Because the consequences of bottle feeding are internal to the infant and gradually cumulate over time before becoming visible, the adopting mother cannot observe the effects of her choice.

Third, the bottle represents a high potential for change with an apparent minimum of social and economic commitment. It appears to produce relatively little social conflict and affirms the user's self-image that she is doing what is best for her infant. This "message" is reinforced by the formula milk companies in the Third World.

The diffusion of western social and economic institutions into the Third World has facilitated the diffusion of western technology. Latham (in Greiner 1977) has identified two western institutions--the western medical care system and the multinational corporation--which have initiated and facilitated the switch to bottle feeding. These two institutions have a great capacity for influencing infant feeding practices.

Critics of modern scientific medicine's role in the Third World have claimed that it has aided the cause of neo-colonialism and has represented an alien system for meeting indigenous health needs. (Fanon 1978; Navarro 1976; Paul 1978). Jelliffe and Jelliffe (1978b: 233-238) have termed the medical care system's early promotion of bottle feeding as an "iatrogenic" cause of infant ill health.* They argue that modern maternity and hospital routines mitigate against breast feeding. Furthermore, in the recent past, while many professionals have taken a strong stand against bottle feeding, hospitals

*See Illich (1976) for a full discussion of the iatrogenic--caused by medical malpractice--effects of modern health practices.

in the Third World have openly cooperated with the free distribution of infant kits, including infant care booklets, supplied by the infant consumer goods industry.

In northern Manitoba, where there is no mass marketing, medical professionals have, until recently, been largely responsible for inaugurating bottle feeding whether by actually recommending it or by practising it themselves as a "demonstration effect" (Clark, Gardiner - personal communication). Latham argues that the modern medical care system has been more concerned with curative than with preventative medicine. In a system which has a vested interest in the commodification of health (Renaud 1978), medical personnel have developed strong professional organizations "which act against public welfare and where profits from medical care are high." (Latham in Greiner 1977: v). It is argued, therefore, that western medicine, with its scientific elitism and capitalist roots, has until the recent past facilitated, and approved of, the easy spread of bottle feeding.

A second institution indentified by Latham (in Greiner 1977: v) is the multinational corporation (see pp. 247 ff.) which is aided by an economic system which "encourages private industry to act aggressively to change dietary practices in the interests of profits and with disregard for human health and welfare." Two features in the western economic system directly related to facilitating the milk companies' expansion into the Third World are: (a) large milk surpluses from the dairy industry, and (b) the western myth that cow's milk is an ideal food for infants everywhere. Diffusing the value that more milk equals better nutrition makes the infant formula company an economic compatriot of the surplus producing West and a nutritional compatriot

in the malnourished Third World. However, as we have seen, marketing expensive infant foods in the Third World has resulted in malnourishment and disease. The term "commerciogenic malnutrition", introduced by Jelliffe (1972) has come to be widely used to describe the nutritional sacrifice resulting from the unjudicious use of commercially prepared foods.*

The infant food industry has a vested interest in inducing the shift from the breast to the bottle, and hence gives the potential consumer the full support needed to change. They have developed a vigorous marketing network of distribution and sales to achieve widespread availability of their products in the Third World. Their success has prompted Nestlé's to advertise that "We are very far from the laboratories and the factories. We are in the very back of the beyond." (cited in Greiner 1977: 18).

The diffusion of western values and culture to the Third World has frequently represented the worst in western ethnocentrism. Nowhere has this become more blatant than in the cultural and social concomitants of the bottle feeding practice. Bottle feeding both reflects the urbanizing values (often seen as westernization) of mothers in the developing world and facilitates achieving that goal. Bottle feeding has, in many areas, become a point of cultural conflict between rural traditionalism and modern urbanism.**

*It must be acknowledged that there is a place for commerciogenic food, including formula milk, in the Third World, but it has been argued that attention has been misplaced on expensive and difficult to use formulations (Berg 1973a).

**Esterik (1977) has an excellent discussion of this problem in her comparison of rural and urban infant feeding ideals in Taiwan.

