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THE PROBLEM OF BREAST-FEEDING AND WEANING
IN THE DEVELOPING WORLD

By

Renate de Kleine

A THESIS

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ABSTRACT

THE PROBLEM OF BREAST-FEEDING AND WEANING IN THE DEVELOPING WORLD

By

Renate de Kleine

This study addresses the problem of infant nutrition and health in the developing world, and is set in Belize. Specifically, it investigates the attitude and behavior of Belizean mothers towards breast-feeding and weaning and the relationship between these and one major cause of infant morbidity and mortality, gastro-enteritis.

The study presents data obtained from a survey of five major culture groups: Maya, Creole, Carib, Mestizo and Mennonite. Data on infant nutrition and weaning are organized to show the sequence of specific feeding behavior of 181 mothers during the first year of life of their babies. Data are analyzed both within and among the five culture groups, and with reference to a set of socio-cultural variables.

Weanling diarrhoea was found to be affected by weaning age, but also by weaning practice, such as the choice of foods. The effect of specific foods is presented in terms of how they prevent or promote good health.

The study data confirm that early introduction of starchy foods, common in Belize, leads to a higher incidence of gastro-enteritis.

For the children of Belize

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CHAPTER I

INTRODUCTION

Historical Development of Infant Feeding

Biologically speaking man is a mammal, a classification based on the way the females nurture their young with the secretion of milk from the mammary glands. This trait is the primary distinction of the class and predates a second characteristic that is shared by almost all mammals, that of giving live birth to the young after carrying them in the womb. Even though man's food habits are different from place to place and have changed over time, the feeding of human infants at the breast has been universal and consistent (Hambræus, 1977: 17).

Infants were not necessarily nursed by their biological mothers. It was customary to have orphaned or foundling infants nursed by a substitute mother, which is referred to in the old testament (Exodus 2:7). Also, until this century, employing a wet nurse was common. The reasons for such a practice were varied and ranged from one as whimsical as a mother's social standing to one as desperate as the loss of the mother. The latter was not a rare occurrence; many women died in childbirth of puerperal fever (identified

by Ignaz Semmelweis about 1850). Unless a baby could be breastfed, either by the natural mother or another, his chances for survival were very poor (Hambraeus, 1977: 17).

The 19th century brought the Industrial Revolution and one result was that a growing number of women accepted employment outside the home. The need for an alternative to breastfeeding was intensified and patented milk producers were striving to come up with a food that was as close to human milk as possible. Infant formulas were developed and continuously improved in terms of quality and safety and they increased the survival rates of babies that could not be breastfed. But even though bottle feeding removed the immediate threat to the life of those babies who were not nursed, there were warning voices already at the beginning of this century and throughout the following decades that artificially fed babies had a higher incidence of disease and mortality than breastfed babies.¹ However, artificial feeding reached a standard where infants did well enough for bottle feeding to become widely accepted, particularly in North America and other industrialized countries (Mannheimer, 1955: 138; Jackson, 1977: 64).

Eventually the practice of formula feeding spread to the developing nations. And there infant morbidity as well

¹For a literature review of this subject, see Edgar Mannheimer, "Mortality of Breast Fed and Bottle Fed Infants: A Comparative Study," Acta Genetica et Statistica Medica, vol. 5, 1954-1955, pp. 134-163.

as mortality rose dramatically and many babies appeared to be wasting away. The marasmus syndrome amongst children of pre-school age was not unknown but the fact that it appeared in increasing numbers among infants was a new phenomenon (Jelliffe and Jelliffe, 1975: 556-61). At the same time it was found that where mothers breastfed their babies six to twelve months or longer, children were healthier and symptoms of malnutrition, if they appeared, occurred at a later age. This was true even for babies who were constantly exposed to an unsanitary environment. Nevertheless, the conditions surrounding formula, such as improper home preparation or insufficient care of the utensils, were blamed for the increase in infant morbidity, rather than artificial feeding itself.

But in the meantime much research had been done and it was clear that there were factors at work that went beyond cleanliness and precise instructions.² Studies of the composition of mother's milk revealed that there were qualities to human milk that laboratories so far have been unable to duplicate; for example, antibodies that are passed from the mother to the baby or the fitness of mother's milk to the particular nutritional needs of her infant for his optimal

²For a thorough review of the literature on the protective effects of human milk against infections, see O. H. Braun, "Über die infektionsverhütende Wirkung der Muttermilch und deren mögliche Ursachen," Klinische Pädiatrie, vol. 188, 1976, pp. 297-310.

development (Goldman et al., 1982: 563-567; Goldman and Smith, 1973: 1082-1090; Jackson, 1977: 64-65; Hambraeus, 1977: 25).

The major cause of the rise in infant morbidity and mortality in the developing countries was due to diarrhoeas, either diarrhoea alone or diarrhoea and vomiting (gastro-enteritis). The observation that this condition was much less apparent among breastfed babies led to increasing interest in human milk. Even though knowledge of breast milk composition is still incomplete, enough has been learned to explain some of the protective effects of breastfeeding (Stoliar et al., 1976: 1258; Hambraeus, 1977: 20).

Composition of Breast Milk and Cow's Milk with respect to Infant Feeding

The milk that is produced by mothers varies in composition from species to species. These variations correspond with the particular needs posed by a combination of factors, such as individual growth rates, activity and the environment the species live in.

Virtually all milks contain carbohydrates, fat, protein, minerals and vitamins. But there is a difference in the proportion in which these nutrients occur. The fat content, for example, is very high in the milk of sea lions and reindeer, but comparatively low in that of camels and humans (Kretchmer, 1972: 73). The former live in polar and arctic regions where the extra fat provides necessary energy for warmth, whereas the latter live in warmer zones or, in

the case of man, have found various other means to compensate for the cold.

The young of animals and man alike experience a dramatic growth period right after birth. The reindeer doubles its birth weight in one month, the cow in one and a half, and the horse in two (Hambraeus, 1977: 19). The human infant, however, requires about six months to double a much smaller birth weight. The most distinct growth in early human life occurs in the central nervous system and the brain, not in body volume (Hambraeus, 1977: 17; Brown, 1977: 247). A child grows new brain cells until he is about eight to twelve months old. After that any increase in brain size and weight is due to cell enlargement, not to an increase in the number of cells. Animal studies and autopsies of deceased infants have revealed that early malnutrition results in irreversible growth retardation of non-regenerating organs, such as the brain (Winick, 1971: 970, 975).

Considering the different rates of growth, it is not surprising that the milks of the species vary, as different nutrients are necessary for the development of the central nervous system than for other body tissues.

Apart from breast milk, cow's milk is of major concern here since most infant formulas, commercial or homemade, are based on it. The following comparison will concentrate on the composition of these two milks and in so doing focus

on those aspects that seem to have special relevance in the prevention of malnutrition and infant diarrhoea.

Lactose

A breastfed child receives his first carbohydrate in form of lactose, also called "milk sugar." This is a disaccharide that is broken down with the aid of the enzyme lactase. If this enzyme is lacking, the body cannot digest and utilize the lactose and may have a severe reaction to it.

In fact, the majority of the world population is lactose intolerant. The minority, which tolerates lactose, is found among those populations that have a pastoral and milking tradition. This circumstance is attributed to natural selection and genetic transmission (Kretchmer, 1972: 73, 76-78; Simoons, 1969: 831). Yet, infants of milk drinking societies as well as infants of societies without a milking tradition have been raised on breast milk without suffering ill effects due to lactose intolerance, even though human milk has the highest lactose content of all milks.

It seems that lactose is particularly important in the development of the brain, for the lactose content of various mammalian milks increases with the relative brain size of the species (Jelliffe and Jelliffe, 1975: 558). As brain cells are added in early life the utilization of lactose as a brain food has to take place then. Thus, the enzyme lactase shows up in the fetus towards the end of the pregnancy (in Europeans from the third month of gestation),

it is most active right after birth, and then diminishes gradually during lactation (Kretchmer, 1972: 72-73; Cook, 1967: 527). Therefore the older child may become unable to digest lactose once he is past the weaning process.

Lactose is split into the simple sugars glucose and galactose in the small intestine. Some of the glucose is absorbed immediately and some is released into the bloodstream together with the galactose (Kretchmer, 1972: 71, 75). This happens at rather a slow pace so that the glucose level in the blood does not rise too quickly (Whittlestone, 1975: 103-104). Because of its higher lactose content human milk is the sweetest among mammalian milks. But it is still not very sweet when compared to a sucrose flavored formula. Sucrose breaks down much faster and releases its glucose into the blood at a faster rate than lactose does. This results in higher blood glucose levels than a baby's system is ready to cope with.

Lactose also promotes the growth of beneficial organisms in the digestive tract, whereas sucrose furthers that of undesirable bacteria (Whittlestone, 1975: 104, 106).

Protein

Protein is necessary for growth and repair of body tissues. Until recently human milk was thought to contain about 1.1 g protein per 100 ml. But these measurements had been derived from total nitrogen content in the milk, including both protein and non-protein nitrogen. The newer

analyses reveal the protein content in human milk as amounting to about 0.9 percent, whereas in cow's milk it is about four times as much (Hambraeus, 1977: 22). However, this is not a case where the higher amount is more conducive to growth and more efficient in tissue repair, as the protein composition is different between the two milks. The human milk protein has a whey to casein ratio of 2.5:1 and that of cow's milk is 1:4 in favor of casein. There is further differentiation in the composition of the whey and casein proteins. Human whey consists mostly of α -lactalbumin and lactoferrin to the total exclusion of β -lactoglobulin, the most prominent protein part in bovine whey. On the other side, bovine whey is virtually devoid of lactoferrin and only contains some α -lactalbumin (Hambraeus, 1977: 22-23).

The low protein and high lactose combination together with the bifidus factor in human milk is thought to encourage the growth of lactobacilli in the infant (Goldman and Smith, 1973: 1082-1083; Hambraeus, 1977: 26). *Lactobacillus bifidus* in turn produces lactic acid which is unfavorable to the growth of pathogenic bacteria.

Lactoferrin, an iron-binding protein, is highest in human milk. Since it occurs mostly in unsaturated form, it binds free iron which at the same time is needed for growth by various pathogenic bacteria, for example, *Escherichia coli* (Goldman and Smith, 1973: 1084-1085; Hambraeus, 1977: 23-24; Bullen and Willis, 1971: 341-342). Therefore

lactoferrin is credited with playing a major role in the prevention of infective diarrhoea in the infant.

Epidemiologic studies have shown that diarrhoeal diseases are rare in the breastfed child, and correspondingly, that the disease is much more prevalent in the artificially fed (Mannheimer, 1955: 143-159; Mata and Urrutia, 1971: 93-108).

Another protein, lysozyme, is 300 times higher in breast milk than cow's milk and its benefit appears to be twofold. It dissolves bacterial cells and also aids other immunological factors such as IgA (Goldman and Smith, 1973: 1084; Hambraeus, 1977: 24).

Milk contains immunoglobulins that differ, however, from those contained in serum. The most important one is secretory IgA (SIgA) with two others, IgG and IgM, being present in much smaller concentration. The amount of IgA in colostrum is even higher than that in serum, but it decreases during the first three months of lactation (Goldman and Smith, 1973: 1083; Hambraeus, 1977: 24). Recent findings indicate that after this initial decline the concentration of IgA and lactoferrin stabilizes for the duration of lactation (Goldman et al., 1982: 563-567). IgG is mostly transferred to the baby before birth and provides him with antibodies to the diseases that the mother has been exposed to. But after birth SIgA, produced in the mammary gland, will also provide antibodies against disease agents that may be present in the environment during the lactation period

(Goldman et al., 1982: 563-567; Whittlestone, 1975: 105).

Immunoglobulins are also present in cow's milk, but there the dominant one is IgG, and at any rate, it is doubtful that the immunity which is useful to the calf offers any to a baby.

The role of SIgA in the protection against both viruses and bacteria is not fully understood, but it is currently thought that it prevents the attachment of the pathogens to the mucosa. Whatever the mechanism, SIgA is quite effective in the treatment and prevention of infant diarrhoea (Stoliar et al., 1976: 1258-1261; Mata and Urrutia, 1971: 106).

Fat

This is the most concentrated source of energy and human milk contains about four percent fat with the amount varying between individuals (Hambraeus, 1977: 19, 21). One characteristic of the fat in breast milk is that unsaturated fatty acids predominate, whereas in cow's milk the saturated fatty acids are more abundant (Hambraeus, 1977: 25; Whittlestone, 1975: 102-103). It is noted that if the mother's diet contains large amounts of carbohydrates, her milk will have a higher proportion of saturated fatty acids (Hambraeus, 1977: 25).

Two of the fatty acids in human milk are considered essential for the infant's well-being: arachidonic acid for normal brain development and linoleic acid in the prevention

of skin lesions (Hambraeus, 1977: 25; Jelliffe, 1977: 53; Slater and Jelliffe, 1977: 5-6).

Fat is broken down by lipase and it is an important aspect of human milk that it contains large amounts of it, since the infant has very little of this enzyme in his own system. On the other hand, the utilization of fat from cow's milk is limited (Whittlestone, 1975: 103).

At the same time the particular composition of the human milk fat together with the high lactose content in breast milk facilitates the absorption of calcium (Whittlestone, 1975: 103). Thus, even though the amount of calcium is much higher in cow's milk, the infant absorbs more of it from breast milk, and there have been cases of hypocalcemia in the artificially fed (Whittlestone, 1975: 103; Slater and Jelliffe, 1977: 9; Jelliffe, 1977: 52).

Minerals

On the whole, cow's milk contains minerals in about three times the amounts present in human milk and even seven times as much in the case of phosphorus (Hambraeus, 1977: 21, 26; Slater and Jelliffe, 1977: 9-10). This fact, together with the higher protein content in cow's milk, has frequently been used in negative comparisons with breast milk (Hambraeus, 1977: 30). However, this high concentration of minerals and protein places a great strain on the infant's kidneys and has now been established as a cause for the faster weight increase in the artificially fed child

(Hambraeus, 1977: 26, 29-30; Jelliffe, 1977: 52). The overload of minerals may actually lead to hypernatremia (Jelliffe, 1977: 52).

One intriguing aspect of human milk is its great variation in composition. Not only does it differ from mother to mother, but the milk that a mother produces in the first days after birth is very different from that which she supplies towards the end of the breastfeeding period a few months later (Goldman et al., 1982: 563-567; Hambraeus, 1977: 25, 29; Slater and Jelliffe, 1977: 12). Furthermore, the first milk in the morning is much higher in fat content than that later in the day and it is also richer in the last minutes of a feed, hindmilk, than the first, foremilk (Dorea et al., 1982: 80-83; Hambraeus, 1977: 25; Hall, 1975: 779-780; Jackson, 1977: 64-65). This is seen as an appetite controlling mechanism, for the stronger a baby sucks, the more prolactin is produced and this appears to be the signal to the mammary gland to increase the fat production (Hall, 1975: 779-780; Slater and Jelliffe, 1977: 12).

The most striking difference in the milk of any one mother is in that of the first few days of lactation and the milk of the following weeks and months. The early milk, or colostrum, has a much higher protein content and consequently more of the disease preventing proteins, such as the previously discussed lactoferrin and IgA, which provide the infant with a strong boost of immunization while he begins to develop his own defense. Thus, milk is a highly specialized

entity, closely matched to a particular individual at a particular time. It appears that each mother, human or animal, provides her baby with a pabulum that best suits his needs for thriving. An intriguing thought is that it applies to mothers of premature infants who have a most crucial need for certain nutrients to overcome the disadvantage of having their development in the womb cut short. There are parallels in the animal world, as for example with the kangaroo. The kangaroo mother can nurse pups of different ages at the same time and provide each with a different milk, specifically suited to the stage in development that the babies are in.

Malnourished mothers and high parity mothers tend to have smaller babies, and there is always anxiety surrounding the feeding of premature or low birth weight infants to have them make up as fast as possible what they missed in the uterus. It would seem that the obvious answer is to put the baby straight away to his own mother's breast, or to pump the mother's breast and feed him that milk, instead of high protein formulas or pooled breast milk from milk banks which collect milk from donor mothers in various stages of lactation.

Atkinson determined from her study of premature babies that the pre-term mother's milk has greater fitness to the premature baby's nutritional needs than does either pooled full-term milk or formulas that are based on mature milk composition. The pre-term milk fed babies showed

faster regain of birth weight than did those fed formula or pooled breast milk.³

Statement of the Problem

The purpose of this thesis is to investigate the incidence of diarrhoeal diseases in relation to weaning practice by geographical area and by ethnic group. The weaning period and the time right after it are so often marked by diarrhoea that this intestinal disorder has actually become known as weanling diarrhoea (Gordon and Scrimshaw, 1970: 1501-1502). It has also become the leading cause of death among infants in developing countries (Stoliar et al., 1976: 1258). It has been found that the incidence of weanling diarrhoea is not only a function of weaning age but also of weaning practice (Gordon and Scrimshaw, 1970: 1503; Latham, 1975: 563). Thus, the crux of the matter to be investigated in this study is not only whether early versus later weaning has an effect in terms of weanling diarrhoea incidence, but also whether different types of weaning foods influence the morbidity picture and prevent or promote good health. Feeding children is a complex decision that is influenced by a mother's background, beliefs, available techniques, available

³Atkinson, Stephanie, "The Importance of Human Milk for the Premature Infant," Paper presented at the Eighth International Physicians' Seminar on Breastfeeding, Chicago, 23-25 July 1981, sponsored by La Leche League International, Inc., Department of Continuing Medical Education, Franklin Park, Illinois.

foodstuffs and other factors. The feeding and, consequently, the weaning pattern, is the result of many decisions and it changes from month to month, even from week to week, not only between cultural groups, but from mother to mother. The actual "why" behind the decision often cannot be answered, but the behavior can be observed.

The study is done in Belize, a country where diarrhoeal diseases are a major cause of infant morbidity and mortality and where ethnic variation is a characteristic of the population. The research includes a study of the land, history, peoples and economy of Belize and a local survey of the attitude and behavior of Belizean mothers towards breastfeeding and weaning.

Weaning means to accustom a young one to food other than breast milk. Strictly speaking, then, a baby, who is not exclusively fed breast milk, is being weaned. Eating anything, whether milk, sugar water, cereal or juice, gives a baby calories and thus makes him less hungry. The less hunger he feels, the less he will suckle the breast. Therefore, the introduction of any food other than breast milk can be considered the beginning of the weaning process.

There is evidence of premature weaning being practiced in the newly independent country of Belize, the former colony of British Honduras. In 1958 it was determined from Child Welfare Clinic data that twenty-nine percent of the primiparous and thirty-three percent of the multiparous mothers adopted bottle-feeding within two weeks after birth

(Losonczi, 1958: 208). As recently as 1980 the country's Medical Report listed gastro-enteritis as one of the five leading causes of hospital admissions and deaths among infants and young children (Belize Medical Report, 1980). This indicates that early and unsatisfactory weaning is still in practice.

Belize was chosen to investigate infant feeding practices, especially early weaning patterns, because the country is characterized by fascinating variety in environment, culture and nutrition. The population numbers less than 150,000 but is composed of eight different culture groups, namely the Maya, Caribs (Garifuna), Creoles, Mestizos, Europeans, East Indians, Arabs (Lebanese), and Chinese. The various groups differ in their approach to agriculture, nutrition and health. It is expected that infant nutrition reflects the variation in dietary habits from one culture group to another. More specifically, it is hypothesized that weaning practices affect infant health. This hypothesis can be supported if it can be shown that early weaning and the choice of certain foods tend to result in a higher incidence of gastro-enteritis. At the same time, if a lower incidence of gastro-enteritis tends to be associated with delayed weaning, this would suggest the importance of breast milk in decreasing infant morbidity.

Health and health care delivery make particular demands on developing and newly independent nations because of

their limited resources. Even the most basic requirement of good health, good nutrition, can be difficult to meet. Frequently, the agricultural and economic situation does not provide a nutritionally adequate food supply for the entire population, or the high cost in terms of price or distance to the market may make it prohibitive; sometimes cultural tradition and lack of information result in the neglect of sound feeding patterns (Jelliffe, 1974: 46; Brown, 1977: 241). Whatever the reasons are for a poor diet, in the long run, it will have the same effect: malnutrition.

It has been said that in medicine there is practically no one cause which by itself is capable of producing an effect (Rothman, 1974: 385). This implies that it takes at least two or more variables to bring about the destructive effect that lies dormant within a disease cause. The relationship between these multiple factors may be synergistic, where the combined action of the individual factors exceeds their sum, as has been observed between malnutrition and infection (Jelliffe and Jelliffe, 1975: 557; Brown, 1977: 241; Latham, 1975: 561, 563).

Small children and infants are particularly susceptible to the damaging effects of a poor diet. Diseases, and foremost among these, diarrhoeal diseases, can hasten the progress of malnutrition because of the poor absorption of nutrients during bouts of diarrhoea (Jelliffe, 1974: 46; Brown, 1977: 242; Latham, 1975: 561). When vomiting accompanies the diarrhoea, indicating that both the upper and

the lower reaches of the gut are involved, the term gastro-enteritis is used to describe the condition. Whether diarrhoea or gastro-enteritis, it results in a depletion of nutrients in the body and robs it of much of its immune defense (Brown, 1977: 245; Latham, 1975: 563). The decrease in nutrients also has a weakening effect on cells, which facilitates the penetration of body tissues by pathogens (Latham, 1975: 563; Gordon and Scrimshaw, 1970: 1497-1499).

Gastro-enteritis is a broad term that covers a whole range of diarrhoeal diseases, that are either due to infection by a variety of pathogens, to the intake of foods that cannot be properly digested or to poor nutrition. In the tropics, where one finds the majority of the developing countries, the disease is thought to be mostly due to bacterial infection. Furthermore, it is the most frequent cause of illness in that region (Jelliffe, 1974: 58; Stoliar et al., 1976: 1258; Gordon and Scrimshaw, 1970: 1501-1503; Latham, 1975: 563). At the same time it is especially the malnourished child that worries mothers and health officials alike in the developing nations (Latham, 1975: 561).

Infant health is influenced by mother's health, early feeding practices, child care and sanitation as the primary factors. One of the best and easiest ways to provide infants with good nutrition and health protection is through breastfeeding, because mother's milk gives babies the necessary nutrients and natural immunity. In those developing countries where mothers tend to nurse their children for

extended periods, infants' health is not so much cause for concern as toddlers' health (Jelliffe and Jelliffe, 1975: 557). There the effects of malnutrition show up as the major health problem for the young between two and five years of age. Generally, the younger the child, the more threatening is the cycle of malnutrition and infection (Latham, 1975: 563). A baby is most vulnerable when he leaves the ultimate of protective environments, the womb. To ease his adjustment to a wider, more threatening environment, his mother provides him with colostrum which is high in protein and immunoglobulins. The mother's milk offers all that he needs for at least the next six months.

The importance of nursing is dramatized when nursing is discontinued prematurely and inadequate nutrition is substituted. When a baby first leaves the womb, his digestive tract is not a very sophisticated system. His liver and gut have to mature and gradually learn to process diverse foods. Therefore, the age at weaning would appear to be of consequence. The weaning period represents a time during which the infant experiences three drastic changes: he has to cope with a new diet, the loss of passive immunity, and the development of his own active immunity. There also is a more subtle change in the loss of the only control he has held over his environment, namely when and how much food he took in at the breast.

This study demonstrates the importance of weaning behavior, that this behavior represents a complex set of

decisions made in a sequence over time. It is necessary to examine closely this sequence--week by week, month by month--to determine the actual weaning pattern and its result. The study presents data obtained from a survey of the five major culture groups: Carib, Creole, Maya, Mennonite and Mestizo. Information on agriculture, diet and nutrition is summarized in a general profile of each group, followed by data on infant nutrition and weaning organized to show the sequence of specific feeding behaviors of 181 mothers during the first year of life of their babies.

A comparison of the feeding patterns and the incidence of diarrhoeal diseases among these 181 babies confirms the relationship between the two.

CHAPTER II

LAND, HISTORY, PEOPLES, AND ECONOMY

A BRIEF OVERVIEW

The Land

On the globe Belize fits roughly between the 16th and 18th northern latitudes and the 88th and 90th western longitudes. It is the second smallest country in Central America after El Salvador and lies immediately south of the Yucatan peninsula. The border between Mexico and Belize follows the natural division of the River Hondo and the Strait between Ambergris Cay and the southern tip of the Mexican state of Quintana Roo (Figure 1).

Both the western and the southern border are with Guatemala, but whereas the southern border also follows a river, the Sarstoon, the western line leads with treaty-table straightness from the Gracias a Dios Falls on the Sarstoon past Garbutt's Falls on the Belize River to the Blue Creek branch of the River Hondo.

Along its eastern side Belize opens to the Caribbean Sea. Almost the entire length of the coast is paralleled by a string of small islands and cays that accompany the longest Barrier Reef in the western hemisphere which is

FIGURE 1

Map of Belize

This map shows the major physical features and largest communities in Belize.

Source: adapted from Carr, David and Thorpe, John, From the Cam to the Cays (London: Putnam, 1961) p. XVI.

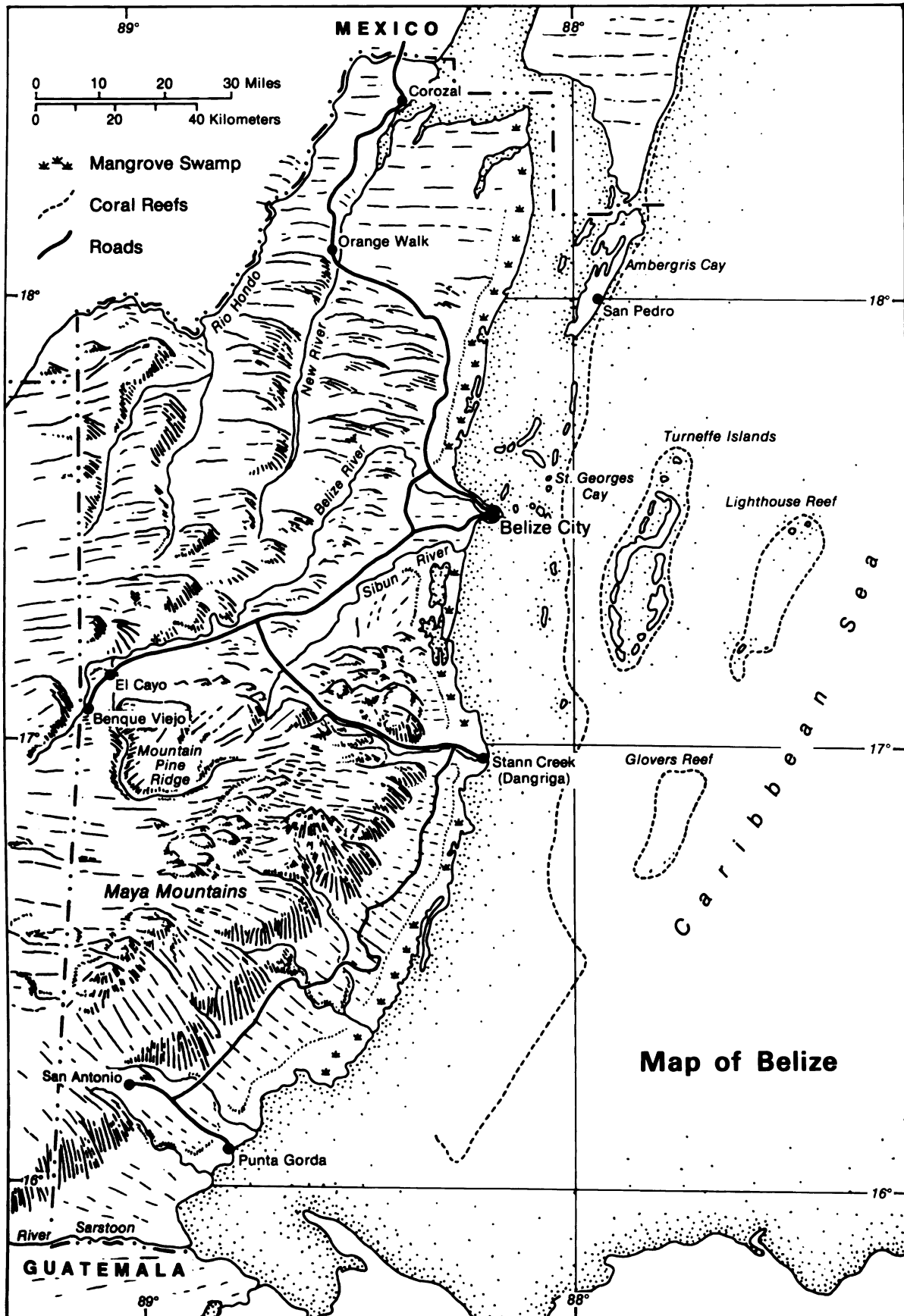


Figure 1

second in length only to the Great Barrier Reef of Australia. The country measures about 174 miles at its longest distance and 68 miles at its widest east-west extension.

Topographically and climatically Belize can be divided into a northern and southern half with the dividing line to be imagined roughly between Mullins River in the east and Benque Viejo in the west. Along the coast, both in the north and in the south, the land barely rises above sea-level and is marked by swamps and mangrove forests. The principal city and seaport of the country, Belize City, is located at the mouth of the Belize River in just that marshy region; parts of the town are built on landfill. In the north the low-lying land gradually increases in altitude to become a 500 foot plateau towards the west. In the south the rise from the marshes is much more immediate and dramatic. Here the coastal plain is but a narrow band between the Caribbean Sea and the Maya Mountains. Whereas all other Central American countries are dotted with numerous volcanoes and benefit from the lava enriched soils, Belize is of a different geologic make-up. The Caribbean Cordillera, which arches from the Golfo Dulce in the south-east corner of the Gulf of Honduras in a northwesterly direction to the Bay of Campeche, separates Belize, the Peten region of Guatemala and the Yucatan peninsula from the heavily active earthquake and volcano zone (Ower, 1927: 380). The whole of Yucatan, including Belize, is a low-lying appendage to the Mexican highlands.

During the Cretaceous period most of Belize was below sea level so that the paleozoic rocks (slates, sandstones, quartzites, schists and intruded granites and porphyries) became covered by a thick layer of white limestone. In the northern, lower lying part of the country, this is overlain with later limestones and chalks, but in the south the Cretaceous limestone is being eroded, exposing the older paleozoic formations in the Maya Mountains (Flores, 1952: 404-405, 408; Ower, 1927: 374-375; Ower, 1928: 494-509).

These mountains are a granite and quartzite formation and the name of one of its ranges, the Cockscomb Range, testifies to its sharp relief (Oliphant and Stevenson, 1929: 136; Ower, 1928: 503). In the case of the northwestern extension of the Maya Mountains, the Mountain Pine Ridge, the name is not similarly descriptive of the topography. "Ridge" here does not indicate a narrow elevation standing out in the landscape, for this region is a hilly plateau that averages about 2000 feet in elevation. In Belizean terminology "ridge" applies to a vegetation zone in which one plant species is dominant, as in a cohune ridge the cohune palm is conspicuous (Ower, 1927: 373). Thus, the Mountain Pine Ridge denotes a coniferous forest.

In the extreme south, running in a more or less west to east direction, is another distinct geologic feature, the Toledo Beds, a shale formation (Ower, 1928: 501).

The climate of Belize is characterized by year-round warm temperatures, averaging 79 degrees Fahrenheit, and

seasonally heavy rainfall. This combination puts Belize generally into the sub-tropical and more specifically into the trade-wind littoral climate. This is described by the country's location on an east coast that is subject to the influence of the trade winds. These winds are a result of air flow between the subtropical High and the equatorial Low pressure zones. With respect to Central America these air masses develop over the warm Caribbean Sea and they therefore can hold much moisture which supplies Belize, proceeding in a north to south direction, with increasingly abundant rainfall. The mean annual precipitation ranges from about 60 inches in the north to about 180 inches in the south. Seasonal variation shows a dry season between February and April, and in some years an additional "little dry" in August (Figure 2). However, sometimes it rains as much during the dry period as it does during the rainy season (Belize, 1964-1965: 100-101; Strahler, 1973: 178).

An additional climatic factor which can add substantially to mean annual precipitation is the peculiar geologic arrangement of North America where the Rocky Mountains and the Appalachians are aligned in such a way as to form a giant funnel through which cold polar air may flow towards Central America (Portig, 1959: 301). This circumstance finds expression in the infamous "northers," severe winterstorms that frequently are accompanied by torrential downpours (Stoddart, 1962: 164).

FIGURE 2

Climograph for Belize City

This graph shows the average temperatures and precipitation throughout the year for Belize City, Belize, indicating the small annual temperature range and the dry season from February through April.

Source: Strahler, Arthur N., Introduction to Physical Geography, 3rd ed. (New York: John Wiley and Sons, 1973) p. 178.

FIGURE 3

Mangrove Forest

Dense mangrove vegetation grows all along Belize's coastline and along the rivers as they approach the sea. The maze of aerial roots makes it difficult to penetrate the jungle.

Source: Strahler, Arthur N., Introduction to Physical Geography, 3rd ed. (New York: John Wiley and Sons, 1973) p. 256.

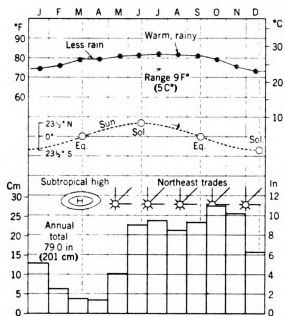


Figure 2



Figure 3

Temperatures vary slightly throughout the country with the extremes being somewhat more pronounced further inland, away from the moderating marine influence. This climate neither guarantees year-round precipitation nor does it withhold torrential rains, and Belize has suffered the disastrous effects of both droughts and floods. But by far the most devastating local climatic occurrences are hurricanes. These cyclones do not strike Belize as often as other areas in and around the Caribbean but when they do sweep over Belize they make up in fury what they lack in frequency.

Since there apparently was no record of a hurricane in Belize for over a century previous to 1931, people were of the blissful assumption that Belize was safe from these tropical storms. But this myth was shaken in 1931, 1942, and 1955 and it was finally shattered on October 31st, 1961 when hurricane Hattie destroyed so much of the country and Belize City, which was then still the capital, that it was decided to build a new capital, Belmopan, about 50 miles inland on the Western Highway (Dobson, 1973: 4-5; Gregg, 1968: 109-120; Kearns, 1973: 147-148).

Belize is dissected by numerous rivers almost all of which empty into the Caribbean Sea. Many head directly for the coast while some wander to the sea via other streams. This somewhat more roundabout course of action happens in the northern part of the country where the rivers follow a northern and northeastern direction and in this way appear to take advantage of the depressions between escarpments

that run parallel to the coast. But the mountain-fed streams of the rain rich south generally rush straight to the shore.

The most important waterway of the country is the Belize River. Beginning in the Peten region in Guatemala, it collects the waters of numerous smaller rivers and creeks that rise in the Mountain Pine Ridge and from other sources along the way. But the Belize River is denied a glorious entry into the Caribbean Sea due to the shallow water at its mouth. Large ocean-going ships have to anchor offshore in deeper waters and the normal wharf activities of loading and unloading are taken over by smaller craft.

The River Hondo and the New River are the major rivers in the north and they flow parallel to each other about ten miles apart towards Chetumal Bay. Immediately south of the Belize and parallel to it runs the Sibun River, and both of these hold great historic as well as economic significance.

