

INFANT NUTRITION AND CHILD HEALTH ON TARAWA, KIRIBATI:
A NUTRITIONAL ANTHROPOLOGICAL APPROACH

by

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This thesis
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ABSTRACT

This Nutritional-Anthropological study examines the interrelation between infant feeding practices and young child health on Tarawa, Kiribati in the context of socio-economic and cultural conditions. The objectives of the study were to identify the infant feeding pattern on Tarawa, to identify the major causes of childhood morbidity and mortality and to investigate the relationship between infant feeding practices and young child health status. The data in the study consists of formal and informal interviews, participant observation made during a short residence on Tarawa, a dietary questionnaire including a 24 hour dietary recall, and a medical examination of the children. The study concludes that infant feeding practices on Tarawa present a risk to the health of the infants and children by exposing them to food and water borne pathogens. The health status of the infants and children is not only affected by the feeding pattern but also by the complex cyclical interaction of illness episodes, nutritional imbalance, environmental contamination and socio-cultural constraints.

CHAPTER ONE

INTRODUCTION TO THE PROBLEM

This thesis presents a nutritional-anthropological examination of the implications of changes in infant feeding practices for nutritional health status during early childhood in the Micronesian population of Tarawa, Kiribati, Central Pacific Ocean¹.

The impact of poor feeding practices on child health is a recognised nutritional problem. Many studies since the mid 1970s have focused on the importance and benefits of breast-feeding in contrast to bottle-feeding whereas fewer activities have been directed toward the problem of complementary feeding, particularly the critical weaning process. Weaning is a crucial event in the life of an infant, most infants' digestive system is weak and inefficient and needs a certain amount of time to perform at an optimum level. If the child is fed an inadequate, inappropriate and contaminated diet the digestive system becomes impaired and the child becomes more susceptible to allergies, malnutrition and other nutrition related disorders.

Breast-feeding alone does not assure adequate nutrition for the first year of life, data indicate that after 4-6 months, depending on the quality of the mothers milk, supplementary dietary intake is needed to allow normal growth to continue, although breast-feeding should also be continued (Scrimshaw &

¹ Kiribati is pronounced kiri-bass. Prior to independence in 1979, Kiribati was part of the Gilbert and Ellice Islands, which included what is now the Polynesian Republic Tuvalu.

Underwood 1980, Maher 1992b). Many infants show signs of malnutrition because appropriate and adequate complementary feeding is not given when needed.

Studies of infant and child nutrition in the Pacific reveal an increase in the severity of malnutrition since the 1950s. Many researchers state that the decline in practice and duration of breast-feeding is a major contributing factor to the rise in malnutrition and nutrition-related diseases in the Pacific (Lambert 1982, Roberts et al. 1981), due to improper bottle-feeding and lack of immunological protection from breast milk. However, this is not the case in Kiribati. Studies in Kiribati reveal that most mothers breast-feed during the critical first months of life, and prolonged breast feeding is very common (Jansen 1977, Brewis 1992). The growing rate of malnutrition and the poor nutritional health status of many young children on Tarawa is associated more with the interrelation of poor environmental conditions and unsound infant feeding practices such as supplementing the breast milk with non-nutritious fluids and feeding the infant a nutritionally inappropriate and contaminated weaning diet. The nutritional health status of the children is also influenced by exposure to infections and gastrointestinal diseases, which affect the intake and utilisation of nutrients by the body. The affects of poor feeding practices on the health status of the children may vary according to the age of the infant, as a very young infant with a more immature immune system has a lower resistance against pathogens and infections than an older infant which can probably tolerate more contaminated foods (Popkin et al. 1986).

The importance of appropriate complementary feeding in promoting children's growth and well-being is well known. Research and information on social, cultural, and nutritional determinants of infant feeding patterns are important and can contribute to reductions in disease, better growth rates and better quality of life for the children.

1.1 Structure of the thesis

This thesis is divided into five chapters. The first chapter, an "Introduction To The Problem" opens with a discussion of Nutritional Anthropology, and of theoretical and conceptual issues in the literature concerning child health and nutrition. The chapter continues with a discussion of the interrelation between socio-cultural changes and nutritional health emphasising those socio-cultural and economic factors which have influenced changes in dietary practices in the Pacific. The aim of the chapter is to introduce the theoretical and conceptual issues which are relevant to the study and also to describe the changes in dietary practices in the Pacific in their economic, social and cultural contexts. The chapter ends with a description of the research methodology applied during the fieldwork.

The second chapter is concerned with introducing the study population. It provides historical, demographic, social, environmental and medical background information on the I-Kiribati². The fieldwork was conducted on the main island Tarawa. Tarawa is the main administrative centre of the Republic of

² The Gilbertese word I-Kiribati refers to a person or a group of people native to Kiribati.

Kiribati and includes Bairiki the capital. 96% of the population on Tarawa are of Micronesian descent.

The third chapter continues with a discussion of the infant feeding pattern, and how infant feeding practices affect the nutritional health status of the children. The chapter emphasises the dangers and risks involved in exposing the children to contaminated supplementary fluids and contaminated weaning foods. The chapter ends with a discussion of the children's food pattern and factors affecting this pattern.

The fourth chapter discusses the most common diseases among children on Tarawa and the relationship of many of these to the nutritional status of children as well as their implications for further nutritional status. The major causes of childhood morbidity on Tarawa emphasised in the chapter are nutrition and diet related diseases, diarrhoeal diseases, parasitic infections, respiratory diseases, skin diseases, eye diseases and other infectious diseases. The chapter ends with a discussion of the I-kiribati peoples' attitudes towards western educated medical practitioners and western medicine.

The final chapter " Summary and Conclusion" summarises the results discussed in this thesis and provides a few practical recommendations.

1.2 Nutritional Anthropology

The field of nutritional and medical anthropology has emerged as a new and rapidly growing field of applied anthropology.

"Applied nutritional anthropology may be defined, in

one sense, as the application of anthropological data and methods to the solving of the cultural aspect of human nutritional problems, or as the study of the interrelationship between diet and culture and their mutual influence upon one another" (Freedman 1977).

Anthropologists have engaged in the study of aspects of human foods for many years, but it was not until the early 1970s that there was a great interest and major development in the field, inspired by general development in anthropological theory.

Kandel, Pelto and Jerome (1980) identify four traditions of food research in Anthropology. One of these is ecological studies. The theory of cultural ecology was formulated by anthropologists such as Leslie White and Julian Stuart. This approach views humans as interacting with other biological units in their environments in an open feedback system. Food becomes a means for the transfer of energy among ecosystem components, and nutritional requirements are conditioned by a multiplicity of ecological factors (Kandel et al. 1980, Brown 1986).

Another tradition is called "food ways" or "food habits". It is basically an ethnographic approach. Anthropologists working in this direction have considered food as a part of a larger ethnological picture and have provided data on attitudes but little data adequate for assessing nutritional status because this approach does not focus on the nutritional aspects of foods, but emphasises analysing food as a way of understanding social and cultural processes (Kandel et al 1980, Cassidy 1981, Brown 1986, Pelto 1987).

A third tradition, a more idealistic approach, emphasises the cognitive aspects of food (food as thought), seeking to understand the meaning of food in cultural and symbolic terms.