In the urban Third World bottle feeding emulates the western way of life. Negative attitudes to breast feeding have been transmitted through the media, the medical profession, civilizing missions and western residents in the Third World. Western moral and legal codes, particularly concerning sexuality, have contributed significantly to basic conflicts in social behaviour. A significant, if frequently unmentioned, point of conflict which has contributed to lactation failure is the adoption of the western roles and symbolism of the female breast. In "traditional" cultures the female breast is associated primarily with motherhood--sacrifice, love, food, fertility, succour and femininity. But, according to Jelliffe and Jelliffe (1978b: 223):

"Westernization is associated with a shift in the emphasis from the breasts' nurturing function in infant feeding to a primarily sex-aesthetic function as emphasized in clothing (which also make nursing more difficult mechanically), advertising, and such visual entertainments as film and television. The infant feeding function of the breast becomes an urban taboo, and certainly not to be undertaken in public."

The transmission of western moral values has had a negative effect on the ability of urban mothers to breast feed due in part to their transformed self-image.*

The tradition-modern conflict in the Third World is reflected in the failure of many urban women to achieve satisfactory lactation. Jelliffe and Jelliffe (1978b: 221) have coined the word 'occidentogenic'

*Subtle evidence of the pervasiveness of the westernization of the female breast is the fact that in the remotest parts of Africa women "cover up" with embarrassment at the approach of a white person, white females notwithstanding. The Third World woman who covers up while breast feeding is a ready candidate for adopting the bottle.

--"that is derived from western cultural influences seen most markedly in the urban context"--to describe the causal factor. To deny the influence to bottle feed would mean to deny an image of modernity. This problem generates a conflict in the self-image of the mother, which in turn undermines successful breast feeding.

Bottle feeding is a product of social change. However, it is also an agent of social change and a measure of acculturation. In the same way that the extent of Coca-Cola diffusion is a measure of westernization, the extent of bottle feeding represents an index of modernization. Berg (1974a: 99) notes that "anthropologists, struck by the relationship of artificial feeding to societal change, have used the duration of nursing as an inverse measure of acculturation for some countries."

The acculturation process associated with bottle feeding is only one aspect of the underdevelopment process. The change from the breast to the bottle also represents a major shift in the use of food resources. The next section examines the bottle feeding problem as the underdevelopment of economic and social resources.

D. BOTTLE FEEDING AS WASTEFUL RESOURCE MANAGEMENT

A change from one food system to another involves changes in a host of social, economic, political and environmental structures of food production, distribution and consumption (Jerome *et al.* 1980). The modern market economy, dominated by bureaucratic and technocratic institutions, controls most of the western world's food systems (Mitchell 1975) and is involved in taking control of Third World food systems (Dewey 1979; Fleuret 1979). In a stratified world structure

of centre-periphery relations, the western metropolises are in a position to appropriate the Third World's food resource potential. The Third World, whether through orienting food production for western markets or through becoming a market for western surpluses, realizes a phenomenal drain of resources to the central world market economies (Brown 1974). The end result is a loss of control over means of production, exchange and consumption, and the further underdevelopment of the world's marginalized people.

The involvement of the modern market economy in infant nutrition represents an appropriation of natural food resources and an expropriation of social well-being on the grand scale of world capitalism. This discussion examines: (1) the commercial infant food industry's vested interest in perpetuating bottle feeding; (2) the appropriation of the Third World--including northern Manitoba--human milk resources; and (3) the expropriation of the Third World's social and cultural well-being.

1. The Infant Food Industry

The infant food industry, of which formula milk producers such as Ross Laboratories, Mead Johnson and Nestlé's form a major proportion, is a complex multifaceted enterprise operating on the multinational corporation scale. Some, like Ross Laboratories and Mead Johnson, are divisions of larger corporations such as Abbott Laboratories and Bristol-Myers, who also manufacture other infant consumer products (Bader 1976).

The infant-related industries have found it opportune to capitalize on the large market potential in the Third World. In the last two decades the slump in western birth rates has limited their sales growth

potential in the West. In 1973 the U.S. food processing industry reported the lowest annual sales growth (5%) of any industry. Bader (1976: 618) cites a business review which claimed there were "too few mouths to feed." Therefore, the vigorous population growth rate in the Third World presents an attractive option to make up for the lack of gain in western markets. Consequently, the infant food industry has a strong vested interest in bottle feeding in the Third World.