Below Mullins River the other creeks and streams form a rather successive pattern of equally short water veins and the notable ones among them are North and South Stann Creek, the Sittee River, the Monkey River, the Rio Grande, the Moho River, the Temash, and finally the Sarstoon.

Some of Belize's rivers, particularly those in the south and the Mountain Pine Ridge, abound in rapids and waterfalls that add to the picturesque scenery but are a hindrance to navigation. Others are navigable for quite a way

upstream, but because of shallow draft they cannot accommodate large vessels. From the early days of logging and settling, these rivers and streams have been humming with activity since they were the main lines of communication be it by canoe, river boats, flat bottomed "pit-pans", or eventually small motor boats.

The escarpments of the northern plain are not spectacularly steep formations; they are the remnants of old reefs that have been incorporated into the land by means of geologic uplift and deposition of alluvium. This process of linking reef to land is exemplified by the location of Belize City on a former cay, where the area behind the town is still a swamp (Ower, 1927: 376).

Where Belize and Mexico are separated by only a narrow channel, Boca Bacalar Chico, "there commences the most remarkable reef in the West Indies." When Charles Darwin made this statement in 1842 he was not ready to classify this feature of Belize's coast as a barrier reef, but in the meantime it has claimed its prominent place as such (Darwin, 1896: 272). Coral reefs develop in clear tropical waters since the tiny coral forming animals need a warm environment. They flourish in areas of strong wave action which is the case at the Belize reef where the trade winds blow the sea into a constant vigorous surf. Belize exhibits two types of reef: the barrier and atoll reefs. The barrier reef stretches in a rather straight and solid crest from the north into a more open and capricious line towards its southern

limits. Proceeding north to south the barrier runs parallel to the coast at a distance of about ten to twenty-five miles and thus forms a long protective lagoon between the low Belize coastline and the Caribbean Sea. The lagoon is quite shallow in the north but becomes deeper in the south, and this is thought to be a possible explanation for the increased fragmentation of the southern stretch of the reef as the coral has to grow up from greater depths and takes longer for the filling in process (Stoddart, 1962: 161-162). On the seaward side of the barrier reef are three atolls or circular coral reefs that enclose shallow lagoons. These are the Turneffe, Lighthouse, and Glover's Reef and they are between fifteen and thirty-five miles long. The crystal clear lagoons, the one formed by the barrier reef as well as those of the atolls, are liberally dotted with cays. This is a derivation from the Spanish word for island or sand bar "cayo" and is pronounced "key." The cays are grown with various trees, especially the cocnut. Many of these islands are too small for human habitation but the largest, Ambergris Cay, supports a permanent population of about 800 people.

About ninety percent of Belize is forested and there is a surprising number of different species for such a small area. The regional variation in vegetation is due to the variation in topography, parent rock and local climatic differences as well as human interference in the natural plant formations.

The major areas of alluvial soils are between the Belize and Sibun Rivers and the coastal plain at the foot of the Maya Mountains. There are also some alluvium accumulations in the north along the rivers but for the most part the northern plain is characterized by calcareous soils. Apart from the alluvial zones two other fertile soils are those that have developed on the old cays in the northern plain and especially the material that is derived from the Toledo shales in the south between the coastal alluvious and the Maya Mountains.

The major vegetation zones are in the mangrove forest of the shore, the inland swamps and marshes, the pine-lands and barrens, the quasi-rainforest of the north and the rainforest of the south (Lundell, 1942: 169).

The mangrove forest is typically found in saltwater lagoons or brackish swamps. It grows all along the Belize coast, on some of the cays and also in some inland swamps that still have a high salinity content. The mangrove is a tropical tree of somewhat bizarre appearance, for it looks as if it had been planted on stilts (Figure 3). This is because of the aerial roots which are actually seeds that germinate in the air and which the tree seems to drop like anchors to the ground where they eventually take hold. As the tidal activity in these coastal regions keeps a lot of sediment in suspension and fine particles attach themselves to the roots, the tree tends to act as a land builder. The most prominent species in Belize is the Red Mangrove (*Rizophora*

Mangle), whose bark has a reddish tint to it from the algae growing on it (Standley and Record, 1936: 19; Money, 1978: 210-212).

The inland swamps and marshes have developed in the limestone depressions in the northern half of the country and are subject to flooding. This is the area where the historically important logwood tree (*Haematoxylon campechianum*) grows (Ower, 1927: 383; Lundell, 1942: 169).

The pinelands are regions of poor soils on which the Caribbean pine (*Pinus Caribea*) flourishes in the company of some oaks and palmetto palms (Standley and Record, 1936: 20; Lundell, 1942: 169). Fire and natural exhaustion of the soil due to nutritional demands by the plants are often the cause of the pinelands' demise. In fact, there are many treeless barrens, known as dry savannas, that result from these causes. The pinezones have an open park-like appearance since they are free of undergrowth except for wetter areas along rivers and creeks. The best known pineland is the Mountain Pine Ridge in Cayo District bordering on Guatemala. This is an area of hilly terrain with rushing streams, cascading waterfalls and a rich palette of orchids. The Mountain Pine Ridge is now a National Forest Reserve and fire lookout points have been set up to protect this natural treasure of Belize.

By far the most luxurious vegetation is that of the quasi-rainforest of the north and the rainforest of the south. Due to the difference in rainfall and edaphic

conditions the plant association varies somewhat between the northern and southern rainforest. On the lime rich soils of the north the predominant trees are the Sapodilla tree (*Achras Sapota*), Mahogany (*Swietenia macrophylla*), Santa Maria (*Calophyllum brasiliense*), Breadnut (*Brosimum Alicastrum*), and the Bayleaf palm (*Sabal*) to name just a few (Lundell, 1942: 169; Standley and Record, 1936: 21-24). In the south one finds combinations of most of the trees of the northern forest together with another important hardwood, rosewood (*Dalbergia Stevensonii*), and an overall greater diversity of species (Standley and Record, 1936: 24). Throughout the country grow the cotton tree or Yaxche (*Ceiba pentandra*), one of the largest trees in Central America, and the Flamboyant tree, whose bright yellow, orange or red blossoms add much color to the landscape (Figure 4). Among the palms the most common is the Cohune (*Orbignya Cohune*) whose somewhat dishevelled appearance is a familiar sight in Belize (Figure 5). The forests are generally secondary growth since they had been cleared for agriculture already during Maya times. The gigantic trees like *Ceiba* and Mahogany are characterized by immense buttress roots and forests display what constitutes even for rainforests and incredible variety of vines, bromeliads orchids, and other epiphytes (Standley and Record, 1936: 24).

Belize's vegetation is distinct from the pattern of Central American flora. Not only does this small area have a large number of species, many of them endemic, but also

FIGURE 4

Flambuoyant Tree

This tree can be found throughout Belize, in the countryside as well as the villages and towns; its blossoms form a colorful umbrella-like crown.

(Author's photograph)



Figure 4

FIGURE 5

Cohune Palm

The Cohune is the most common palm in Belize; its kernels of oil hang like a huge cluster of grapes from the base of the palm fronds. This tree is also a favorite resting place of Belize's most feared snake: the fer-de-lance known as Tommy Goff.

(Author's photograph)



Figure 5

some that are found only in the West Indies. The prime examples of the endemic species are the logwood tree, which is confined to Belize and the Campeche Bay area, and the sapodilla species whose native distribution extends into Guatemala. The presence of species also found in the West Indies is attributed to a former land bridge existing across the Antilles between Central America and the Guyana region in northern South America. Typical examples of West Indian flora are the Caribbean pine and the breadnut tree (Lundell, 1942: 169; Standley and Record, 1936: 52-55).

History

The Pre-Columbian Period

It is now widely accepted that the original inhabitants of the Americas came from Asia via the Bering Strait land bridge to Alaska and then spread through North, Central, and South America. These people were hunters and gatherers, and estimates of the beginning of their migrations to America date as far back as 20,000 years ago (Thompson, 1966: 43). The groups that wandered into Central America and remained there eventually cultivated maize, squash, beans, chili pepper and cotton. Later on they added to this list the avocado, papaya and cocoa. But in terms of animals they apparently only domesticated the dog and the turkey and kept bees for honey (Coe, 1966: 140; MacNeish, 1964: 29-30; Morley, 1946: 156-158, 448; Thompson, 1966: 45, 184).

The Maya

Two distinct civilizations crystallized out of this Meso-American culture hearth, the Mexican of the Mexican uplands and the Maya of the Central American lowlands and Guatemalan highlands. The Maya civilization comprised the area of the Yucatan peninsula, parts of the Mexican states of Tabasco and Chiapas, Guatemala, Belize, and parts of Honduras and El Salvador (Coe, 1966: 17-27; Morley, 1946: 3). The distribution of Maya civilization is illustrated in Figure 6.

The Maya achieved one of the most magnificent pre-Columbian civilizations of the New World. They accomplished this with a highly disciplined society that adhered to a strict division of labor. All advanced knowledge was held by the religious elite and the peasantry was responsible for food production for the entire society. Beyond that the peasants were also required to do construction labor on the elaborate ceremonial centers that served religious as well as social and marketing purposes (Morley, 1946: 441-455, 168-176; Thompson, 1966: 171-182).

Generally, one distinguishes three stages in the Maya history: the Formative Period from about 500 B.C. to A.D. 300, the Classic Period from A.D. 300 to A.D. 900, and following that the Post-Classic Period (Brainerd, 1954: 12; Morley, 1946: 4; Thompson, 1966: 50). The most recent findings from Belize at the Cuello and Cerros sites put the Formative Period at a much earlier time, but the dating process has not yet been completed.

FIGURE 6

Areas of Maya Culture

This map shows the distribution of Maya civilization in Yucatan (Mexico), Belize, Guatemala, Honduras and El Salvador.

Source: Coe, Michael D., The Maya (New York: Praeger, 1966) p. 21.

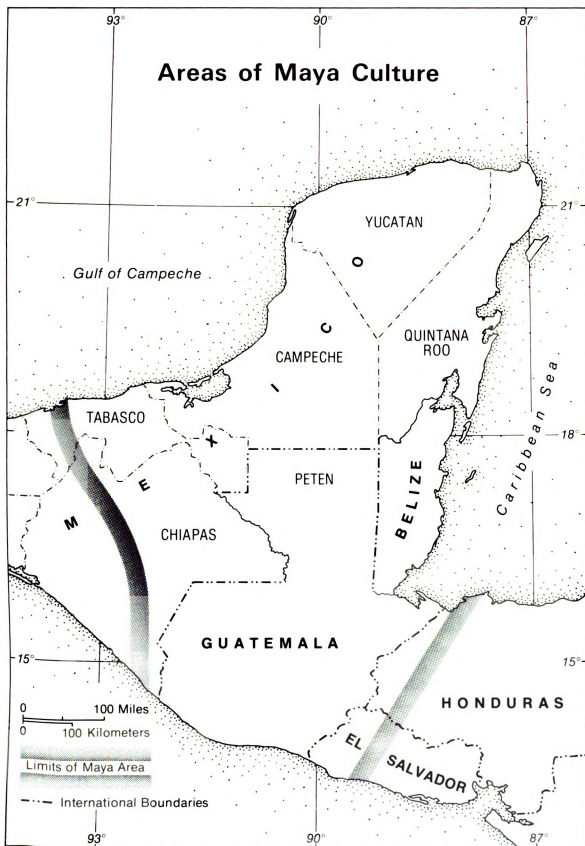


Figure 6

The cause of the decline of this civilization is still a matter of speculation and many ideas have been proposed as possible explanations. Various archaeologists and historians have suggested that the end was brought about by disease, invasion, soil exhaustion or an uprising by the lower class against the established order (Morley, 1946: 69-70, 102; Coe, 1966: 115; Thompson, 1966: 102, 105).

Whatever the cause, the intellectual activities in the Southern and Central zones, including Belize, ceased during the 10th century. The already diminished population was further reduced by migration into northern Yucatan, where Maya culture experienced another flowering in the 13th and 14th centuries. But when the Europeans arrived, the Maya civilization no longer existed. Only their peasant way of life had survived.

The European Period

The Spaniards

Christopher Columbus named the Bay of Honduras for the depths in this part of the Caribbean Sea (Spanish "hondo" translates as "deep"). He reached the Cape of Honduras (Cabo de Honduras, Republic of Honduras) during his fourth voyage, in 1502, and claimed the land for Spain (Cohen, 1969: 284-286; Wells, 1857: 449-450; Winsor, 1891: 441-444). Cortes was apparently the first European to set foot in Belize when he led an overland expedition from Mexico to Honduras between 1524 and 1526. This march as well as later

expeditions by other Spanish explorers proved to be exhausting and depressing due to swamps, mountains, almost impenetrable jungle and a forbidding marshy coast (Herrera y Tordesillas, 1973: 314-315; Saville, 1918: 436; Diaz del Castillo, 1966: 393-419; Prescott, 1890: 398-416; Dobson, 1973: 42-44). These disastrous first impressions may partly explain why the Spaniards never really attempted to settle Belize (Fig. 7).

The English

The report of the first English ship in the West Indies dated that event about 1527 (Oviedo y Valdes, 1944: 127). It was soon followed by numerous vessels from other European nations. But the Spaniards considered this part of the world entirely their own and regarded the arrival of the English, French and Dutch as an intrusion. Already by 1529, the Spanish commanders in the Caribbean drew up plans on how to protect themselves from these "pirates", as they called the ships of other nations (Burney, 1891: 36-39).

The English in particular were incensed over the Pope's division of the non-Christian world entirely between Spain and Portugal, and that this was to exclude English trade and settlement in those regions of the world. Thus, when the King of Spain complained to Queen Elizabeth that her seafarers were not only sailing in Spanish waters but furthermore raiding Spanish ships, she let it be known that the Pope could not give away what he did not possess in the

FIGURE 7

Spanish Exploration in the Bay of Honduras

Beginning with Columbus' fourth voyage in 1502, the Spaniards launched a number of exploratory journeys into Belize. None of these voyages resulted in Spanish settlement of the eastern Bay area.

Source: Dobson, Narda, A History of Belize (London: Longman Caribbean, 1973) p. 43.

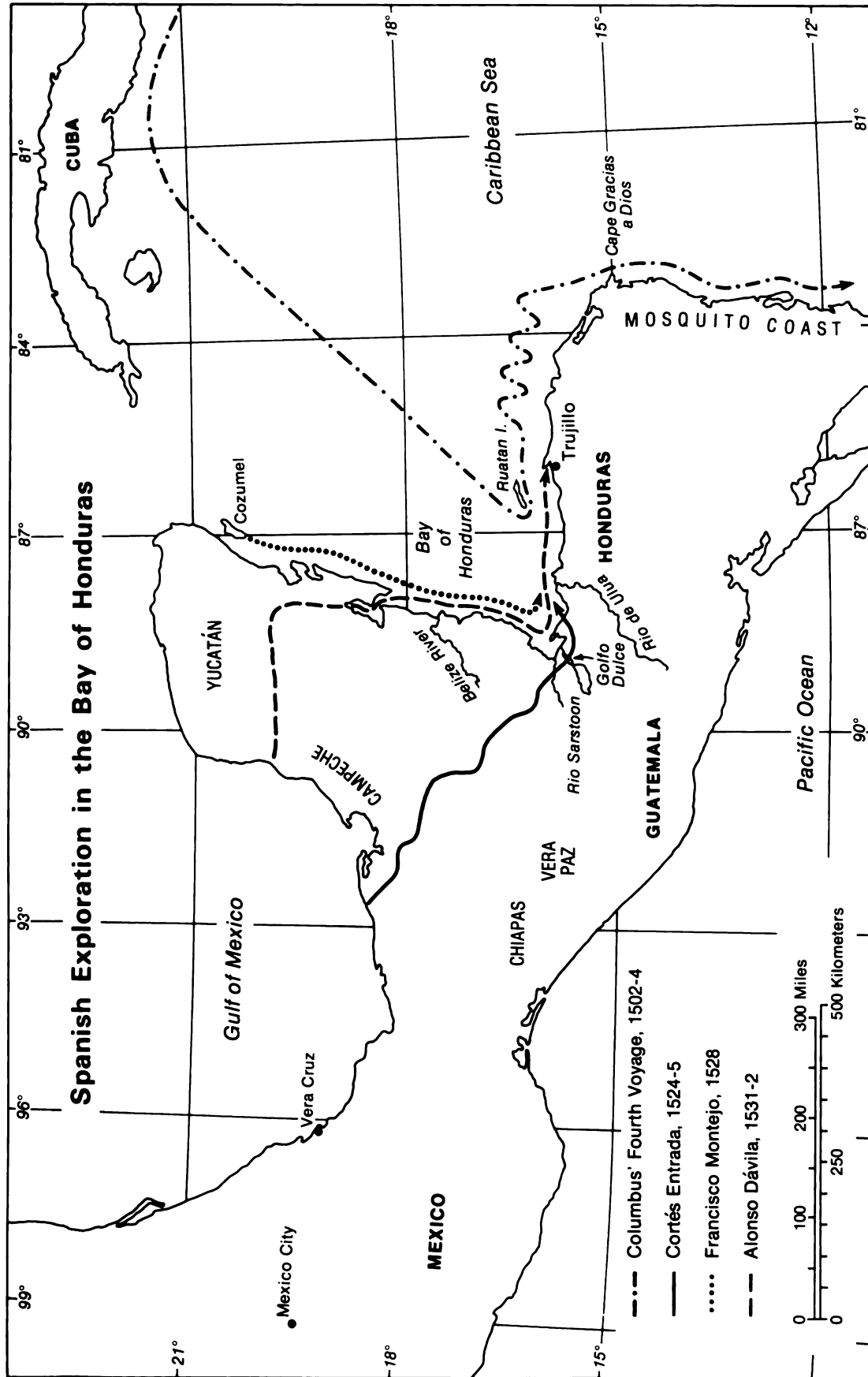


Figure 7

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first place, and that the Spaniards better take physical hold of the lands they wanted to remain free of foreign exploration (Burney, 1891: 40-41).

The Buccaneers

The immediate result of England's strong stand was a veritable armada of privately owned ships making for the West Indies with the tacit approval of the English, French and Dutch governments. The men sailing them came to be known as the buccaneers, a name that distinguished them as the aristocrats among freebooters. The term buccaneer originated from the manner in which these men preserved meat for their long journeys. They learned this process from the Carib Indians who cut pork or beef into strips and then smoked it over a "boucan," a wood-fire (Burney, 1891: 48-49; Esquemeling, 1967: XXV-XXVI).

The buccaneers used the island of Tortuga, twenty miles north of Hispaniola (Haiti), as a base for their operations (Burney, 1891: 32,39; Esquemeling, 1967: 6-13; Pope, 1977: 9). Since the French, English or Dutch could not mine the gold and other precious goods themselves, they concentrated their efforts on relieving the Spanish galleons of their cargo before they reached Europe. The many islands of the Caribbean region and the innumerable cays between the Barrier Reef and the Belize coast provided ideal lairs for the buccaneers.

Despite this advantageous situation for privateering, the English realized that in order to get a foothold in the New World they had to establish permanent settlements. This they did with some of the West Indian islands and on the mainland in Belize (Dobson, 1973: 48). These first European communities in Belize were the logwood cutters' encampments.

The Logwood Cutters

One of the items the Spaniards tried to ship to Europe was logwood, and the buccaneers made forays into the Bay of Campeche to intercept these vessels (Esquemeling, 1967: 56). Logwood, a tropical tree native to Central America, was then a precious commodity because of its dye haematoxylin. For a long time the Spaniards held the monopoly on it and thus were able to drive the price up to one hundred pound sterling a ton (Caiger, 1951: 37). The English started to cut these trees themselves and eventually the Spanish authorities made concessions and granted cutting rights. Belize was particularly rich in logwood, something the buccaneers knew better than the Spaniards.

Belize

According to numerous reports the first European settlers in Belize were a few shipwrecked seafarers who went ashore at the mouth of the Belize River about 1638 (Caiger, 1951: 29; Dobson, 1973: 51-52). Another popular version is that the buccaneers apparently were driven off Tortuga in 1640 and a Peter Wallace led them to Belize. This man is

credited with the founding of Belize City in 1640, and the name Belize is supposed to have evolved from Wallace (Caiger, 1951: 31-37; Dobson, 1973: 51-52). This point is argued, however, since the Maya language contains the word "belize," meaning "muddy waters", which is a truthful description of the Belize River (Belize, 1964/1965: 103; Dobson, 1973: 52).

In 1667 buccaneering was outlawed by treaty between Spain and England, which caused some of the buccaneers to settle down as logwood cutters. In another treaty of 1670 the Spaniards recognized as English possessions all those territories that England held then in the New World, without making any specific mention of Belize. But later the Spaniards decided to retain the logwood monopoly and made foreign logwood cutting strictly a licensed business (Caiger, 1951: 45; Dobson, 1973: 57-58; Waddell, 1961: 9). The English logwood cutters in Belize saw no problem with that decree; they considered themselves on British held ground since they had established some loggers' camps in Belize well before 1670. Nevertheless, the Spaniards made numerous efforts to stop their activities. The settlers, or Baymen, as they came to be called, remained steadfast and finally, in 1717, Britain decided to defend the logwood cutters' rights wherever land was not actually settled by Spain (Dobson, 1973: 59, 61-62; Waddell, 1961: 9).

The Bay Settlement

The Peace of Versailles of 1783, following the American War of Independence, contains the first boundaries of the British logwood cutters' settlement in Belize. The treaty permitted the English to cut logwood between the Belize and Hondo Rivers, and fishing was restricted to the coast on the Eastern border of this area (Dobson, 1973: 64-67). See Figure 8 for the treaty boundaries.

The Convention of London in 1786 extended the Bay settlement south to the Sibun River and also allowed the cutting of another native wood of Belize, which by that time had gained far more importance than logwood: mahogany (Figure 8). Spain still maintained sovereignty and did not permit that land be brought under cultivation by the settlers apart from planting small gardens. This way Spain wanted to ensure that the Baymen only cut wood and did not carry out any ideas of making Belize a British colony (Dobson, 1973: 73, 82-86; Waddell, 1961: 10-11). A clause of the London Convention stipulated that the English vacate the Mosquito Coast (Nicaragua), and this increased the Bay population by 2250 people.

The settlers were pretty much on their own as far as governing was concerned. The Spaniards never established any direct representation in Belize. And far from being a British colony, the Bay settlement came under remote British supervision by way of Jamaica.

FIGURE 8

Logwood Cutters' Settlement in Belize

This map shows the first boundaries within which British loggers were permitted to cut wood in the Bay area. This agreement was part of the Peace of Versailles of 1783. The hatched area shows the extension of the Bay Settlement in the Convention of London in 1786.

Source: Asturias, Francisco, Belize, 2nd ed. (Guatemala City, Guatemala, C.A., 1941).

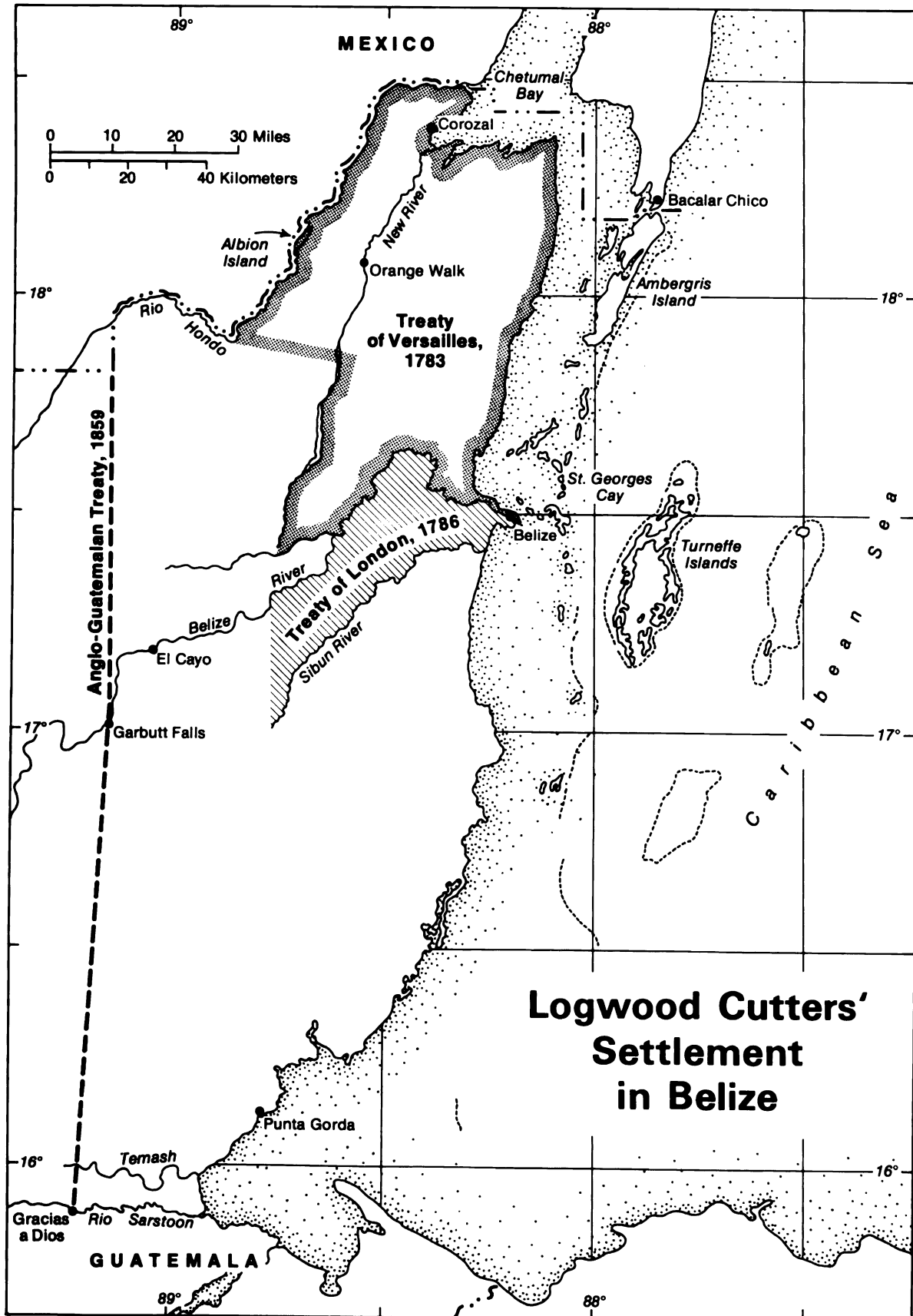


Figure 8

In September 1798 the Spaniards sailed down from Yucatan and attacked strategic St. Georges Cay opposite Belize City. But they were fought off and after two and a half hours of battle on September tenth, the Spaniards withdrew. This turned out to be the last military effort by the Spaniards against the Bay settlement (Caiger, 1951: 96-100; Dobson, 1973: 77-78; Gregg, 1968: 13-15; Humphreys, 1961: 8; Waddell, 1961: 12).

At the beginning of the 19th century the huge Spanish Empire broke into smaller units. A number of independent republics sprung up all around the Bay settlement. As the Central American republics gained independence, their boundaries formed generally along the previous boundaries of the Spanish administrative districts. Since Belize had been under the jurisdiction of the Governor of Yucatan, Mexico attempted to include this territory in her nation. However, the Anglo-Mexican Treaty of 1826 basically reaffirmed the London Convention of 1786 and that Mexico would not interfere in the British settlement in Honduras (Bloomfield, 1953: 14; Humphreys, 1961: 26-29). Neither side established sovereignty over the settlement.

That claim was put forward by Guatemala. The British considered Guatemala's claim without basis since, even though a couple of military offensives by the Spaniards against the Bay settlement had been launched from the Peten, the Belize territory had never been under the jurisdiction of Peten.

In 1859 Britain signed the Anglo-Guatemalan Treaty which established the boundaries for Belize along the Sarstoon River in the South to Gracias a Dios Falls and from there north to the Mexican border along the River Hondo.

The Colony of British Honduras

In 1862 the Bay settlement was declared the Colony of British Honduras, remaining under the authority of the Governor of Jamaica. Finally, in 1884 British Honduras received her own governor (Bloomfield, 1953: 50; Dobson, 1973: 212-213, 217).

During the second half of the 19th century civil war had broken out in Yucatan. This was the brutal War of Races, Caste War, or War of Colors, in which Indians fought anybody of European descent, be they white or Mestizo. The Baymen supplied one of the Indian tribes with arms, and the fighting spilled over the Mexican border into British Honduras. Some of the war victims took refuge in the Colony and established a number of sizable settlements in the northern area. The Anglo-Mexican Treaty of 1893 fixed the boundary between Mexico and British Honduras and recognized Ambergris Cay as part of British Honduras (Bloomfield, 1953: 20; Dobson, 1973: 222-228; Gregg, 1968: 135; Humphreys, 1961: 148-149).

One result of the War of Races in Yucatan was an influx of refugees, Indian as well as Mestizo, into British Honduras. The 1861 census revealed that almost forty percent of the population had been born in Yucatan and most of

these people settled in the Northern District (Dobson, 1973: 134, 251; Waddell, 1961: 53, 249-250).

Belize

Belize achieved internal self-government in 1964, but her external affairs and national defense remained Britain's responsibility as Guatemala threatened to invade Belize. On September 21, 1981 Belize became fully independent. However, the British Forces remained as a protective measure on Belize's request since Guatemala still had not given up her claims.

The Peoples

Of all Central American countries Belize has the smallest population, but smallness in numbers has not limited racial diversity. The Belizean people form a highly complex society that includes the major races of the world. The main population groups are the Creoles, including those of African descent, the Mestizos, the Maya, the Caribs, the Europeans, the East Indians, the Arabs and the Chinese. The reasons for this varied composition is the country's geographic location and its colorful history.

The Maya

The only people of Belize that are indigenous to Central America are the American Indians, the Maya. But the Maya living in this country now do not represent a direct link in the uninterrupted occupance of Belize by the same

Maya tribes as first cultivated this land more than a thousand years ago. Most, if not all of them, are in fact relative newcomers to the Belize scene and many of them still wander about the Maya Mountains and the Peten region of Guatemala feeling no confining restraint on their movement by such modern institutions as political boundaries.

Three Maya groups can be distinguished: the Yucatecans of the north, the Mopan in the west-central area of Cayo and Toledo District and the Kekchi of the south. Of the three groups the Maya of the north are the most integrated into the Belize population. The farther south one gets the stronger becomes the adherence to the traditional way of Maya life, because of the remoteness of the Maya communities in the south. The Kekchi Indians, whose villages are in close proximity to each other, came to the Toledo District from the Vera Paz area of Guatemala beginning towards the end of the last century (Dobson, 1973: 253; Huck, 1971: 262; Jones, 1970: 262-263).

The Kekchi still hold to the ancient Maya way of agriculture, a shifting cultivation system in which they clear a piece of land out of the forest and after raising one or two crops that pretty much exhaust the soil, leave these fields, or milpas, in search of newer more fertile ground (Kellman and Adams, 1970: 323). Milpa agriculture is illustrated in Figure 9.

The Maya grow mainly corn, beans and some rice, and some still employ a simple pointed stick in the planting

FIGURE 9

Milpa Agriculture

Shifting cultivation near the ancient Maya site of Xunantunich in Cayo District; part of the ruins is visible to the extreme right of the photograph. The fields, or milpas, have been cleared out of the bush. Also visible in the foreground are a few cohune palms.

(Author's photograph).



Figure 9

process as did their forebears. In terms of livestock they raise poultry and pigs which are fed surplus corn. Since the Maya do not work the same fields year after year but rather move about in their pursuit of farming, they are not very keen on land ownership but like instead to lease land for a limited period only, even though it means sometimes that they have to walk many miles from their village to their farm plots.

As the Maya are re-immigrants to Belize from Guatemala and Mexico, their first contact with European culture had been under Spanish rule and with Roman Catholicism. Originating from a deeprooted tradition of highly organized community life and further bolstered by a period under strict Spanish administration the modern Maya still lead a rather ordered village life. For the most part they embraced the Roman Catholic religion but managed to combine Christian belief with ancient Maya religion. This finds expression throughout the agricultural year as they implore various gods from seeding time to harvest season to bless their fields with bounteous crops (Dobson, 1973: 292).

The Creoles

Even though their name implies that they are the local population, the Creoles are a grand mix of the descendants of people from Africa, Europe, and a few other places thrown in for good measure. The Spanish "criollo" (French "creole"), meaning domestic or locally bred, was applied to

those who were born to white as well as black settlers in the West Indies. In Belize, the Creoles are the descendants of the buccaneers, the Baymen, and their slaves. They comprise the largest group among the people of Belize and are probably the ones who are most confident about their own identity. They hold the leadership position by number and seniority alone (Fig. 10).

The Creoles can date their existence in Belize back to the 17th century and this holds true for both the white and black element in their people. The Africans were brought to the West Indies as laborers since the harsh Spanish rule had decimated the indigenous population to a point near extinction. African slaves replaced Caribbean slaves to perform the difficult work in the mines and later the plantations that the Europeans did not want to do themselves in the hot and humid climate.

As the Baymen went about their laborious logging operations in the Belizean forests they depended increasingly on the strong black slaves for the hard physical labor. Since these slaves had to be entrusted with machetes and axes, it is easy to see why they were treated on a more equal basis than the West Indian plantation slaves. The hard work in an entirely masculine atmosphere that was shared by the Baymen and their slaves in the forest for months at a time was conducive to a somewhat more egalitarian work relationship than was generally enjoyed by slaves in those times. The Baymen's confidence went so far as to

FIGURE 10

Street Scene in Belize City

This picture was taken on Victoria Street in Belize City and shows the urban architecture. The majority of homes are constructed of timber. The swampy land and the climate with its tropical storms contribute to a faster deterioration of the traditional building material. This group of Creoles gathered to watch a parade.

(Author's photograph).



Figure 10

put guns into the slaves' hands and having them fight against the Spaniards. Judging from the accounts of the Battle of St. Georges Cay the victory over the Spanish aggressors was in no small part thanks to the fearless and fervent fighting by the slaves (Dobson, 1973: 145-151; Gregg, 1968: 15-17).

It was the work in the forests that gave the slaves a measure of dignity and set them apart from other slaves that were employed merely as physical laborers and often with no difference between their treatment and that of beasts of burden. From this it can be understood why the black slaves of Belize clung to their jobs in the logging camps and did not show much interest in assuming responsibilities that carried less status than a woodcutter's.

The Creoles hold the largest percentage of administrative positions in Belize today and they generally are town dwellers working in skilled trades or business. A number of them are still employed in forestry and few make a living as farmers (Dobson, 1973: 256-257). Their language is English or a quaint Creole dialect which is reminiscent of a pidgin English and takes some practice to understand.

The Mestizos

Numerically the Mestizos are the second largest group and comprise about thirty-two percent of the population. The Mestizos came to Belize during the second half of the 19th century under the most violent of circumstances. These

people were refugees of the "War of the Races" that tormented Yucatan. This war was an uprising of the Maya against the descendants of the Spaniards and went so far as to include people who were of mixed Maya and Spanish-European parentage. But their vision of regaining their ancestral land for a purely Mayan race was eventually destroyed when the war ended in favor of the Mexicans with the result that the Maya also fled south across the Hondo to escape the retaliation of the Mexicans. So, curiously, the two enemies ended up living side by side in Belize which they could not manage to do in Yucatan.

The major contribution of the Spanish, Mestizo and Indian immigrants was their agricultural knowledge acquired under Spanish rule. They had been farmers in Yucatan and they wanted to farm in Belize. They settled mainly in Corozal District and Orange Walk District where soil and climatic conditions are quite good for agriculture and they built up a sugar industry that is still expanding. Sugar has become an export item of increasing importance.