Food has little to do with nutrition and nourishment, it becomes a medium for social and cognitive expression (Kandel et al. 1980, Cassidy 1981, Brown 1986). The previous two approaches are often referred to as the "Anthropology of food" as distinct from the fourth tradition labelled nutritional anthropology.

Nutritional anthropologists are interested in food intake and food patterns, but in contrast to the anthropology of food which has a predominant social and cultural focus, nutritional anthropology is more bio-cultural in focus, emphasising the study of nutrition. Nutritional anthropology emphasises precise descriptions of sample populations, accurate assessment of nutritional health status and dietary intake, and accurate measurement of the nutrient content of the food (Kandel et al. 1980, Brown 1986, Pelto 1987).

The methods of nutritional anthropology have influenced both nutritionists and epidemiologist. Fieldhouse (1986:20) made the following statement:

"Anthropological reports have traditionally been qualitative in nature; nutritionists have favoured quantitative approaches, describing the dietary habits and nutritional status of populations in statistical terms. A marriage of these two approaches promises fruitful research efforts within the emerging discipline known as nutritional anthropology."

Anthropological methodology can contribute a great deal to the assessment of nutrition in the community because it emphasises community studies and participant observation. The community has been the primary focus in anthropological research, and the community base continues to be a major feature in nutritional anthropology. As Brown (1986:57) states:

" Most anthropologists can contribute to the community

nutritional assessment process because of their community focus; their expertise in research design, implementation, and evaluation; their ethnographic skills; and their ability to use an ecological approach. Nutritional anthropologists with specialised interests and training in food and nutrition-related issues can bring special expertise to community assessments"

1.3 Nutrition and child health in the Pacific

Most health related field studies in the Pacific are carried out by either biomedical or social scientists, each approaching the problems from their own disciplinary perspective. During the past decades many nutritional scientists have become interested in multidisciplinary approaches to the problem of malnutrition. Graham (1991:3) defines malnutrition as:

"The state of undernutrition and occurs when the human organism takes in insufficient nutrients for performance, growth and development, and biological functions"

Social, economic, biological, and environmental factors are underlying causes of malnutrition. Inadequate dietary intake is not the only cause of malnutrition; it is linked to conditions such as poverty, food availability infectious diseases, and parasitic diseases.

The group of conditions known as protein-energy malnutrition (PEM) constitute a serious nutritional health problem in the developing world today. This term has been used to describe a range of disorders primarily characterised by growth failure or retardation in children. Infants and young children are the group most affected because of their high energy and protein needs relative to body weight and their particular vulnerability to infection (Torún & Viteri 1980). Older children normally have

milder forms of PEM because they can cope better with food availability constraints. Infections become less severe and early survival may imply a natural selection of the fittest (Torún & Viteri 1988). An individual suffering from infection has a reduced food intake and often has poorer utilisation of a range of nutrients (Pellett 1987). As dietary intake becomes deficient children cope by slowing their rate of growth and reducing physical activity.

Extreme clinical forms of protein energy malnutrition are called Marasmus and Kwashiorkor. The term Kwashiorkor is derived from the Ga language of Ghana and means "the disease that the first child gets when the second is on the way". The term suggests that the disease could be due to inappropriate weaning habits (Williams 1935). Kwashiorkor is more frequent after 18 months of age and occurs in children who are weaned to a protein-scarce diet such as starchy gruels and vegetable foods that are rich in carbohydrates (Torún & Viteri 1988, McElroy & Townsend 1989)³.

Marasmus is most common in the first year of life and occurs mainly if the child's diet is low both in protein and calories and is associated with an insufficiency of energy containing foods (Jelliffe & Jelliffe 1978). A later form can occur in children as a result of prolonged breast-feeding not supplemented with other foods or as a result of inadequate lactation because

³ This classical view of kwashiorkor has been challenged by Jackson (1990), because the protein requirements have been reappraised, and found to be lower than previously recommended. So some children who have been classified as kwashiorkor could in fact be adequate in protein.

of maternal malnutrition, overwork or environmental psychosocial stress (Jelliffe & Jelliffe 1978).

Weaning age malnutrition is complex and multi factorial. Anthropologists and nutritionists using anthropological methods have focused on the roles of cultural beliefs, knowledge, and attitudes in trying to understand the causes of malnutrition. Studies show that cultural beliefs about the nutritional content of foods and understanding of nutrition and disease have an indirect effect on child health and malnutrition (Cassidy 1980, Mitzner et al. 1984).

The concept of benign neglect is useful in the understanding of the interrelationship between weaning customs and the development of malnutrition. Cassidy (1980:129-130) defines this concept:

"Benign neglect refers to actions permitted or encouraged by customs and beliefs which potentiate physical dysfunction although their goal is to achieve a positively valued social effect. Since our subject is toddler malnutrition, I shall specify this definition and classify benign neglect parental caretaker actions supported by customs and beliefs which limit toddler access to food supply and thereby indirectly potentiate weaning stress and malnutrition, but do so with the benevolent goal(s) of promoting social congruity and normal socialization of the child"

Many experts denigrate the parents by interpreting their actions as being "neglectful" due to "illiteracy" or "ignorance". Although many child care practices can be harmful to children, the parental intentions are good. Parents act according to their knowledge, experience and social customs, in order to protect their children (Cassidy 1980, Graham 1991).

Food taboos and food restrictions are social customs known

to promote toddler malnutrition. Every society specifies among the foods available what is edible and what is not. The foods are also classified into appropriateness for different occasions, sexes and ages (Cassidy 1980, Fieldhouse 1986). Many children in the Pacific countries did not receive fish until they were one year old due to the belief that it would cause skin sores and loose stools (Jansen 1977). This prohibition could cause a protein deficiency in weaning age children.⁴

Some researchers have found that unequal food distribution within the family, in which the male members are favoured over others, has an impact on the nutritional status of women and children (Mitzner et al. 1984). Researchers attribute a high rate of toddler malnutrition to the practice of newly weaned toddlers competing with older siblings and adults for food. The nutritional problem lies in the fact that they are inexperienced and often of low social value, and may get an uneven share of the food available (Cassidy 1980). Other studies have found that when food supplies are low or famine occurs, children are favoured rather than discriminated against (Wheeler & Abdullah 1988). Other causes of weaning age malnutrition are insufficient supply of food due to; production failure; over population; poor soil; maternal income; socio-economic status of the family; and parasitic- and infectious diseases which are synergistic to

⁴ This prohibition may have protected some young children from developing a food sensitivity to fish. Fish are among those foods that are associated with food sensitivity when introduced too early. Therefore many nutritionist recommend that foods such as wheat, rye, oats, egg white, citrus fruits, chocolate, and fish should not be offered before 8-9 months of age and preferably delayed until 12 months (Birckbeck 1992).

malnutrition. These causes are not distinct but interact with each other (Mitzner et al. 1984, Pellett 1987).

Poor nutrition and health result in a decrease in overall quality of life and reduced levels of development for human potential. Research indicates that the severely malnourished child is characterised by apathy, withdrawal, irritability, low responsiveness to environmental stimuli and poor attention maintenance (Thomson & Pollitt 1977, Barrett & Frank 1987). Among infants and young children severe malnutrition is directly associated with high levels of mortality which may affect the whole country. Badcock (1990:5) states:

"A high prevalence of malnutrition in early childhood will affect the development and educational ability of the country's future adult workforce."