The infant food industry's sophisticated marketing strategies have successfully made the Third World market an important contributor to their growth rates. For Abbott Laboratories, between 1969 and 1973, the overseas portion of paediatric sales grew from \$12.5 million to \$31.3 million (or 14.3% to 22.2%). While Ross Laboratories (manufacturers of Similac and Isomil) expanded domestic sales of formula milk by 9%, foreign sales grew by 32% (Bader 1976). Bristol-Myers (whose Mead Johnson division manufactures Enfamil, Olac, and Prosobee) increased international sales from \$100 million to \$400 million between 1968 and 1974. Infant formula milk sales constituted the fastest growing segment of this industry's growth rate. It is significant to note that together Abbott and Bristol-Myers control 90% of the infant formula market; this constitutes a virtual monopoly over the formula milk industry (Bader 1976).

The large commercial interest in the infant feeding bottle constitutes a major threat to infant nutrition and health. Furthermore, it constitutes a major misappropriation of natural and human resources. Infant food products, particularly those geared for the infant's first six months of life, do not represent a supplementary consumer good, but are in fact a replacement for breast milk. Once breast feeding has

ceased, commercial infant foods become a compulsory item in the infant diet. Hence, not only does the infant food industry have a vested interest in extracting economic resources from poor Third World countries, but also in the drying up of indigenous food resources which it replaces.

2. The Appropriation of Third World Food Resources

The value of human breast milk is rarely considered in studies which examine the metropole's appropriation of Third World food resources. The same social, economic and political structures which facilitate the removal of agricultural wealth operate to appropriate the replacement value of lost human milk production. A study of the economics of infant feeding reveals a tremendous economic loss in potential breast milk production and a large gain for international profits.

On a world scale, human milk production potential represents a phenomenally large food resource. Latham (in Greiner 1977: i) has estimated that if all mothers of newborns lactated to their potential, they would produce about 30 billion litres of breast milk a year. This milk would adequately nourish the estimated 120 million infants born each year. In nutritional terms, this milk potential would represent 22,500 billion Kcals and 400 billion grams of protein. At 1976 U.S. prices it would be valued at \$15 billion. Latham also estimated that due to bottle feeding, there is an approximate annual shortfall of 12 billion litres.

In the developing world, Jelliffe and Jelliffe (1978b) have estimated that human milk production represents about one quarter of total cows' milk production. Studies evaluating lost human milk poten-

tial in developing countries have demonstrated the cost of replacing mothers' milk. In Chile, for example (Berg 1973b), 95% of the mothers breast fed for one year in 1950, whereas by 1969 the proportion had dropped to only 6%. In 1950, out of a production potential of over 57.7 million litres, about 2.9 million litres were not used. By 1969, 78 million litres of the potential 93.2 million litre production were drained off to corporate profits. It would have taken the production of some 32,000 milk cows to replace the lost milk. Jelliffe and Jelliffe (1974) estimated that if all the women in India were to cease lactating, 114 million cows would be required to replace the loss.

In monetary terms, the loss in human milk production has meant a steadily growing demand for imported milk and milk products. Berg (1973b) estimated that in the Philippines \$33 million was lost to bottle feeding. In Kenya, about \$11.5 million, or about two thirds of the health budget, was lost. Importing milk substitutes has required using valuable foreign currency resources to replace the milk resources when breast feeding is abandoned. Not only has the milk potential been lost, but the profits gained from the sale of milk substitutes has accrued first to the national metropolises and then finally to international capitalism.

In northern Manitoba the scale of human milk appropriation is relatively less significant in size. However, where incomes are meagre and where human milk substitutes are very expensive, the loss in milk production represents a considerable economic and nutritional loss.

Rough calculations were made on the potential loss of human milk for Manitoba's native people and for all Manitobans.* Indian women giving birth to 1,235 infants had a potential production of 191,500 litres of milk. With the mode of infant feeding distribution given by Ellestad-Sayed et al. (1979), it was calculated that there was a potential loss of 145,760 litres.** To replace this milk with cow's milk would cost about \$111,700 at Winnipeg prices (1981), or about \$110 per infant. To formula feed all the Indian infants for six months would have required 25,400 kg of formula milk powder.