The Mestizos represent the Spanish element in the Belizean community. They speak Spanish and they are devout Roman Catholics. Recently the Spanish segment of the Belizean population has been increasing at a faster rate than the other groups. This may be partly due to a possibly higher birth rate among the Mestizos. But the main reason for this increase is the immigration of citizens from other Central American countries, especially refugees from El

Salvador. At the same time this in-migration has increased the number of people in skilled professions, as some of the refugees are doctors and dentists.

The Chinese

The first Chinese immigrants were brought to Belize in 1865 under a settlement plan to develop agriculture in the colony. At the time about five hundred Chinese indentured laborers were hired by a few landowners in hopes of cultivating their land. But the Chinese endeavor did not work out, partly because many of them died of diseases contracted in the unfamiliar environment and partly because they defected in large numbers to side with the rebellious Maya in Yucatan. At any rate, three years after their arrival only 211 were left. They had originally been taken to Corozal District, but shortly afterwards were resettled in Toledo District because of friction with the Mestizos in the north (Setzekorn, 1975: 24). The few that survived in Belize eventually assimilated, mainly with the Indian segment of the community (Waddell, 1961: 18).

But as the 20th century censuses reveal, Chinese are present in Belize today. The breakdown of the population by place of birth in 1946, for example, lists forty-two citizens as born in China. These new immigrants are mainly shopkeepers and are concentrated in Belize City and Punta Gorda. With their families they were thought to have increased to about two hundred in 1968 (Dobson, 1973: 251;

Gregg, 1968: 125; Setzekorn, 1975: 25).

The East Indians

In 1958 the English Parliament tried to kill two birds with one stone: the British Honduras colony needed sugar plantation workers and the Bengal soldiers, the Sepoys, had staged a bloody uprising in East India that threatened British rule there even though the British managed to put down the rebellion. Consequently, one thousand Sepoys and their families were expatriated to the Caribbean to help defuse a tense situation. Their descendants still provide labor in the sugar plantations and rice fields in Corozal District in the north and Toledo District in the south (Dobson, 1973: 250; Holdridge, 1940: 380, 383-384, 392; Waddell, 1961: 74).

The "Syrians"

Even though termed "Syrian" the Mideast community is actually Lebanese; at the time that they first emigrated to British Honduras the state of Lebanon did not exist, hence the "Syrians." Some families have been in the country for about three generations but there are also more recent arrivals. Most of them are involved in trade (Dobson, 1973: 254; Gregg, 1968: 75,125).

The Europeans

This category is self-explanatory, comprising obviously the British and other European nationalities. But

this group also includes the North Americans, a large number of whom arrived during the late 1860s as a result of the Civil War. Most of these were refugees from the Confederate States persuaded to leave war torn America and try a new life in the colony of British Honduras. The promotion of the move to Central America was done by Young, Toledo and Company that had established an office in New Orleans. They represented a large landholding group in Toledo District and therefore this colonization effort near Punta Gorda became known as the Toledo settlement.

The American settlers had to clear the bush before they could consider planting crops and the combination of disease and lack of laborers caused many of them to return to America. Nevertheless, in 1893 the Americans and their families numbered about two hundred people, between them they had twelve sugar mills and nine hundred cattle, six hundred acres were planted and worked by three hundred laborers (Holdridge, 1940: 382). But the settlers had concentrated all their efforts on one crop, sugar, and as Europe increasingly filled its need for this commodity with beet sugar, the demand and price for cane sugar dropped. Being devout Methodists, the settlers could not reconcile it with their conscience to enter the lucrative rum production which would have averted some of the impending economic doom. This, together with the circumstance that the settlers sent their teen-age children to the United States for their education, caused many repatriations among subsequent

generations. Yet, American immigration continued and Belize still has strong ties with the Southern States, particularly Louisiana (Holdridge, 1940: 376-393).

The Caribs (Garifuna)

Another group of Belizeans with a most fascinating history are the Caribs, or more precisely, the Black Caribs. These people originated in northern South America and, being fine boat builders and navigators, they made their way from the mouth of the Orinoco through the islands of the Lesser Antilles and towards the Greater Antilles. Apart from the Maya they were the only other people of the Caribbean region to use sails with their boats (Conzemius, 1928: 197, 199).

However, they did not become famous as the accomplished seafarers they were but instead their name came to denote a rather unpleasant habit some humans have: eating other humans. In the Carib language their name signifies "brave people." The Spaniards corrupted the word into Caribales and Canibales and subsequent to the discovery of the Caribs all people that ate human flesh were named Cannibals.

Their major domicile and base for their trading excursions was the island of St. Vincent, so named by Columbus in 1498 when he discovered it on the day of St. Vincent, January 22nd (Conzemius, 1928: 183).

The original inhabitants of the Antilles Islands were the Arawak Indians and the Caribs made short shrift of them but did take the Arawak women with them. In this

fashion the Carib culture acquired a second language, for the captured women retained their Arawak tongue and passed it on to their daughters whereas the sons eventually spoke their fathers' language. This division in the language has survived till today.

By the time the Spaniards appeared the Caribs were beginning to leave their mark on the Greater Antilles and had actually conquered part of Puerto Rico (Conzemius, 1928: 186). The Caribs were making their way through the Caribbean Islands, but the extinction of the Arawaks in the Greater Antilles was carried out by the Spaniards. Many of the Arawak tribes were of rather delicate constitution and did not survive for long the slave labor in the mines. That left the Caribs. But, being mindful of the odious distinction of these brave people, the Spaniards then resorted to imported slave labor from Africa.

Nevertheless, starting in 1624 the Caribs had to retreat from some of the islands until they finally held St. Vincent, St. Lucia and Dominica (Conzemius, 1928: 187). Then their culture received a new infusion in 1975 when African slaves were shipwrecked off St. Vincent and mixed with them. Thus the "Black Caribs" came into being. The original pure Caribs used to paint their bodies red or yellow. In order to differentiate between the new and the original groups, they were called the "Black", "Red", and "Yellow" Caribs, respectively (Conzemius, 1928: 188).

In 1763 the British took st. Vincent but there certainly was no peaceful coexistence between the Europeans and the natives. There was continuous strife and a final war which the British settled in 1795 in their time-honored tradition of deporting the dissident element. Only few of the Black Caribs managed to escape the dragnet and they remained in St. Vincent. About five thousand of their people were taken to Ruatan Island in the Bay of Honduras from where they soon followed an invitation by the Spanish governor of Honduras to settle in Trujillo. But when the Central American states went through their seesaw periods between monarchies and republics the old fighting spirit awoke in the Caribs and they joined the effort of the Royalists. When they found themselves on the losing side many of the fled to British Honduras where they settled the town of Stann Creek (Conzemius, 1928: 189-190).

Even though the Caribs spread from Stann Creek, they never settled far from the sea or a watercourse leading to it. They still are deft carpenters and boatbuilders, and fishing is a major Carib occupation. Because of their physical strength they supplied for many years the labor force in the mahogany cutting industry.

Among the Caribs the women always were the ones who did most of the work in the fields from planting through harvesting with the men more or less just clearing the bush. This is contrary to the Central American Indians where the men traditionally do all the planting, in some tribes out of

fear that the crop will not do well if put into the ground by women. When a missionary once questioned some Caribs why they did not help the women more with the hard field work they told him: "You have yet to learn that women know how to bring forth and we don't; if they plant, the maize stalk gives two or three ears of corn, the cassava plant yields two or three baskets of tubers, and similarly everything is multiplied. Because the women know how to bring forth and they know how to make the grain bring forth; therefore they do the planting as we don't know as well as they" (Conzemius, 1928: 194). This attitude together with the Creoles' opposition to farming has formed a major obstacle to the development of agriculture in Belize (Fig. 11).

The Mennonites

Even though these people are of European stock, they represent such a distinct group in the Belizean community that they warrant a separate entry. The Mennonites are the latest addition to the hodge-podge of people in Belize, most of them having arrived between 1958 and 1961. They are members of a religious sect that was founded early in the 16th century in Europe as an offshoot of the Reformation. Their doctrine insists on a literal interpretation of the New Testament and stresses separation of church and state, pacifism, baptism not of infants but only of adults, refraining from delivering oaths and adherence to a simple life (Sawatzky, 1971: 1-2). These strict laws that ran counter to the

FIGURE 11

Little Garifuna Girl

This little girl is a happy example of Belize's great ethnic variety. Among her ancestors are the Red Caribs who originated in the Orinoco region in South America and spread through the Antilles Islands. The entire island region adopted its name from the Caribs, but today the majority of their descendants live in Belize and the small islands of Dominica, St. Lucia and St. Vincent.

(Author's photograph).



Figure 11

established Church's rules caused a lot of friction for the Mennonites and they moved to the rural areas where they would be less conspicuous. Thus, farming became almost the exclusive occupation of the Mennonites.

Various rulers in Europe and Russia made amends to attract the quietly industrious Mennonites but sooner or later differences arose, generally because of attempts to incorporate the sect into the community of the host country. That always was the signal for the Mennonites to move on. Eventually they came to North America, especially to Pennsylvania and Canada (Sawatzky, 1971: 10). As the Canadian authorities pressed for public schooling of the children, many Mennonites moved to Mexico beginning in 1920 and stayed in Chihuahua and Durango until familiar troubles stirred them once more into pulling up stakes and following an invitation to the colony of British Honduras. Both sides, the Mennonites and the representatives for the Crown, signed the Privilegium which grants the Mennonites special concessions that permit them to live life as their religion dictates (Bushong, 1960: 308). The highlights of this agreement are, for the Mennonites, exemption from military duty and social security taxes and the right to their own churches and schools in their old German language. For their part of the commitment the Mennonites have to pay property taxes and income taxes and must assume their community's welfare care and furthermore produce surplus food for the country's needs as well as for export. This agreement was signed in 1957

on December 18th and the Mennonite families started to settle in their new home in 1958.

If one expects the Mennonites to be a tight-knit group in face of so much adversity from the rest of the world, one finds that even here are enough differences to fragment the union. In the course of their history the Mennonites have adopted varying degrees of permissibility. Different factions have bought five separate tracts of land in Belize. The "Kleine Gemeinde", the most flexible group among the Mennonites in Belize, settled at Spanish Lookout in Cayo District (Sawatzky, 1971: 336-337, 363).

Despite the fact that they are excellent farmers the Mennonites experienced a number of failures with agriculture in Belize. To begin with, they had to clear the bush and adapt their agrarian techniques to the local soil and climatic conditions. The more progressive community members at Spanish Lookout, who employ some machinery which more conservative Mennonites consider forbidden, combined some of the Maya techniques with their own and were quite successful with their bean and peanut crops. They also developed a poultry industry that had a great impact on the local economy and substantially reduced the need for import of poultry products. Beyond that they are in the process of improving a cattle breed that will have greater resistance to the local insect pests and tick-borne diseases. But locally produced fresh milk is now replacing some of the heretofore only imported tinned milk. The Mennonites have established

the Mennonite Center in Belize City, the town that is their main market (Dobson, 1973: 255).

It is obvious that Belize's population is anything but homogeneous. Some of the components have a higher affinity for mixing than others. The Maya, Caribs and Mennonites are quite conscious of their racial, ethnic or cultural distinction and so far this perception of themselves has prevented their assimilation. The crystallization of these elements does not have a disruptive influence, but rather lends greater variety to the mosaic of the Belizean people. However, Belize is in the process of building a nation and therefore searching for unifying elements instead of extolling the exclusive qualities of some of its people (Crosbie and Furley, 1967: 56).

Generally, such factors as a common language, culture, or education and sometimes religion are shared by a people. But Belize has not been able to benefit from such normal national bonds. Its population comprises many cultures and languages and the Protestant as well as the Roman Catholic religion have been influential in the country. From the inception of the educational system the churches controlled the schools and they have retained this power until now. Both the ruling party and opposition agreed to this situation because of the very limited public funds available for education (Dobson, 1973: 320). Since the Protestant schools tended to teach English ethics while the Catholic schools tended towards Latin American attitudes,

education emphasized differences instead of stressing unifying cultural elements. But the government and the churches are attempting to overcome this now and instituted an inter-denominational school in the new capital of Belmopan.

In 1975 Belize had a population of about 140,000 people and the population density then was fifteen people per square mile.¹ However, the actual geographic distribution is quite lopsided with about one-third of the entire population living in Belize City. One other city, Belmopan, seven towns and 160 villages and settlements hold the rest of the population. The towns and villages are clustered between Orange Walk Town and Corozal Town in the north, along the Belize River and the road between Stann Creek and Punta Gorda, and the northern cays, particularly Ambergris Cay, hold a large proportion of the population involved in the fishing industry.

The average annual rate of increase in 1975 was 2.8 percent, which is among the highest in the world. Whether the population growth will result in a filling in of the empty regions and a more homogeneous population, only the future will tell. But it will have to be accompanied by improved agriculture if all these people are to be fed adequately.

¹All population data for 1975 are taken from Quick Facts About Belize, published by the Belize Tourist Board, 1975.

The Economy

Belize was settled by Europeans because of its riches in timber. Until the 20th century its forestry resources remained its only *raison d'etre*. But once the demand for logwood and mahogany had experienced a global decline--the one because cheaper synthetic dyes had greatly diminished its value and the other because different furniture woods had become more fashionable--the need for new export products arose.

The natural turn of events should have been a more intensified production of tropical cash crops that were in demand on the European market. However, agriculture in British Honduras was a very minor industry. Historically the Spaniards had suppressed farming in the British settlement from the very beginning since they wanted to prevent other Europeans from gaining a foothold in Central America. Numerous treaties between Spain and England spelled out tight restrictions for the Baymen as far as their agricultural activities were concerned. But apart from these political considerations there were cultural and social reasons why agriculture remained undeveloped in British Honduras.

When Belize's economy finally had to become more diversified, Belize's people had developed very definite opinions as to what constituted proper gainful employment and had strong antipathies against what they considered occupations beneath their dignity. Forestry had not only

formed the basis of the economy, but employment in forestry had also represented a respected standing in the society.

The nature of the forest industry made particular demands on the physical strength of the people involved in it and also required them to be away from home for months at a time. This left the women, the old and the weak to tend to the food production. Small wonder then that agriculture never amounted to much more than subsistence farming and for most items the country's production did not even meet its own needs.

Thus Belize had never been anywhere near self-sufficient and had become dependent on imported food long ago. A large proportion of its national expenditure went for food. In 1967, for example, more than a quarter of its imports consisted of foodstuffs (Setzekorn, 1975: 239). When logwood sold at a hundred sterling pounds a ton these payments were not difficult to meet but once Belize had nothing of great value to offer on the world market the very necessities of life became luxury items.

To build a viable economy against the complicated historical and social background of Belize was, and still is, an arduous task. There were other factors to be reckoned with, such as the small population and the lack of infrastructure within the country. Communication between the various sections of the country has been hindered by the very rudimentary road system. There are only three major roads: the Northern Highway between Belize City and

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Chetumal in Mexico, the Western Highway leading from Belize City to Benque Viejo on the Guatemalan border, and the Hummingbird Highway between Belmopan and Stann Creek and continuing as an all weather road to Punta Gorda. A road to the southern border is under construction, but as yet the communities in the south are rather isolated since the road to Punta Gorda and the smaller ones feeding to it are frequently impassable. Small aircraft and coastal traffic by boat is providing much of the transportation between the most important population centers. This poor communication network has been an added hindrance in the development of agriculture and remains a problem in the shipping of crops.

In 1959 a land use survey was made which indicated that about forty percent of Belize has good soil conditions for farming. The same survey disclosed that only about five percent of the suitable farmland was actually used for agricultural production. But the government is determined to boost cultivation and has made some decisions in the matter that underline that resolution in no uncertain terms. For example, much of the land is held by a few large landowners who are frequently absentee landlords (Huck, 1971: 136; Crosbie and Furley, 1967: 59). As they have not made any great efforts to improve their land the government has decided to prod these people into action with a graduated Rural Land Utilization Tax that is increased each year that the owner fails to cultivate the land (Dobson, 1973: 273). Parcels of less than a hundred acres were exempted from

this tax in order to encourage small farmers.

Considering the socio-economic history of Belize since the European period began there was not much of an agricultural basis to build on. Nevertheless, agriculture today represents the most important sector of the economy. It holds the greatest promise for Belize's economy and some remarkable achievements can be registered already. Great changes took place in the primary industries of forestry and agriculture between 1950 and 1965; 1959 was the first year that sugar and citrus exports together amounted to more than the timber exports. And in 1961 sugar and citrus alone surpassed the value of the timber exports (Crosbie and Furley, 1967: 59-60; Dobson, 1973: 265; Huck, 1971: 170).

Sugar

Sugar has become the most important export item and the small farmers, particularly the Mestizos of Orange Walk and Corozal, have a large share in the production of this crop. In the past the Belize Sugar Industries (BSI) was the major grower as well as processor of cane in the country. But since 1963, BSI has been a subsidiary of Tate and Lyle of England and though they still grow some cane they are required to buy the cane that is raised by the small independent growers. Therefore their major operations now are with the processing and shipping of the sugar.

The industry is given yearly export quotas by the International Sugar Association above which it cannot sell sugar on the international market. But BSI has been able to have this quota doubled by their best customer, the United States. They are also branching into the sale of other products, such as molasses.

The sugar production in Belize has not nearly reached its potential. Yield per acre is still rather low compared to other sugar growing countries. This is due to such factors as different growing techniques and lack of fertilizer. But because of the soil and climatic conditions the sucrose content of the Belize sugar cane is among the highest in the world and is on the level of the finest Cuban sugar cane (Dobson, 1973: 270; Setzekorn, 1975: 243).

Citrus

As sugar is the major crop of the north, citrus is the one of the south. Like sugar Belizean citrus did not reach its important place on the market until after the Second World War. But it also had its beginnings much earlier and actually had won international recognition as a superior quality product. At the 1928 Imperial Fruit Exhibition in England, for example, Belize's grapefruit won the Gold as well as the Silver Medals (Caiger, 1951: 151).

Citrus trees do not belong to the indigenous vegetation in America. They were introduced to the New World by the Spaniards who particularly grew limes throughout

Central America since the juice of these fruits helped to ward off scurvy.

The commercial growing of citrus fruit in Belize was started about 1912 in the Stann Creek area and export of the fruit began in 1925 (Dobson, 1973: 271; Gregg, 1968: 106). The Stann Creek valley is ideally suited to the growing of oranges and grapefruit since the climate is warm with sufficient rainfall and the soil is very fertile. This eliminates much of the expense which in some citrus growing areas of the United States is necessary for irrigation and fertilization. The fruits are processed by two firms near Stann Creek, one is the Citrus Company of British Honduras which is controlled by a Jamaican firm, and the other is the British Honduras Fruit Company owned by Salada Foods of Canada. These processors also buy the produce of the small growers, but most of the citrus groves are actually owned by these two large firms who control the industry. The majority of the citrus export is to the United States and Canada and increasingly to Great Britain. By 1970 the orange production approached that of Florida and by 1975 citrus groves covered nine thousand acres. Citrus fruits accounted for one quarter of Belize's export value (Dobson, 1973: 271; Gregg, 1968: 106; Setzekorn, 1975: 247-248).

Thus sugar and citrus exports represent over three quarters of Belize's export and the importance of agriculture to the country's economy cannot be more clearly

demonstrated. At the same time it does not make good business sense to have such a high proportion of one's economy based on two items. Therefore numerous efforts are being made to diversify agriculture in Belize. More products are needed for local consumption as well. In some cases development has been so good that the government had to expand the international market for its products. In 1971 Belize became the twelfth member of the Caribbean Free Trade Area (CARIFTA), which is composed of former Commonwealth countries of the Caribbean region (Dobson, 1973: 288). The Caribbean nations established this Association to enlarge their market and to improve trade by lifting barriers to trade. Belize, of all the CARIFTA members, has the smallest population and the lowest population density; it has the room and the potential to increase cultivation and at its doorstep it has a fast growing market for the fruits of this development. Other crops than sugar and citrus that have gained or regained some importance are rice, beans, corn, and bananas.

Bananas

Around the turn of the century bananas, the traditional export crop of Central America besides coffee, were also one of the export items of British Honduras. But in the 1920s a Panama disease outbreak destroyed most of the banana plantations and put an end to the export of this crop. In the meantime some more disease resistant varieties

have been developed and bananas are again a trade item in Belize's economy. Most of the plantations are in the citrus region near Stann Creek and the majority of the fruit is shipped to Great Britain. The Banana Association of Belize is planning to have eventually more than six thousand acres under banana cultivation. In 1969 this crop could claim 35.2 million pounds as its contribution to Belize's export total (Caiger, 1951: 141-142; Dobson, 1973: 267; Setzekorn, 1975: 249-250).

Corn, Beans and Rice

These foodstuffs are diet staples of the Caribbean region and thus there is a ready market for them. Corn and beans of course have been grown in Belize since Mayan times. The need for these crops has not only increased because of the population expansion in Belize and the expansion of its international market but, in the case of corn, also because of the development of the livestock industry. Corn production grew from 9.1 million pounds from 11,383 acres in 1964 to 35 million pounds from 25,000 acres in 1971 (Setzekorn, 1975: 258).

Compared to corn and beans, rice is a new crop in Belize but its cultivation has experienced a dramatic development there. To a great extent this is due to an American farmer who introduced new growing and harvesting methods as well as new varieties and did this in grand style on a large area in central Belize. Until then rice

had been grown in modest amounts in the south. He eventually hopes to have 32,000 acres planted in rice. Since 1973 Belize has been able to add this crop to its export list (Setzekorn, 1975: 255-256; Floyd, 1972: 5).

Livestock

The poultry industry got its start after the arrival of the Mennonites in Belize and has developed very well. But the raising of other livestock, such as cattle and hogs, has not yet progressed to the point where it meets local demand. In the case of cattle, in 1970, the total herd contained 32,000 head and these are being improved by various breeds to make them more resistant to the local disease and tick threats. There are hopes to eventually export beef and pork (Floyd, 1972: 5; Setzekorn, 1975: 256-258).

Fishing Industry

The barrier reef forms an ideal habitat for an extraordinary variety of sea animals and particularly for the marketable crayfish (lobster). A very lucrative lobster industry has developed with exports mainly to the United States. But commercial fishing also includes conch, shrimp and snapper.

Despite excellent fishing grounds along the Belizean coast the scalefish industry is lagging far behind the lobster industry. The reason for this is that the government has put price controls on fish for local consumption, whereas lobster is exported at a far higher price level.

But the coastal communities are generally well supplied with fresh fish (Craig, 1966: 77; Craig, 1968: 172-178; Craig, 1969: 252-263). The fishing practices reflect local marine topography as well as cultural traits of the people. The three distinct fishing groups in Belize are the Mestizos, Creoles and Caribs.

The Mestizos employ a variety of methods ranging from handline fishing to skin-diving to trapping and seine fishing. On Cay Caulker trapping is the most common practice. The trapping of fish, particularly lobster, is a rather recent development in Belize. An even newer commercial fishing method is skin-diving. Its introduction is attributed to vacationing sport fishermen (Craig, 1966: 72). The Creole fishermen work generally with handlines and seines except for the Creoles at Placentia who skin-dive for lobster. The Caribs in the south employ handlines in their fishing (Craig, 1966: 72).

Commercial fishing is organized through five fishing cooperatives that also manage the processing plants. There is no doubt that the fishing industry is gaining importance and that there is great potential between the Barrier Reef and the coastline. Nevertheless, the proportion of labor force in fishing is still very small and the government holds strict control over the permits for fishing to prevent overfishing (Floyd, 1972: 2).

Forest Products

The economy of Belize was dominated into the 20th century by its forest products: logwood, mahogany and chicle. Today, logwood production is nearly insignificant. Mahogany, due to its quality as a furniture and fine boat wood, still is an important timber item of the Belizean forests, but due to the exploitation in the past the mahogany stands have been sorely depleted. The future of this industry hinges on successful reforestation.

A Forest Department was instituted in 1922 to assess the situation and take steps to stem the exhaustion of this valuable natural resource. At first, the department did not have sufficient funds to implement the necessary measures. But eventually it took control over the felling of prescribed timber and the replanting of seedlings in an effort to ensure sustained harvest from the forests. This management includes other marketable woods that have gained economic importance, such as pine, cedar and rosewood, and the establishment of National Forest Reserves (Dobson, 1973: 261-263).

The other historical product of Belize's forests is chicle from the sapodilla tree. Chicle is obtained by bleeding the sapodilla tree and this latex for many years formed the basis in the production of chewing gum. Like logwood it has suffered on the world market due to synthetic substitutes and continues to experience a steady decline from its past importance (Fig. 12).

FIGURE 12

Chicle Collection

A Sapodilla tree near the Mexican border in Orange Walk District: the cross-cuts have been made to bleed the tree for its latex "chicle," which in pre-synthetic days was the basis for the chewing gum industry.

(Author's photograph).



Figure 12

Mineral Resources

Belize is not known to have extensive deposits of valuable minerals. Because of major oil reserves off the Mexican coast of Yucatan and in the Peten region of Guatemala oil exploration was also undertaken in Belize. However, the drilling efforts were unsuccessful and therefore discontinued (Fox, 1962: 113).

Tourism

The Caribbean climate, palm-fringed islands and beaches, the Barrier Reef and the magnificent Maya ruins, all these add up to an attractive vacation spot. But there are far too few hotels to handle a large tourist industry. A number of foreign entrepreneurs, mostly American, have attempted to develop resorts, but most of these projects did not go far beyond the planning stage. The people of Belize do not appear that eager to become another Caribbean tourist spot. Considering the social problems that have arisen around the Caribbean because the majority of the people have to make a living as servants to wealthy foreigners frolicking in their countries, Belize may be wise not to promote this business in grand style.

CHAPTER III

FIELD METHODOLOGY

The field work for this study was conducted in Belize during October and November of 1980, and during May and June of 1981. The sample was drawn from five of the six districts of the country: Belize, Orange Walk, Cayo, Toledo and Corozal.¹

The data were obtained by observation, from discussion with informants from all walks of life and culture groups in Belize, and from interviews. Out of personal preference and in order to gain as much insight as possible into various dietary, health and child care practices, the researcher lived in private homes throughout the country every night but one while in Belize.

Approval for the study was granted by the Assistant Permanent Secretary of Health, who also initiated cooperation from the Public Health Department and other government offices (see Acknowledgments).

¹The sixth district, Stann Creek, was not visited due to time limitations. Moreover, Stann Creek is primarily Carib, and a sufficient number of interviews with Caribs was obtained in Toledo District.

Since the study focuses on cultural variation in infant feeding/weaning practices, it was designed in such a way as to allow the sampling of each group in an area of the country where the group in question is predominant. This meant that in Orange Walk Mestizo and Maya were interviewed, in Cayo Mennonites and Mestizo, in Corozal Mestizo, in Belize Creole, and in Toledo Caribs and Maya. The design was expected to eliminate outlier minorities as they are probably neither representative of their own nor the predominant group.

The interviews were based on a structured questionnaire on which responses were recorded during each interview (see Annex). Almost all questions were close-ended. However, each questionnaire had additional space for further information. A separate journal was kept every evening, and information that had not been anticipated was also entered there. A number of the questions were put to the mothers in different ways. Sometimes a small change in phrasing, or simply a repeat of the question later during the conversation, resulted in a more detailed or comprehensive answer. All interviews were conducted by the researcher alone, except during approximately twenty interviews with Maya and Mestizo mothers which were done with the assistance of a translator (see Acknowledgments).

Apart from the cultural considerations in the choice of the sample, a major criterion was that the mother being interviewed have a baby not older than one year.

The reason behind this decision was that the mother's memory of weaning practices and episodes of ill health might be more precise if the questions focused on the more recent past.

Mothers were found practically on a door to door basis, by walking down the street and looking for diapers drying on lines outside the houses (Figure 13). Since most women do laundry almost daily, this turned out to be a very successful procedure. Another aspect of Belizean life also led to many interviews and that was the fact that life is very open and many women sit in their doorways or on the front steps and either do some housework or just look to chat with a passer-by. A number of interviews resulted from the researcher's enquiries whether there were other babies in the same block or the next one. About half of the interviews were done at the Child Health Clinics that are conducted throughout the country. Interviews were conducted at Fixed Child Health Clinics in Toledo, Belize, Cayo and Orange Walk Districts, and at Mobile Child Health Clinics in Orange Walk and Corozal Districts. The majority of mothers interviewed at the clinics were there for check-ups of their babies.

The problem of transportation became very evident during the two field trips when a number of scheduled Mobile Child Clinics had to be cancelled because the only available vehicle had broken down.

FIGURE 13

Signs of a Baby in a House

This picture illustrates one of the guides the author used in locating mothers of small babies for the study: diapers drying on the line. This scene is from Orange Walk District and shows some of the architecture that is typical in that region.

(Author's photograph).



Figure 13

The researcher experienced all means of transportation in carrying out the survey and travelled by truck, bus, car, small airplane, dugout canoe, land rover and especially on foot.

Only one person refused to be interviewed.

A specific problem in the study design which arose at the very beginning was that all of the population data that had been available from the literature in the United States were outdated. The difficulty in obtaining an accurate ethnic breakdown of the Belize population made it necessary to estimate proportions for interview allocations as follows: sixty percent Creole, fifteen percent Mestizo, seven percent each Maya and Carib, and three percent Menno-nite. The remaining eight percent represent other, smaller culture groups excluded from this study. Attempts to obtain current information after arriving in Belize resulted in inconsistent figures from a variety of offices and individuals. All sources of information did agree that there had been changes in the relative composition of ethnic groups, due particularly to a larger increase among the Mestizo group than among the others. Much of this increase is caused by the open door policy of Belize and a great influx of refugees from other Central American countries, such as El Salvador, but no specific figures were available. The final proportion of total interviews, still the author's best estimate, is presented in Table 1.

TABLE 1
DISTRIBUTION OF INTERVIEWS BY DISTRICT AND GROUP

District	Group				Number
	Maya	Creole	Carib	Mestizo	Mennonite
Belize		64			64
Cayo				7	12
Corozal				3	3
Orange Walk	6			55	61
Toledo	14		20		34
Total	20	64	20	65	12
Percent of Population	10	32	10	32.5	6
					90.5*

*Excluding "other" 9.5 percent

After the field work was completed in June, 1981, the researcher had a lengthy visit with the Belize Census Officer and was given the provisional figures of the 1980 Census (see Acknowledgments). Still, the computation of the ethnic breakdown had not yet been completed. The opinion of the Census Officer was that the Mestizo population had increased near to that of the Creole, but that the Creole population, comprising about thirty-five percent, was still the leading group by a few percent.

A re-count of completed questionnaires showed that the Mestizo were somewhat over-represented according to the Census Officer's estimate. It was concluded that the additional information is more valuable to the study than an attempt to achieve correct proportions by trimming the size of one of the sampled groups. The Mennonites likely comprise no more than four percent of Belize's total population; they, too, are probably over-represented, but it was felt that the entire Mennonite sample was so small that a higher ratio of interviews was justified.

After return to the United States, the 115 questions for 181 interviewed mothers were entered on large paper grids to facilitate computation and analysis of the data. These data were summarized in five individual tables that show the sequence of feeding and weaning of each baby within each of the five culture groups surveyed.

The accompanying Figure 14 shows the distribution of interviews by district and culture group.

FIGURE 14

Interview Distribution

To indicate where interviews were obtained the entire location name is underlined if interviews were conducted at homes as well as Fixed Clinics. Only the first letter of the location is underlined if interviews were conducted at Mobile Clinic.

Source: adapted from Atlas of Belize, 5th ed. (Benque Viejo del Carmen: Cubola Productions, 1980) p.11.

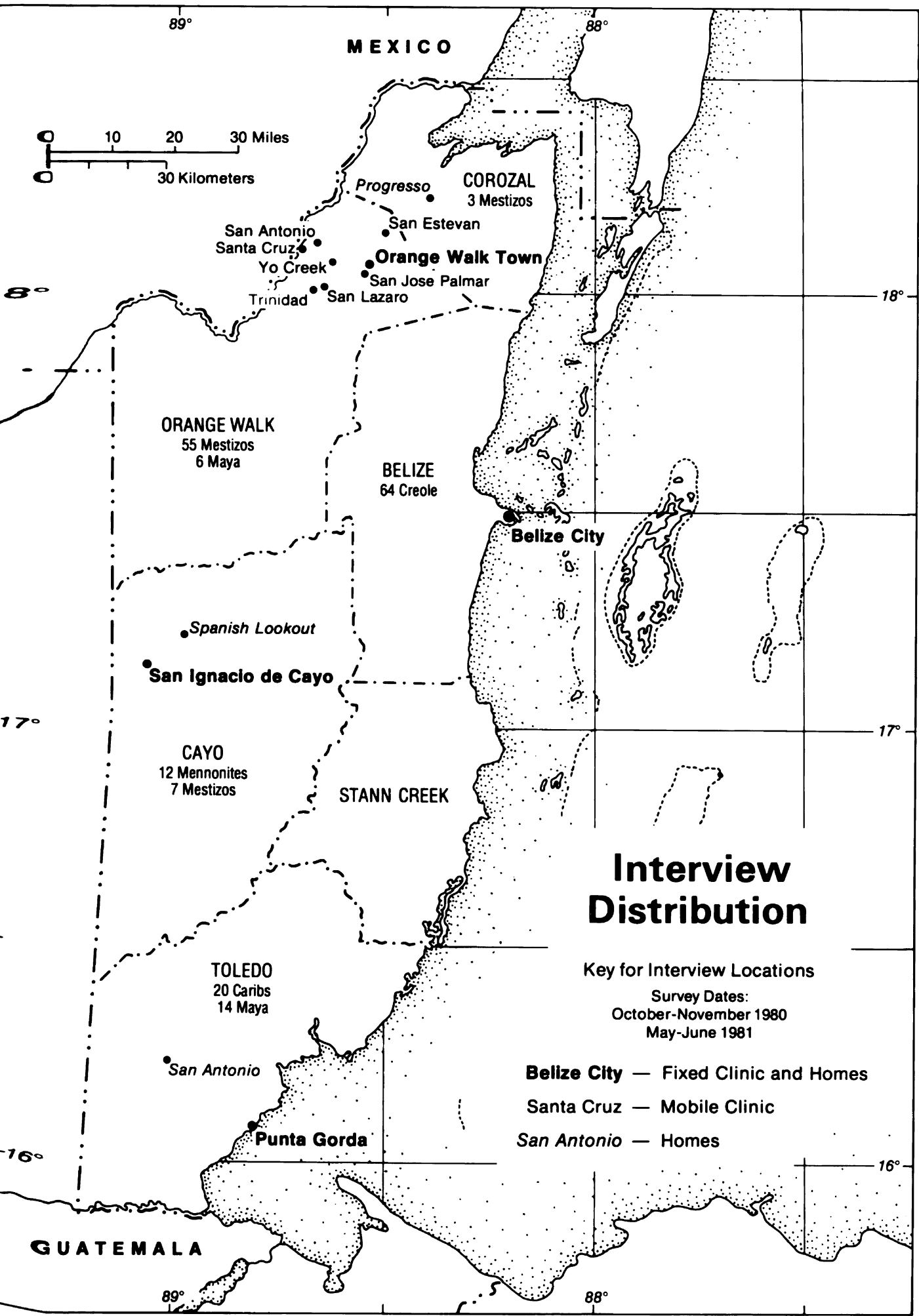


Figure 14

CHAPTER IV

INTRA-ETHNIC ANALYSIS

This chapter presents the profiles of the five culture groups surveyed. The profiles are compiled from the journal entries, observation, numerous conversations, as well as the formal interviews of mothers. Each general profile is followed by a section that describes the specific characteristics of each sample and relates these characteristics to breast-feeding behavior.