Evidence suggests that poor nutrition has a significant impact on physical activity, child growth and development. Tests on infant development focus on the development of specific skills. They are not intelligence tests (Barrett & Frank). Results from these tests show that children with a history of malnutrition are more likely to show developmental deficits than children who have not experienced malnutrition (Barrett & Frank 1987). Studies on the effect of malnutrition on cognitive development are inconsistent. Several studies suggest that malnourished children showed poorer short term memory and performed poorly in schools and on IQ tests (Galler et al. 1983). A poorer intellectual performance among malnourished children could be due to the fact that undernourished children are characterised by behaviour impairments such as poor attention, reduced activity, distractibility and emotional disturbance. These social and

emotional behaviours are important for the child's development and may affect intellectual performance and later achievements (Barrett & Frank 1987). Studies also suggest that malnutrition affects adult work performance and overall quality of life. When the head of the family is undernourished, he will be absent from work more often and perform less efficiently (Read 1977). In addition, malnutrition lessens an individual's ability to fight infectious diseases.

There are other specific deficiency problems of comparable magnitude in the world today affecting young children. Micronutrient malnutrition is a term now commonly used to refer to vitamin or mineral deficiencies of public health significance: such as iodine deficiency, vitamin A deficiency, zinc deficiency and iron deficiency. The main causes of micronutrient malnutrition are inadequate intake of foods containing these micronutrients and their impaired absorption or utilisation. The transition from breast-feeding to bottle-feeding or to necessary but often inadequate and inappropriate weaning foods increases the risk of vitamin A deficiency and anaemia among infants.

A micronutrient deficiency impairs growth, development and survival of infants and young children. The magnitude, causes and consequences of PEM and vitamin deficiencies in Kiribati will be discussed further in Chapter Four.

1.4 Socio-cultural changes and nutritional health in the Pacific

Nutritional Anthropological research has increased in recent years, moving in many directions. One direction is defined by Pelto (1987:38) as:

"socio-cultural process and nutrition, in which the nutritional consequences of social and cultural forces, such as "modernisation" are examined".

Anthropologists working in this direction are focusing on how major contemporary processes of socio-cultural changes affect the health and nutritional status of the study population (Pelto 1987).

Generalisations about concepts like modernisation, economic development, and urbanisation should be taken with caution. It is insufficient to conclude that economic development, urbanisation and migration are causally related to the decline in nutritional status, without knowing exactly, how, for example urbanisation can lead to a decline in the health status in the specific cultural setting. Few studies on diet were conducted in the Pacific before 1950, therefore nutrition studies have compared urban consumption pattern today with rural consumption pattern today and then extrapolated as if these rural pattern were the same as or similar to the aboriginal consumption patterns (Pollock 1992). The relationship between dietary changes, urbanisation and food import dependency, and the health consequences of this relation ship have been described by many scholars (McGee 1975, Thaman 1982, Lewis 1988, Schoeffel 1992). Urbanisation has resulted in a break up of the traditional lifestyle. The introduction of monetisation and cash employment has played a great role in the deterioration of traditional food systems. Urban people quickly became dependent on imported products because there was no longer land available to cultivate native products.

Pacific Islands development resources have been used to

support production for the export of commodity crops such as fish and copra instead of focusing on the production and marketing of local foods (Thaman 1982, Kent 1987, Schoeffel 1992). The imported foodstuffs in the Pacific countries are usually of a worse quality compared with those available in the Western Countries. White flour, rice (often polished), sugar, soft drinks, canned beef, and canned fish are products which are cheap to process, store and transport. Sometimes fresh fruits such as apples, oranges and kiwi are available, but they have often been damaged during transport, and are too expensive for a family living on an average income (Thaman 1982, Coyne et al. 1984).

The decline in consumption of traditional food supplies is not only due to the availability of imported products but also to the exhaustion of some traditional resources. For example there is a shortage of fish for consumption in the Pacific urban market today due to the commercial fishing for export (Kent 1987).

The shift from a reliance on traditional food and subsistence systems to an increasing dependency on western food products has been referred to as the "The eating catastrophe" (Keith-Reid 1982). Non communicable diseases such as diabetes mellitus, dental caries, hypertension, obesity and heart disease which were unknown and rare in the South Pacific before European arrival have increased. The increase in non communicable diseases has been related to the change in the diet, lack of exercise due to a more sedentary lifestyle, and possibly a genetic predisposition to disease (Thaman 1983). Zimmet et al. (1978) believe that Micronesians have a genetic genotype which makes

them susceptible to diabetes.

A number of disabilities are caused by diet related diseases and nutritional deficiencies. The new foods in the Pacific are generally less nutritious than the aboriginal diet and constitute higher concentrations of sugar, salt, fat and cholesterol. An increase in the consumption of processed foods has also led to a lower fibre intake and higher intakes of additives and preservatives (Coyne et al. 1984, Thaman 1988, Heywood 1990). The increase in sugar consumption in the Pacific appears to be related to increases in the prevalence of obesity in children and adults, diabetes, anaemia and kwashiorkor (Thaman 1983). An increasing consumption of salt is linked by many experts with the increasing prevalence of hypertension in adults (Prior & Evans 1979). Saturated fat in the western world has been linked to raised serum cholesterol levels and higher incidence of coronary heart disease in adults (Coyne et al 1984, Thaman 1983).

Chapter Three will discuss further the influence of the changes in the dietary pattern on infant feeding practices and ultimately the nutritional health status of infants and children.

1.5 Research and fieldwork methods

This study comprises three weeks preliminary fieldwork and two months on site field work on Tarawa atoll, Kiribati. During the fieldwork I was privileged to live with a native I-kiribati family and participate in their daily routine.

Nutritional and anthropological data were collected by participant observation, formal and informal interviews, standardised questionnaire interviewing including a 24 hour

dietary recall and a medical examination of children under five by a UN volunteer medical doctor working at the local hospital. The interviews took place in private homes whereas the questionnaire interviewing and the medical examinations took place in each village local meeting house (maneaba). The village nurse notified all the women in the village of our visit before our arrival. The medical examination involved all children under five whereas the questionnaire interviewing only investigated children up to the age of three.

One important limitation of the study was that I was not able to speak Gilbertese, and therefore used local interpreters. Women who are able to speak excellent English are all employed, so I had to use women interpreters who were not used to translating, and occasionally I even had to use a male interpreter. To overcome the language barrier the questionnaire was constructed in cooperation with local people and I always discussed the contents of the interviews beforehand with my interpreters, to make sure we understood each other.

Participant observation is an essential part of anthropological research. One advantage of this approach is that it is more accurate than methods relying on recall, another advantage to nutritional research is that it provides first hand knowledge of the activity pattern, food habits, food preparation, and food distribution within the family. It is very good to perform an intensive observation before conducting a dietary survey since such intensive observation gives an understanding of social relations and social roles associated with food. However this approach is considered to be too expensive by many

researchers in multidisciplinary teams.

193 children from seven villages on South Tarawa took part in the questionnaire interviewing. The criteria for inclusion in the study were that the child be no older than 36 months of age and that the mother or caretaker could provide reliable information concerning the child's dietary habits. 52.8% (102) of the sample children were male and 47.2% (91) were female. Nearly half of the sample children 49.2% were 0-12 months of age, 32.7% were 13-24 months of age and only 18.1% were 25-36 months of age. The distribution of the sample according to age, sex and villages is shown on Tables 1.1 and 1.2.