For all Manitoba, 16,542 mothers had a potential to produce 2,564,000 litres for the six month period. Of this total, 1,871,000 litres was lost to bottle feeding. About 300,000 kg of formula milk would have been required to replace the lost breast milk. To replace it with cow's milk would have cost \$1,435,600. In Winnipeg, the cost of formula feeding (1981) for six months was \$255 for ready-to-use formula, \$158 for powdered concentrate, \$143 for liquid concentrate, and \$90 for evaporated milk. The cost of supplementing a lactating mother's diet for six months is estimated to be about \$85 (Clark, personal communication).***

*See Berg (1973a: 229-232) on methods for computing the value of human milk. An annual average of 1,235 births for I.R. and U.T. and 16,542 births for all Manitoba was calculated for the 1975 to 1979 period. The average mother produces 155 litres of milk in the first six months of lactation. About 183 litres of cow's milk is required to replace the mother's milk to achieve an equal nutritional value. If formula milk is used, an average of 25 kg is required in the first six month period.

**The Ellestad-Sayed et al. figures for breast feeding are correct for their communities, but are considered to be high as an all Indian average, hence the estimated losses are conservatively low.

***A lactating mother requires only an additional 600 Kcals per day, making her a very energy efficient producer of milk (McKigney 1971).

The cost of replacing mother's milk represents a considerable burden for an impoverished family. Where finances are not available to bottle feed adequately, the child suffers nutritionally and medically. In some Third World countries it requires from 50% to 75% of the family income to properly formula feed an infant (Greiner 1977). The burden of inadequate income which the infant bears nutritionally has been shown not to improve appreciably with increased income. A study from Calcutta found that the marginal propensity to spend increased income on infant food was only 5%.* According to Latham (in Greiner 1977: vii), "they found that higher incomes of the kind described not only may fail to reduce malnutrition, but on the contrary may increase infant malnutrition."

The resource costs of abandoning breast feeding are not limited only to replacement milk. Additional costs include cooking utensils, refrigeration, and cooking fuel, which in poor areas is a major expense. One of the largest misappropriations incurred in bottle feeding is the additional medical resources required to repair the damage. When bottle fed infants are hospitalized ten times as often and remain ten times as long (Ellestad-Sayed *et al.* 1979), the medical costs of bottle feeding are considerable.

The bottle feeding phenomenon represents a tremendous misappropriation of resources. Not only is the potential breast milk lost, but the profits gained from bottle feeding are appropriated by the modern market economy. The next section discusses the expropriation of human well-being incurred by bottle feeding.

*This means that only 5% of additional income would be spent on food.

3. The Expropriation of Well-Being

The forces of modern social and economic structures exert tremendous pressure on culture bound systems of nourishing and rearing infants. When the shift from breast feeding to bottle feeding occurs on a large, socio-cultural scale, one could argue that the way becomes open for an expropriation of social and cultural wealth as well as economic wealth. The wide scale bottle feeding phenomenon results in losses in at least four areas of human well-being necessary for maintaining good physical and psycho-social health.

(a) In shifting from breast to bottle feeding, the control over the means of production, distribution and consumption is relinquished to the modern market economy. The expropriation of control is complete once lactation has ceased. Furthermore, once the mother switches to bottle feeding her role becomes reversed from being a producer to being a consumer, subject to all the vagaries of the producer-consumer society. It was determined previously that control over production, distribution and consumption in an impoverished and marginalized society was critical for maintaining good nutrition and health.

(b) Bottle feeding results in an expropriation of independence. Though it can be argued that the bottle allows the mother to become independent from her infant, she in turn becomes entirely dependent on the modern market economy when she ceases to breast feed or chooses to bottle feed from the outset. For particularly the impoverished mother, such dependence is sacrificial and results in a loss of well-being. It was determined previously that dependency was a mark of impoverishment and underdevelopment.

(c) Social and cultural wealth are expropriated by the switch in infant feeding practices. Traditional cultures have rich infant feeding traditions, which are lost when there is a large scale switch to the bottle. Not only are cultural traditions and values lost, but so are the skills to breast feed successfully. The main reasons for unsuccessful breast feeding in the West, where strong extended families have broken down, is a failure in the transmission of the art of breast feeding from mother to daughter. One of the most intransigent obstacles to breast feeding in the West are "traditional" mothers and grandmothers who in their generation of child rearing switched to bottle feeding (Clark, personal communication). Breast feeding is a practiced art, which when lost, results in pain, disappointment and failure (Clark 1981a). A strong social support system is also a necessary prerequisite for successful breast feeding for a substantial length of time (Hirschman and Sweet 1974; Jones and Belsey 1977). The loss of social and cultural wealth is also a significant consequence of the underdevelopment process.