Profile of the Maya

In Belize, as in other American countries, the indigenous population has receded from the later arrivals. Ruins, such as Tulum in Yucatan and the Cerros site in northern Belize, show that the Maya once had splendid communities along the coast. But today they live on the periphery of modern day Belize in remote villages. Three groups of Indians can be distinguished: the Yucatecans live in the north, the Kekchi in the opposite corner, in the far south, and the Mopan Maya in Cayo and Toledo District towards the border of Guatemala (Figure 15).

Their seclusion has helped the Maya to adhere to a traditional way of life. The agricultural system is still

FIGURE 15

Belize Population Map

Belize's population is concentrated in a few towns along the coast, in the fertile sugar country in the North, along the Western Highway between Belize City and Benque Viejo del Carmen, and to a lesser degree in the South.

Source: adapted from Atlas of Belize, 5th ed. (Benque Viejo del Carmen: Cubola Productions, 1980) p. 21.

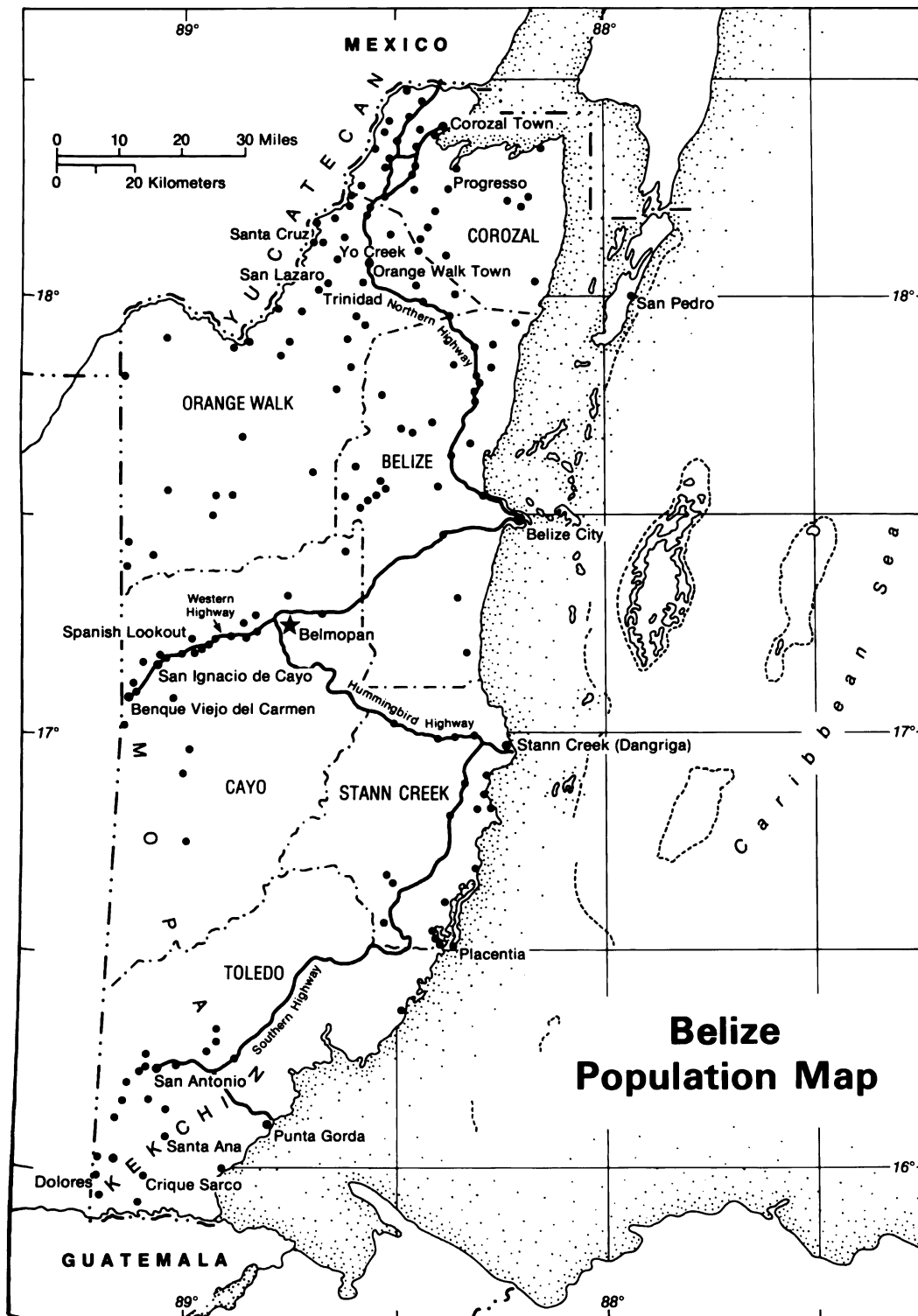


Figure 15

the shifting cultivation that is typical for rain forest people around the globe. With this slash and burn method they manage to raise enough corn, beans, some fruits and vegetables to feed their families and have a surplus to sell at the market. Many of them also grow rice and some sugar cane along with the beans as profitable cash crops. Almost every family has a few pigs and chickens and some also keep a cow.

Their homes are rather simple structures with a rectangular floor plan that usually has a division across the narrow side to separate the cooking from the sleeping area. Sometimes the two living spaces are entirely separated into two buildings. The sides are constructed of wooden poles and the roofs appear from the outside as plain thatch covers (Figure 16), but inside one can discern the intricately woven patterns of the palm leaves. They are very efficient in keeping out the torrential rains that are a definite feature of the local climate. The flooring is usually packed dirt floor and the small hearth is located directly on the ground.

For sleeping there are either simple bedsteads or hammocks. The hammocks are particularly comfortable in the hot humid weather, for even the slightest breeze can help to cool the body through the loosely chained loops. Whatever animals a family has will share the house and sleep right under the hammocks.

FIGURE 16

Maya Dwelling

This home is in Santa Cruz village on the Hondo River. The outside view does not show the tight weave of the thatch roof which provides very good protection from the rain. In the left corner a trestle table is visible which is in better view in Figure 17.

(Author's photograph).



Figure 16

FIGURE 17

Outside Kitchen

When the weather is nice much of the housework is done outside, such as meal preparation, washing, or doing dishes. This man was not interrupted in any of these chores, he just wanted to be in the picture.

(Author's photograph).



Figure 17

The water source may be a nearby creek, collected rain water or a well. Personal cleanliness is very important to the Maya and bathing is a daily ritual. Travelling down a jungle river in the afternoon, one can see parents and their offspring splashing about in a river bend, or meet them paddling home on the return from the family's favorite water hole.

Considering these environmental factors, it is not surprising that two major health problems of the Maya today as in the past are related to insect and helminth pests, namely malaria and dengue fever and intestinal parasites. Malaria had been waning for a while but in the last few years there has been a dramatic increase again in Belize.

The Kekchi Indians are the most isolated. Some of their villages are Crique Sarco, Dolores and Santa Ana in the extreme south (Figure 15). These are mainly reached by boat travelling from Punta Gorda along the coast to the mouth of the Moho or Temash River and then upstream. The trip to Crique Sarco, for example, takes about five hours by dugout canoe with an attached outboard motor.

The Kekchi women generally still dress only from the waist down. They wear long wide skirts and if they have a baby they may carry it in a wide band that is wound around the mother's forehead and rests on her back.

The Mopan women also wear long skirts and blouses that are gathered around the neck and sometimes have pretty embroideries. The Yucatecans in the north, however, mostly

wear plain short dresses.

But even if they adopt a more modern mode of dress, many Maya are still highly suspicious of modern medicine except for surgeries. For their traditional cures they rely heavily on extracts and infusions of plant materials that act as diuretics and diaphoretics. The rich flora of the jungle forest provides them with a large variety of medicines so that they can choose from a number of remedies for a wide range of ailments.

An additional health problem apart from fevers and intestinal disorders exists in the very limited diet which restricts their nutritional intake to few items. On the other hand, the chronic problems of industrialized societies, such as arthritis, arterio-sclerosis, peptic ulcers, or heart disease are much less evident.

The basis for just about every meal are tortillas, and some days tortillas represent breakfast, the main meal at noon, as well as supper, which in colonial English tradition is referred to as "tea" throughout Belize. Thus, breakfast is usually tortillas and coffee, the main meal may be beans or rice and beans, with tortillas and possibly some meat or fish, and tea is usually again tortillas with or without fried beans or sometimes egg, and as beverage tea or cacao. Meat is not an everyday part of dinner, but the men hunt and fish and sometimes deer, fish, gibnut (a rodent), chicken or pork may accompany the beans and tortillas. Meat or fish are served about once a week,

"twice a week, if we catch plenty." The larger portion of protein is provided by the corn and beans rather than by meat. The beans are mostly the red beans or sometimes black beans. The black variety is assumed to be even richer in iron than the red.¹ Vegetables and fruits are not consumed much apart from tomatoes and cabbage, and even there the tomatoes appear to be grown more for sale at the market than for personal use. They also grow some bananas, oranges and limes.

To prepare the tortillas the women boil the corn in white lime, grind it, mix it with water and then bake without benefit of seasoning (Figure 18). But more than enough zest may be derived from the chili peppers, another plant indigenous to the region and first cultivated by the Maya. These peppers are also a good source of vitamins A and C.

As in the past, many Maya women still visit the yerbatera, the traditional midwife, during pregnancy. They may see the nurse at the nearest Health Center for check-ups as well, but certain functions are only performed by the yerbatera. One function is called "anointing," for which the midwife applies some oil and then energetically massages the expectant mother's abdomen. Sometimes this is done just before birth and also again afterwards.

¹The researcher was unable to verify this information from nutrition text books, as iron content was listed for dried beans in general and not for individual varieties.

FIGURE 18

Grinding Masa

A Maya mother is grinding corn in preparation for tortillas, a staple of the Maya diet. The corn had first been boiled and was allowed to soak in the bucket on the left.

(Author's photograph).



Figure 18

The traditional custom at birth is that the woman is delivered at home by her husband. He makes a bed for her out of the bark of the cohune tree with a hole to drop all the waste underneath, such as the afterbirth, and covers it. Then he makes a fire next to the bed to heat a stone, wraps it and puts it onto her stomach. He also grinds some black pepper and parched cacao beans and mixes them with hot water. The new mother drinks this to heal her inside, and together with the hot stone, this is also meant to bring down any clots. Not long after this treatment the mother goes to bathe in the river. The husband may be assisted by the yerbatera or his mother, or the women may conduct the delivery instead of the husband.

The cacao, in addition to preventing clotting, is supposed to help bring down the milk. As theobromine, an ingredient in the cacao bean, is used in medical science as a vasodilator, this is not such a far-fetched idea. The internal treatment is augmented externally by "combing down" the breasts with warm orange water. Orange leaves are boiled in water, the breasts are washed with this solution and actually stroked with a comb in downward motion. When the milk does begin to flow it is manually expressed, but not given to the baby. At this point it is the early milk, colostrum, which is yellowish in color and therefore thought to be "spoilt and harm the baby." Thus, the baby is not put to breast until "the clean, white milk comes in, maybe one, two, or three days after birth."

In the meantime the baby is given anise seed tea. For this a small piece of cloth is shaped into a nipple, inside it are tied some anise seeds and garlic, it is boiled in water and then allowed to stand. When it has cooled down, it is put to the baby's lips and gently squeezed into the mouth. This procedure is repeated by holding the nipple again in the tea and letting it soak up some more liquid. Some mothers sweeten the tea with sugar or glucose, but others feel the slight sweetness of the anise seed is enough. This tea is given to clean out the baby's system of meconium. In pharmacology anise seed is known as an anti-choleric and carminative (for flatulence) and garlic has long been used for its anti-spasmodic benefit.

The yerbatera gives the baby daily navel treatments with oil and nutmeg, and she may also begin the "mal ojo" procedure. The weak and very young are especially vulnerable and thought to be particularly susceptible to the influence of the "evil eye" or "mal ojo." To protect a newborn from mal ojo, one squeezes a drop of the ruda plant leaf (Figure 19) into each eye, opened, on consecutive fridays "seven to heal and nine to overlook." That is, you do it seven fridays in a row to protect a child from mal ojo, but nine fridays if you want to provide the child with the power of the evil eye. This is quite a sinister effort, for if a person with mal ojo power looks at anything young or growing, like a baby up to about six months,

FIGURE 19

Ruda

The leaves of this plant are rubbed between the fingers and a drop of the juice is put into each eye of a baby on seven consecutive Fridays to protect him from the evil eye, but on nine Fridays to provide him with the power of "mal ojo."

(Author's photograph).



Figure 19

seedling plants, young animals like chicks, kittens, or puppies, these creatures will meet a very fast and unhappy ending, usually within twenty-four hours through sudden illness, unless they have been protected with the ruda plant, or the person with the mal ojo power holds them, touches them and strokes them lovingly.

Another form of protection is a red string tied around the wrist, and this is also supposed to ward off such diseases as gastro-enteritis. This belief can make mothers trusting to the point of carelessness.

The Maya Sample

The Maya mothers ranged in age from sixteen years to forty-one years, with a mean age of 25.5 and a median age of twenty-five years. The number of living children per mother ranged from one to eleven children with a mean of four children (Table 2). However, number of pregnancies per mother (including miscarriages and deceased children) ranged from one to fourteen with a mean of 4.6 pregnancies (see Table 3 for distribution of deceased children).

All Maya mothers were married, but one mother was living alone with her children, since her husband had left her.

Eighteen of the Maya mothers had spent between five and nine years in school with a mean of 6.6 years. One of the two remaining mothers could not remember how long she had been to school and the other said "not much." None of

TABLE 2
MAYA PARITY

Age in Years	Number of Living Children of Maya Mothers										
	1	2	3	4	5	6	7	11	Total		
16-19	2	1							3		
20-24	2	2							4		
25-29			1	4	3	1	1		10		
30-34						1	1		2		
35-39											
40-44								1	1		
Total	4	3	1	4	3	2	2	1	20		

TABLE 3
MAYA DECEASED CHILDREN

Age in Years	Number of Deceased Children of Maya Mothers (Incl. Miscarriages)			
	1	2	3	Total
20-24		1		1
25-29	3	1		4
30-34	1			1
35-39				
40-44			1	1
Total	4	2	1	7

the Maya mothers had attended school beyond primary education.

Only two of the mothers, or ten percent, could be considered to have an occupation. One of the two helped in the family's store and the other did occasional odd jobs and sewing.

The households numbered from three to thirteen members, and nineteen of the mothers lived in their own nuclear families. Only one household had two members in addition to the parents and children.

In relation to health care, the majority of the Maya mothers (70 percent) said they see a doctor or go to the health center if they are sick. Some of these women also consult a bush doctor in addition to a medical doctor. The other mothers depend on traditional medicine entirely.

When asked whom they saw for medical care during pregnancy, only one Maya mother said she saw a doctor once, but that she usually visits the yerbatera (traditional midwife). Most of the mothers (75 percent) saw the traditional midwife during pregnancy, either in addition to a doctor or nurse (60 percent), or exclusively so. One reason for seeing the yerbatera is for the very vigorous massages or "anointings" she gives pregnant women. But one mother thanked the nurse at a health center for the good anointing when the nurse took extra time in feeling the mother's abdominal area with her hands to check the

position of the fetus.

When asked why they seek out the yerbatera even though they already go to the health center, one answer was that it is very nice to have the yerbatera attending at birth because she will also help with some of the chores, such as washing, and "nurse does not wash."

Only one of the Maya mothers was delivered in a hospital, and three were attended by a local nurse. The majority (45 percent) were delivered by their husbands, with or without assistance from the mother-in-law or the yerbatera; six mothers were attended by the yerbatera alone. The midwife may also be referred to as "nannie," meaning a traditional midwife who has had some training in modern midwifery. The one remaining mother delivered her baby all alone.²

The Maya sample is rather homogeneous in terms of marital status, education, employment, nuclear family and the type of health care that the mothers seek during maternity. But there is a range in the mothers' ages and parity (number of children), and these two factors are linked: older mothers have more children.

²This was the woman whose husband had left, but she did not seem to think it extraordinary that she delivered her baby by herself.

Breast-Feeding

The breast-feeding/weaning history is presented in Table 4.

Seventeen of the Maya mothers (85 percent) did breast-feed for some time. Actually, eighteen Maya mothers started out to breast-feed (see Table 4), but one mother stopped after one week because she developed an infection with sores over her breasts. In all further discussion, the mother who discontinued breast-feeding after one week, will be included among the three Maya mothers who did not breast-feed for some time. Of the two mothers who never attempted to breast-feed, one gave inverted nipples as the explanation and the other mother's reason is unknown.

As Table 4 shows, nursing is the common mode of feeding infants, and if a Maya mother does not do so it appears to be more for health reasons (inverted nipples, infection) than for other factors, such as age, education, parity or employment.

A custom that is connected with the first few days of breast-feeding is Combing down the Breast. The interviewer learned of this practice when the sampling of the Maya mothers was already in progress. Due to the incompleteness of answers to this question, the relationship between combing down and breast-feeding cannot really be investigated among the Maya. However, three of the mothers who started to breast-feed were asked if they applied the combing down treatment and all three answered yes.

TABLE 4
MAYA BREAST-FEEDING/WEANING HISTORY

		AGE IN MONTHS												
BABIES		0	1	2	3	4	5	6	7	8	9	10	11	12
BABY	1A	NO 3	F									I		I
"	2	F				CUSTARD G							G	I
"	3	GL								ORANGE VEG EGG+COFFEE				X
"	4	GL GP				MASA+EGG JUICE								X
"	5									BANANA EGG		MEAT	X	
"	6A	2										X		
"	7	F ₁				RICE CEREAL				VEG+SOUP POTATO		X		
"	8					IM				MASA+EGG FRUIT	I			
"	9					CONDENSED MILK	4			MASA				X
"	10	NO GP	F ₂			MASA				BEAN JUICE				
"	11		-IF			JUICE G				YOLK CEREAL	I			
"	12					COFFEE COND. MILK				X				
"	13													X
"	14	NO								X				
"	15	F				CEREAL GI								
"	16	F ₄	6			6				X				
"	17	F ₁								X				
"	18	F ₁								X				
"	19A	F ₃	2			CORN COND. MILK				X				
"	20	NO								X				
		KEY:												
		A: ANISE SEED TEA												
		GL: GLUCOSE SINCE BIRTH												
		GP: GRIPEWATER " "												
		F ₃ : FORMULA; THREE BOTTLES PER DAY												
		M: INTRODUCTION OF WHOLE MILK												
		G: EPISODE OF GASTRO-ENTERITIS												
		-----: BREAST-FEEDING												
		-----X: " CONTINUED BEYOND TIME OF INTERVIEW												
		-----I: " ENDED AT THAT AGE												
		3-----: THE DAY AFTER BIRTH WHEN BREAST-FEEDING BEGAN												

KEY:

A: ANISE SEED TEA

GL: GLUCOSE SINCE BIRTH

GP: GRIPEWATER " "

F₃: FORMULA; THREE BOTTLES PER DAY

M: INTRODUCTION OF WHOLE MILK

G: EPISODE OF GASTRO-ENTERITIS

-----: BREAST-FEEDING

-----> " CONTINUED BEYOND TIME OF INTERVIEW

-----I: " ENDED AT THAT AGE

3-----: THE DAY AFTER BIRTH WHEN BREAST-FEEDING BEGAN

THE AGE OF A BABY IS INDICATED BY A VERTICAL LINE ON THE RIGHT

They delayed breast-feeding for a minimum of two days and fed the babies anise seed tea during that period. Of these three babies, one stopped breast-feeding after ten months, the second baby was ten months old at the time of the interview and still nursing, and the third baby was only two months old at the time of the interview, but also continuing to breast-feed. If these three mothers are any indication, then the practice of combing down and at the same time delaying breast-feeding does not appear to have a limiting effect on the eventual duration of breast-feeding.

Nursing in itself is not an issue among the Maya, but an important aspect of breast-feeding is the extent to which mother's milk represents the baby's food intake. This question is examined in the following section.

The Weaning Process

Another custom of which the interviewer learned only after the Maya sampling was well under way, is that of regular glucose or sugar water feedings for infants. This information also is not available for the entire sample. Six mothers were asked whether they give their babies glucose or sugar water and four of the mothers did not. This would indicate that thirty-three percent of the Maya do feed their babies glucose water, but this is based on a subsample of the Maya. The two mothers who answered yes had been giving glucose water to their babies since birth. One mother (#3) gave one teaspoon three times per day, and

the other (#4) gave three ounces twice a day (see Table 4).

Formula or Milk other
than Breast Milk

Nine babies were on formula, three of them exclusively and six of them supplementary since birth. One more baby was on daily supplementary feedings of condensed milk. Thus, fifty percent of the Maya babies were on formula or milk other than breast milk since birth.

Ten babies were breast-fed without any other supplementary feedings. However, two of these babies were given daily glucose feedings. Therefore, forty percent of the Maya babies were exclusively breast-fed without any formula or glucose feedings. This is possibly a high percentage since not all of the mothers were asked about glucose feedings. The actual percentage of babies exclusively breast-fed is probably smaller.

Once the Maya mothers had established a certain feeding pattern, either breast-feeding or bottle-feeding or a combination of the two, they tended to stay with it. At age one month, one additional baby started formula feedings but continued to breast-feed, and another was introduced to condensed milk porridge. At age two months, one baby began to eat "masa," a corn cereal. The first baby to stop breast-feeding did so at age four months; until then he was exclusively breast-fed without any supplementary feeding.

As parity was the only variable in which the Maya mothers differed, it was compared with breast-feeding and

bottle-feeding, respectively. Seventy-one percent of the low-parity mothers (two or less children) and ninety-two percent of the high-parity mothers did start to breast-feed their babies. Thus, a larger percentage of the mothers with three or more children did breast-feed. However, this difference was statistically not significant at the .05 level (chi square = 1.55 compared to the threshold value of 3.84).

An almost equal percentage of mothers (forty percent of the low-parity compared with forty-two percent of the high-parity mothers) supplemented breast-feeding from the start. And here the high-parity mothers gave the bottle more frequently on a daily basis than did the low-parity mothers.

The weaning process of the Maya sample during the first four months is summarized in Figure 20.

Weaning and Gastro-Enteritis

It is difficult to diagnose gastro-enteritis without laboratory analysis of stool samples to determine, for example, type and number of bacteria present, or loss of electrolytes. But in the advanced stage of the disease the stools frequently contain blood, mucus and pus which can be observed by the mother.

In this study a case of gastro-enteritis is defined as such if the baby had numerous loose green stools with blood and/or mucus and/or pus and with or without vomiting.

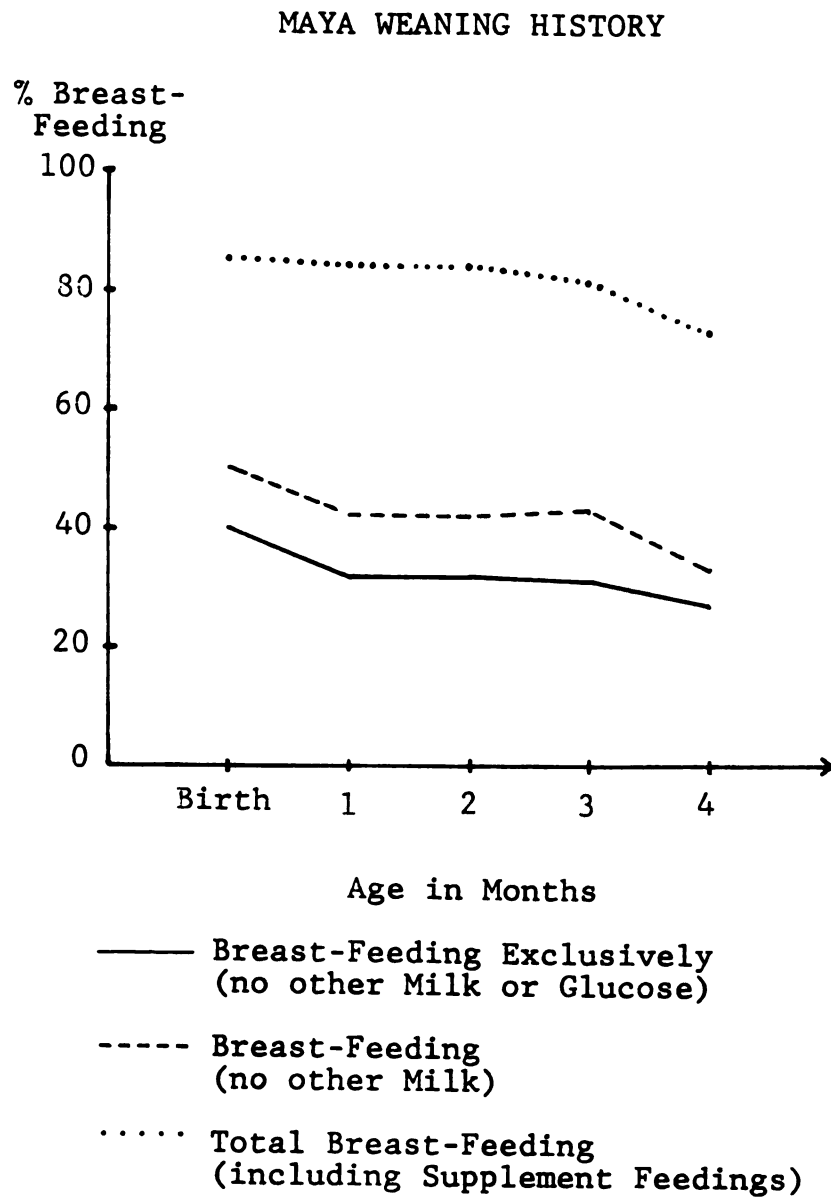


Figure 20

This does not include simply loose stools, even if a baby had "many, many every day" or "went out every minute." If a mother mentioned a bout of diarrhoea, the interviewer asked her to describe the episode in detail, in order to determine whether the loose stools may have been a mild case accompanying a cold or teething.

There were seven gastro-enteritis cases in the Maya sample. Four of these babies were still breast-feeding at the time of incidence, but none of them exclusively. Six of them had been on supplementary feedings since birth, and the remaining one had been introduced to condensed milk prior to illness (Table 4).

The number of cases mentioned refers to the number of babies who had gastro-enteritis, not to the number of episodes in the sample. If a baby had more than one episode, this analysis takes into account only the first one. However, all episodes are indicated in Table 4.

Profile of the Creoles

The Creoles are preferably urban dwellers and the majority of them live in the old capital, Belize City. Their most frequent occupations are in administration, business offices, and skilled professions. As the Creoles for historic and cultural reasons do not do much farming, and as there is also little industry in Belize, they often find it very difficult to enter the work force at home. Consequently there is much migration to the United States,

especially to New York, Chicago, Los Angeles, New Orleans and Miami.

Among other points this has far-reaching implications on family life in Belize. In many households the mother is the head while the father is away trying to improve his family's lot. Financially the situation becomes better once he finds work in America and sends money home. An American salary goes a long way in Belize where life is much cheaper than in America, except for groceries that to a great extent are imported from the United States.

But the material benefits are often dearly paid for by the disintegration of the family. The men usually go north with the idea of having their families follow as soon as possible. However, the United States does not have an open door policy and it is difficult and time-consuming to become a citizen. In many cases the separation becomes too much of a strain on the marriage and it breaks up. From there, discontinuation of financial support for the family in Belize is often just a matter of time.

Sometimes then the mother leaves the children in the care of the grandmother or another relative and she herself goes to America for employment. But generally, the mothers somehow make do at home so that the children have at least one parent with them.

Even without a father's move to America there are many households that are headed by single women. This may be partly due to the great out-migration of men and the

ratio of fewer males to females. One result of a fatherless home is usually that the mother and children will move in with some other family members in order to save on housing; and one finds that many Creole households are much larger than would be indicated by the number of children a mother has. The size of the house very often does not really accommodate that large a group and extremely crowded conditions are a frequent outcome.

A benefit of this situation is that an aunt or a cousin may take care of the children and the meals while other adults in the family are working. Many mothers in Belize City are employed. They work at the banks, the hospital, health centers, schools, various government offices or they are self-employed, for example, as shopkeepers. A few hundred women are employed at a factory outside Belize City where they sew shirts and jeans that are sold in America under the "Dickey" label.

The houses are usually constructed of wood boards and are built on stilts (posts) as the heavy downpours during the rainy season often inundate the already swampy ground and cause a slow run-off. Having the living quarters high above the ground is also a definite advantage during the floods that follow the occasional hurricane. If the area between the stilts on the ground level is walled in, it usually houses a shop of some sort, storage space, wash-room, or possibly a large cement tank for rain water and, in some cases, the space is a carport.

Most houses are built in close proximity with narrow strips of yards separating them. These are often enclosed by slat fences. The small size of the yards does not preclude large trees growing there, like almond trees or coconut palms. Flowering shrubs, such as hibiscus, add bright notes of color nearly everywhere. Many Creole women take great pride in their house plants and flowers and seem to be forever exchanging cuttings; but their green thumb efforts do not extend to vegetable gardening.

In a number of yards the most conspicuous object is a huge wooden vat. This holds precious rain water which people prefer for personal consumption even if they do have piped water in their homes (Figure 21).

But it is by no means every house that has a water tank or piped water. Families without this convenience have to get their water in buckets or large bottles from a public faucet, "the pipe," that one finds standing along the streets about every block or every other block (see Figure 22). This is very often the job of children and they devise all sorts of ingenious ways to carry the heavy containers home, such as two little boys lining up six plastic gallon jugs on a broomstick between them or another pushing a whole battery of containers home on a wheelbarrow. If the rains are late and the vats run dry, or the water pump cannot run because of a blackout then a family cuts down its water usage to the bare necessities.

FIGURE 21

Belize City Home

This photograph shows a typical home in Belize City. The house is constructed of wood boards with a corrugated metal roof. The upper floor is reached from outside stairs and a veranda which provides a convenient drying space for the laundry. A pipe leads from the eaves trough to a wooden vat next to the house where rain water is collected for drinking purposes. A fence separates the home from the street and the drain running alongside. This scene, as Figure 10, was taken on Victoria Street.

(Author's photograph).



Figure 21

FIGURE 22

Public Faucet

A young boy is getting water from the "pipe" which provides city water for those households that do not have piped water directly in the home or a vat to collect rain water.

(Author's photograph).



Figure 22

Power blackouts are quite usual and necessary under the existing circumstances, where Belize has to import its energy. The city rotates the blackouts among the various sections of the town in order to conserve energy and to allow repairs on the equipment when it breaks down.

While some houses have flush toilets with septic tanks and some are connected to a piped sewage system, there are two other methods of sewage disposal that are common in Belize City. One is the latrine or outhouse and the other is the bucket system whereby somebody, usually an old lady, makes her rounds in the mornings with a bucket to collect a family's wastes and disposes of it in one of the many canals that are in Belize City.

Garbage collection by the city is not done from house to house. Instead there is a spot along the street in each block--and this often near the standpipe--where people take their trash to have it removed by the city (Figure 23). For lack of vehicles and lack of sufficient workmen, this cannot always be done regularly.

This, together with the raw sewage in the canals and the open drains that line many streets, constitutes a major environmental health hazard. In the heat that exists year-round bacteria easily multiply and just as easily become airborne and get inhaled. Children play near the drains and if a ball falls in they will possibly kick it around a few times to get the worst mud off before they resume their play. Or one drops a fruit or a cookie and

FIGURE 23

Water and Refuse

The public garbage collection bin is often located near the standpipe where many people get their water. As these bins service at least one block, the refuse quickly piles up and becomes an ideal environment for bacteria and parasites.

(Author's photograph).



Figure 23

picks it up again to finish it unless the mother is nearby to stop him. This is the way of children everywhere, but in a colder climate it does not present the same danger. Thus, intestinal disorders and parasites are a major threat to children; and crowded conditions enhance that threat.

Under these circumstances of a difficult water supply, less than ideal sanitation and frequently being the sole provider, mothers have an immense task to keep their children fed, bathed, and in clean clothes. Laundry is done by hand and almost on a daily basis. Most women get up very early in the morning and wash for an hour or so before they put breakfast on the table.

Getting the meals also requires a fair amount of time. Shopping is usually done every day and most dishes are prepared from scratch. Belize City has a daily market, open-air as well as in a hall by the waterfront where one can find beef, chicken, fish, and eggs as well as fruits and vegetables. There is another, smaller market on the opposite end of town near Belcan bridge, so that one does not have to travel clear across the city to find some fresh produce. Downtown, there are two miniature editions of American supermarkets and, in fact, the groceries sold there are almost all American and priced accordingly. Numerous small neighborhood stores offer a limited range of produce or groceries, and often one can smell freshly baked bread or the aroma from frying "panades" (individual meat or fish pies) coming from little shops along the streets.

The Creole diet is varied and their staple is rice, or rice and beans. The Creole have also adopted a number of dishes from other ethnic groups in Belize. Breakfast may be bread or tortilla. The popular flour tortillas are either eaten just buttered or split and filled with egg or cheese. Dinner is fish or meat with rice or rice and beans, maybe with some sliced tomatoes, cabbage, or raw shredded carrots, and very likely some ripe fried plantain slices. The rice is not always just plain boiled rice; often it is cooked in coconut cream instead of water. For this, one cracks a matured coconut with a machete and grates the white meat which is then squeezed through a strainer with some water. The milky white liquid obtained this way is used to cook the rice and it gives the grain a particular, somewhat sweet flavor. Apart from that it also increases the nutritional value of the rice. Soups and stews are also regular dinner fare, and these may be either the Carib style "sere" with "fufu" (plantain dumplings), a hotter Mestizo variety "relleno," or a delicately flavored "African stew" with chicken gizzards and peanut butter. Stewed red beans are a frequent side dish and often cooked with pigtail for added flavor.

Tea is either sandwiches or tortillas with egg, cheese, lunchmeat or fried beans, or as a special treat, panades or tamales. Beverages are mainly reconstituted powdered milk or diluted evaporated and condensed milk for children, coffee, tea, or a glass of milk for adults.

Fresh milk is also drunk and readily available in the city, but it is more expensive. With dinner there is usually a freshly squeezed juice from orange, lemon, or lime, diluted with water (including the orange juice) and sweetened with sugar (again including the orange juice). A special drink at teatime is Milo or a chocolate milk shake, both prepared from a cocoa powder mix. Creoles eat citrus fruits quite regularly and have an orange or grapefruit often at breakfast or pick one during the day from a vendor on a street corner. Citrus fruit is grown in Belize and practically available year-round. It is unusually sweet and is prized for its flavor among the Commonwealth Countries.

Many women regularly take a tonic, such as Geritol, but a more popular one seems to be "3-SSS," a mixture of various minerals. Another common practice is to drink a bitter tea once a month "soroci," which is said to aid the cleansing process of menstruation.

When in need of medical care, Creole women generally take advantage of the free medical care provided through the Public Health Care Clinics. Only a few women appear to see a bush doctor. However, at the market hall there is a "bark lady" who can recommend various teas from barks, leaves, roots, and blossoms for different digestive troubles or fevers. Her remedies are rooted in the indigenous folk medicine. Some women also see the "obeahman," but more for social problems, such as affairs of the heart, than for physical ailments. Nevertheless, the cures he

prescribes are obtained at the local drugstores.