Table 1.1 Distribution of young males according to village and age (months)

Villages	0-6	7-12	13-18	19-24	25-30	31-36	total
Bagantebure	2	2	1	1	0	0	6
Abararo	4	5	1	3	2	0	15
Eita	5	9	7	4	1	3	29
Tebunia	3	5	0	2	1	0	11
Banraeaba	1	2	1	5	1	2	12
Korobu	1	5	3	3	1	3	16
Wirara	4	5	1	2	1	0	13
	20	33	14	20	7	8	102

Table 1.2 Distribution of young females according to village and age (months)

Villages	0-6	7-12	13-18	19-24	25-30	31-36	total
Bagantebure	2	3	1	1	0	1	8
Abararo	0	2	0	0	1	0	3
Eita	7	9	7	2	2	6	33
Tebunia	4	1	1	8	3	0	17
Banraeaba	3	1	0	1	3	1	9
Korobu	1	3	1	1	0	0	6
Wirara	1	5	2	4	2	1	15
	18	24	12	17	11	9	91

The questionnaire sought to identify such information about the infant feeding pattern as: duration of breastfeeding, introduction of supplemental fluids, introduction of solid foods, consumption practices and food attitudes. A 24 hour recall was part of the questionnaire. The women were asked to recall all foods and liquids consumed by the child during the day previous to the interview, this included all foods consumed at home as well as away from home. The 24 hour recall is very useful in obtaining the general diet pattern of the children on a group basis. Another advantage of this approach is that it reduces the risk of the individual changing their customary food pattern because the response rate is high and it involves very few obligations for the respondent (Young 1981). Nutrient intake was not evaluated nor calculated from the 24 hour recall as this was not the purpose of the study. Being a dietary study the 24 hour recall gives no direct measurement of nutritional status on an individual basis, it only suggests that if dietary intake is inadequate, nutritional status may also be inadequate (Young 1981). A disadvantage of this approach is that it relies on the mother's/caretaker's memory. Response to the questionnaire was generally very friendly, the I-kiribati women are very open, patient, tolerant and love to talk about their children, of whom they are very proud.

Information concerning the current health status of the children was obtained by the assistance of Dr. Darisuven who screened the children under the age of five. Unfortunately we were not able to obtain reliable information concerning each child's medical history as no written records were available and

most women's recall of the child's medical history was not very accurate. The medical examinations took place from June to September 1994. The examinations involved about 3000 children from all the villages on Tarawa atoll. Due to social and cultural reasons young children are often admitted too late to the hospital for the health professional to be able to cure or save them. The aim of the screening was early detection of common diseases such as: respiratory diseases (ARI), TB, eye diseases, parasitic infestations, malnutrition, micronutrient deficiency and infectious diseases among children under five. This was to enable the early treatment of the most common childhood diseases to prevent children dying from diseases which can be cured if the child is admitted to the hospital in time. Another aim of the examinations was to get an idea of which are the most common diseases affecting children under the age of five. In some circumstances the examination itself did not detect the illness and many children were sent for further lab tests: blood tests, stool tests and x-rays. Most mothers or grandmothers brought their children or grandchildren to the medical examinations, however those women who did not attend were probably either too busy, thought that nothing was wrong with their child, or had a sick child and were ashamed of showing up, knowing that the examination would not be done in private.