(d) The expropriation of good nutrition and good health is ultimately the most visible consequence of the nutritional shift. Ill health, whether or not it is serious enough to result in hospitalization, drains the physical, psychological and social resources of the victim and his/her immediate social group and, when on a large scale, society as a whole. Hence, an individual's loss of well-being also means a loss of social well-being.

The infant feeding bottle has played a significant role in the underdevelopment of health and nutrition. The expropriation of human well-being is ultimately the most serious consequence of the moderniza-

tion/underdevelopment process in which the bottle has played a small, but significant role.

E. CONCLUSION

The infant feeding bottle has inaugurated a revolution in infant feeding practices. As an image of modernity it has accompanied the invasion of western value systems and has successfully penetrated traditional socio-cultural values. Not only has it become a tool of cultural invasion, but it has also successfully facilitated economic exploitation. The consequences of this facet of the nutritional shift have been malnourishment and ill health for many of the world's impoverished infants, including northern Manitoba. The invasion and exploitation of the hinterland plays the major role in the underdevelopment process. This case study of bottle feeding has illustrated how the underdevelopment process continues to exploit the Manitoba hinterland and how it continues to perpetuate the expropriation of good nutrition and health.

CHAPTER XI

CONCLUSION

This thesis has analysed the process that generated structures which debilitated the well-being--and thus impoverished and marginalized --a people living in the midst of a relatively wealthy and advantaged society. Special attention was paid to northern Manitoba as an example of a Third World type region existing as a colony within an industrialized, western country. The processes which generated underdevelopment in the North were analysed and applied to examine the processes which generated the nutritional shift which in turn had debilitating consequences for Indian nutrition and health. The bottle feeding case study provided an example of how the bottle, as an element of the modernization process, radically disintegrated a well-balanced, ecologically sound system of food production, distribution and consumption. The case study has provided a paradigm which adequately reflects the sacrifices of nutrition and health which tend to accompany the modernization process.

The thesis has addressed the four problems presented at the outset. The first problem stated was to determine whether modernization contributed to or detracted from human well-being. The second problem was to isolate some of the mechanisms which explain the impact of modernization and underdevelopment processes on nutrition and health.

The third problem was to develop a theoretical framework whereby underdevelopment and modernization processes could be incorporated into an essentially structural and ecological framework to assess the underdevelopment of nutrition and health. The fourth problem was to determine whether or not northern Manitoba fits the Third World paradigm.

This study has demonstrated that northern, Manitoba, with its history of underdevelopment and resource exploitation exhibits many Third World type characteristics. The history of the marginalization and impoverishment of the North's indigenous inhabitants brings the Third World paradigm to northern Manitoba with forceful clarity. It was illustrated how the Indian territories and the Indian people were integrated into the world system of merchant capitalism. Their integration resulted not in their development, but in isolation and disintegration. The exploitation of resources and the expropriation of cultural and social wealth were found to place the Indian people into a state of precarious susceptibility to starvation and disease. The effects of natural and human resource degradation, the loss of independent access to land, dependency, marginalization and ultimately irrelevance combined to transform and unleash the biological phenomena which nearly decimated the Indian population in a manner which could be termed genocidal. It is also argued that the cumulative maladaptive effects of the historical underdevelopment process continue to be manifest in numerous biological and psycho-social pathologies.

The underdevelopment and modernization processes were shown to generate spatial, economic, social and political structures which mitigate against achieving good nutrition and good health. Marginalization was seen to be the hallmark of the underdevelopment process. Marginali-

zation was found to manifest itself economically in structures of poverty, lack of opportunity and in subsistence welfare. Socially it has resulted in alcoholism, suicide and violence. Politically it is manifest in apathy, alienation and helplessness. Such oppressive structures were shown to debilitate the biological and social capacity of the Indian people to develop a positively adaptive response to the contemporary processes of modernization.