The Creole women seem to continue their familiar diet when they become pregnant and to go to the Health Centers for obstetric care even though some women go to a traditional midwife for anointings during pregnancy. Most mothers have their babies at Belize City Hospital and are generally delivered by a nurse who has had modern midwifery training. Once they get home from the hospital, some women drink soroci tea or "Spanish medicine" (an herbal tea) and a number do treat the baby's navel with nutmeg. But that appears to be the extent of traditional birth-related practices.

A Creole mother and child can be seen in Figure 24.

The Creole Sample

The Creole mothers ranged in age from sixteen years to thirty-nine years with a mean of 23.6 and a median age of 22.5 years. The number of living children per mother ranged from one to thirteen with a mean of 2.5 children (Table 5). However, the number of pregnancies per mother (including miscarriages and deceased children) ranged from one to thirteen with a mean of 2.8 pregnancies (see Table 6 for distribution of deceased children).

As far as marital status is concerned nearly one third of the Creole mothers (32.8 percent) lived in common-law marriage with the father of the baby at the time of the interview. The remainder of the sample consisted of almost

FIGURE 24

Creole Mother and Child

This young woman has three other children besides the little girl with her here. Apart from looking after her own family and running a drugstore, she also takes care of boarding students who come to Belize City to attend school. This picture was taken on Cay Caulker where she spent one rare free day.

(Author's photograph).



Figure 24

TABLE 5
CREOLE PARITY

Age in Years	Number of Living Children of Creole Mothers									
	1	2	3	4	5	8	13	Total		
16-19	4	8						12		
20-24	13	9	5	3				30		
25-29	1	2	4	5	1	1		14		
30-34	1		2		2			5		
35-39			1	1			1	3		
Total	19	19	12	9	3	1	1	64		

TABLE 6
CREOLE DECEASED CHILDREN

Age in Years	Number of Deceased Children of Creole Mothers (Incl. Miscarriages)			
	1	2	3	Total
20-24	1	2	2	5
25-29	5	1		6
30-34				
35-39	1			1
Total	7	3	2	12

equal proportions of mothers who were legally married, single, or had a visiting relationship with the father of the child. Some of the mothers in the last group termed this "borrowing," meaning that the father was married to somebody else.

For the sixty-four Creole mothers interviewed, completed number of years in school ranged from seven to sixteen years with a mean of 10.8 years. In Belize eight years of school constitutes primary education. One third of the mothers (35.9 percent) had primary education, and two thirds (64.1 percent) had primary education and at least some secondary education. Of the latter, 14.1 percent had additional higher education beyond completion of High School.

Twenty-three of the Creole mothers (35.9 percent) were employed and three of these were self-employed. Among the occupations listed were seamstress, accountant, secretary, waitress, teacher, clerk, government employee, domestic, druggist, and factory worker.

The households numbered from three to twenty-five members with a mean of 6.98. Only twenty-two of the sixty-four mothers (34.4 percent) lived in a household that was composed of the mother, her legal or common-law husband and her children. Thirty-five mothers lived in households that exceeded, in many cases by large numbers, the size of her own nuclear family. For example, a young woman and her husband lived in a family of seven even though they only

had one baby.

Sixty-three mothers delivered their babies in the hospital, and the one mother who delivered at home was attended by a midwife who had been trained in modern midwifery. The hospital stay for the mothers who delivered at hospital ranged from four hours to one month with the largest proportion staying only one day (Table 7). Four mothers spent only a few hours at the hospital, but two mothers remained for one month. All of the mothers who stayed at the hospital in excess of three days did so because their babies were delivered by Caesarean section or because complications arose following delivery. One mother entered the hospital five days preceding delivery due to high blood pressure and another because her water burst five days before birth. Both mothers were released one day after delivery. The distribution of length of stay in hospital for the Creole sample is presented in Table 7.

Thirty-three mothers (51.6 percent) said they seek out a doctor when they are sick, the others said they go for help to the Health Center. However, some of the mothers added that they only do that if they are "very, very sick" since the private physician has to be paid and the visits at the Clinics involve long waiting periods. When asked whom they saw for medical care during pregnancy, only eighteen mothers (28.1 percent) said they went to a doctor, the other forty-six mothers said they went to the Health Center. Independently of a physician's care or the

TABLE 7
 LENGTH OF HOSPITAL STAY
 OF CREOLE MOTHERS

Length of Time	Mothers	
	Number	Percent
Hours	4	6.4
1 Day	24	38.1
2 "	20	31.7
3 "	5	7.9
4 "	2	3.2
5 "	1	1.6
6 "	2	3.2
7 "	3	4.8
1 Month	2	3.1
Total	63	100.0

Maternal Clinic at the Health Center, eight mothers (12.5 percent) also saw a traditional midwife while pregnant for anointings.

Twenty-nine mothers drink soroci tea regularly in connection with their period, but most of them discontinue this practice during pregnancy. However, six of these mothers did continue to drink soroci tea while pregnant and four of them had haemorrhaging problems with delivery.

Fifteen mothers drank soroci tea after delivery, nine drank Spanish medicine and three took Castor oil to help cleanse themselves out.

Only one Creole mother said that she ate white mud while pregnant.

Breast-Feeding

The breast-feeding/weaning history of the Creole sample is presented in Table 8.

Of the Creole mothers, seventy-seven percent (49/64) did breast-feed for some time. Twelve mothers (18.8 percent) never really attempted to breast-feed and the remaining three (4.7 percent) did try briefly between one and three weeks but were unsuccessful. Two mothers gave "blind" or inverted nipples as the reason for not nursing. A few of the other mothers explained the "baby did not want to," but most of them were rather vague as to why they did not breast-feed.

TABLE 8
CREOLE BREAST-FEEDING/WEANING HISTORY

		AGE IN MONTHS												
BABIES		0	1	2	3	4	5	6	7	8	9	10	11	12
BABY 1	GL M				CER*YOLK			MEAT						I
" 2	GL F		CEREAL		VEG*VEG			FISH						I
" 3	F ₁		JUICE		EGG		CEREAL	VEG*EGG						I
" 4	F ₄						G		G CER. G			FISH*JUICE		I
" 5	GL F ₂			JUICE	EGG*FISH									I
" 6	GL		EBULL		EGG	MEAT	SUGARWATER					CER.		I
" 7	GL		F ₁		JUICE	VEG	G							I
" 8	GL		M ₂					CER*JUICE		CUSTARD				I
" 9	GL		F ₁		F ₄			MEAT				FISH		I
" 10	GL				JUICE	EGG	MEAT							I
" 11	GL				CEREAL			VEG*EGG						I
" 12	GP		IF	G CEREAL	JUICE		POTS	MEAT*FIS						I
" 13	SU				F ₃	CEREAL								I
" 14						MEAT		F EGG						I
" 15						JUICE*POTS		F FISH						I
" 16	GL		PRICECER		JUICE		FISH	VEG*EGG						I
" 17	GL		F ₃ -G		CER	YOLK	VEG	COND SM						I
" 18			JUICE F ₃		CEREAL		MEAT CUST							I
" 19	GL		F ₂		JUICE	EGG	MEAT CER							I
" 20	GL		F ₄		JUICE		VEG*FISH							I
" 21	GP				CER	YOLK	MEAT*VEG							I
" 22	GL		F ₁		JUICE	CER		VEG						I
" 23	GL				JUICE	VEG	EISH	MEAT						I
" 24	GL		F ₄		ORNG	CER	VEG							I
" 25	GL		F ₁			CER	ORNG	FISH						I
" 26	GL		F		M CER	CUSTARD	MEAT	VEG						I
" 27	GL		F ₃		JUICE	GERBERS	FISH							I
" 28			F ₄		JUICE	EISH								I
" 29	GP				CER	MEAT*E								I
" 30			F ₂		CUSTARD		G							I
" 31	GP		IF		JUICE	M	VEG*FIS							I
" 32	GL		F		G		MEAT EGG							I
" 33	GL					MEAT*VEG	CER							I
" 34	GL		F ₄		CEREAL		FISH							I
" 35	GL				JUICE									I
" 36	F				CEREAL									I
" 37	GL		F ₂		JUICE	CEREAL								I
" 38	GL		M ₃			CEREAL								I
" 39	GL		F ₁ -G		JUICE	EGG*E								I
" 40	GL		F ₁		JUICE									I
" 41	GL		M		JUICE	CUST								I
" 42	GL		F CER		JUICE									I
" 43	GL		M ₁											I
" 44	GL		FLABG		JUICE									I
" 45	GL		F ₂		JUICE	CER								I
" 46	GL		F		JUICE									I
" 47	SU		JUICE		G									I
" 48	SU		F		G	JUICE								I
" 49			M ₁		JUICE									I
" 50	GL				IFG	M								I
" 51	GL		F CEREAL											I
" 52	GL				JUICE									I
" 53	GP				JUICE	F ₄								I
" 54	GL				CEREAL	G								I
" 55			F ₁		JUICE									I
" 56	GL		F ₃											I
" 57			M ₃		CUST									I
" 58	GL		M ₁											I
" 59	GP				M ₁									I
" 60	GL				F ₃	JUICE								I
" 61	GL		M ₄											I
" 62	GP													I
" 63	GP													I
" 64	GP													I

KEY:

- GL: GLUCOSE SINCE BIRTH
- GP: GRIPEWATER " "
- SU: SUGARWATER " "
- F₃: FORMULA; THREE BOTTLES PER DAY
- M: INTRODUCTION OF WHOLE MILK
- G: EPISODE OF GASTRO-ENTERITIS
- : BREAST-FEEDING
- : CONTINUED BEYOND TIME OF INTERVIEW
- I: " ENDED AT THAT AGE
- THE AGE OF A BABY IS INDICATED BY A VERTICAL LINE ON THE RIGHT

In the following analysis of six factors related to breast-feeding, the twelve mothers who did not attempt to nurse and the three who tried unsuccessfully will be treated together as a total of fifteen mothers who did not breast-feed for some time.

In terms of marital status, education, parity, and length of hospital stay, there was little difference between the mothers who breast-fed and those who did not.

Nuclear family and employment appeared to have a slightly stronger influence. Eighty-six percent of the mothers who lived in a household comprising the mother, father, and children (19/22) did breast-feed as compared to seventy-one percent of the mothers who lived in different family situations (30/42). This difference was not statistically significant at the .05 level (chi square = 1.796 compared to the 3.841 threshold value).

There was a more pronounced difference between employed and unemployed mothers in beginning breast-feeding. Eighty-three percent of the unemployed mothers (34/41) did breast-feed for some time compared to sixty-five percent of the employed mothers (15/23). However, this difference also was not statistically significant at the .05 level (chi square = 2.56 compared to the threshold value of 3.841).

When questioned how they manage to combine breast-feeding with employment, a number of the mothers explained that they go home over the noon break to nurse the baby.

Since Belize City is not a large sprawling urban community, this is easily possible, and employment is less of a deterrent in breast-feeding than it might be in a city the size of Chicago or Los Angeles.

Four Creole mothers said they practice combing down the breast with orange water. One of them had just learned the custom in hospital from a Mestizo mother there who delivered her baby at the same time as the Creole mother. The other three mothers who were familiar with this custom said they learned it from their mothers and grandmother. But these three nevertheless tried to breast-feed the same day the baby was born.

The Weaning Process

For many Creole babies the first food is glucose rather than breast milk. Forty-two of the babies were given glucose water and three were given sugar water on a daily basis since birth. Together the forty-five babies represent seventy percent of the Creole sample that were given some form of sugar in addition to the lactose present in the breast milk or to whatever sugar was contained in the various formulas that were being fed to the babies. The amounts given ranged from one ounce (one baby) to twenty-four ounces (one baby) per day. Seven mothers did not say how much glucose or sugar water the babies were being given. The distribution of glucose feedings is presented in Table 9.

TABLE 9
CREOLE GLUCOSE DISTRIBUTION

		Amount of Glucose or Sugar Water in Ounces											Total
		1	2	3	4	5	6	8	9	12-16	24	Unknown	
Number of Babies	1	4	8	7	2	3	4	4	6	2	1	7	45

Formula or Milk other
than Breast Milk

Twenty-eight babies were on formula, either exclusively or as a supplement to breast-feeding, before they were one week old. An additional six babies were on reconstituted powdered, evaporated, or cow's milk either exclusively or as a supplement, before one week of age.

In other words, fifty-three percent of the Creole babies (34/64) were either completely off the breast or in the process of being weaned before they were one week old.

Forty-seven percent (30/64) were fed only breast milk up to age one week without supplementary formula or other milk feedings. However, eighteen out of these thirty babies were fed glucose or sugar water on a daily basis in varying amounts.

Thus, only twelve babies, or nineteen percent, were exclusively on breast milk up to age one week and received no glucose or sugar water, no formula or other milk. Two of these babies were only two weeks old at the time of the interview. Of the remaining ten who were exclusively breast-fed up to age one week, five were introduced to formula or other milk as a supplement, and one to other milk as a substitute for breast milk at or before one month of age. Therefore, only seven percent of the babies were fed nothing but breast milk at age one month.

As with beginning breast-feeding, the variables parity, education, nuclear family, and length of hospital

stay were not very strong indicators of early or late weaning, respectively. Even though a larger number of the low-parity mothers, of the secondary education mothers, and of the non-nuclear family mothers weaned earlier, these differences were not statistically significant.

In terms of weaning, length of hospital stay made the least difference, even though initially a larger percentage of mothers who had spent three days or more at hospital did breast-feed. Almost equal proportions of mothers from both groups had their babies weaned at the two and three months intervals. It appears that the efforts by the nurses at the hospital to convince mothers to breast-feed may have an initial effect in getting mothers to at least begin breast-feeding. But whatever relationship may exist between length of hospital stay and breast-feeding, it seems to have no delaying influence on early weaning among the Creole mothers.

However, marital status and employment did make a significant difference in early weaning. At age two months, thirty-three percent of the single mothers who had started to breast-feed had their babies fully weaned. Only 4.5 percent of the married mothers who started to breast-feed stopped at two months of age. This difference was statistically significant at the .05 level (chi square = 5.68 compared to the threshold value of 3.84).

At age four months, the percentage of weaned babies among the married mothers was close to that of the single

mothers. Thus, it appears that marital status has a significant impact on early weaning up to and including three months old, but not for babies weaned a month or two later.

Employment did not make a significant difference in weaning until three months of age. At that interval one finds that fifty percent of the employed mothers and sixteen percent of the unemployed mothers had their babies fully weaned (chi square = 4.421). One explanation for this may be that more mothers returned to work as the babies approached three months, and that some of the others who had already returned to work but maintained breastfeeding felt increasingly inconvenienced by trying to do both.

The weaning process of the Creole sample during the first four months is summarized in Figure 25.

Weaning and Gastro-Enteritis

There were seventeen gastro-enteritis cases among the Creole babies. Age at first incidence ranged from three days to nine months. Nine of these babies had been fully weaned and eight were still on breast. However, seven of these eight were in the process of being weaned, and only the baby who was three days old at incidence was still exclusively breast-fed; apart from nursing, his mother also started to give him one teaspoon of gripe-water three times a day when she brought him home from the hospital at two days old (baby #64 in Table 8).

CREOLE WEANING HISTORY

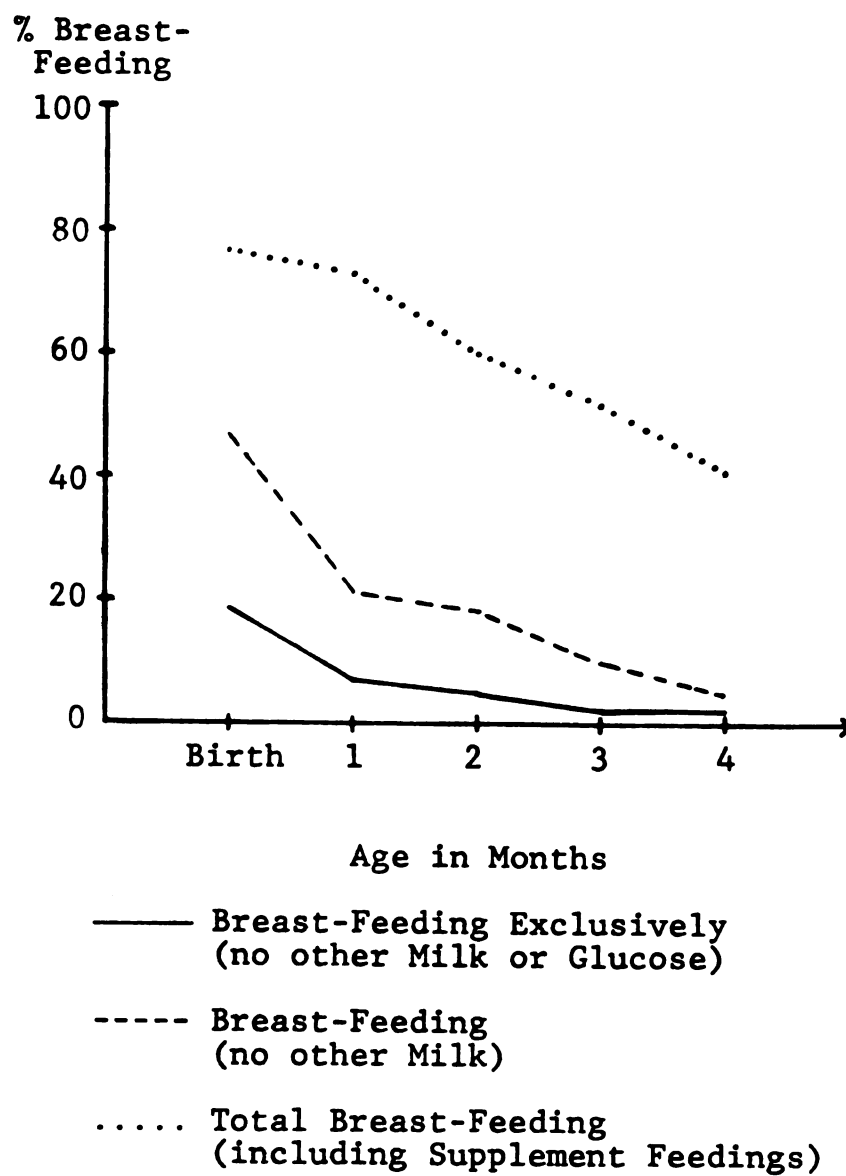


Figure 25

Profile of the Caribs

The Caribs (Garifunagu) are concentrated in two communities mainly in Belize, Stann Creek Town, also known as Dangriga, and Punta Gorda Town, generally referred to as P.G. (Figure 15). Dangriga is the capital of Stann Creek District and P.G. that of Toledo District. Because of lack of employment in these two districts, more and more of the Caribs are moving to other areas of the country, such as Belize City and to Orange Walk in the north where they work in the sugar industry. Like other Belizeans, many Caribs also migrate to North America for work. But for the majority home is in the south along the coast between Punta Gorda and Dangriga. There is a strong African element in their culture and this is particularly evident in their music and dancing and some of their foods.

Dangriga is about thirty-five miles, as the crow flies, from Belize City. But since most of the land between the two towns is mangrove swamp (Figure 1), one has to travel on the Western Highway from Belize City to Belmopan, and then south on the Hummingbird Highway to Dangriga, altogether about a hundred miles. To continue on to Punta Gorda, one travels another ninety miles on the Southern Highway. The entire trip from Belize City to Punta Gorda, 190 miles, takes eight to nine hours by bus, since the Southern Highway is mostly a dirt road and the Hummingbird Highway curves through the foothills of the

Cockscomb Range. In the past there existed scheduled boat services between Belize City and Punta Gorda, but these have been discontinued.

Due to heavy rains during the greater part of the year, the Southern Highway becomes frequently flooded and impassable. The only consistent transportation between Punta Gorda and the rest of Belize is by small airplane. Thus, Punta Gorda is by circumstance much more dependent on the immediately surrounding land for its foodstuffs than, for example, Belize City.

The Caribs have a strong fishing culture and due to the coastal location, fish is readily available and much more often the main dish than meat. But either way, the fish or meat portion is generally not the biggest part of the meal. That distinction belongs to the accompaniment, rice or "ground provisions" (root crops). Both of these foods are grown in Toledo District.

Market days, particularly Saturdays, bring many Indians into town from the outlying villages. They come either by truck or boat and sell their produce, such as tomatoes, limes, beans and corn. The most common fruits are oranges, bananas and plantains. Plantains look very much like bananas, but are larger, starchier and less sweet. They are a good source of vitamins A and B. However, they are generally eaten like a vegetable rather than as a fruit. They are most popular fried, but also served boiled or baked.

A delicacy among vegetables in this region is "cohune cabbage". For this the heart or the marrow of the palms is used and so this is by no means an everyday dish.

Apart from the Mennonites, the Caribs are much more likely to use root crops than any of the other Belizean people. Losonczi stated "for the Caribs, the cassava is identified with living and with the God, and the attitude toward the staple is religious" (Losonczi, 1958: 207).

The cassava roots look like elongated sweet potatoes, but their flesh is more cream colored than orange. It is a starchy food and frequently cooked in stews and soups.

Another use of cassava is to make it into a flour. For this, one grates the root, washes it and squeezes it through a cloth. The water is permitted to stand for a day or two and the settlement from it is dried in a pan in the sun for about three days. Except for its high caloric content all other nutritional value is gone from the product at this point. But it yields a fine white, easily digestible powder, the cassava starch, which is then used to make cassava bread, also called "Carib bread" by other Belizeans (Figure 26).

Cassava is furthermore an important early baby food among Carib mothers. It is served like a cereal and called "lab." For cassava lab one mixes the starch with a little sugar and salt and some liquid, usually water, or diluted evaporated or condensed milk. However, one mother said "limejuice is best." Lab is also made with cornflour.

FIGURE 26

Carib Bakery

The young Carib woman is transferring freshly baked bread from the oven at right to cool under a towel. She is not baking the traditional cassava bread at the time but instead small loaves of yeast bread and "buns" which are made of sweeter dough and shaped in a decorative form. The oven has a wood fire underneath as well as above the baking chamber; the top fire is lifted off to remove the bread.

(Author's photograph).



Figure 26

One way of preparation for this dish is to boil a cinnamon stick in water till it is soft, strain it and then mix corn flour into it with a pinch of salt. Any lab may be flavored with cinnamon or nutmeg, sugar, and sometimes given with milk.

As in other Belizean areas, many Carib homes also are built on stilts or "posts." This is particularly important in Toledo District which has the most abundant rainfall in the country. The building material is mostly wood and the roofs are usually corrugated sheet metal or thatch covers. Water supply is provided through wells, rain water or public pipes which one can tap from the ubiquitous spigots standing along the streets.

In connection with child bearing and delivery the Caribs have a variety of customs and medicines. Like pregnant women everywhere, they may be overcome by nausea and cravings for foods that they normally do not particularly long for. Some of these cravings the Carib women share with women throughout much of the world, like eating more sweets, cookies and cake. But another Carib custom is more unusual: the eating of white mud. Many Carib mothers eat this when pregnant, but it is also supposed to be good for heart problems and heart burn. The white mud (cipula, kipula, or akipula) is sold in small white bars, about two by two and a half inches and less than half an inch high. Some women consume up to six or seven of these bars per day when pregnant. The mud for the bars comes from one mountain

in Guatemala, San Jose Pinula, where it is washed, shaped, decorated with a religious design, e.g. Jesus on the cross, and then dried on long boards in the sun. It is called "panito del senor" (small bread of the Lord) and is distributed wholesale in Guatemala City. The Belizean market is supplied from there. The bars cost ten to fifteen cents B\$ apiece, and if the stores run out or women cannot afford them for awhile, they substitute chalk, cassava starch, baking soda or ground raw rice for it.

Immediately after birth the mother drinks a bitter tea made of romero, manzanilla, cumino, spice seed, soroci, anise seed, and possibly also garlic and mint. This mixture is called "Spanish medicine," and the new mothers are supposed to drink it three times a day for about two weeks.

A special treatment for the baby's navel is to mash a soft candle with one's hands, mix it with nutmeg, rub it all over the navel area, cover it with a cloth and tie it on. This procedure is started when the baby is one day old, and the dressing is changed every morning. In the evening, when the light of the coals is low, you warm a cloth under it and rub the baby's navel area, tummy, and back area, to warm it all over. This helps to heal and is done for about two weeks.

Apart from the white mud, the Carib women do not seem to change their diet much when pregnant. Thus, the typical meal pattern of the Caribs is also the norm for the mothers-to-be. Breakfast may be tortilla (flour or corn)

or bread and tea. Sometimes, this is augmented with fried beans and, or egg. The main meal at noon is often a fish stew, or fish or meat with rice, ground provisions or rice and beans. A popular stew is "sere," made from fish, coco (a potato like root crop), cassava, and "fufu" which are plantain dumplings, all in a broth. This dish is also called "Matilda's foot," because a woman named Matilda somehow got her foot into the act when mashing the plantain for the dumplings.

For tea, leftovers from the noon meal are served with bread or tortilla, or cheese or eggs with bread or tortilla. Beverages are tea or reconstituted powdered milk, diluted evaporated and condensed milk, coffee or juice.

The Carib Sample

The Carib mothers ranged in age from nineteen years to forty years with a mean of 24.25 and a median age of twenty-three years. The number of living children per mother ranged from one to ten with a mean of three children (Table 10). However, number of pregnancies per mother (including miscarriages and deceased children) ranged from one to fourteen with a mean of 3.5 pregnancies (Table 11).

In terms of marital status the Carib sample was almost equally divided among legally married (25 percent), common-law (30 percent), single (25 percent) and "borrowing" mothers (20 percent). The legally married and common-law marriage mothers comprised together fifty-five percent.

TABLE 10
CARIB PARITY

Age in Years	Number of Living Children of Carib Mothers									
	1	2	3	4	5	9	10	Total		
16-19	2	1						3		
20-24	2	6	3					11		
25-29				2	1			3		
30-34	1					1		2		
35-39										
40-44							1	1		
Total	5	7	3	2	1	1	1	20		

TABLE 11
CARIB DECEASED CHILDREN

Age in Years	Number of Deceased Children of Carib Mothers (Incl. Miscarriages)			
	1	2	4	Total
20-24	1	1		2
25-29	2			2
30-34	1			1
35-39				
40-44			1	1
Total	4	1	1	6

For the twenty Carib mothers interviewed, completed number of years in school ranged from six years to fourteen years with a mean of 10.25 years. Eight mothers (40 percent) had primary education and twelve mothers (60 percent) had at least some secondary education beyond that. Seven of these had additional higher education.

Five of the Carib mothers were employed and none were self-employed.

The households numbered from four to fifteen members, with a mean of 7.95 members. Only six mothers (30 percent) lived in a household that was composed of the mother, her legal or common-law husband and her children. Twelve mothers lived in households that exceeded the size of their own nuclear families.

All but one Carib mother delivered their babies in hospital. Some of them had home delivery for previous children, but of the babies in this sample only one was born at home, and his mother was attended by a midwife who had been trained in modern midwifery. The hospital stay ranged from one day to four days with an average of 2.26 days (Table 12).

When sick, the Carib mothers either go to the Health Center (75 percent) or see a doctor. But some mothers added that if there is a particular problem, such as snakebites, they see the bush doctor. One mother also sees the bush doctor for special herbal baths and she said that many women do. However, this question was not routinely

TABLE 12
 LENGTH OF HOSPITAL STAY
 OF CARIB MOTHERS

Length of Time	Mothers	
	Number	Percent
1 Day	3	15.8
2 "	9	47.4
3 "	6	31.6
4 "	1	5.2
Total	19	100.0

asked during the interviews.

During pregnancy, ninety percent of the mothers went to the Health Center for medical care and only two saw a doctor. Nine mothers saw the yerbatera in addition to going to the Health Center. These visits were mainly for anointings.

The majority of the mothers (60 percent) drink soroci tea regularly in connection with menstruation and for extended periods, between one week and two months, following parturition. Some mothers drink Spanish medicine in addition to soroci tea and one mother said she makes her own bush medicine.

Many Carib mothers eat white mud regularly during pregnancy in varying amounts of one bar per week to six bars per day. Sometimes the mud consumption increases during the second half of the pregnancy. It is also not unusual for expectant mothers to take cassava starch during pregnancy, but most white mud consumers will resort to cassava starch or ground raw rice only if they run out of the preferred white mud.

No information was obtained from the Carib sample about Combing down the breast since the interviewer was not familiar with the custom when talking to the Carib mothers.

Breast-Feeding

The breast-feeding/weaning history of the Carib sample is presented in Table 13.

TABLE 13
CARIB BREAST-FEEDING/WEANING HISTORY

		AGE IN MONTHS														
BABIES		0	1	2	3	4	5	6	7	8	9	10	11	12		
BABY	1	GL F ₄	-----					MORANGE FISH						VEG CER	EGG	I
"	2	GL F ₂	-----									VEG+YOLK MEAT	-----		I	
"	3	GL F					M CER+BABYFOOD JUICE+FISH									I
"	4						EVERY- THING	6	-----							I
"	5		-----							JUIC+VEG FISH	-----					I
"	6	GL	M LAB						VEG FRUIT	-----		MEAT FISH	I			
"	7						F ₄ G	CEREAL	-----		EGG FISH FRUIT	I				
"	8		-----							VEG+JUIC MEAT+FIS	+EGGWHT					
"	9	GL					CEREAL JUICE		EGG	VEG FISH	I					
"	10		-----							I						
"	11	GL	F--I	ORANGE				CEREAL	I							
"	12	GL	FLAB	M				ORANGE	I							
"	13	GL	G	JUICE	M CER	-----		I								
"	14	GL	F LAB				G CUSTRD	I								
"	15	GL F ₄	M				CUSTRD	I								
"	16		JUICE	VEGMEAT EGG WH.												
"	17	GL	FLAB	JUICE	-----											
"	18		LAB	-----												
"	19	GL	F I													
"	20	GL F	-----													

KEY:

GL: GLUCOSE SINCE BIRTH

GP: GRIPEWATER " "

F₃: FORMULA; THREE BOTTLES PER DAY

M: INTRODUCTION OF WHOLE MILK

G: EPISODE OF GASTRO-ENTERITIS

-----: BREAST-FEEDING

-----I: CONTINUED BEYOND TIME OF INTERVIEW

-----I: ENDED AT THAT AGE

THE AGE OF A BABY IS INDICATED BY A VERTICAL LINE ON THE RIGHT

KEY:

GL: GLUCOSE SINCE BIRTH
 GP: GRIPEWATER " "
 F₃: FORMULA; THREE BOTTLES PER DAY
 M: INTRODUCTION OF WHOLE MILK
 G: EPISODE OF GASTRO-ENTERITIS
 -----: BREAST-FEEDING
 -----X: CONTINUED BEYOND TIME OF INTERVIEW
 -----I: ENDED AT THAT AGE
 THE AGE OF A BABY IS INDICATED BY A VERTICAL LINE ON THE RIGHT

Eighteen Carib mothers (90 percent) breast-fed successfully for some time. One more mother had started to do so but stopped when she left the hospital and the baby was two days old. Her explanation was that the baby did not nurse.

Even though larger proportions of the unemployed, primary education, married, high-parity and nuclear family mothers started to breast-feed, none of these factors made much difference. Length of hospital stay also did not make a statistically significant difference in breast-feeding, however, a larger percentage of the shorter stay mothers than of the longer stay mothers did breast-feed.

The Weaning Process

Twelve Carib babies were given glucose water on a daily basis since birth and an additional baby started when one week old. This represents sixt-five percent of the entire Carib sample. However, five of the mothers were not questioned about glucose feedings. Thus, the percentage of babies who received glucose may be higher. If one considers only the fifteen mothers who were asked about glucose feedings, then eighty-seven percent did give glucose regularly. The amounts given ranged from four ounces per day (three babies) to twelve ounces per day (four babies). Three mothers did not say how much glucose the babies were being given. The distribution of glucose feedings is presented in Table 14.

TABLE 14
CARIB GLUCOSE DISTRIBUTION

		Amount of Glucose or Sugar Water in Ounces							
		4	6	8	9	12	Unknown	Total	
Number of Babies	3	1	1	1	1	4	3	13	

Formula or Milk other
than Breast Milk

Six babies were on formula, either exclusively (two babies) or supplementary (four babies) before they were one week old. Thus, thirty percent of the Carib babies were either completely off the breast or in the process of being weaned before they were one week old.

The majority of the babies (seventy percent) were fed only breast milk up to age one week without supplementary formula or other milk feedings. However, at least six out of these fourteen babies were given glucose on a daily basis during that time. Therefore, eight babies (forty percent) were exclusively on breast milk up to age one week and received no glucose, formula or other milk. One of these babies was started on daily glucose feedings at age one week and one other baby began on supplementary formula feedings at that age.

One baby stopped breast-feeding at two weeks and one at one month. This left eighty-three percent of the Carib babies at age one month still being breast-fed, either exclusively or supplementary.

Even though a larger proportion of single mothers than of married mothers weaned earlier, marital status as well as the other variables parity, education, employment and nuclear family made little difference in early weaning. Length of hospital stay was similar in that it did not make a statistically significant difference. Fewer of the

shorter hospital stay (twenty-three percent) than of the longer hospital stay mothers (forty-three percent) were in the process of weaning their babies since birth by bottle feeding either entirely or supplementary. The longer hospital stay did not result in a statistically significant delay of weaning practices, even though the nurses at Punta Gorda Hospital are particularly concerned that mothers breast-feed.

The weaning process of the Carib sample during the first four months is summarized in Figure 27.

Weaning and Gastro-Enteritis

There were five gastro-enteritis cases among the Carib babies. Age at first incidence ranged from one month to nine months. Two babies had been fully weaned at the time and three were still on breast. However, two were in the process of being weaned and the remaining baby, even though he received no other milk than breast milk, was on regular glucose feedings since birth.