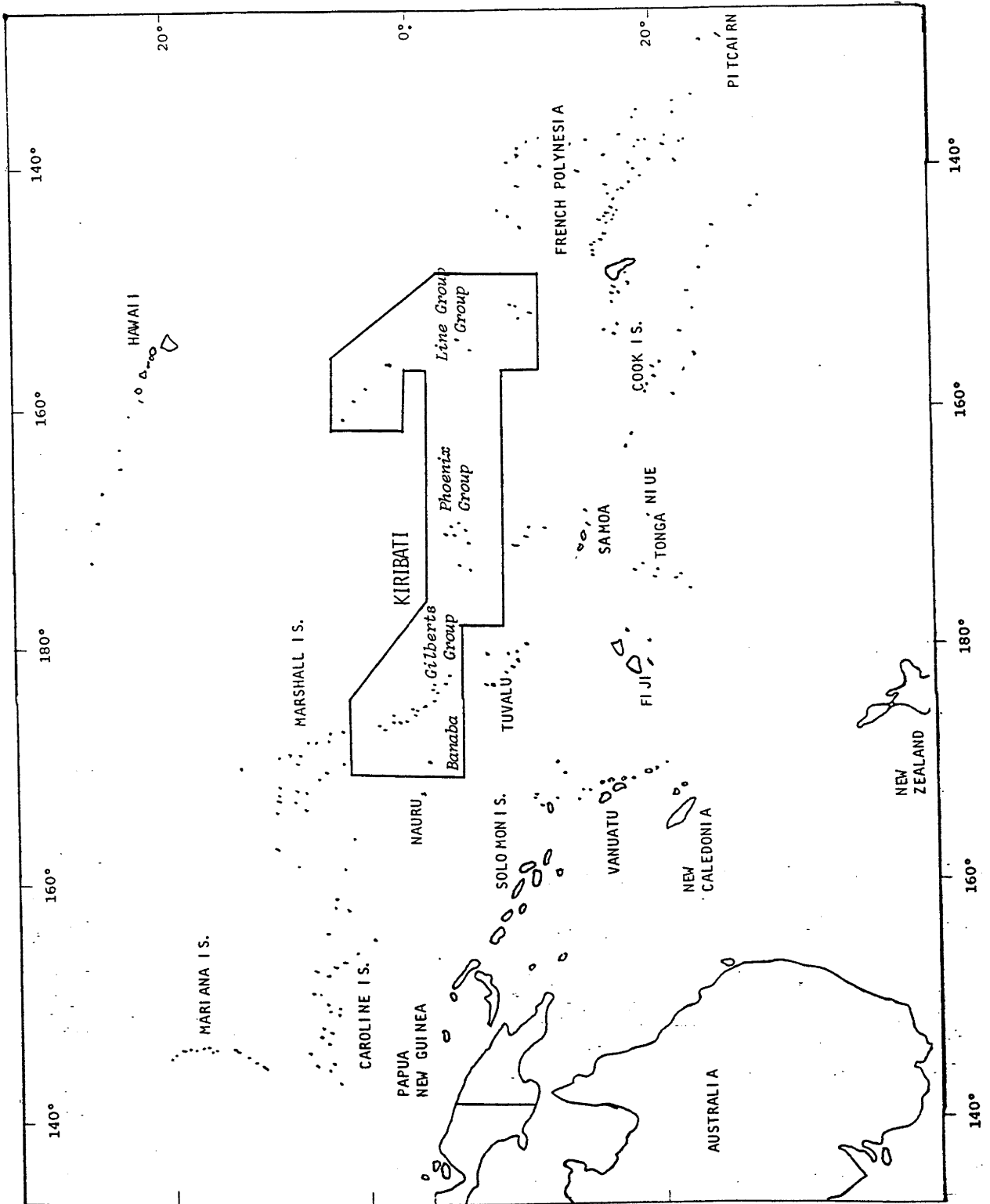


Fig. 1 The Republic of Kiribati and adjacent neighbouring countries

REPUBLIC OF KIRIBATI
TARAWA ATOLL

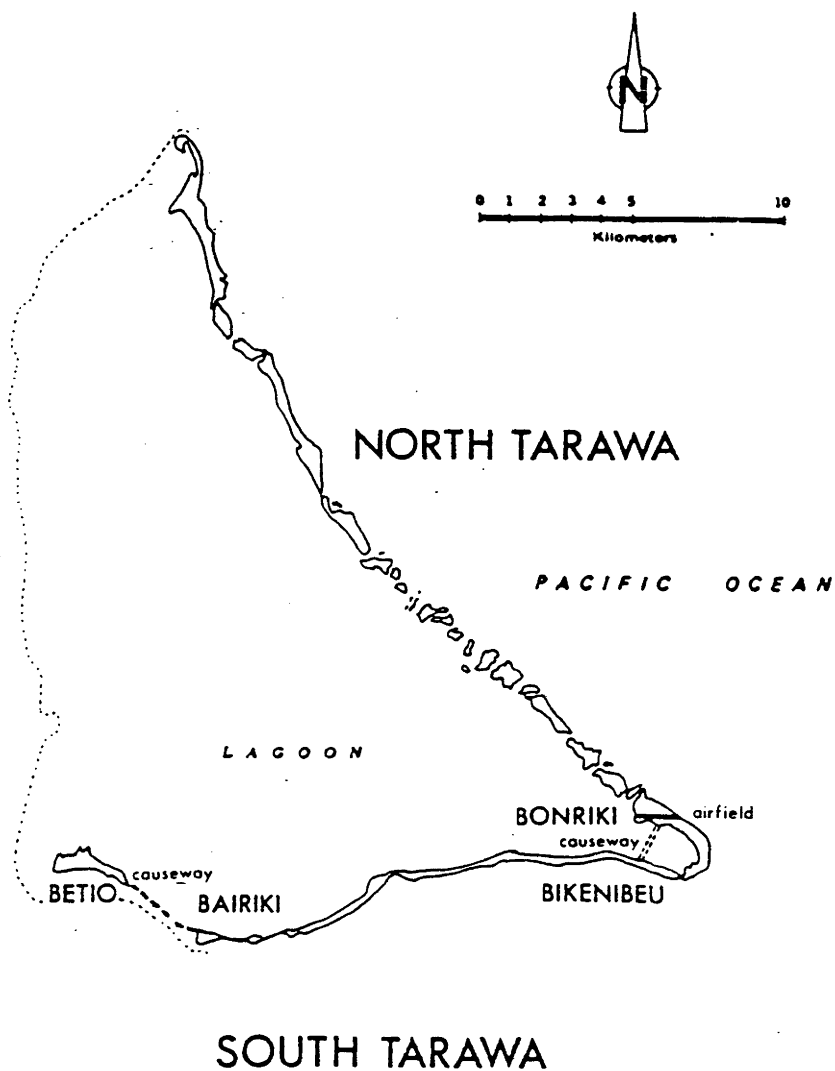


Fig. 2 Tarawa atoll

CHAPTER TWO

THE RESEARCH SETTING: KIRIBATI

This chapter concerns historical, demographical and environmental information relevant to the study. A basic discussion of the social history of the I-kiribati is followed by a description of the aboriginal diet and a discussion of the history of health and disease. The chapter continues with a discussion of demographic and environmental data concerning the study population today.

According to the oral history of the I-Kiribati, the great God Naraeu the Wise picked flowers from the ancestral tree and threw them north of Samoa to mark the place where the Islands of Tarawa, Beru and Tabiteuea appeared. Today these Islands together with other atolls form the Republic of Kiribati.

Kiribati consists entirely of 33 small widely scattered coral islands and atolls straddling the Equator in the Pacific Ocean. The Republic is divided into three main island groups and one Ocean Island, called Banaba. Kiribati has a land area of 823 km² and spans a total ocean area of 13,000,000 km² ocean, an area larger than the continental United States of America (UNCED 1992).

The Westernmost group, the Gilbert Islands, comprises 13 atolls and three limestone islands, including the main island Tarawa. Tarawa atoll, where the study was carried out, is the main urban and governmental centre for the Republic of Kiribati and includes the capital of Kiribati, Bairiki. Tarawa atoll as shown on fig. 2 is roughly triangular shaped with a land area of

approximately 8 square miles in a narrow string of islands.

The Phoenix Group consists of eight scattered uninhabited atolls. Archaeological remains indicate that some of the Phoenix Islands were once inhabited, but by the time of European arrival, these people had left or died (Maude 1968).

The Line Islands are made up of three northern Islands. The largest Island in the group is Kirimati (Christmas island). Kirimati is the largest atoll in the world, with almost half the total land area of Kiribati (Taylor 1990). The Ocean Island, Banaba, lies 450 km south west of Tarawa, closer to Nauru. The mining of Banaba's phosphate deposits was the main source of foreign exchange until 1979, when the deposits were exhausted, the same year as Kiribati gained independence (UNCED 1992, Browne & Scott 1989).

2.1 Historical influences

Spanish sailors in the 16th century is believed to have been the first Europeans to visit the area, but they seem to have had little contact with the inhabitants (Maude 1968, Macdonald 1982). The Gilbert Islands received their European name from Captain Thomas Gilbert, who was in command of one of the first two convict transports to Australia. On his way from Port Jackson in 1788 to Canton in China, he sailed past the Central Gilbert Islands Aranuka, Kuria, Abaiang and Tarawa (Lewis 1981, Macdonald 1982).

Around 1830 English and American whalers, with their need for refreshment and desire for women, began to visit the Islands frequently. The southern Gilbert Islands were a regular base for

these whaling ships because of their location. Trade with the whalers took place on board ship rather than on shore, because as Macdonald (1982:17) writes

"Trade took place on ships rather than on shore; from the whalers point of view it was quicker, much safer, and the initiative remained with them rather than with the Islanders".

Contact with whalers led to the introduction of metals (iron), pigs, goats, poultry and crops such as pumpkin and squash. In return the whalers got food supplies and women (Mcdonald 1982, Lawrence 1992). Serious consequences of the trade with the whalers were tobacco addiction⁵ and a form of "prostitution". (Brady 1972, Macdonald 1982, Lewis 1988). The craving for tobacco was constant as Wilkes (1845:51) noticed:

"Their chief desire was to obtain tobacco, of which they seem to be extravagantly fond; it was their constant request, and whilst in their canoes alongside, or on deck the cry was constantly 'tebake'. It was not begged as a gift; for what appeared singular enough for South Sea islanders, they seemed to have no idea of receiving anything as a gratitude, but instantly made a return of something for whatever was given them. So eager were they after it, that when one had put a piece in his mouth, other would size him, and actually force it out with their fingers."

Tobacco for women developed as the major trade relationship (Brady 1972). Wilkes (1845:65) states:

"Their young girls were offered to be disposed of, by their fathers and brothers, alongside the ship,

⁵ Lewis (1988) argues that tobacco was an ideal commodity to initiate the gustatory subversion of the Gilbertese, because as he (1988:85) writes "it was cheap to supply yet created a strong craving, if not an addiction. Unlike demand for hardware and tools demand for tobacco was continuous and not easily saturated". The demand for tobacco was greater in the southern Islands which were closer to the whaling grounds. Wilkes (1845:72) reports that islanders on Tarawa were ignorant of the use of tobacco whereas the islanders further south had constantly asked for it.

openly, and without concealment; and to derive bargain for them was one of the principal objects of their visits to ship".