Modernization was demonstrated to have a debilitating effect on Indian health, even though it did succeed in reducing mortality and in providing crisis care. It was argued that the Indian people not only have continued to carry the burden of diseases related to poverty, but that they have also assumed the diseases related to civilization. The concept of modernogenic disease was used to describe the burden of disease which has its roots in the modernization process. The concept was also expanded to include the extraordinary burden of psycho-social pathology. Furthermore, the analysis of diseases relating to bottle feeding firmly established the modernogenic explanation of infant mortality and morbidity. It was concluded, therefore, that modernization could be considered a critical component in the etiological explanation of malnourishment and ill health among the Indian people.

This study focused on the nutritional component as the intermediary between the underdevelopment process and health. The analysis of the nutritional shift illustrated how first the fur trade and later the modern market economy altered the Indian relations of food production/procurement, distribution and consumption. It was illustrated how these processes transferred the Indian food system to an alien trophic level of food production, distribution and consumption over which they subse-

quently lost control. It was described how the pre-contact food system was able to provide an adequate dietary standard except in times of sporadic famine. After the Indian resource base collapsed, the Indians became dependent on the Hudson's Bay Company. During the time they subsisted primarily on the inefficient fish-hare economy supplemented with imported food. After World War II, with increasing modernization and acculturation, the modern market economy progressively predominated in providing the Indians with food produced entirely outside their food system. Furthermore, the modern market economy began determining food values and consumption patterns based on southern food values. The consequences of this nutritional shift were seen to be nutritionally maladaptive. The cumulative effects of nutritional maladaptation were linked to the diseases of civilization. The loss of nutritional well-being was then identified as the vital link between the underdevelopment/modernization process and the loss of good health.

The case study on bottle feeding provided a near ideal example detailing the mechanisms operative in the interaction between modernization, nutrition and health. The shift from breast feeding to bottle feeding represented a nutritional shift in every sense of the term. The evidence provided by this example tangibly and clearly elucidated how the contemporary modernization processes have served to undermine the well-being of infants and adults whether they belong to an impoverished, disadvantaged population, or to a wealthy population with all the advantages of industrialization. The bottle feeding problem in the Third World was demonstrated to have definite links to the processes of modernization and underdevelopment, with origins firmly established in the industrialized West.

The shift from breast feeding to bottle feeding in the Third World exemplified the interaction between modernization, nutrition and health. It was demonstrated how the bottle fit into the modernization diffusion paradigm, and how this example could be used to explain precisely how modernization has a decisive impact on nutrition and health. It was described how the bottle, as a modern innovation, carries the full weight of a scientific, technocratic economic system which has consumption and profit as its modus operandi. As a symbol it represents the diffusion of the modern, western way of life concomitant with western culture, western consciousness, and western values. As an agent of social and economic change the apparently innocuous bottle has allowed the modern market economy to penetrate one of the most ecologically sound, intimate and time-honoured modes of nourishing infants for the purposes of economic and cultural exploitation.

A study of infant feeding practices was seen to present a near ideal opportunity to examine the consequences of the nutritional shift on the relatively sterile and uncomplicated environment of the new born infant. The shift from breast feeding to bottle feeding has dramatic consequences to infant life and infant health. Furthermore, it was shown how the shift has negative psycho-social consequences for both the infant and its mother, and potential cumulative consequences for the infant in its adult years. Not only were the consequences seen to represent the expropriation of well-being as health, but also social and cultural well-being in the form of lost skills and wholesome values. Economically, the shift was seen to represent a tremendous mismanagement of human and natural resources and economic loss in the form of the additional costs of replacing breast milk and in the form of medi-

cally rehabilitating the ill infants. The heaviest costs to human life and well-being have been borne by those who are economically and environmentally most disadvantaged. The infant feeding bottle, as an object and symbol of the modern way of life was shown to represent the milking of Third World social, cultural, economic and environmental resources for the appropriation of wealth by the advantaged centres of economic and political power in the industrialized developed world. Hence, by using this case study as a specific example of the nutritional shift under modernization, it was concluded that modernization does indeed have dramatic and often deleterious consequences to nutrition and health. Furthermore, it was concluded that modernization of a people who nevertheless continue to be impoverished and marginalized sustains and perpetuates the historical processes of underdevelopment which lie at the root of that poverty.

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