Profile of the Mestizos

The Mestizos are a result of the union between the indigenous American Indians and the Spaniards that came to the New World in the wake of the Age of Discovery. But even though Belize ostensibly was once part of Spain's Colonial Empire, the Spaniards never established any settlements there and instead relinquished the jungle and swamp land piece by piece to the British Baymen. Belize's

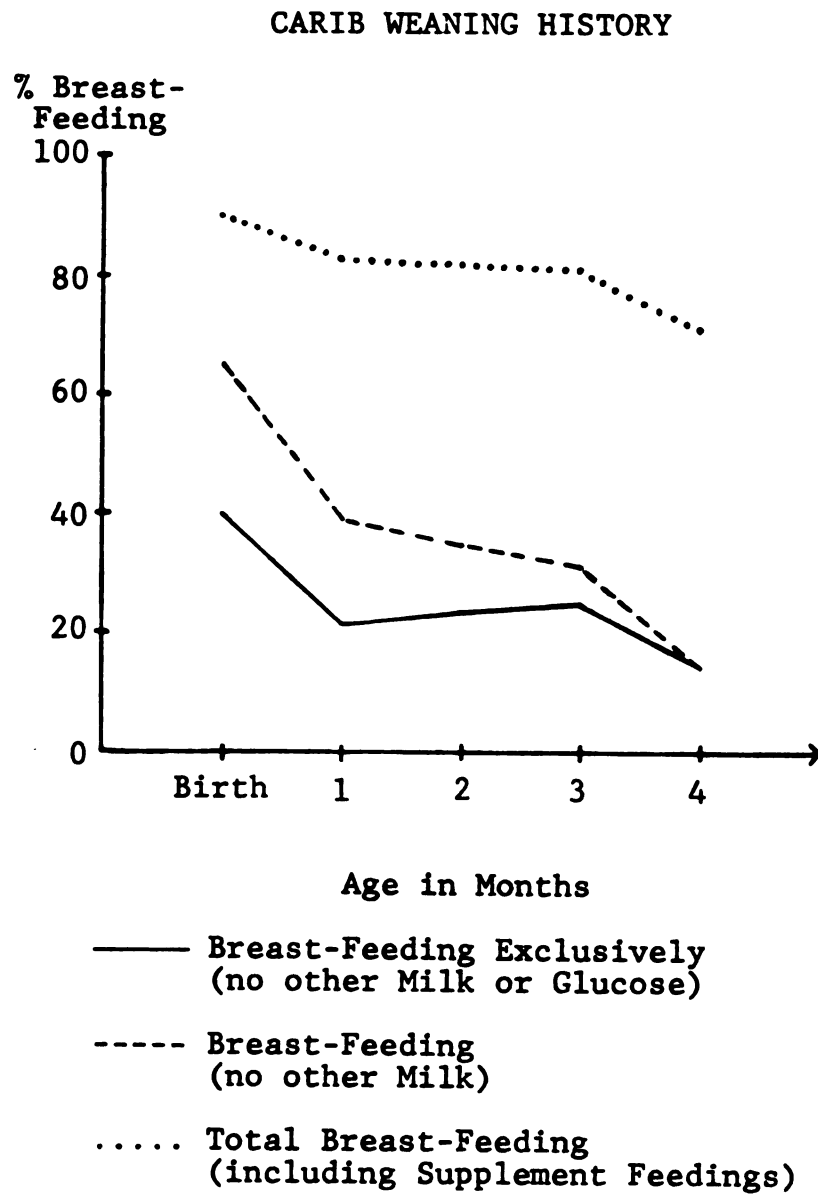


Figure 27

Mestizos therefore first immigrated from Mexico.

The majority of the Mestizos live in the two northern districts that adjoin Mexico and so have remained close to their original homeland. Their dual background is quite apparent in their culture to this day. The Spanish influence is most easily recognized in their Catholic religion and Spanish language, and the Indian origin can be traced through the agriculture and firm adherence to established customs. The latter is not surprising if one considers that it was the men who came from Spain to conquer America for their Catholic Monarchs and the Pope. In the end, the Catholic Church and Spanish Administration supplanted the previous order of a state that was run by Aztec and Inca priests and aristocracy. However, as the Spaniards chose their wives locally, continuity of Indian tradition in everyday life was assured by the Aztec and Maya women. The more a custom pertained to the female sphere of influence, such as home-life or motherhood, the easier it was to maintain since there were too few Spanish women to establish the corresponding European custom. As the Spaniards furthermore mainly concerned themselves with affairs of state and military matters over a huge area, agriculture remained in the hands of the native population except for the fact that the planting of certain crops was required for the European market. In this way, the Mestizo continued not only the milpa farming of corn and beans, but he also became an efficient cash crop planter.

The districts of Corozal and Orange Walk where the Mestizos are concentrated represent sugar cane country and it is this commodity that has provided the Mestizo with a certain degree of wealth. The sugar plantations in Belize cannot be compared to the huge estates of Jamaica, Cuba and Haiti that long ago were the foundation of great wealth in these island nations and required large numbers of laborers. These are smaller, family owned units and are basically managed by the family. The Mestizo men thus have their income and independence, and they enjoy a definite authority as family heads.

The Mestizo villages and towns generally give quite a prosperous impression. The houses are clustered together and the men walk, ride on horseback or go by truck to their milpas and cane fields.

The homes may be in the style of the Maya thatch houses, but also frame or cement structures with a number of rooms (Figures 13 and 28). Nearly all Mestizos confess to the Catholic faith and in most homes one finds a crucifix or picture of Jesus prominently placed.

The Mestizo way of life is very similar to that of the Maya and many Maya traditions are being continued by the Mestizos. It ranges from the milpa agriculture to diet, as well as to maternal and infant care.

Tortillas, mostly prepared from corn but also from flour, form the basis of the Mestizo diet and they are closely followed by beans. One can find both tortillas and

FIGURE 28

Mestizo Homes

Mestizo villages usually present a mix of the thatch roof construction which is typical of the Maya and the stilted frame architecture of the Creole. Even though small livestock, like the two pigs in front of the thatch house, wander freely during the day in search of food, the villages have a very neat appearance. This picture was taken in Progreso in Corozal District.

(Author's photograph).



Figure 28

beans on the table for breakfast, dinner and tea (see Figure 29).

A typical breakfast consists of tortilla, possibly with a fried egg and maybe fried beans. But some people also start the day with a thick puree of peas or a boiled potato mashed with a fork and mixed with some butter. These potatoes are from Mexico and have a distinct flavor. Dinner is usually rice and beans, or plain stewed beans, with some meat such as chicken, game or pork. Meat is not a daily item nor is it the most sizeable part of the meal when served. If soup or stew is the main dish it is usually accompanied by tortillas. A popular stew is "relleno," which consists of chicken, pork meatballs and eggs boiled in a pitch black broth. The black color is due to a spice which makes this a very pungent dish. This stew is inevitably eaten with corn tortillas where the tortilla becomes practically an eating utensil: it is folded and one then spoons some vegetable, meat or hard boiled egg with some broth from the stew into the tortilla and eats it from there.

The village Mestizos also fish in the many creeks or lagoons if the village is near one and thus, fish is served regularly in some families. However, in the towns, such as Orange Walk Town, fish is less common as the stores do not offer it consistently. Tea again consists of tortillas with possibly lunchmeat, egg or beans. A popular but not daily dish for breakfast or tea is an omelet

FIGURE 29

Tortilla Bakery

The preparation of tortillas in the towns is much more mechanized than in the Maya homes. The young Mestizo couple runs their business in Belize City. The batter is piled on a tray next to the man; he puts small amounts into the tortilla maker where the batter is flattened, cut into rounds and then run over a conveyor through the oven to be baked. The woman stacks them and weighs them on the scale on the left.

(Author's photograph).



Figure 29

concoction of onions, tomatoes, eggs and a variety of peppers depending on how "hot" one's taste is.

Beverage is frequently coffee or tea for adults, reconstituted powdered or diluted condensed or evaporated milk for children. Milo is popular at tea time. The Mestizos do not grow many vegetables so they are mostly imported from Mexico and rather expensive. Consequently they do not constitute a large portion of the daily food consumption. Legumes, tortillas and rice definitely represent the greater part of the food intake. Plantains are commonly grown, however, and they make up a frequent side dish as crisply fried chips or the softer fried and sweeter tasting slices.

During pregnancy, childbirth and early childhood the "yerbatera," traditional midwife or bush doctor, is very popular with the Mestizo women and mothers. Many of them have a series of massages, "anointings," during pregnancy and sometimes just before delivery. Home delivery in presence of a midwife is common.

The Mestizo women readily breast-feed their babies but like to wait until the baby is a few days old and the colostrum has given way to the regular breast milk. Comb-ing down of the breast or simply washing down with warm orange water alone is the regular procedure during that time while the baby is given anise seed tea, glucose or sugar water. Navel application consists of oil or nutmeg, or both, and the "mal ojo" (evil eye) procedure with the

ruda plant extract is also common here.

The Mestizo Sample

The Mestizo mothers ranged in age from sixteen to forty-two years with a mean of 24.23 and a median age of twenty-three years. The number of living children per mother ranged from one to eight with a mean of 2.7 children (Table 15). However, number of pregnancies per mother (including miscarriages and deceased children) ranged from one to thirteen with a mean of 3.2 pregnancies (see Table 16 for distribution of deceased children).

Fifty-two of the Mestizo mothers were legally married and ten were living with the father of the baby in common-law marriage at the time of the interview. The three remaining mothers had a visiting relationship with the father of the child.

For the sixty-five Mestizo mothers interviewed, completed number of years in school ranged from zero to fifteen years. The one mother who had not finished a single year in school said she went for one week but did not like school and kept running away whenever she was sent to class. Of the remaining mothers, five did not say how many years they had been to school, but they had not gone beyond primary education. Of the entire sample, sixty percent had at least some secondary education and three mothers had additional higher education.

TABLE 15
MESTIZO PARITY

Age in Years	Number of Living Children of Mestizo Mothers							Total
	1	2	3	4	5	8		
16-19	12	2					14	
20-24	8	10	10	1			29	
25-29	1	2	3	2	1		9	
30-34			2	4	1	3	10	
35-39			1			1	2	
40-44						1	1	
Total	21	14	16	7	2	5	65	

TABLE 16
MESTIZO DECEASED CHILDREN

Age in Years	Number of Deceased Children of Mestizo Mothers (Incl. Miscarriages)				
	1	2	4	5	Total
16-19	2				2
20-24	8	2			10
25-29	3		1		4
30-34	2	1	1		4
35-39				1	1
40-44			1		1
Total	15	3	3	1	22

Six Mestizo mothers were employed. Among the occupations listed were teacher, nurse, and store clerk.

The households numbered from three to fifteen members with a mean of 5.9 persons. Forty-five mothers (sixty-nine percent) lived in households that were composed of the mother, her legal or common-law husband and her children. Nearly one third lived in households that exceeded in size that of their own nuclear families, and one mother lived alone with her children.

Delivery in presence of a traditional midwife is quite common among the Mestizos. Twenty of the mothers (thirty-one percent) were delivered at home; sixteen of these mothers were attended by the yerbatera, three by a nurse and one mother was alone. The other two thirds (sixty-nine percent) were delivered at hospital. The hospital stay for the mothers who had their babies there ranged from a few hours to one week (Table 17).

All but one of the Mestizo mothers either see a doctor or go to the Health Center when sick. One mother declared she is never sick, does not intend to be, and therefore does not need to see a doctor. However, she was one of only eight mothers who saw a physician during pregnancy. One mother saw exclusively the traditional midwife, and the majority (eighty-six percent) went to the Health Center for medical care during pregnancy.

Independently of visits to the Maternal Clinic at the Health Center or to a physician, more than half the

TABLE 17
 LENGTH OF HOSPITAL STAY
 OF MESTIZO MOTHERS

Mothers		
Length of Time	Number	Percent
Hours	1	2.2
1 Day	5	11.1
2 "	13	28.9
3 "	21	46.7
4 "	1	2.2
5 "	1	2.2
7 "	3	6.7
Total	45	100.0

mothers (fifty-seven percent) also saw the yerbatera for anointings, ranging from two to nine massages per pregnancy; sixteen of these mothers were attended to by the yerbatera during delivery, even though they also visited the doctor or the Health Center.

Many mothers drink soroci tea regularly during menstruation or even apart from that time, but very few continue this practice while pregnant. A number of mothers drank soroci tea after delivery--almost all of them for one week--took castor oil, or drank Spanish medicine; nearly forty percent of the mothers followed these practices. Few mothers take vitamins on a regular basis, but one third of the Mestizo sample said they take a tonic or mineral preparation, such as 3-SSS or Geritol.

None of the Mestizo mothers said she ate white mud during pregnancy.

Washing the breast with warm orange water following parturition is quite popular with the mothers and most of them stroke the breast at that time with a comb in a downward motion. A total of thirty mothers did not put the baby to breast for a period of one to three full days after birth. Eleven of these (seventeen percent) waited for the maximum time of three days before putting the baby to breast. In other words, eleven babies were not breast-fed until the fourth day after birth. The majority of the babies received anise seed tea during the waiting time, but some were given glucose water or formula.

Breast-Feeding

The breast-feeding/weaning history of the Mestizo sample is presented in Table 18.

Fifty-seven Mestizo mothers (87.7 percent) did breast-feed for some time. Three more mothers tried for three to four days but were unsuccessful; five mothers never attempted to. The reasons for not breast-feeding were breast infection, baby's refusal, baby got diarrhoea from breast milk and not enough milk. Thus, a total of eight Mestizo mothers (12.3 percent) did not breast-feed for some time.

In terms of parity, education and nuclear family, there was only a slight difference between mothers who breast-fed and those who did not. Even though a larger proportion of married as well as of unemployed mothers did breast-feed, the differences were not statistically significant. However, all of the mothers who spent three days or more in hospital in connection with delivery of the baby did breast-feed for some time compared to seventy-nine percent of the mothers who spent two days or less at hospital, or had home delivery. This difference was statistically significant at the .05 level (chi square = 4.404 compared to the threshold value of 3.841).

The Weaning Process

Thirty-three of the Mestizo babies were given glucose water and four were given sugar water on a daily basis

TABLE 18
MESTIZO BREAST-FEEDING/WEANING HISTORY

		AGE IN MONTHS												
BABIES		0	1	2	3	4	5	6	7	8	9	10	11	12
BABY 1	GL	F ₁												
"	2	GL			F ₂ ORANGE									
"	3	GP			CEREAL			FISH			EGG			
"	4	F ₁												
"	5	GL												
"	6	GP												
"	7*	GL												
"	8GL	F												
"	9	GP												
"	10	GP												
"	11	GP												
"	12GL													
"	13AGL													
"	14													
"	15													
"	16	GL												
"	17	GL												
"	18	F ₃												
"	19	GP												
"	20	GL												
"	21A													
"	22	GL												
"	23													
"	24GL													
"	25													
"	26	GL												
"	27GL													
"	28	GL												
"	29	GL												
"	30	GP												
"	31													
"	32A	GL												
"	33													
"	34GL													
"	35	SU												
"	36	GL												
"	37AGL													
"	38GL													
"	39	GL												
"	40GL													
"	41	GL												
"	42A	SU												
"	43	GL												
"	44	GL												
"	45	GL												
"	46A	SU												
"	47GL													
"	48	GL												
"	49A	GP												
"	50													
"	51	GL												
"	52	GP												
"	53A	GL												
"	54GL													
"	55A	GL												
"	56	GL												
"	57	GL												
"	58	GL												
"	59	GP												
"	60	GL												
"	61	GL												
"	62GL													
"	63A	GP												
"	64GL													
"	65	GP												

KEY:

A: ANISE SEED TEA

GL: GLUCOSE SINCE BIRTH

GP: GRIPEWATER " "

SU: SUGARWATER " "

F₃: FORMULA: THREE BOTTLES PER DAY

M: INTRODUCTION OF WHOLE MILK

G: EPISODE OF GASTRO-ENTERITIS

-----: BREAST-FEEDING

-----> " CONTINUED BEYOND TIME OF INTERVIEW

-----I: " ENDED AT THAT AGE

-3-----: THE DAY AFTER BIRTH WHEN BREAST-FEEDING BEGAN

THE AGE OF A BABY IS INDICATED BY A VERTICAL LINE ON THE RIGHT

UPPER CASE GL, SU, A, NEXT TO BABY'S # MEANS FEEDING OF BABY WHILE "OTHER" DELAYED NURSING DUE TO COMING DOWN OF BREAST

" : TWINS

KEY:

- A: ANISE SEED TEA
 - GL: GLUCOSE SINCE BIRTH
 - GP: GRIPEWATER " "
 - SU: SUGARWATER " "
 - F₃: FORMULA; THREE BOTTLES PER DAY
 - M: INTRODUCTION OF WHOLE MILK
 - G: EPISODE OF GASTRO-ENTERITIS
 - : BREAST-FEEDING
 - : CONTINUED BEYOND TIME OF INTERVIEW
 - : ENDED AT THAT AGE
 - : THE DAY AFTER BIRTH WHEN BREAST-FEEDING BEGAN
- THE AGE OF A BABY IS INDICATED BY A VERTICAL LINE ON THE RIGHT
- UPPER CASE GL, SU, A, NEXT TO BABY'S # MEANS FEEDING OF BABY WHILE MOTHER DELAYED NURSING DUE TO COMING DOWN OF BREAST
- *: TWINS

since birth. One other baby was given glucose water since birth, but not every day. Thus, thirty-seven babies (fifty-seven percent) received glucose or sugar water on a regular basis since birth (Table 19). In addition to these babies, eight received glucose only during the initial period after birth, either in hospital or at home, while the mothers waited for the colostrum to pass and for the regular milk to come in. However, once these babies started to breast-feed they were no longer given glucose water.

For seven babies, the first food was anise seed tea while the mothers practiced combing down. Four more babies were given anise seed tea once they came home from the hospital where their first food had been glucose water. The amounts of glucose or sugar water given on a daily basis ranged from two to twenty ounces. Four mothers did not say how much glucose or sugar water the babies were getting per day.

Table 19 presents the distribution of glucose or sugar water feedings for those babies who continued to receive it after the first few days following birth.

Formula or Milk other than Breast Milk

Twenty-nine babies were on formula, either exclusively (eight babies) or as a supplement to breast-feeding (twenty-one babies), before they were one week old. Two additional babies received reconstituted powdered milk as a supplement to breast-feeding during that period.

TABLE 19
MESTIZO GLUCOSE DISTRIBUTION

		Amount of Glucose or Sugar Water in Ounces											Total
		2-3	4	5	6-7	8	9	10	12	16	20	Unknown	
Number of													
Babies	4	8	2	2	6	2	4	3	2	1	1	4	37

Thus, forty-eight percent of the Mestizo babies were either completely off the breast or in the process of being weaned before they were one week old.

Fifty-two percent of the babies were fed breast milk up to age one week without supplementary formula or other milk feedings. However, almost half of these babies were given glucose or sugar water on a daily basis in addition to the breast, or glucose or anise seed tea while waiting for the breast-feeding to begin. Once breast-feeding had begun, seven babies were breast-fed without any further glucose feedings. Thus, the initial number of only nine babies (fourteen percent) that were exclusively breast-fed without milk, formula, glucose, sugar water or anise seed tea, by the fourth day after birth had increased to sixteen babies (twenty-five percent).

After the changes of the first week, the decrease in overall breast-feeding was quite gradual over the early four months period.

As with beginning breast-feeding, parity, education and employment made little difference in early weaning. Since ninety-five percent of the Mestizo mothers were either legally married or living in common-law marriage with the father of the child, this factor cannot be investigated in terms of weaning differences among the Mestizo mothers. As it was, two of the three mothers who had a visiting relationship, nursed for a minimum of eight months and the third mother did not because she had twins and felt

she could not nurse two babies at the same time.

Even though length of hospital stay had been a significant factor in beginning breast-feeding, there was only a small difference in early weaning between the mothers who had spent three days or more in hospital and those who spent two days or less there. Nearly equal proportions of longer stay mothers and of shorter stay or home delivery mothers had their babies weaned by four months.

The combing down practice also did not make a statistically significant difference in early versus later weaning; of the eighteen babies who were breast-fed without supplementary formula or milk up to four months, ten had been of mothers who delayed breast-feeding in the beginning.

More of the mothers who lived in a nuclear family setting did breast-feed than mothers who lived in different situations. This difference persisted through the early weaning months. Thirty-three percent of the non-nuclear mothers compared to sixteen percent of the nuclear family setting mothers had their babies weaned by four months. This, too, was not statistically significant at the .05 level.

The weaning process of the Mestizo sample during the first four months is summarized in Figure 30.

Weaning and Gastro-Enteritis

There were twenty gastro-enteritis cases among the Mestizo babies. Age at first incidence ranged from two

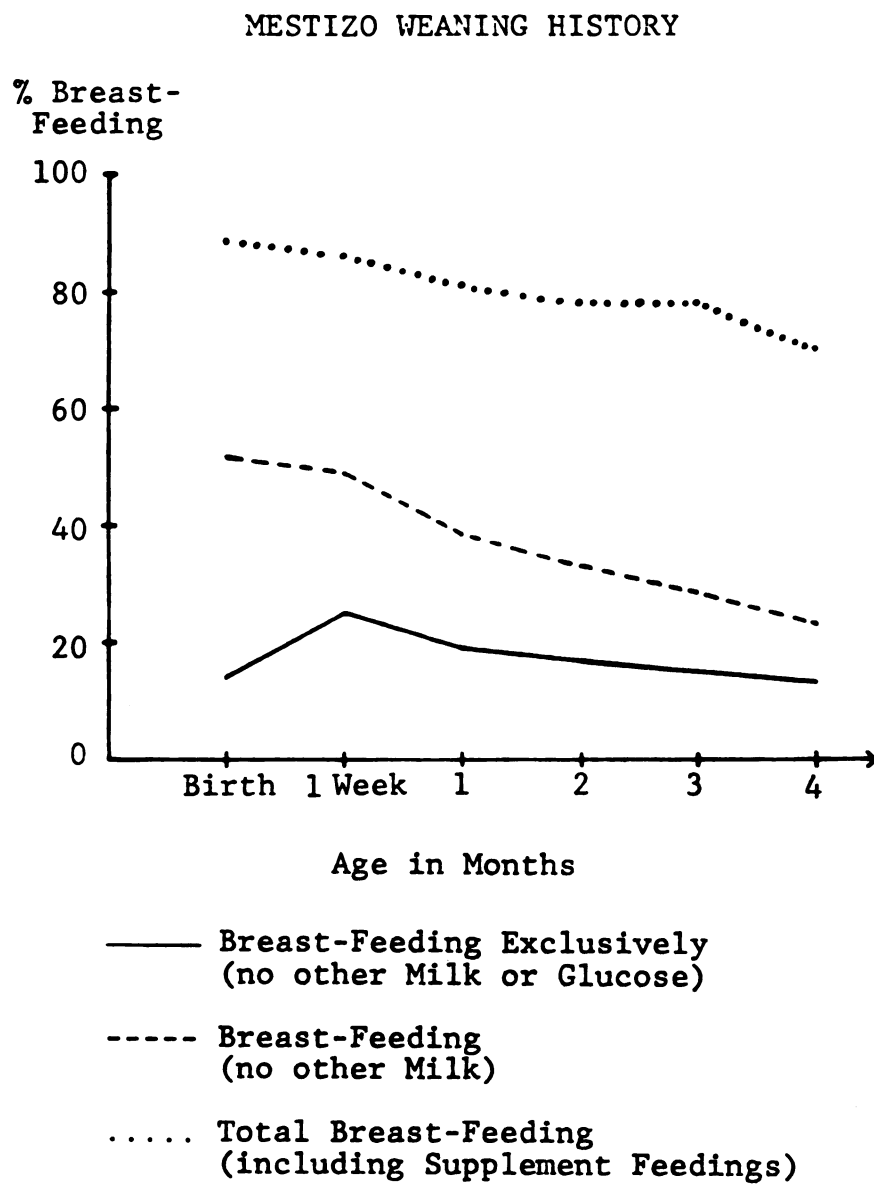


Figure 30

weeks to eleven months. Six babies had been fully weaned, ten were in the process of being weaned and four were still fully breast-fed at time of occurrence. However, all four latter babies had been receiving glucose (three) or sugar water (one) on a daily basis since birth. Thus, none of the babies was exclusively on breast when he developed gastro-enteritis.

Profile of the Mennonites

When the Mennonites came to Belize in the late 1950s, they settled on rather inaccessible bush country and their number were mostly contained within their colonies. Three of the original colonies, Blue Creek, Shipyard, Spanish Lookout, and a more recent one, Little Belize in Corozal District, are the areas of their major concentration today. However, smaller clusters and individual families are spread throughout the country and one can meet Mennonites even in most remote Crique Sarco in Kekchi country.

Over the years there have been fluctuations in their numbers and also some splintering of the groups at Blue Creek and Shipyard. Fear, that grew out of rumors that they would be expected to do military service once the country became independent, caused some people to move to South America. But the majority trust the agreements of the Privilegium they signed with the government which promises them exemption from army duty. Thus, when the Shipyard colony, which always had been the most populous,

became too numerous for the allotted land, some families bought a stretch of bush country near Progreso in Corozal District and "Little Belize" was opened up.

The primary occupation among Mennonites is farming. In addition, a number of them are now involved in other ventures which are closely related to agriculture. Some have bought trucks to haul farm goods to Belize City and in turn bring back wares that are not produced by the Mennonites in the colony. Others make furniture or construct the huge wooden vats that collect rain water in many Belizean households. There also are a few mechanical shops that service the farm machinery and vehicles in the colony. But even these men have farms with at least enough livestock to feed their families.

Apart from these somewhat more modern business endeavors, life remains quite traditional, simple and unhurried for the Mennonites. Religion is very much a part of everyday life and not a day passes without prayer or singing of a hymn or psalm. Outside of Sunday there are many occasions during the week when people gather in service to God, such as religion hour for both children and adults. Whatever recreational activities the Mennonites pursue, they are strictly within the realm of family or church life. The primary form of entertainment is conversation; there are no radios or magazines. Despite the lack of printed information, the people are not uninformed as to what is happening in the world. A visitor soon finds himself

engaged in thoughtful discussions about the political, economic and social situation of his homeland.

Spanish Lookout, as an example of a Mennonite colony in Belize, is a dispersed farming community that reminds one of rural areas in Pennsylvania or Ontario, except that citrus trees have replaced the apple trees near the homes. Every farmstead has chickens in varying numbers and at least one cow. There are also banana groves, mango and papaya trees, fields with beans and corn, pineapple and the ubiquitous coconut and cohune palms. Flowers and hedges surround most of the houses, giving the community a neat and rather prosperous appearance (Figure 31).

It is a community that draws on itself for almost everything. There is no police force or municipal administration nor are social services provided by the government. Instead, the Mennonites consider these their own responsibilities and they take them very seriously. They take care of their own needs and also look out for those of the collective group. For example, the road system in the colony as well as the one bridge that leads into it were constructed by the Mennonites. Both are maintained by them and sections of the road are under the responsibility of individual residents of Spanish Lookout who have to get a group of men together when their part of a road or the bridge is in need of repair.

As far as law and order are concerned, the Mennonites live so religiously by the ten commandments that

FIGURE 31

Mennonite Farm Yard

A scene from Spanish Lookout that is reminiscent of the North American rural landscape, except for the vegetation: the trees in the background are citrus trees, and the large poinsetta here is not an exotic Christmas plant, but is native to Central America.

(Author's photograph).



Figure 31

there is hardly a need for a civil force in charge of public order. If adolescent boys cause trouble, some men in the colony will take it upon themselves to talk to the fathers whose sons seem to need a sterner hand at home. At the same time the Mennonites leave retribution for greater evil to God. Once, a young man had been killed by an outsider. According to Belize law, the punishment for murder is death by hanging. But the family of the victim refused to press charges since their faith demands that they leave such punishment to divine justice.

The colony has its own school system. The girls go for seven years and after that time generally stay home and help in the household until they get married. But often there is more than one post-school age daughter in a family and they may look for something different to occupy them. Some work in the poultry processing plant or do bookkeeping or other office work for businesses such as the hatchery or the dairy. Others may keep a sizeable flock of hens or raise some other livestock at home and in this fashion earn a living.

Boys attend school for eight years and then help with the farming or whatever business the family does besides, until they can buy some land and start on their own.

Health care belongs officially under the jurisdiction of the Public Health System of Cayo District where Spanish Lookout is located. It thus falls under the responsibility of the Public Health nurse in San Ignacio

de Cayo. However, true to their principle of self-reliance, the Mennonites have built a small clinic on the colony that is a model of cleanliness if not of the latest in modern medical care. The clinic is geared towards maternal and child care. A young Mennonite nurse is in charge of it and she delivers between fifty and sixty babies a year.

In their history the Mennonites have had so many problems with government agencies of all sorts that they have become very shy about trusting any public institutions. But the non-Mennonite Public Health Nurse in Cayo is a woman of great sensitivity, patience and warmth and she has been able to gain a measure of trust and respect from the Mennonites. One result is increasing attendance at the Mobile Child Health Clinic when she makes her visits at the Colony. It is to her credit and that of the young Mennonite nurse that more and more children are being vaccinated, for example.

Many Mennonites have a rather fatalistic attitude towards illness and will not do much to prevent it. But once someone does become sick the best possible medical care is provided even if it requires travel to Belize City, Merida in Mexico or Guatemala City; moreover, they think nothing of flying to the United States or Canada to see specialists.

Their diet reflects the German origin of the Mennonites. They are traditionally potato eaters, but some are adopting the Belizean rice and beans instead of potatoes as

the most frequent accompaniment to their meats. Meat is consumed quite regularly since the Mennonites raise poultry and cattle both. Therefore, fresh meat is readily available to them from their own farms. Fish is rare here due to the distance from the coast and the fact that the Mennonites do not do much fishing. Fresh milk and milk products, however, are very prominent in their diet.

A typical day's meals offer a variety of nutrients from different sources. In tune with their physical work the day is usually started with a hearty breakfast of porridge with milk or cream, fried eggs, homebaked bread and jam. Dinner is generally a meat dish of chicken, beef, or pork with potatoes, noodles or rice, vegetables or salad or both, bread and possibly something sweet, such as crumbcake, cookies or homemade pudding. The fact that the main meal of the day is served at noon is not an adaptation to the Belizean sequence of meals, but rather an old German custom. Meat is not necessarily served every day but on the majority of days during the week. Supper once more is a substantial meal with a bowl of soup or stew, homemade pickles, bread, jam, some fruit and cookies. Milk is always offered and drunk especially by the children. Adults often drink milk, too, but also may take tea or coffee.

The Mennonites adhere to a most simple lifestyle and to practices that have been established by generations before them. Furthermore, they tend to keep to themselves and do not have much interaction with other culture groups

which might encourage an active exchange of ideas. Therefore, their lifestyle tends to remain very much the same whether they live in Canada, Mexico, or Belize.

The Mennonite women are pregnant so much of their adult life that it almost appears the normal state to be in. Consequently, the pregnant condition hardly causes a ripple, be it in terms of dietary practices or customs that might apply only to childbearing. The majority of the women are delivered by the nurse at the Spanish Lookout clinic and as a rule there is no question whether the child will be breast-fed or artificially fed. Babies are frequently swaddled and not much exposed to fresh air. This covering of most of the body surface continues through childhood and adulthood. The women wear usually shirt dresses that cover their shoulders and also the arms at least partially if not to the wrist. Some women wear their dresses ankle-length, but even shorter hemlines are well below the knees. This also holds true for young girls. Adolescent girls generally wear their hair in braids and adult women cover it under a scarf or bonnet. Boys wear suspender pants with long legs, shirt and often a wide-brimmed straw hat. A benefit of this complete clothing is that there is much less exposure to the many insect pests in this hot and humid climate. But one is struck by the pallor of most of the children (Figure 32).

When changes in the Mennonite diet, health and child care practices do occur, they come about in subtle

FIGURE 32

Little Mennonite Girl

In her family four different languages are spoken: English not only because it is the official language of Belize but also because her grandparents' original home is Canada; Spanish is familiar because the Mennonites had emigrated from Canada to Mexico before settling in Belize; an old German patois which is their common tongue, and High German as the language of their Bible and religion.

(Author's photograph).



Figure 32

ways and are filtered in through one of their own. Such is the case of one Mennonite who while passing through Mexico as a young mother fell ill together with her child. A Mexican woman cared for them and convinced her to give the child cinnamon tea for the bad stomach disorder it was suffering from. Today, her daughters give this treatment for loose stools.

For a group as tradition-bound as the Mennonites, changes in the pattern of living happen only very slowly and not in a dramatic overturning of old customs. They may adopt a new crop, such as corn or peanuts, but they remain farmers. They may eat rice and beans a couple of times a week instead of potatoes, but their diet basically is the same as it was when they lived in Canada; the feeding and care of infants similarly remains traditional.

The Mennonite Sample

The Mennonite mothers ranged in age from twenty-five years to forty-five years with a mean of 34.75 and a median age of 32.5 years. The number of living children per mother ranged from three to fourteen with a mean of 7.75 children (Table 20). However, the number of pregnancies per mother (including miscarriages and deceased children) ranged from three to sixteen with a mean of 8.66 pregnancies (see Table 21 for distribution of deceased children). The number of pregnancies would even be higher, but there are two sets of twins among these children.

TABLE 20
MENNONITE PARITY

Age in Years	Number of Living Children of Mennonite Mothers							
	3	5	6	7	11	12	14	Total
25-29	2			1				3
30-34		1	3					4
35-39			1					1
40-44						1	2	3
45-49					1			1
Total	2	1	4	1	1	1	2	12

TABLE 21
MENNONITE DECEASED CHILDREN

Age in Years	Number of Deceased Children of Mennonite Mothers (Incl. Miscarriages)			
	1	2	3	Total
30-34	4			4
35-39			1	1
40-44	1	1	1	3
Total	5	1	2	8

All Mennonite mothers were married, had primary education within the Mennonite school system and none were employed. The households numbered from five to sixteen members with a mean of 9.25 persons. All of the mothers lived in a nuclear family situation.

Only one of the mothers delivered at home in the presence of the Mennonite nurse. All other mothers either delivered their babies at the Spanish Lookout clinic under the nurse's care or at a doctor's clinic in Cayo or Belize City. All of the mothers see a doctor when they are sick, and for medical care during pregnancy they either see the nurse at the colony's clinic or a doctor.

None of the mothers told of any particular custom during pregnancy or delivery, and none of them ever ate white mud.

The interviewer was not familiar with the combing down custom while talking to the Mennonite mothers; it is unlikely that they practice it, however.

Breast-Feeding

The breast-feeding/weaning history of the Mennonite sample is presented in Table 22.

All twelve Mennonite mothers did breast-feed for some time. As there was no variation in beginning breast-feeding among the Mennonite mothers, none of the factors that were compared with breast-feeding in the other four samples are investigated here. Furthermore, the sample was

TABLE 22
MENNONITE BREAST-FEEDING/WEANING HISTORY

		AGE IN MONTHS													
BABIES		0	1	2	3	4	5	6	7	8	9	10	11	12	
BABY	1	-----CEREAL FRUIT-----SOME FAMILY POT-----													
"	2	-----CEREAL BANANAS-----F-----													
"	3	-----FGLUCO CEREAL-----													
"	4	GL	-----CER MEAT FRUIT VEG----->												
"	5	-----BANANAS CEREAL----->													
"	6	-----F-----CEREAL JUICE VEG-----													
"	7	-----CEREAL JUICE VEG----->													
"	8	-----CER----->													
"	9	--- F	CEREAL			EGG									
"	10	F	-----CEREAL----->												
"	11	----->CER													
"	12	-----F----->													
		KEY:													
		GL: GLUCOSE SINCE BIRTH													
		F: FORMULA													
		----- BREAK FEEDING -----													

KEY:

GL: GLUCOSE SINCE BIRTH

F: FORMULA

-----: BREAST-FEEDING

----->: # CONTINUED BEYOND TIME OF INTERVIEW

-----: # ENDED AT THAT AGE

THE AGE OF A BABY IS INDICATED BY A VERTICAL LINE ON THE RIGHT

quite homogeneous in its composition, except for the mothers' ages and parity; neither of these factors made a significant difference in the mothers' decision whether to breast-feed.

The Weaning Process

Only two of the Mennonite mothers spoke of giving glucose water, but one of these two apparently did not begin this practice until the baby was five months old, when she also introduced formula as a supplement to breast-feeding. The other mother gave glucose since birth, but did not say how much.

Formula or Milk other than Breast Milk

The way to nourish an infant among the Mennonites is to breast-feed. Only one baby was given formula from the start and this was as a supplement to breast-feeding. The mother was forty-three years old and this was her fourteenth child. She felt that she did not have sufficient milk for the baby and offered him the bottle after each breast-feeding session. At age three weeks one mother discontinued breast-feeding for a number of reasons, the main one being that her baby was born with a heart condition. At the time of the interview this child was five months old and already scheduled for a second heart valve operation. The baby would tire easily at the breast, due to the heart problem, and the mother in turn had not a very plentiful

milk supply. Therefore the baby was only bottle-fed after three weeks. Thus, by one month only one baby was fully weaned and all others continued breast-feeding. The second baby to discontinue nursing did so after age four months.