The Gilbertese praised chastity, so the women involved in the trading were mainly lower-class unmarried or divorced women known to have had sexual relationships (nikiranroro), and slave women who did not have any choice (Brady 1972, Macdonald 1982). When whale stocks declined through overfishing, coconut oil became the dominant trade item. Later it was replaced by copra trade (dried flesh of the coconut). Copra is the major export crop today in Kiribati (Lawrence 1992).

At the same time as the whalers traded with the islanders, beachcombers⁶ arrived at the Islands. Many of these were escaped convicts and deserting whalers. Some of them settled down (went native), married local women and later became permanent traders. Others who were not as successful in crossing the cultural barrier were killed (Brady 1972).⁷ By the 1860s, there were about 50 Europeans living in the Islands (Maude 1968, Onorio 1979). Many had established themselves as permanent traders, trading European goods for coconut oil, bêche de mer (sea cucumber), and turtle shells. Many of these traders were able to establish a regular exchange net (Lawrence 1981, Onorio 1979).

Protestant missionaries arrived in the Northern Gilberts in

⁶ Brady (1972:51) defines "a beachcomber as one of that group resident white men, normally preceding the resident traders, who were completely dependent on the Islands community."

⁷ The Gilbertese people had a reputation for being fierce and violent, as Brady (1972:55) writes: "the reputation of the Gilbertese was such that at least one group of castaways, those from the wreck of the Cosair, preferred to sail off into unknown seas rather than attempt a landing on Tibeteua".

1857. The missionaries brought significant changes. They introduced a new religion and a whole new set of values to the I-Kiribati people, whose old world view based on traditional religion was transformed (Brady 1972). The most successful missionaries were Protestant missionaries from the London Missionary Society (LMS), who worked in Samoa and the Catholics. In the beginning they modified their teaching to suit local customs and social organisation. Later when the people had converted to Christianity, the missionaries made laws and introduced their own punishments (Brady 1972, Etekiera 1979). The LMS missionaries were most successful in the Southern Gilbert Islands whereas the Catholics were most influential in the North. Tension and dispute have characterised the relationship between Protestants and Catholics over time (Etekiera 1979, Macdonald 1982). The missionaries were in part responsible for promoting literacy by building schools and they also established large copra plantations and introduced new crops such as bananas (Thaman 1982).

From about the 1850s to the 1890s blackbirders recruited labour in the Islands for plantations and mines in Peru, Tahiti, Hawaii, Samoa, Fiji and Queensland. Many of the southern islands were seriously depopulated by these blackbirders who used kidnapping and extortion to get contract workers (Lawrence 1992, Brady 1972). A majority of the labour recruits did not return, many of those who returned home brought some of the western life style with them and an even greater taste for western foods (Lewis 1988). The return of the labourers also established the concept of wage labour as a way to get economic advancement

(Lawrence 1992).

In 1892 the British established a protectorate over the Gilbert & Ellice Islands to forestall a feared German takeover from their colony in the Marshalls. Banaba became a part of the protectorate in 1900, when phosphates were discovered there. The protectorate officially became a colony in stages from 1915-16. Christmas Island became a part of the colony in 1919 and the Phoenix Islands joined in 1937. The British stopped civil disturbances, set up a government system, established law and order and protected the interests of resident foreigners in the Gilbert and Ellice Islands (Takaio 1979, Stanley 1992).

Before the outbreak of World War II the Gilbertese people were well acquainted with western food and cooking utensils that allowed them to fry and boil their food saving time and work. Earth ovens were only used on ritual occasions (Lewis 1988). During World War II The Gilbert Islands were occupied by the Japanese. The islands were isolated, no trading ships arrived, and there were no imported goods such as kerosene, soap or tobacco. On the Islands where the Japanese were the islanders obtained tobacco and soap from the soldiers in exchange for local foods (Mamara & Kaiuea 1979). Throughout the war the Gilbertese civilians were forced to work for the Japanese and after the war they worked for the Americans. The Gilbertese were very impressed by the amount of the American supplies, therefore a delegation was sent to the U.S military command asking for American sovereignty, but without success (Mamara & Kaiuea 1979)

The post war period was one of rapid urbanisation, when hundreds of outer-islanders migrated to south Tarawa. The first

move towards self government came in 1963 when the British appointed islanders to executive and advisory councils. In 1967 the Advisory Council was replaced by a House of Representatives, a new phase in the development of local government. In 1974 the post of Chief Minister and a House of Assembly were established. Kiribati gained independence from the United Kingdom in 1979 (Macdonald 1982). The forces of change have been great and continue to effect the modern Kiribati society. Lewis (1988) argues that the process of gustatory subversion is a cumulative result of whalers, early explorers, beachcombers, traders, missionaries, wage labour and nowadays multinational corporations' influence on inducing trade under unfavourable terms for the Gilbertese and other Pacific people by creating new taste preferences (or addictions) which only can be satisfied through trade.

2.2 Aboriginal diet

The atoll environment is a very limited and difficult environment for human settlement as the atoll soil of Kiribati is very poor. Traditionally the islanders depended heavily on the sea for their subsistence. Fishing provided most of the proteins and animal fat in the traditional diet (Lewis 1988). Fish were often eaten raw or wrapped in leaves with coconut cream and baked, they could also be preserved by drying; salting was not practised (Coyne et al. 1984, Lewis 1981). Crayfish, lobsters, crabs, turtles and shell fish were eaten. Shell fish were mainly gathered by women and children and were considered a sign of

poverty (Lewis 1988). The islanders were skilled fishermen and used a wide range of traditional fishing techniques, including poisoning the water to stupefy fish and using nets during night fishing.

The whalers introduced pigs, goats and poultry⁸ to the Gilbertese (Macdonald 1982). Pigs were consumed but only on special occasions (Lundsgaarde 1965). Animals were not always accepted by the islanders: ducks, pigs and goats were at first the subject of supernatural fear, later they (especially pigs) became an essential part of the culture. According to Grimble (1933) chickens were not eaten because of their association with Tabuariki, the spirit of thunder and lightning. Rats, lizards, frigate birds and eggs were not eaten, but dogs were eaten in some cases for medicinal reasons (Lewis 1988).

Despite limitations of soil and water the Gilbertese developed a subsistence agriculture based on coconuts, breadfruit, pandanus, and native fig (*ficus tinctoria*) and the cultivation of the swamp taro (*cystoperma*), locally known as "babai". Coconuts in various stages of development were essential to the Gilbertese diet (Turbott 1949). Green coconuts were used for drinking, the soft jelly like flesh was used as first soft food for infants and was also eaten by adults. The mature nut provided the hard flesh which was eaten with fish or grated into beverages; coconut cream or coconut milk (Coyne et al. 1984, Lewis 1988). The mature coconut flesh is high in saturated fat, crude fibre, and potassium, whereas the younger coconut is higher

⁸ Chickens were present in pre-contact times on some islands (Koch 1965, cited in Lawrence 1992).

in vitamins. The soft flesh provides small amounts of thiamine, riboflavin, vitamin C and fibre and the coconut water provides small but natural amounts of energy, calcium, iron, phosphorous, niacin and vitamin C. (South Pacific Commission 1983, Coyne et al. 1984).

The Gilbertese made a special drink known as toddy from the sap of the coconut palm, drawn off from the budding spathe before it is allowed to flower and fruit. Sometimes toddy is boiled down to the consistency of molasses, known as "kamaima" (Turbott 1949). Toddy is very rich in Vitamin C and contains small amounts of Vitamin B and iron. Fresh coconut toddy is very high in vitamin C (Coyne et al. 1984). Coconuts provided the Gilbertese with most of their requirements, not only with food and drink. The coconut fibre was used for construction of huts and canoes. Empty coconut shells made useful containers and cooking pots (Sabatier 1977).

Breadfruit was a more important source of food on the wetter islands. On drier southern islands such as Tarawa and Maiana it required more careful tending to survive through drought and was mostly for ritual consumption (Lewis 1981). Breadfruit was eaten in many forms by the Gilbertese, including roasted, baked, and steamed in the earth oven (Lewis 1988). The fruit season lasts from May to July sometimes until December (Catala 1957). The breadfruit pulp is high in vitamin B (thiamine, riboflavin, and niacin) and contains some Vitamin C, and calcium, (South Pacific Commission 1983, Coyne et al. 1984)

Although the cultivation of Babai (swamp taro) required much labour it was widely used. The islanders prepared it in numerous

ways. The babai was a major source of fibre and starch. It is high in calcium, and contains some iron and vitamin C (South Pacific Commission 1983, Coyne et al. 1984)

Pandanus and coconuts were the main staple of the aboriginal diet. *Pandanus tectorius* trees were propagated and not cultivated. The fruits were gathered, and could be preserved, which allowed it to be stored for long periods of time and used in sea voyages or in periods of food shortage (Lewis 1981, Lawrence 1992). Pandanus fruit is rich in vitamin C, vitamin A (carotene), calcium and fibre. The inedible parts of the drupes was used as fuel, the trunks provided framework pillars for houses, the leaves were (and still are) used to make thatch, baskets, fine mats used as carpets, bed covers and blankets (Catala 1957, Sabatier 1977).

Under normal conditions the aboriginal diet would have been nutritionally adequate for an adult (Parkinson 1982, Lewis 1981). The diet was moderate in fat and adequate in vitamins and minerals. Energy provided by carbohydrates such as taro, breadfruit and pandanus was relatively high. The diet provided a large amount of crude fibre; root vegetables have on average three times the crude fibre content of refined cereal products (Coyne et al. 1984). Protein intake appeared to be more than adequate for adults, young children may not have received sufficient protein or energy due to the bulkiness of the root vegetables, food taboos and food restrictions (Parkinson 1982, Coyne et al. 1984). The diet was low in sodium and high in potassium, food was sweetened sparingly, using kamaima (Lewis 1981 & 1988). Traditional ways of food preparation, such as

eating raw fish, steaming vegetables or baking in earth ovens was nutritionally superior to many introduced methods because these methods preserved the heat susceptible vitamins (Thaman 1982, Lewis 1992).

When the society was disrupted by war, prolonged rough seas, drought, and diseases, vegetable foods and all kinds of fish were scarce and malnutrition occurred. During prolonged drought lagoons dried out and there would be no fish in the lagoons. The breadfruit tree has low resistance to prolonged drought, the babai pits would dry up and the plants rot, and coconut trees did not bear any nuts but the flower from which toddy is derived continued to flower (Lawrence 1992). H.E. Maude reports drought conditions on Nonouti Islands:

"The Gilbertese drought can be a fearsome thing. I was in one on Nonouti, I think, 1938 and it seemed as if the lagoon ecosystem was determined to combine with the terrestrial in ousting man from the scene; for at the heights of the drought, when flora was dead or dying, the prolific fish population deserted the lagoon. Over-fished, you will say, but the Gilbertese felt rather that the foods of the fish was no longer there.....What happened during a period of prolonged drought may be seen from the history of Ocean Islands, where Webster recorded a population of 2,000-3,000; whereas scientist Finsch found 35 left in 1880, and those half-starved." (Quoted in Lundsgaarde 1966)

2.3 Health and disease before and at European contact

At the time of European contact, the people were reported to be very healthy, although troubled by skin diseases and intestinal parasites⁹. Wilkes (1845:110) reported that many

⁹ We can only infer the health status of the Gilbertese, since we do not have any written record of the time before contact. Much of the data from the contact period were gathered

Gilbert and Ellice Islanders suffered from a "scurf" resembling ringworm:

"From disease the natives appear to be tolerably free. Consumptions, and a kind of cholera morbus are the most fatal. There were no cases of elephantiasis seen, but as has been remarked in speaking of the islands separately, the kind of cutaneous disorder, called by the natives gunes, prevails extensively;... at some stages the disease, resembles ringworm....it was most prevalent at Taputeouea, the most southern of the Kingsmill Islands, and gradually becomes less so in the northern Islands."

Intestinal parasites were less common in the Gilberts than in the Ellice Islands (Lambert 1928).

Early descriptions of the Islanders' appearance at the time of contact suggest that the Islanders on the northern islands Makin and Butaritari tended to obesity, probably due to a more stable chiefdom and richer environment and therefore a higher consumption of toddy which is high in carbohydrates (Lewis 1981, Brewis 1992). Hale (1968:94) wrote about the people of Makin:

"Instead of the slender forms, sharp features, and stern countenance of the Drummond islanders, we saw a crowd of stout, hearty figures, and round jolly faces, which, though different in features, recalled to our minds the bulky chieftains of Tahiti".

On the southern Island Tabiteuea (Drummond's Island) there were no signs of obesity (Hale 1968). Obesity was appreciated among affluent chiefs in the traditional society, valued as a hallmark of beauty and high status where as leanness was sign of hard work and poverty (Schoeffel 1992, Pollock 1992). Sabatier (1977:201)

by people who were not trained as medical professionals. The islanders in at that time were probably healthier than an average person living in northern Europe, who lived in overcrowded cities under poor sanitary conditions. They have also looked healthier than many sailors who suffered from scurvy and other diseases due to a monotonous diet onboard the ship.

wrote:

"The king had to stand out to his subjects, if not by intelligence and stature, which after all one can do nothing about, then at least by the girth of his belly. To achieve that, the prince had to undergo special training. From childhood they were stuffed with food - rather in the way they fattened up geese in Bresse."

The right to consume unrestricted food including the most valued foods, was a chiefly prerogative, as was the freedom from obligation to do routine work (Schoeffel 1992, Pollock 1992). Current Western images concerning thinness, beauty and health are not very influential in Kiribati today, fatness is still associated with high prestige and social well-being.

The early explorers brought many new and unfamiliar illnesses to the Pacific Islands. It is impossible to assess the importance of the introduced diseases on the Pacific population. However an earlier estimate (Lambert 1934) indicates that the effect of the new diseases on the Pacific population was devastating as the natives had no immunity to these illnesses. The Gilbert Islands does not seem to have suffered as much as other Pacific Islands. Dr. S.M. Lambert concluded in 1924 that the Gilbert and Ellice Islanders were afflicted with fewer introduced diseases than any other race in the Pacific:

"In general the Gilbertese and the Ellice Islanders are people living under good physical conditions. They are afflicted with fewer natural or imported diseases than any race of the Pacific. The Gilbertese have in general only three public health problems: (1) the control of tuberculosis; (2) the control of yaws; and (3) quarantine against filariasis of the Ellice group" (in Sabatier 1977:349).