The weaning process of the Mennonite sample during the first four months is summarized in Figure 33.

Weaning and Gastro-Enteritis

There were no gastro-enteritis cases among the Mennonite babies.

MENNONITE WEANING HISTORY

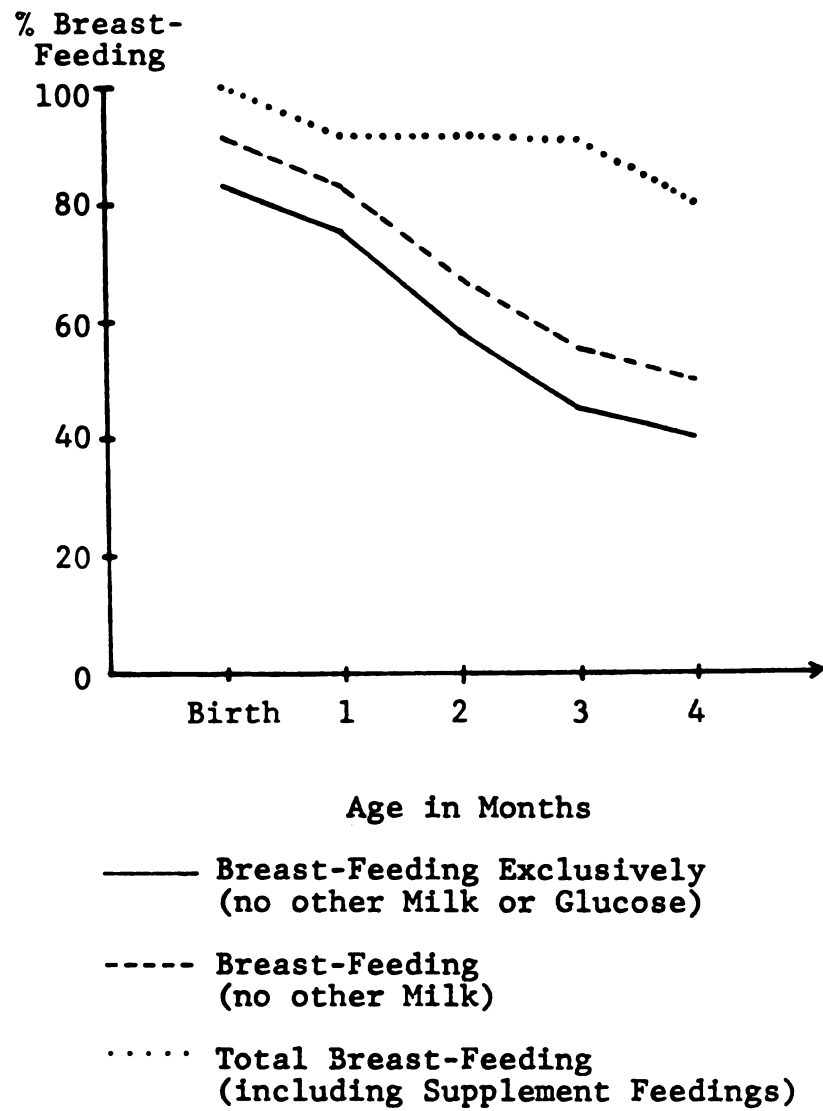


Figure 33

CHAPTER V

INTER-ETHNIC ANALYSIS

The preceding chapter treated each group individually. In this chapter, the five sample groups are compared with one another, first on the basis of general group characteristics, then on breast-feeding and weaning behavior. Gastro-enteritis is discussed in relation to weaning, and finally, the relationship between gastro-enteritis and specific weaning foods is examined. The sample composition is presented in Table 23, and the comparison between the culture groups in terms of general characteristics is summarized in Table 24.

The mean age for the mothers ranges from 23.6 years to 34.75 years (Table 24). For four of the groups the average age ranges between 23.6 and 25.5 years, but for the Mennonites it is about ten years higher, namely 34.75 years. The main reason for this large difference is that the young Mennonite women are very reserved and extremely shy about talking to outsiders, which is why very few of the younger age group are in this sample. Also, among the four larger groups, there are many mothers who have their first child while still in their early teens. With this sample, a tendency to have children at a younger age seems to be

TABLE 23
SAMPLE COMPOSITION

Group	Number	Percent
Maya	20	11.1
Creole	64	35.3
Carib	20	11.1
Mestizo	65	35.9
Mennonite	12	6.6
Total	181	100.0

TABLE 24
GENERAL CHARACTERISTICS OF SAMPLE

Group	Mean Age (Yrs)	Children Mean (#)	Pregnancies Mean (#)	Marital Status (%)	Years in School (Yrs)	Employment (%)	Nuclear Family (%)
Maya	25.5	4.0	4.6	95.0	6.6*	10.0	95.0
Creole	23.6	2.5	2.8	56.25	10.8	35.93	34.37
Carib	24.25	3.0	3.5	55.0	10.25	25.0	30.0
Mestizo	24.23	2.7	3.2	95.0	9.25*	9.23	69.0
Mennonite	34.75	7.75	8.66	100.0	6.5	0.0	100.0
Total Sample Mean	26.46	3.99	4.55	80.25	8.68	16.03	65.67

*This covers only eighteen of the Maya mothers and sixty of the Mestizo mothers, since the others did not say how long they attended school. They had not gone beyond elementary school, however.

somewhat more pronounced among the Creoles. This may be due in part to their environment in Belize City where life is more sophisticated.

All five groups are child-rich and large families are the norm in Belize. Population growth is encouraged because of Belize's very low population density. Birth control is not promoted and abortion is illegal. In this sample, the Mennonite mothers have a much higher mean number of children than the other four groups (Table 24). This may be in line with their higher average age which gives them that many more child bearing years. It does appear, though, that the Mennonites generally have a somewhat greater parity than other groups in Belize. This, again, would seem to fit into their particular lifestyle which is very much family oriented. Furthermore, for their livelihood, they depend almost entirely on an agriculture where technology has replaced only some of the manpower. With respect to the higher mean of living children for the Mennonite mothers, one consideration is that the Mennonites have a better survival rate than the other groups. However, if one compares the number of living children with the number of pregnancies in Table 24, one finds that the Mennonite mothers are just as likely, if not even more so, to lose a child through miscarriage or death as a Maya, Creole, Carib, or Mestizo mother. At any rate, the differences in mean parity between the four major groups, ranging from 2.5 to 4.0 children, are much smaller than the

difference between any one of these groups and the Mennonites with a mean of 7.75 children.

There is little variation in marital status between the Maya, Mestizo and Mennonites; the percentages of married mothers range between 95.0 percent and 100.0 percent. However, the Creoles and Caribs, who show almost identical percentages, are about forty percent below the other groups. One explanation here again may be urban life, since the Creoles and Caribs were entirely surveyed in Belize City and Punta Gorda, respectively. Even though a number of Mestizos interviewed live in Orange Walk Town, about two thirds of the Mestizo sample, as well as the Maya and Mennonites, live in villages. Religion also may be a factor; most Mestizos and Maya are Catholic, but so are most Caribs. It is felt that the occupation preference of the different groups has a much stronger impact on marital status. The Maya, Mestizo and Mennonites are mainly farmers and are by circumstance tied to the land. The Creoles and Caribs, however, do not practice much agriculture. They prefer to work in occupations for which there are not many openings in Belize. In the past they left home to go log-wood or mahogany cutting in the forest for months at a time. Now many go to North America to work in industry at least for months and often years at a time with only short visits in between. The work and work location has changed, but the effect on marital life, namely the interruption or postponement of it, is the same or even worse.

It should be pointed out why the legally married women and those living in common-law marriage are grouped together, for in Belize the same social stigma is not attached to cohabitation as it is in many other societies. In fact, a woman living in common-law marriage has a claim on the man's pension in case of death just as the widow of a legally married man.

As for education, the Creoles and Caribs once again are very much alike (Table 24). They share the highest average number of years in school, 10.8 and 10.25 years, respectively. The Mestizos rank not far below them with an average of 9.25 years. The two remaining groups, the Maya and the Mennonites, have nearly identical amounts of schooling, 6.6 and 6.5 years, all elementary education. The fact that the Creoles and Caribs are so similar in the education they receive, is likely related to living in areas where secondary education institutions are more accessible. If young people from the rural areas are interested in schooling beyond primary education, they often have to leave home and board in Belize City. The Maya and Mennonite children, and many Mestizos, have a greater need for training in farming, and they get that at home.

The Creole mothers have the largest proportion of employed women, 35.93 percent, followed by the Caribs with 25.0 percent. Due to the higher percentage of unmarried mothers, they probably have a greater need for employment than the others do. The Maya and Mestizo are quite similar

in percentage employed, 10.0 percent and 9.23 percent, as well as in type of employment, e.g. helping in the family store. None of the Mennonite mothers in this sample are employed.

As far as nuclear family setting is concerned, this is much more common among the Maya and Mennonites, 95.0 percent and 100.0 percent, respectively, than among the Creoles and Caribs, 34.37 percent and 30.0 percent, with the Mestizos fitting in between the two pairs with 69.0 percent (Table 24). The greater percentage of married women among the Maya and Mennonites is a factor here. Another one is probably the tighter housing market in the towns where even married couples often live in an extended family setting.

Delivery of the babies occurs generally at hospital or a clinic for the Creoles, 98.43 percent and for the Caribs with 95.0 percent. Of the Mennonites, 91.67 percent were delivered under private doctor care or at the Spanish Lookout Clinic. Only five percent of the Maya babies were delivered at hospital, and the Mestizos had 69.0 percent hospital deliveries. Because of limited bed space it is customary to release mothers from hospital one day after delivery unless there are complications. This practice applies especially to Belize City Hospital which services not only the largest community in Belize, but also many cases from the entire country. The average stay at hospital for the Creole sample is 2.95 days. but this includes

two mothers who both spent a month at hospital. Excluding these two mothers, the average hospital stay for the Creole mothers is 2.06 days. The other District Hospitals average somewhat longer stays with 2.26 days for the Caribs and 2.76 days for the Mestizos.

Breast-Feeding and Weaning Behavior

Figure 34 summarizes the breast-feeding/weaning history for the entire sample. But Belize's population is not homogeneous and neither is its breast-feeding behavior, and the variation in infant feeding between the different population groups is obscured by representing the sample with collective curves. Therefore, Figure 35 presents the breast-feeding/weaning history for the five sample groups during the first four months by separating the middle curve of Figure 34 into the different ethnic group components. These curves, which are taken from the individual intra-ethnic analyses, represent breast-feeding without supplementation of other milk. However, they do include glucose and sugar water feedings. It is felt that these curves form a more realistic basis for a breast-feeding/weaning comparison between the five groups than do the "Total" or "Exclusive Breast-Feeding" curves. "Total Breast-Feeding" --meaning all babies who are nursing--includes infants that are for all practical purposes weaned except for one nursing session per day. The "Exclusive Breast-Feeding" of the Maya, Carib and Mennonite samples may include some glucose

WEANING HISTORY OF ENTIRE SAMPLE

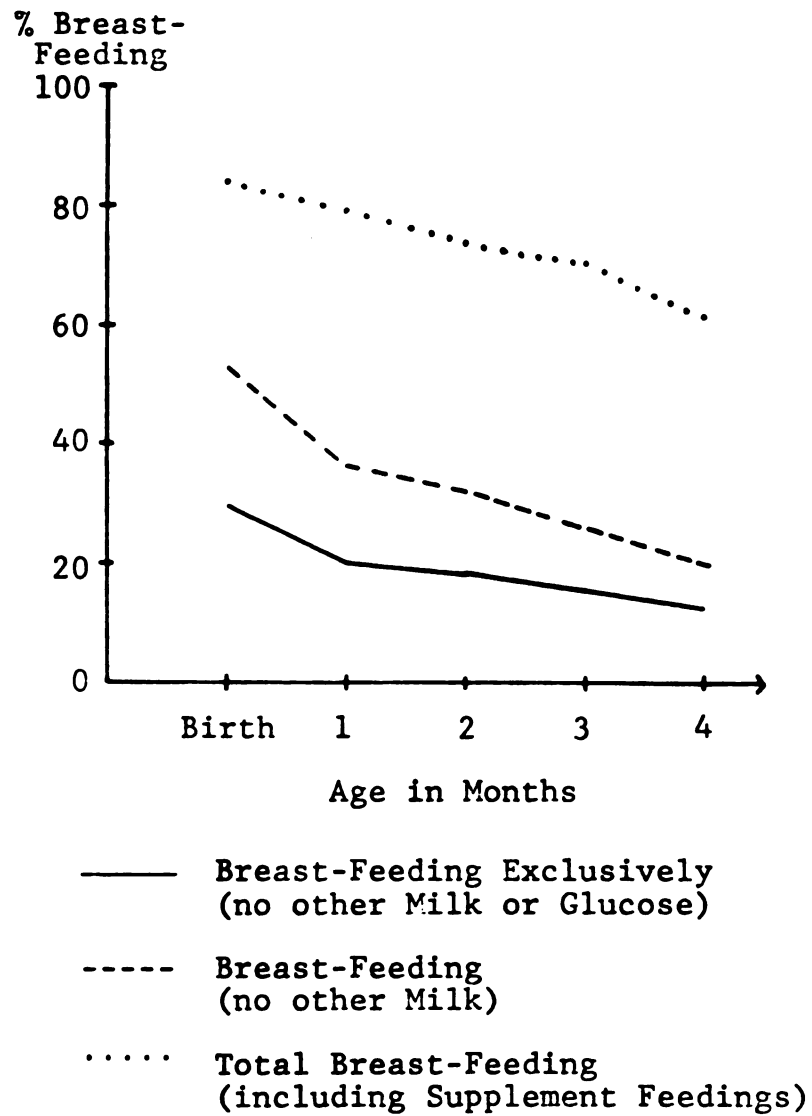


Figure 34

BREAST-FEEDING OF FIVE SAMPLE GROUPS

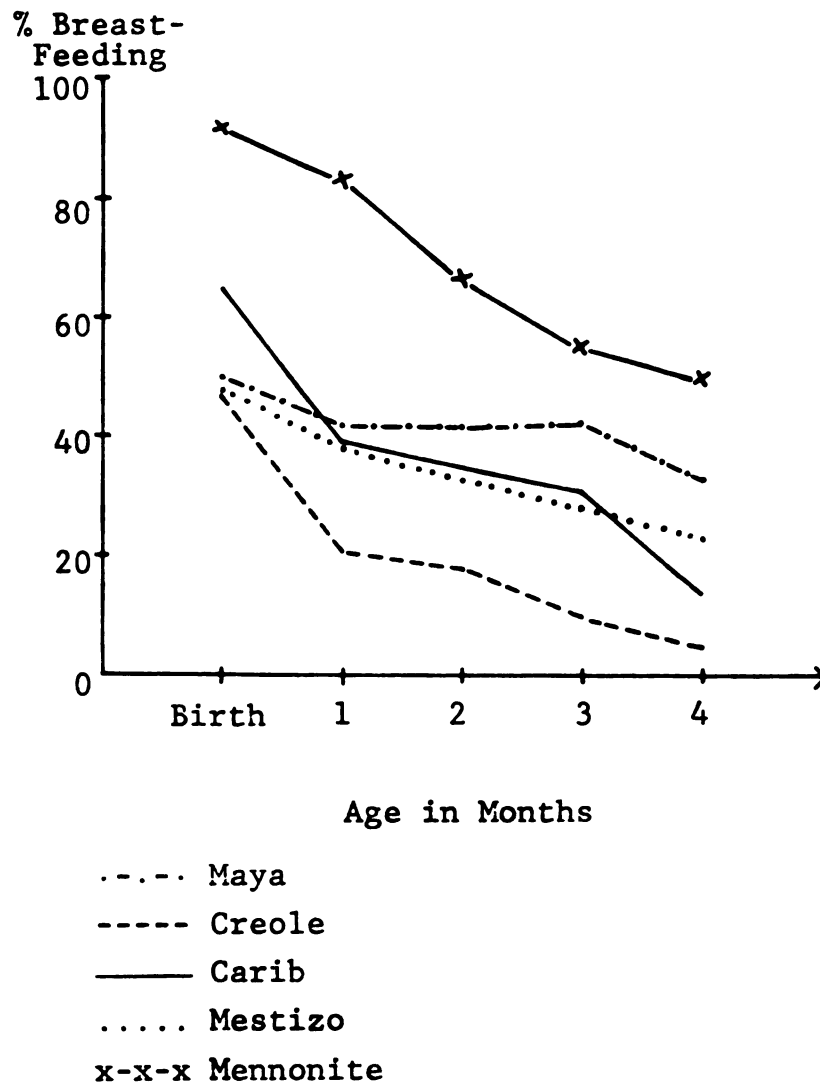


Figure 35

feeding due to the fact that not all the mothers of these three groups were questioned about that practice. Thus, the data of the "Breast-Feeding" curves are the most consistent from group to group.

The five curves in Figure 35 share similarity insofar as each begins at its highest point and decreases over time. However, the curves occupy different levels in the chart and display varying slopes. Throughout the four-month period, the Mennonite sample represents the highest proportion of breast-feeding without supplementation, and the Creole the lowest. Whereas the Creole mothers initially have nearly the identical percentage of breast-feeding as the Maya and Mestizo mothers, many more Creole mothers supplement and complete weaning during the early four months than do mothers of the Maya and Mestizo groups. The greatest change over time is indicated by the curve representing the Carib sample: the Carib mothers have the highest proportion of beginning breast-feeding after the Mennonites, but at the end of the four-month period they have the second lowest. The variation in breast-feeding between the five samples will be considered in relationship to the specific factors parity, education, marital status, employment, nuclear family and length of hospital stay.

In comparing breast-feeding with parity, one finds some variation between the groups. Among the Creole and the Mestizo more low-parity mothers (one or two children) started to breast-feed, but a greater percentage of them

also began the weaning process earlier. Among the Caribs and the Maya a greater percentage of the high-parity mothers (three children or more) started to breast-feed and they, too, began weaning earlier. There are a number of factors that might play a role in these contradictory findings. Generally, a mother who has only one or two children to take care of has fewer demands on her attention and time, and she therefore is more likely to have an undisturbed nursing session. Especially if the child is her first, she has probably attended the Maternal Clinic at the Health Center and has been advised by the nurses to breast-feed, since the Ministry of Health supports breast-feeding. On the other hand, she is less experienced in nursing and may not be as successful at it as a mother who has had a few more children. By the same token, a multiparous woman has the experience, but also tends to have more chores to do simply because she has a larger family. Additionally, the older children may be in need of attention while she is trying to settle down with the youngest for feeding. It was also found, especially among the Maya, that the women help in the milpas; thus, an older child may be left in charge of feeding the baby during the mother's absence. Apart from these minor differences, parity does not appear to be strongly related with breast-feeding/weaning in any of the groups.

Similarly with this sample, education has little impact on breast-feeding and weaning, even though mothers

with primary education appear to favor nursing over other modes of infant feeding. Nevertheless, the difference in breast-feeding between primary and secondary education mothers is not statistically significant. A slightly larger percentage of mothers who had completed High School did bottle-feed, and this is true among the Creoles, Caribs and Mestizos. Possibly, the women with more education find it easier to integrate a new practice, such as artificial feeding, into their lifestyle and are also more eager to try it.

Comparing breast-feeding with marital status, the unmarried Creole mothers show a steep decrease in unsupplemented breast-feeding already during the first month. Among the Carib there is also a more distinct difference between the married and single mothers in weaning than among the Mestizo, Maya or Mennonite. But among the Creole the difference between single and married mothers in relation to unsupplemented breast-feeding is significant. There is probably more than one factor at work here. In Belize, the majority of married women are housewives without outside employment. A married woman may also feel less need to go out than a single woman and may feel more relaxed to fulfill her role as a mother. Many young Creole and Carib women find themselves with the responsibilities of a mother but without the regular support and companionship of the father of the baby. Therefore, they may feel not only the economic pressure to work, but also the need

to remain socially active. Both the social and the economic aspects tend to occupy the mother away from home and thus also away from the baby. The significant difference in unsupplemented breast-feeding between single and married Creole mothers is seen as a consequence of the greater opportunity for employment as well as entertainment in Belize City.

There is a much stronger relationship between employment and breast-feeding/weaning than with some of the other variables. Mothers can take maternity leave from work, but the drop in income can be a deterrent. Yet, many employed mothers maintain breast-feeding for some time and do so by going home during the noon hour, which many Belizeans do regularly. But a nursing session really cuts into a working woman's break, and so these efforts generally do not last beyond one or two months and other milk or formula feedings are given at least as supplements if not as substitutes.

Employment is highest among the Creole and Carib mothers, and one finds a decrease in breast-feeding and an increase in weaning with these two samples. The difference in breast-feeding between employed and unemployed mothers is even stronger among the Creole mothers; this is seen as a result of the marital status, education and urban environment of the Creoles.

Even though a larger proportion of nuclear family mothers does breast-feed, compared with non-nuclear, the

difference between the two is not significant. With the two largest groups, the Creoles and the Mestizos, the mothers who live in a nuclear family situation tend to nurse more than do those who live in different family situations. A woman who lives just with her husband and children can dedicate more time to them than one who has a number of additional relatives to consider on an everyday basis. The Carib mothers resemble the Creole and Mestizo mothers insofar as more nuclear family mothers start to breast-feed. However, more of them are supplementing, too. But the difference is slight and may be due to the small sample size where only six Carib mothers live in a nuclear family setting.

Length of hospital stay depends on whether a mother lives in an urban or rural environment, and it is a factor only with the three samples who had large proportions of hospital deliveries, the Creole, Carib and Mestizo. With the Mestizo sample, a longer hospital stay (three days or more) shows a significant positive effect in beginning breast-feeding. This finding is surprising for two reasons: Orange Walk Town Hospital, the one associated with the Mestizo sample, is the only hospital without rooming-in which is considered helpful in establishing breast-feeding, and the practice of Combing down the breast with concurrent delay of breast-feeding is widespread among the Mestizo mothers. While the mothers are in hospital, they do not wash down or comb down their breasts with orange

water, but wait to do so until they get home. The longer a mother stays in hospital, the longer the baby is kept off the breast and fed glucose water from a bottle and in some cases formula also. Bottle-feeding is much easier for an infant than suckling the breast, and one might expect that the longer the baby is fed by bottle, the more he gets accustomed to this mode of feeding and will resent the change. However, the nurses in Orange Walk Hospital, especially the Public Health Nurse and Rural Nurse who see the mothers also during pregnancy, strongly support breast-feeding. As far as the withholding of the early mother's milk (Colostrum) is concerned, the mothers who practice Combing down consider this delay an essential step before breast-feeding. They are quite determined breast-feeders afterwards. All but one of the mothers who practiced Combing down were still breast-feeding at age one month. Ironically, six of the mothers who started breast-feeding without Combing down, had their babies fully weaned by one month.

Figure 36 shows the distribution of bottle-feeding of formula or milk other than breast milk for each of the five groups over the first four months. The curves represent the complement of those shown in Figure 35 that indicate full breast-feeding without supplementation. From this graph it can be determined that there is a wide range in age at the introduction of bottle-feedings between the five samples. For example, at age one week, eight percent

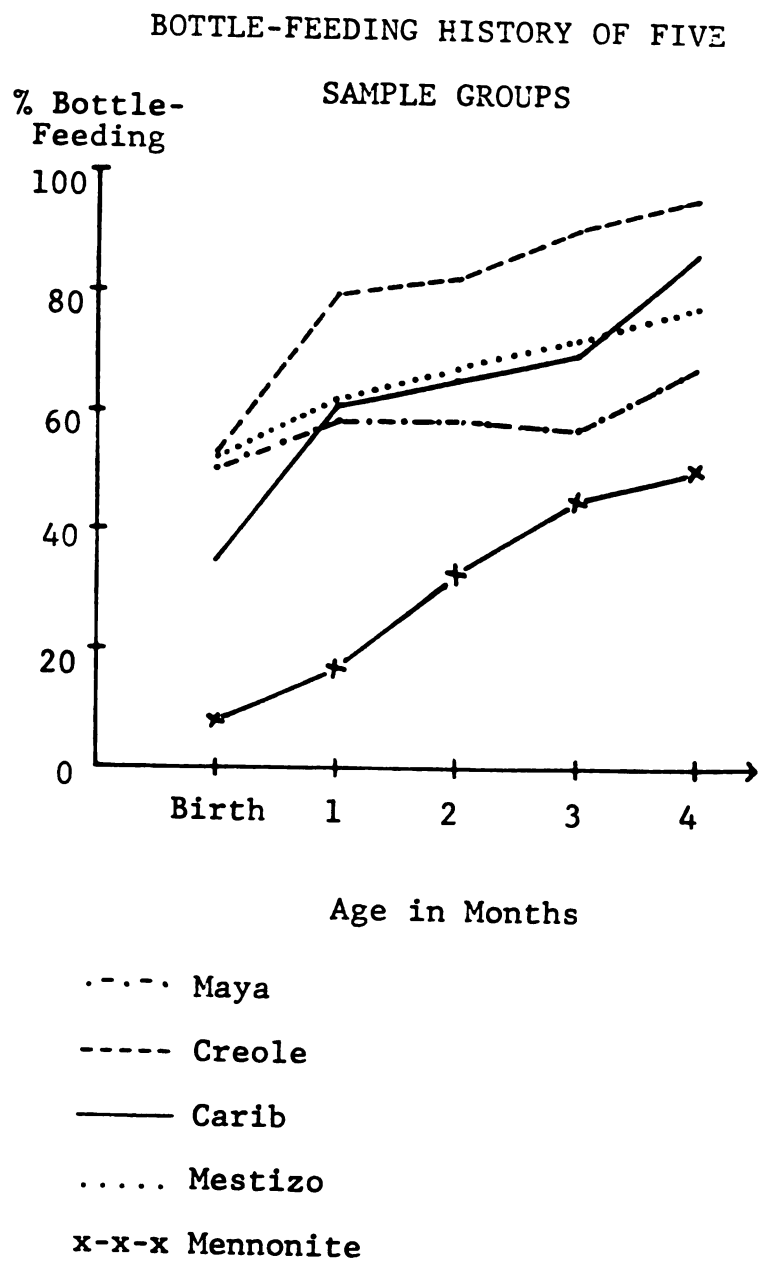


Figure 36

of the Mennonite babies are bottle-fed compared to thirty-five percent of the next highest group, the Carib babies, and fifty-three percent of the Creole infants. At the end of the four month period, ninety-five percent of the Creole babies are bottle-fed compared to fifty percent of the Mennonite babies. This variation in weaning age cannot be attributed to any one factor in particular. The same variables that explain the decrease in breast-feeding account for the increase in bottle-feeding.

The two variables that showed the most pronounced difference in breast-feeding/weaning are marital status and employment. Fifty-six percent of the Creole mothers are married compared to one hundred percent of the Mennonite mothers, and almost thirty-six percent of the Creole mothers are employed compared to none of the Mennonite mothers. It is felt that the combined effect of these two factors accounts for much of the variation between the Creole and Mennonite mothers.

The Carib mothers who with fifty-five percent have nearly the same proportion of married mothers as the Creole and the second highest of employed with twenty-five percent show exactly the same steep increase in bottle-feeding, namely twenty-six percent, as the Creole during the first month. The other factor that these two groups have in common is the urban environment which lends greater possibilities to employment as well as social life.

The Maya and the Mestizo whose background is in part Maya show the least change in feeding pattern not only during the first month, but over the entire four month period. Both samples have a ninety-five percentage of married mothers and ten and nine percent, respectively, of employed mothers.

The Mennonite who resemble the Maya and Mestizo in marital status (one hundred percent) and employment (none) similarly show little increase in supplementation during the first month. However, after that first month many Mennonite mothers resort to supplementary bottle-feedings at such a rate that by the end of the four month period their percentage change in bottle-feeding equals that of the Creole mothers (fourty-two percent) rather than that of the Maya and Mestizo mothers. It is felt that this is a consequence of this particular sample and mainly due to the large age difference between the Maya and Mestizo on the one side and the Mennonite on the other; the Mennonite mothers' main reason for early supplementation is insufficient milk which is affected by age and parity.

The reasons for not breast-feeding appear to be more health related (inverted nipples, infection, insufficient milk) among the Maya and Mennonite and to a lesser degree among the Mestizo than among the Creole where the most common explanation was "baby did not want to." One assumes that this reflects the more traditional lifestyle of the Maya, Mennonite and Mestizo.

Referring once more to Figure 34, one finds that sixteen percent of the babies are never breast-fed and that thirty percent start out breast-feeding exclusively. The proportion of exclusively breast-fed infants would be much higher, namely 52.5 percent, were it not for the common practice of glucose feedings in Belize. The distribution of glucose feedings for the entire sample is presented in Table 25. A total of ninety-eight babies (fifty-four percent) received daily glucose or sugar water feedings since birth. This figure is considered conservative since only thirty percent of the Maya and seventy-five percent of the Carib mothers were asked about this practice. This figure further excludes babies who received glucose infrequently and those infants who were on glucose or sugar water only for one to three days following birth while their mothers practiced combing down.

The custom of administering daily glucose or sugar water is an important aspect of infant feeding for a variety of reasons: it not only adds calories to the baby's diet and thus distracts from nursing, but it also puts a great strain on the immature digestive system to cope with a large load of sugar and to store the excess in form of glycogen in the liver. Additionally, this practice increases the possibility of the introduction of bacteria by mouth.

A frequent condition coincident with weaning is gastro-enteritis, commonly referred to as "weanling diarrhoea." Since gastro-enteritis among babies as well as

TABLE 25
DISTRIBUTION OF GLUCOSE FEEDINGS

Number of Babies	Amount of Glucose or Sugar Water in Ounces													Total
	0.5	1	2-3	4	5	6-7	8	9	10	12-16	20	24	Unknown	
Maya*	1					1								2
Creole		1	12	7	2	3	4	6		2		1	7	45
Carib*				3		1	1	1		4			3	13
Mestizo			4	8	2	6	2	4	3	3	1		4	37
Mennonite													1	1
Total	1	1	16	18	4	11	7	11	3	9	1	1	15	98

*Sampling not complete

early weaning and glucose feedings are widespread phenomena in Belize, the sample is analyzed to determine if a relationship exists between these factors.

Weaning and Gastro-Enteritis

The distribution of gastro-enteritis is presented in Table 26.

A total of 27.6 percent of the entire sample developed gastro-enteritis. According to these data, the two largest groups, the Creole and the Mestizo, show an incidence of twenty-eight percent and thirty-one percent, respectively. The highest incidence of gastro-enteritis is found among the Maya, thirty-five percent, and the lowest --apart from the Mennonites who had none--among the Caribs, twenty-five percent. The fact that the Caribs have a lower incidence may be a true reflection of the situation, but it may also be due to the circumstance that the survey of the Caribs was completed early during the field work, when the interviewer had not as much experience in collecting the data. In the Stann Creek District, where the majority of the population is Carib, Benguche found in her 1980 survey of ninety-five babies a gastro-enteritis incidence of fifty-three percent (Benguche, 1980: 48). But hers was not an entirely Carib sample, rather a cross-cultural one in which the Caribs represented nearly two-thirds. Also, the Benguche sample was entirely drawn from hospital records, whereas ninety percent of the present survey was conducted

TABLE 26
DISTRIBUTION OF GASTRO-ENTERITIS

Group	Sample Size	Gastro-Enteritis Incidence	
		Number	Percent
Maya	20	7	35.0
Creole	64	18	28.1
Carib	20	5	25.0
Mestizo	65	20	30.8
Mennonite	12		
Total	181	50	27.6

on a house to house basis. An additional factor to take note of is, that in the Benguche study a baby was considered to have suffered from gastro-enteritis if he had more than three loose stools per day; in comparison here a case is considered gastro-enteritis if the baby had numerous green stools with blood, mucus or pus and with or without fever and vomiting. While the true cause of diarrhoea cannot be determined without laboratory analysis, loose stools with blood or pus indicate intestinal infection (Jelliffe, 1974: 59-60).

Returning to the Carib sample in the present study, if one compares the formula/milk feeding graph in Figure 36 with gastro-enteritis incidence, one finds that of the four major culture groups the Caribs introduced formula or milk feedings later than did the three groups with higher incidence of gastro-enteritis. The Mennonites, who had not a single case of gastro-enteritis, introduced formula or milk later than any of the other groups.

A closer look at the fifty babies with gastro-enteritis reveals that eighty-six percent of the Maya cases, sixty-seven percent of the Creole cases and sixty percent of the Mestizo cases were introduced to formula or milk within the first few days of birth. The first Carib case to start bottle-feedings did so at age two weeks. Only five babies of the fifty cases (ten percent) were still fully breast-fed without any supplementation. However, four of these babies were receiving daily glucose/sugar

water feedings since birth and thus only one infant received all his nutrition from breast milk.

These results indicate that gastro-enteritis incidence is very much a function of weaning and that earlier weaning leads to a higher incidence of the disease. Age at incidence ranged from three days to eleven months. The average age for the Creole cases was 2.8 months, for the Maya 3.1 months, for the Mestizo 3.85 months, and for the Caribs 4.2 months. For the entire sample the average age at incidence was 3.4 months. The fact that the Maya have the highest incidence of gastro-enteritis even though as a group they are not as quick to supplement or substitute bottle-feeding for breast-feeding is attributed to environmental conditions that favor the multiplication of bacteria, for example rubbish disposal that is easily accessible to flies as well as domestic animals that roam freely during the day and share the home at night. It was also found that the babies who came down with gastro-enteritis at a younger age generally developed more severe symptoms than did the others, according to the mothers' descriptions.

A frequent problem with gastro-enteritis is dehydration due to the great loss of fluids caused by the numerous stools that may be accompanied by vomiting and fever. Dehydration may be recognized by the sunken fontanelle, which in Belize is commonly referred to as "mole drop" from the Spanish "caida de la mollera." If that happens, many mothers take their babies to the traditional midwife who

fills her mouth with warm water, places her lips over the baby's sunken fontanelle and then sucks it up. This is customary not only in the rural areas with the more traditional groups, but also in Belize City, where four Creole mothers mentioned that they took the baby to the midwife for this treatment. Others take the baby to the hospital for drip treatment. It was learned that many mothers use their own judgment and administer castor oil, worm syrup or other purgatives to rid the baby's system of the disease in a thorough cleansing action. Another common treatment is to increase the glucose feedings.

Weaning Foods and Gastro-Enteritis

Table 27 was constructed for the comparison of the weaning practices among the fifty gastro-enteritis babies to see whether they have any weaning foods in common and if so, what their characteristics are.

Thirty-two of these fifty babies (sixty-four percent) were given glucose or sugar water on a daily basis since birth. Even this percentage is considered low since not all the Maya and Carib mothers were questioned about glucose/sugar water administration. Among the Creoles and the Mestizos, where the data collection with respect to glucose/sugar water feedings is more complete, seventy-eight percent and seventy-five percent, respectively, of the gastro-enteritis cases had been receiving daily glucose or sugar water feedings since birth. It appears thus, that

TABLE 27
WEANING PATTERNS AND GASTRO-ENTERITIS INCIDENCE

			AGE IN MONTHS												
BABIES			0	1	2	3	4	5	6	7	8	9	10	11	12
1	MAYA	# 2	F				CUST G								6 I
2	"	9	CONDENS. MILK				G								
3	"	11	-IF			JUICE	YOLK								
4	"	12				COFFEE	CEREAL								
5	"	15	F			COND. MILK									
6	"	16	F ₄				CEREAL								
7	"	17	F ₁												
8	CREOLE	# 4	F ₄							CEREAL					
9	"	6	GL			FRUIT	EGG								
10	"	7	GL			F ₁	JUICE	VEG							
11	"	11	GL				CEREAL								
12	"	12	GL			-IF	CEREAL								
13	"	15				JUICE									
14	"	17	GL			F ₃	CER	YOLK	VEG						
15	"	19	GL			F ₂	JUICE	EGG	MEAT						
16	"	20	GL			F ₄	JUICE	VEG	EGG						
17	"	30	F ₂			CUSTARD									
18	"	32	GL			F									
19	"	39	GL			F ₁	JUICE	EGG	EGG						
20	"	44	GL			-F ₁	LAB								
21	"	47	SU			JUICE	EGG								
22	"	48	SU			F									
23	"	50	GL												
24	"	54	GL												
25	"	64	GP												
26	MESTIZO	# 1	GL			F ₁									
27	"	2	GL			F ₂	ORANGE								
28	"	3	GP			F ₂	CEREAL								
29	"	6					JUICE	EGG	EGG						
30	"	TWIN 7	GL			F	JUICE	CER	VEG						
31	"	15	GP			F ₄									
32	"	16	GL			F ₂									
33	"	17	GL			F ₁	JUICE	VEG							
34	"	19	GP			-IF	CEREAL								
35	"	20	GL			F ₃									
36	"	21A	GL			F ₃	JUICE	VEG							
37	"	26	GL			F ₃	JUICE	VEG							
38	"	28	GL			F ₃	JUICE	VEG							
39	"	38	GL			F ₃	JUICE	VEG							
40	"	40	GL			F ₃	JUICE	VEG							
41	"	44	GL			F ₃	JUICE	VEG							
42	"	51	GL			F ₃	JUICE	VEG							
43	"	53A	GL			F ₃	JUICE	VEG							
44	"	55A	GL			F ₃	JUICE	VEG							
45	"	61	GL			F									
46	CARIB	# 4													
47	"	6	GL												
48	"	7													
49	"	13	GL												
50	"	14	GL												

KEY:

A: ANISE SEED TEA

GL: GLUCOSE SINCE BIRTH

GP: GRIPENESS " "

SU: SUGARWATER " "

F₃: FORMULA; THREE BOTTLES PER DAY

N: INTRODUCTION OF WHOLE MILK

G: EPISODE OF GASTRO-ENTERITIS

-----: BREAST-FEEDING

-----: " CONTINUED BEYOND TIME OF INTERVIEW

-----I: " ENDED AT THAT AGE

.3-----: THE DAY AFTER BIRTH WHEN BREAST-FEEDING BEGAN

THE AGE OF A BABY IS INDICATED BY A VERTICAL LINE ON THE RIGHT

UPPER CASE GL, SU, A, NEXT TO BABY'S # MEANS FEEDING OF BABY WHILE MOTHER DELAYED NURSING DUE TO COMING DOWN OF BREAST

this practice predisposes an infant to gastro-enteritis.

Only five babies were fully breast-fed and without supplementation of any other food at the time they suffered gastro-enteritis except that four of them had been receiving daily glucose or sugar water since birth. Two more babies who were also fully breast-fed without supplementation of other milk developed gastro-enteritis after they were started on orange juice.

The interviewer observed that gastro-enteritis and milder cases of diarrhoea often followed the introduction of orange juice, but not if the mothers gave the babies the orange fruit. This distinction between juice and fruit appears noteworthy as it is common in Belize to prepare orange juice by squeezing the fruit, diluting it with water and adding sugar to it. Thus, juice becomes another vehicle for sugar, whereas a baby that just sucks the whole fruit receives fewer carbohydrates and is less exposed to possibly contaminated water mixed into the juice.

Another food whose introduction frequently preceded a bout with diarrhoea or gastro-enteritis was custard. But of all the mothers who fed their babies custard, only one prepared it from egg and milk, all others used custard powder from a tin which is a cornstarch mix with sugar and sometimes vanilla flavored.

An item similar to this type of custard is "lab." This is prepared from cassava starch, cornstarch or corn flour, mixed with water or occasionally milk (then

preferably condensed milk) sweetened with sugar and possibly flavored with cinnamon. It has the consistency of a pudding or custard.

Cereal or porridge often had the same effect on babies in terms of diarrhoea or gastro-enteritis and this, too, is commonly condensed milk into which starch has been added as a thickening agent. In fact, some mothers called it "condensed milk porridge."

Looking at Table 27, one notes that sixty percent of the babies (30/50) were still on breast when they developed gastro-enteritis, but that actually only one baby was exclusively breast-fed at the time. All others were on a higher carbohydrate diet from early on than they would have been had they been exclusively breast-fed.

Thus, even though different weaning foods are used from group to group--such as cassava lab with the Carib, corn flour lab with the Maya and Mestizo, and porridge with the Creole--there is similarity in their high carbohydrate content and the source of these carbohydrates being sugar and starch. Comparing this with the Mennonites, one finds that the Mennonite mothers also offer cereals to the infants when weaning, but they differ in the amount of carbohydrates (mainly in carbohydrates from sugar) and in the age at which the mothers introduce these foods.

Diarrhoea can be caused not only by a variety of pathogens, but also by foods that cannot be properly digested (Jelliffe, 1974: 59). Carbohydrates have long been

implicated as a nutrient that can favor ill health in infants, e.g. lactose intolerance. However, lactose is not the only carbohydrate that can present difficulty in digestion in the very young. Because of the immaturity of the digestive tract, the activity level of some enzymes is much lower in infants than in children or adults. Amylase, for example, which is necessary for the digestion of starch, is present in the newborn only at about one twentieth of what it is in the adult (Husband et al., 1970: 290). Many infants under six months old have very low amylase activity which results in the malabsorption of starch by babies (Lilibridge and Townes, 1973: 280-281).

While carbohydrates per se represent an important part of human nutrition, the proportion of different carbohydrates changes from infancy to adulthood. The major carbohydrate for babies is lactose, and the activity level of the enzyme lactase is high in the breast-fed infant and gradually decreases during lactation. As the child gets older, starch increasingly becomes the main source of carbohydrates and lactose ranks only third after sucrose (Lebenthal, 1975: 757). During the first year of life the amylase activity level increases about four-fold, but under age six months it can be very low, and starch has been found in the stools of infants, which indicates that this food is not properly digested (Husband et al., 1970: 290-292; Auricchio et al., 1967: 857, 860). Indeed, poorly digested carbohydrates have been implicated in fermentative

diarrhoea (De Vizia et al., 1975: 52; Lebenthal, 1975: 758; Lilibridge and Townes, 1973: 279-281).

A common cause of infant diarrhoeas are E. Coli bacteria. At the same time, E. Coli are a normal part of the intestinal flora and present in the healthy infant (Nelson, 1979: 769). Consequently, there must be some phenomenon that inhibits bacterial development from becoming toxigenic. Bacterial analyses of stools have shown that Coliform bacteria are present in larger numbers in bottle-fed infants, whereas lactobacilli predominate in breast-fed babies (Bullen and Willis, 1971: 338). Thus, human breast milk, and in particular the lactoferrin in human breast milk which binds iron that E. Coli need for growth, is credited in the prevention of bacterial overgrowth. On the other hand, an overload of carbohydrates for which an infant has limited enzyme activity can only be partly digested. The rest can be utilized by bacteria in fermentation and lead to diarrhoea.

The findings of this study confirm that the introduction of starchy foods in the young infant's diet, as is common in Belize, leads to a higher incidence of weanling diarrhoea. Introduction of the same foods in somewhat older babies does not result in a similar incidence of this disease. This is most convincingly demonstrated by the Mennonite sample where the mothers tend to breast-feed for extended periods.

Breast-feeding is associated with very little gastro-enteritis incidence. This can be observed in the fact that only one out of the fifty gastro-enteritis cases was breast-fed without supplementation of other foods. But even this baby received griewater--given as an anti-spasmodic rather than a nutrient--and therefore may have have been infected by a contaminated utensil. Since so many of the gastro-enteritis cases were still on breast at incidence, it is obvious that breast-feeding cannot prevent gastro-enteritis unless it represents the baby's sole nutrition to the exclusion of all other foods. Even though breast milk has been successfully used in the treatment of infants with gastro-enteritis (Stoliar et al., 1976: 1260), breast-feeding cannot be regarded as a medication, it is a way of life for the infant.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Good nutrition is necessary for a healthy existence throughout one's lifetime, but it is particularly important when body tissue is in need of repair or during periods of growth. The need for an adequate diet is especially critical at the early developmental stage in the womb and in infancy, when lack of proper nutrition can result in irreversible growth retardation. Whereas the fetus is entirely dependent on maternal nutrition, at birth a choice opens up in the infant's source of nutrients: breast-feeding or bottle-feeding.

The traditional way to feed a baby is to nurse him for six to twelve months (Nelson, 1979: 196) and to gradually wean him onto other foods beginning between four and six months. But after the turn of the twentieth century it became increasingly common to substitute artificial feeding for breast-feeding already at birth.

Even though cow's milk usually formed the basis of formula feeding, human breast milk has been the model to be copied. In their effort to define breast milk composition as precisely as possible so that formulas could be better substitutes, researchers learned that there are

differences between breast milk and cow's milk beyond the variations in the proportion of protein, fat and lactose.

To ease the newborn's move from a very limited and highly protected environment into a wider and more threatening one, maternal protection is continued through nursing. Mother's milk contains not only all the nutrients that the growing organism needs, but it provides them in a form in which they can be easily digested and absorbed by the baby. Also, breast milk is not a uniform product, but its composition is finely matched to the individual baby's needs. Furthermore, mother's milk provides the infant with antibodies against disease agents that are common to the mother's and baby's environment during lactation.

The break from mother's protection is not complete until the baby has been fully weaned. However, the protection diminishes as soon as breast milk is no longer the only food in the baby's nutrition. The weaning process extends from the time when the infant is first introduced to food other than breast milk until he is entirely off the breast. It is during this period, when the baby becomes increasingly dependent on his own metabolism and when he builds up his own immunity, that he is particularly vulnerable.

Despite the immunological advantages of breast milk, bottle-feeding has been successful where environmental factors, such as climate and sanitation are favorable, where formulas are properly prepared and stored and

where the parents are financially able to continue correct formula feeding for a number of months.

These criteria are not as easily met in the developing countries that are mainly in the tropics, where good sanitation is much more difficult to maintain than in the temperate regions, and where the purchase of imported infant formula cuts deeply into a family's income. At times it may become necessary to dilute the formula or discontinue it altogether for a while and feed the baby something that resembles breast milk only in color, such as watered down cassava starch or evaporated milk.

Inadequate formula feeding has quick repercussions in lowered resistance to infection in the infant, which in turn can hasten the progress of malnutrition. The relationship between infection and malnutrition is synergistic. One manifestation of this is weanling diarrhoea, the leading cause of morbidity and mortality among infants and young children in the developing countries.

Weanling diarrhoea is associated with a change in nutrition. In Belize, gastro-enteritis which is another term for weanling diarrhoea is a common problem, but the incidence of the disease is not characterized by even distribution. Disease incidence is higher in the rural than in the urban areas as is demonstrated by the difference between the Maya and the Creole, who represent entirely rural and urban samples, respectively. But there is further variation between the different culture groups which

goes beyond a simple rural-urban division. The Mennonites, who are also a rural group, have either very little gastro-enteritis incidence or a much milder form of diarrhoea.

There is a wide range in weaning age as well as weaning foods, and it appears that both these factors influence the incidence of the disease. The groups who have larger proportions of mothers either substituting or supplementing breast-feeding earlier, show a greater disease incidence at a younger age. This can be observed with the Creole, for example, who have the largest proportion of supplementing babies from birth on and who show the youngest average age at incidence of gastro-enteritis. The opposite is found with the Mennonites who begin supplementing later than any of the other groups and where no gastro-enteritis is indicated among the sampled mothers.

If a baby is weaned within the first few months of birth, he is usually fed by bottle. Since it is commonly formula that is given by bottle, the two have become synonymous. There is a strong relationship between bottle-feeding and gastro-enteritis and the findings in Belize confirm this. Gastro-enteritis can be caused by formula that has been prepared with contaminated water or if fed from contaminated bottles. But the problem of gastro-enteritis has more facets than simply the one of poor hygiene.

It was found that while early bottle-feeding is a strong indicator of weanling diarrhoea, the incidence was

increased by other factors, such as glucose or sugar water feedings and early introduction of semi-solids. The most frequent first weaning food in Belize is glucose or sugar water. In fact, for many babies it is the first nourishment of any kind they receive, even before milk. This is due to a taboo among the Maya and Mestizo who believe that colostrum, the early breast milk, is harmful to the baby because of its yellowish color. It has been the custom to give the newborn anise seed tea while the mothers wait for the regular milk to come in. But many mothers now administer glucose or sugar water instead of the traditional infusion. While the custom of withholding colostrum and at the same time combing down the breast is original and most familiar to the Mestizo and Maya, it is also found with some other Belizean mothers. Independently of withholding colostrum from the infant, many babies in Belize receive glucose or sugar water feedings as a complement to their daily diet from birth until they eat entirely from the family pot at about age one year.

The second most frequent weaning food is proprietary milk, such as formula or diluted evaporated or sweetened condensed milk, fed by bottle. Thus, many babies are immediately put on glucose and milk bottle feedings. But glucose is also given to infants who are otherwise entirely breast-fed. Both bottle-feeding and glucose or sugar water feedings are most common among the Creole babies, but also widespread among the Mestizo, Carib and to a somewhat

lesser degree among the Maya. However, bottle-feeding is a substitute for breast milk rather than a supplement to breast-feeding for a larger proportion of Creole babies than for babies of the other groups.

Third among the infant weaning practices in Belize ranks the early introduction of semi-solids. These are various sweetened cereals or custards. Overall, the diet of Belizean babies is high in carbohydrates from starch and sugar, but there are gradations from group to group. As the custom of giving anise seed tea instead of colostrum is related to culture, so are other infant feeding practices of the individual groups. Thus, one finds that the first semi-solids given to the young are soft porridges of the staple foods: usually cassava "lab" (custard) among the Carib, corn flour lab or masa among the Mestizo and Maya (also known as "atole" among the Maya), oatmeal gruel among the Mennonite, and rice cereal or custard among the Creole. These practices are not exclusive to the individual groups and many mothers also prepare custards with commercial cornstarch mixes and serve these as cereals.

The cereals are followed by mashed vegetables from the family pot, fruit, egg and minced meat, such as chicken or fish. Here again, the choice of specific items from the basic food groups is often tied to the typical diet of the culture group. The Mennonite mothers feed mashed potatoes while the Maya and Mestizo mothers give small pieces of tortilla with bean juice or mashed beans, and the Carib

mashed cassava, coco and yams. Surprisingly, banana is most popular as a baby food among the Mennonite and much less so among the other groups. Another food is particularly favored by the Carib mothers and also common among the Creole: "fish tea," for which the mothers mash fish with some broth in which the fish was cooked.

While various food avoidances for infants exist that deprive babies of some valuable protein--not feeding egg yolk because it will give the baby "puff" (colic), for example--these beliefs are not universal and it is felt that they are far less damaging than bottle-feeding, glucose water and early semi-solids. The different infant feeding practices and especially the choice of the first semi-solid food for the baby reflect the cultural tradition of each group. But the individual mother's decisions concerning breast-feeding/weaning are also influenced by socio-economic factors, such as marital status, parity, education, employment, nuclear or non-nuclear family status and length of hospital stay.

The variable parity was inconclusive in predicting breast-feeding/weaning behavior insofar as it showed conflicting findings. Among the Creole and Mestizo a larger proportion of low-parity mothers began to breast-feed compared with the Carib and Maya where a greater percentage of high-parity mothers did so. This particular grouping may be due to the fact that the Creole and Mestizo represent the two largest samples in this survey with sixt-four

and sixty-five mothers, respectively, compared to the Carib and Maya samples with twenty mothers each.

Nuclear family status and education did have some influence on breast-feeding/weaning, but neither made a statistically significant difference. A higher percentage of nuclear family mothers and of primary education mothers did breast-feed. These two variables concerned only the Creole, Carib and Mestizo, since all of the Maya and Mennonite mothers lived in a nuclear family and did not attend school beyond primary education.

Marital status and employment had a strong impact on breast-feeding/weaning among the Carib and Creole. Both factors made a significant difference among the Creole mothers. Again, these two variables did not concern the Maya and Mennonite.

Length of hospital stay was the only significant variable among the Mestizo, and they are the only group where a longer hospital stay had a significant positive influence in beginning breast-feeding. But this initial influence is of limited duration.

Considering the socio-economic aspects, one can generally divide the five samples into three groups: the Creole and Carib on the one side, the Maya and Mennonite on the other, and the Mestizo in between. The Creole and Carib share an urban environment, similar education, marital status, nuclear family status and, somewhat less so, employment. The same is true for the Maya and Mennonite on

the opposite end of the scale in a rural environment. The Mestizo, however, share education with the Creole and Carib, nuclear family and marital status with the Maya and Mennonite, and urban as well as rural environment with both groups.

This grouping is altered when one turns to breast-feeding/weaning behavior. At that point one can separate the five samples into two groups: the Maya, Carib, Creole and Mestizo in one and the Mennonite alone in another. As a group, the Mennonite begin weaning much later than any of the other groups and rarely introduce semi-solids before three to four months and prefer to wait until the baby is five or six months old. While the Maya and Mestizo also breast-feed for extended periods, they resemble the Creole and Carib in that they supplement very early. The Maya and Mestizo, however, are not as quick with semi-solids as the Creole or the Carib.

With many mothers in Belize the problem with infant feeding is not so much the lack of breast-feeding as supplemented breast-feeding. One can ask a mother if she is breast-feeding and she can say yes and be right. But in fact, she may be weaning, because she is supplementing, be it with glucose or formula or custard or all three. Therefore, the question of the relationship between breast-feeding and health becomes one of weaning behavior and health. This is confirmed by the finding of this study where practically all gastro-enteritis cases received

something else in addition to breast milk at the time of incidence, even if it was only gripe-water. However, in most cases the disease occurrence climaxed an accumulation of carbohydrates in the infant's diet, where glucose or sugar water and starches figured prominently. Since the enzyme activity for the digestion of starch in infants is limited, the undigested carbohydrates can be utilized in the fermentation of bacteria and lead to gastro-enteritis. Thus, the precipitation of the disease in the very young may be developmental due to the immature digestive system, but it becomes an infectious disease because of bacterial overgrowth.

The developing countries in the world form a group of nations that are trying to emulate the industrial countries. A major factor that makes that achievement a desirable goal is the standard of living that has been reached by the already developed countries and which has created a glowing image for people everywhere.

The most important indicators of the standard of living are measured in terms of health: life expectancy is higher, infant death rate lower and general nutritional status better among people who live in technologically more advanced societies. Thus, the ways of the people that live in the industrialized countries hold a great promise, and to practice them is a step in the direction of progress.

However, a particular practice of one group of people cannot always be adopted without some negative side

effects. For a practice may have evolved at the same time with an entire range of factors, such as sanitation and education, technology and health care, and fit into a tightly linked model. When that practice is taken out of context, it may not have the same satisfactory effect as it did in the place of origin. The tragedy is that the practice itself is not recognized as the culprit, instead only an aspect of it may be considered harmful. For example, when a baby comes down with gastro-enteritis following the introduction of formula, the mother may simply switch from one brand to another, rather than question bottle-feeding itself.

Medical and pediatric societies in many industrialized nations, for example Canada and the United States, are making efforts to return to breast-feeding as the preferred way of feeding babies (Jelliffe, 1977: 58-59), while the developing countries are just fully embracing bottle-feeding. There appears to be a time lag at play in the diffusion of these customs, and if the past pattern continues, the present trend in the industrialized nations will diffuse into the developing world.

Recommendations

Several recommendations follow from the specific findings in this study. As presented here, they are designed to fit into the existing framework and resources of the Belize government's Ministry of Health programs for

Health Care Delivery and Health Education, and other existing institutions, such as radio.

1. It is strongly recommended to promote not just breast-feeding, but exclusive breast-feeding for all babies for six months.
2. Suckling the breast is hard work for a baby, and he must learn it from the beginning and not become accustomed to the bottle, which is easier. Therefore, it is suggested to not even expose the baby to the more leisurely food source, for he may not want to work so hard and refuse the breast when mother attempts to nurse him. In connection with this, it is recommended that all glucose feedings be banned from the Maternity Wards and that all medical personnel be asked to advise mothers not to administer glucose or sugar water to their babies.
3. In order to establish a successful breast-feeding pattern from the start, it is desirable to put the baby to the mother's breast as soon as possible after birth to initiate the milk flow.
4. Rooming-in at all hospitals would appear to be beneficial in the promotion of breast-feeding. That way mothers can attend to their babies when they get hungry, without having to wait for nurse to bring them. At the same time, the nurses may be able to assist mothers in successful

breast-feeding techniques before they are released from hospital.

5. The custom of washing-down the breast with warm water (or orange water) and squeezing or stroking in downward motion appears to be helpful and alleviate engorgement. Therefore, no harm is seen in permitting this practice at hospital and even ask a mother who belongs to a culture group where this is common, whether she feels a need to do so; one could provide her with warm water and a washcloth for that purpose.
6. In connection with the combing down custom it is recommended to advise mothers of the importance of not withholding the breast from the infant during that time. It is recognized that this is a very delicate matter and not at all easy to convey, since this is a taboo that is deeply rooted in the traditional health care. The early milk (colostrum) because of its yellowish color is thought to be spoilt and to be harmful to the baby. However, a breast-feeding campaign in Honduras has been successful in convincing mothers that the colostrum helps to clear the baby's system of the early stools (meconium) which the mothers want their babies to pass very quickly because of its very dark green color.

7. It is suggested to employ the traditional midwives' cooperation in the matter of withholding colostrum as much as possible. Many deliveries in Belize do not take place at a hospital, but at home and under the care of a traditional midwife. These midwives are required to attend regular meetings that are held by Public Health Staff in order to be permitted to practice. Information sessions that take into account the traditional beliefs, and integrate those aspects that are not harmful into the modern knowledge of colostrum and its importance to the nutrition as well as the immunological defense of the infant, would appear to be helpful.
8. Belize has excellent school system, and the population has a literacy rate of nearly one hundred percent. Therefore, it is recommended to employ a similar breast-feeding brochure, if not the same, as has been used in a highly successful breast-feeding promotion program in Canada.

It is necessary to recognize that attitudes and behavior do not change overnight and that resources have to be committed here to communicate correct information. Because of Belize's fine education system it is suggested to present mothers in the brochure as well as in health education with findings from research that deals with the problems and arguments which keep them from breast-feeding.

One should also cite examples of how other mothers cope with the same problems. The most frequent explanations gathered in the course of this study were:

inverted nipples

not enough milk

baby does not want to

Mothers frequently excuse lack of breast-feeding with an inability to do so, because of inverted nipples ("blind nipples") or poor milk flow. These are problems about which mothers can be reassured during pregnancy, so that by the time the baby arrives, she is confident about nursing him.

Special brassieres and breast shields can be worn and used with gentle pulling exercises for inverted nipples which can be discussed with the expectant mother at the Maternal Clinic. Poor milk flow is best improved by repeated suckling and emptying of the breast. There are very few mothers who cannot breast-feed their babies. Indeed, there are women who are successfully breast-feeding adopted babies without having given birth (Brown, 1977: 119; Cohen, 1971: 996-997). This is accomplished by permitting the infant to suckle the breast frequently for a few days or by applying a breast pump. This relactation method has also been employed in fighting gastro-enteritis outbreaks among

babies in refugee camps, as for example in Bangladesh (Brown, 1977: 116-117). If it is possible to induce milk flow in a non-postpartum woman, then it should be even more easily accomplished in a woman who has actually given birth, for it is the separation of the placenta that initiates milk flow, and the sucking action of the baby that increases it. The answer that baby does not want to nurse usually means that mother does not want to. Promotion of the advantages of breast-feeding should stress the nutritional, immunological, economic and contraceptive benefits of breast-feeding. It is further suggested to emphasize that a nursing mother regains her muscle tone faster, for it is a widespread belief that breast-feeding is disfiguring to the mother.

9. It is recommended to include comprehensive breast-feeding information in Health Education at the schools as well as expanding breast-feeding advice to the mothers during prenatal consultations at the Maternal Child Clinics.
10. A weaning brochure that stresses the importance of correct weaning foods and their preparation, with examples from Belizean diets would seem to be beneficial. Some mothers prepare a "fish tea" for baby from some boiled fish, mashed with some of the broth or butter (even peanutbutter) and sometimes

boiled potato. This is a very nutritious and easily digestible food for babies.

11. Radio Belize has regular announcements advising mothers to breast-feed. It is felt that these, too, could be expanded and aired closer to prime listening time. Belize has a very popular radio serial "Novella" which practically everybody in the country listens to. A breast-feeding announcement just prior to or immediately following that broadcast would seem much more promising than the present airing time.
12. The importance of sanitation cannot be stressed too much, especially in view of limited piped clean water supply and open drains.
13. The involvement of the baby's father should be encouraged. The male influence is very pronounced in Belizean life, even though in many families the woman is the stable influence. There are no television stations in Belize, and consequently movies are very popular. So are spectator sports, such as soccer and especially boxing. Without question the most popular athlete among Belizean men is Muhammad Ali. To air radio announcements or show a commercial just before a movie with this man promoting breast-feeding would probably increase nursing faster in Belize than most other ideas suggested here.

In the same vein of advertisement it is recommended to attempt and get a few popular film stars to promote breast-feeding on posters that can be distributed in Belize. There are many lovely women in Belize and beautiful babies. It must be possible to come up with posters of Belizean mothers that convey how a baby thrives on his mother's milk, rather than posters of foreign women bottle-feeding.

14. Finally, two global issues are addressed where the benefits of breast-feeding have hardly been realized or fully recognized, namely the population increase particularly in the developing countries and the widening food shortage. A high birth rate may be desirable for a country with a small population like Belize. But one must also consider the effect of many pregnancies in rapid succession on mother's health and consequently the infant's health. Birth control is a delicate issue in many societies, be it for religious, moral or health reasons. Breast-feeding in the past has been credited with preventing pregnancy, a belief which was later considered an old wives' tale. But more recently scientific evidence has confirmed that lactation delays the onset of ovulation (Reyes et al., 1972: 589-594; Bonnar et al., 1975: 82-84; Perez et al., 1972: 1041-1047). Here again, unsupported breast-feeding is stressed, as that

in higher plasma prolactin levels, and it is the hormone prolactin which is credited with delaying ovulation. Thus, breast-feeding can be recommended as a natural form of birth-control, one less likely to raise objections.

Additionally, fast population growth puts a great strain not only on an individual family's food budget, but also on the entire country's if the local food production is insufficient, so that much of the food supply is imported. A baby between two and three months old, for example, requires about five or six feedings a day at five to six ounces of milk each time. If one were able to calculate the amount of milk necessary to satisfy all the babies in a country in a given year, one could put a price on it and appreciate the enormous resource that mother's milk represents. But that figure would not describe the true value of breast-feeding with all its nutritional, immunological, psychological and public health significance.

ANNEX

ANNEX

QUESTIONNAIRE

Basic Questionnaire for Mother

1. Name
2. Age
3. Culture Group: 1. Mennonite 2. Mestizo 3. Maya
4. Carib 5. Creole
4. Religion: 1. Catholic 2. Anglican 3. Methodist
4. Other
5. How many years did you go to school?
6. Marital Status: 1. Single 2. Married 3. Living with
the father of the child 4. Visiting relationship
7. Employment: 1. Regularly 2. Occasionally
3. Unemployed
8. Husband's Culture Group: 1. Mennonite 2. Mestizo
3. Maya 4. Carib 5. Creole
9. Husband's Employment: 1. Regularly 2. Occasionally
3. in Milpa
10. Household Size
11. How many children do you have?
12. How many pregnancies (inclgd. miscarriages, stillborn).

13. How old is the youngest child?
14. Are you nursing now?
15. Have you ever lost a child? (if yes, see Mortality Questionnaire)
16. How old are your children? (What is the interval between each birth?)
17. When feeling ill, do you: 1. go to doctor
2. Health Center 3. Bush doctor 4. Obeahman
18. When pregnant, did you go to the : 1. Doctor
2. Health Center 3. Bush doctor 4. Yerbatera

Health Questionnaire

1. How is your health? 1. Excellent 2. Good 3. Poor
2. Have you been sick within the last year?
3. If yes, what was wrong? (Describe)
4. Is the baby (children) healthy? 1. Excellent 2. Good
3. Poor (Describe)
5. Has the baby been sick? If so, what? 1. loose stools
2. cough 3. cold 4. fever 5. vomiting

Note all illnesses and how old the baby was when he was sick

6. If the baby had loose stools, answer the following:
 1. Age
 2. Color of stool (green?)
 3. Was there blood in the stool?
 4. How many stools per day when loose?
 5. For how many days was the baby loose?
 6. Did you take the baby to a doctor, health center or somebody else?
 7. What was done for the baby?
 8. Did the baby have mole drop?
 9. If yes, who fixed it?

Modern Health Care Questionnaire

1. When you are sick, do you go to: 1. the doctor
2. the health center
2. When you are pregnant, do you go to: 1. the doctor
2. the health center
3. How many times did you see the doctor when you were pregnant?
4. Did you have the baby: 1. at home 2. in hospital
5. Who was with you when you delivered the baby:
1. doctor 2. nurse-midwife
6. How many days were you in hospital for delivery?
7. Did you have any problems at birth? If so, what?
8. Did you have a check-up after birth? 1. yes 2. no
9. Do you see a doctor or nurse regularly?
Only when sick
Only when pregnant
10. Do you bring your baby to the child clinic?
Regularly
Only when sick
11. Does baby get vaccinations? 1. yes 2. no

Traditional Health Care Questionnaire

1. Did you see a yerbatera when pregnant?
2. Did you have anointings?
3. How many anointings did you have?
4. Do you drink soroci tea? 1. yes 2. sometimes
3. never

5. If yes, do you drink it every month during your period for how many days?
6. Do you also drink it when pregnant?
7. What do you drink after the baby is born to clean out?
 1. soroci tea 2. Spanish Medicine 3. castor oil
 4. other
8. Did you put nutmeg on baby's navel to heal?
9. Did you comb down your breast after birth with comb and orange water? 1. yes 2. no
10. Did you put baby to breast the day he was born or did you wait? 1. same day 2. next day 3. two days old 4. three days old
11. Did you give the baby anything before the breast?
 1. anise seed tea 2. glucose water 3. formula bottle (NAN, OLAC, LACTOGEN)
12. If baby was delivered in hospital, what was he fed in hospital?
13. Did you take any bush medicine while pregnant or after birth? If so, what?
14. Did the baby get the ruda treatment? 1. yes 2. no
15. If yes, how many times? 1. seven 2. nine

Diet Questionnaire for Mother

1. What do you usually eat in a day for: 1. breakfast 2. dinner 3. tea
2. How often in one week do you eat: 1. meat 2. fish 3. eggs 4. fruit 5. vegetables

3. What kind of meat do you eat usually?
4. What fruits do you eat usually?
5. What vegetables do you eat usually?
6. What do you mostly eat with your meals?
 1. rice 2. beans 3. tortillas 4. ground provisions
 5. rice and beans 6. tortilla and beans 7. potatoes
7. Do you drink milk? How many glasses in a day?
8. Which kind of milk do you usually drink?
 1. natural
 2. condensed 3. evaporated 4. powdered (Nido, Klim)
9. Do you take vitamins or a tonic?
 1. vitamins 2. tonic
 3. Geritol 4. 3-SSS 5. other
10. Do you eat differently when pregnant? How?
11. Do you eat white mud when pregnant (kipula)?
 1. yes 2. no
12. If yes, how many bars in a day?
13. What do you substitute if you cannot get white mud?
14. In general, do you eat more when pregnant?
15. In general, do you eat less when pregnant?

Breast-Feeding Questionnaire

1. Are you breast-feeding now?
2. How many times do you breast-feed in a day?
 1. more than six times a day
 2. six times
 3. four-five times
 4. two-three times
 5. only at night

3. How long does baby usually nurse?
 1. more than twenty minutes
 2. fifteen-twenty minutes
 3. ten-fifteen minutes
 4. less than ten minutes
4. When do you nurse the baby? 1. on schedule 2. demand
5. Where do you nurse the baby? 1. anywhere 2. only at home
6. Apart from breast milk, do you give the baby milk in a bottle? 1. yes 2. no
7. If yes, what kind 1. Lactogen, Olac, Nan 2. Klim, Nido 3. evaporated 4. condensed
8. How old was baby when you started milk in a bottle?
 1. since birth
 2. age
9. Do you boil the water? 1. yes 2. no
if yes, how long?
10. When preparing formula, how much powder do you mix into the water: 1. exactly as asked for 2. less 3. more
11. Do you prepare more than one feeding at a time?
 1. yes
 2. no
12. Do you refrigerate leftover formula? 1. yes 2. no
13. Do you boil the bottles and nipples? 1. yes 2. no
14. If the baby gets both breast and bottle, how many times the breast? How many times the bottle?
15. Does baby get glucose or sugar water? 1. yes 2. no
If yes, which?
16. If yes, since when? 1. since birth 2. what age
17. How many times a day does baby get glucose water?

18. How many ounces each time?
19. Does baby get griewater? 1. yes 2. no
20. If yes, since what age?
21. How many times a day do you give griewater?
22. How old was baby when first given cereal?
what kind of cereal? (porridge, custard, etc.)
23. How old was baby when first given juice?
24. How old was baby when first given vegetables?
25. How old was baby when first given meat (chicken)?
26. How old was baby when first given fish (fish tea)?
27. How old was baby when first given egg?
28. Do you give the whole egg? 1. only yolk 2. whole egg
3. only white
29. Does baby get any vitamins? 1. yes 2. no
30. Since what age?
31. How old was baby when you stopped breast-feeding?
32. If still breast-feeding, until what age of the baby
do you plan to nurse?
33. If you have stopped breast-feeding, what was the
reason?

Baby Questionnaire

1. How many stools in a day? 1. one 2. two 3. three
2. Stool consistency? 1. Hard 2. Soft 3. Normal
4. Runny, loose describe
3. Stool color 1. yellow 2. brown 3. green
describe

4. What do you do when the stool becomes loose or green?
 1. Go to the health center
 2. Go to the doctor
 3. Get something from the pharmacy
 4. Go to the yerbatera
 5. Change baby's feeding
5. If you change baby's feeding, in what way?
6. Has baby ever been in hospital?
7. If yes, for what reason?

Home Questionnaire

1. What type of house do you live in?
 1. thatch house
 2. board (frame) house
 3. cement house
2. Water supply:
 1. rain
 2. piped
 3. well
3. Refrigeration:
 1. yes
 2. no
4. Bathroom facility:
 1. flush toilet in the house
 2. pit latrine outside
 3. go into the bush
 4. bucket system

Mortality Questionnaire

1. How many miscarriages?
2. How many stillbirths?
3. Number of deceased children?
4. Age at death?
5. Cause of death?
6. Whom did you take the child to see for help when he was sick?

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