The impact of the introduced diseases was not as serious in the Gilbert Islands because the islands are very isolated and distant

from the main trade routes, nor were they attractive to foreigners because they have limited raw materials such as copra (Brewis 1992).

The most serious imported diseases in the Gilbert Islands were venereal diseases, particularly yaws, and diseases such as leprosy and tuberculosis (Geddes 1984, Lambert 1928 & 1943). Dr Lambert found 28 cases of leprosy in 1924, later the leprosy patients were sent to a leprosarium which had been built on Tarawa (Geddes 1984). Leprosy is still prevalent in Kiribati today. In 1988 there were 45 cases of leprosy recorded (Kiribati Statistics Office 1988). Brewis (1992:115) mentions that 27 new cases were identified in 1990. Tuberculosis was one of the major causes of death on the Islands after European contact. Dr Lambert (1928) found that tuberculosis cervical adenitis was almost universal in the Gilbert and Ellice islands. He further estimated that tuberculosis was the cause of 30% deaths in the islands in 1924. Tuberculosis is still endemic in Kiribati today. There were also outbreaks of dysentery, measles, pertussis and chickenpox, however these diseases were not as serious as the tuberculosis. The wind (ang) was believed to be the carrier of the new illnesses, later the islanders realised, that the ships carried the diseases (Geddes 1984).

Traditionally sick people were cured by medicine extracted from plant leaves, bone setting and massage. Massage was¹⁰ the most common treatment of specific ailments used both by female

¹⁰ Massage is still today the most common therapy used on Tarawa. It used by traditional healers, traditional midwives as well as by ordinary people. Massage is applied to a variety of health problems including illegal abortions.

and male practitioners, whereas bone setting was practised mainly by male healers. Obstetrics was known and practised by many women, however a female relative or a recognised and respected traditional midwife would assist during parturition.

Many Islanders had personal experiences with different massage types and some herbal medicines, however a person did not become a traditional healer or midwife just because they wanted to, people earned the right to be thought of as specialists in medical skills and knowledge. The traditional healer would often choose a kindred person (often a son/daughter) who was trustworthy and seemed able to learn the various techniques (Geddes 1984).

Traditional healers and midwives occupied a respected position and are still today respected among the islanders for their skill and knowledge. The following case story illustrates the strong belief in and respect for the work and experience of indigenous midwives still prevalent in Kiribati today:

"A I-Kiribati woman was expecting a baby and went to the local nurse for a medical examination. The nurse was inexperienced and told her that the baby had no head. The pregnant woman was devastated, and cried and cried, therefore the family decided to call upon a very famous indigenous midwife from Marakai atoll. The midwife came to visit the pregnant woman who at that time was living on Tabiteuea. After examining her, she told her that the baby was not headless, but there were two heads because she was expecting twins. 5-6 months later the woman gave birth to two perfect babies."

2.4 Demographic trends and family planning

Since 1921 frequent population censuses have been made in Kiribati, the last one being made in May 1990. The 1990 Census

recorded a population of 72,298 unevenly distributed with 93.3% of the population living in the Gilbert group (see table 2.1), which constitutes only 33.8% of the total land area (UNCED 1992).

Table 2.1 1990 population estimates by island group.

Gilbert Group	67471	93.3%
Phoenix Group	45	0.1%
Line Group	4782	6.6%
Total	72298	100%

Source: Kiribati Statistics Office 1990

The population structure is broad at the base with about 40% of the total population younger than 15 years, about 18% younger than 5 years and a median age of 20 years (Kiribati Statistic Office 1990). This population structure with a larger number of young and old people relative to those of the working age places great burden on the national economy to provide a means of livelihood (Pollard 1987). Life expectancy is only 53 years, due to high infant mortality. The infant mortality rate is high today: 65 per 1000 live births, although it has declined from 87 per 1000 live births in 1973/78. The average annual rate of population increase has been estimated at 2.4% per annum, this rate of growth cannot be sustained without serious implications to the living standard (see table 2.2). This high growth rate is due to both declining mortality and high fertility (Tesfaghiorghis 1993).

Table 2.2 Kiribati: Population trends, 1990

	1990
Population	72298
Rate of natural growth	2.0%
Total fertility rate	3.8%
Crude birth rate (per `000)	29.4
Infant mortality rate (per `000)	65
Life expectancy (years)	
Males	57.7
Females	62.8

Sources: Kiribati Statistics office 1990 & Tesfaghiorghis 1993

Family planning programs have been carried out in Kiribati since the 1960s. In 1990 there were 4573 recorded modern contraception users in the country, including those vasectomized. The highest number of acceptors are found in South Tarawa where land is scarce and people depend more on the cash economy (Pulea 1986). Many islanders have been resistant to the idea because family planning conflicts with their Christian values and beliefs. The relationship between family planning and religion is very strong on Kiribati. Family planning has been unsuccessful in Kiribati mainly because of the Catholic church attitude towards modern family planning methods. Many islanders, especially Catholics justify their large families as being "the will of God" (Pulea 1986). The Catholic church is very influential in Kiribati, according to the 1990 population census 53,4% of the total population are Catholic.

Another factor affecting the islanders' attitudes towards family planning are traditions and customs. Many men would never allow their wives (nor the women themselves) to be gynaecologically examined by male doctors (Jansen 1977, Pulea 1986).

The concept of family planning is not a modern phenomenon, in fact the idea of big families seems to be a more recent idea introduced by missionaries, who were against infanticide and abortion. Traditional families were kept small, two children were the norm on most islands (Wilkes 1845, Hale 1968, Macdonald 1982). Restrictions on intercourse during lactation may have had some effect in reducing conception. Traditional methods of birth control such as abortion and infanticide was practised throughout the Gilbert & Ellice Islands as a means of population control¹¹. Abortion by traditional means was common, especially among younger and single women (Brewis 1992). Wilkes (1845:108) wrote:

"So as soon as a woman believes herself to be enceinte for the third or fourth time she determines that the offspring shall not survive, and calls in the aid of an experienced midwife to destroy it, who effects the purpose by external pressure on the abdomen or back, and though not unattended with much pain and difficulty to the mother the operation rarely proves fatal....looked upon without any sort of horror or shame, being considered as necessary and proper means to prevent their families from becoming so large as to be a burden to them, and not because the island might become overpopulated for this later idea does not seem to have occurred to them...The practice of destroying the foetus is universal among the unmarried females, but children are never destroyed after birth. According to Wood, this custom does not prevail at Makin".

Wilkes' comment that abortion was not practised as a way to prevent overpopulation is in contrast to Reverend Bingham's view. He reported that abortion was practised to avoid the island

¹¹ I use the terms Gilbert and Ellice Islands and the Gilbertese and Ellice islanders, when referring to the time before independence in 1979. No unified economic and political system encompassed the Islands before the colonial period. Although the Ellice Islands and the Gilbert Islands have similar cultures; customs and institutions differed more or less within the islands in the two island groups.

becoming overpopulated (Brady 1972). Brady (1972:22) writes:

"The uea¹² of Abaiang asked Bingham whether abortion was the general custom in America; when told it was not, the king asked with an air of surprise whether we did not suffer from famine".

Infanticide by drowning or suffocation was the most common form of birth control in the Ellice Islands. In some cases it was the two first children who survived, in others it was the first of each sex (Macdonald 1982). Infanticide and abortion are forbidden by law today. Infanticide disappeared rapidly with the arrival of missionaries (Brewis 1992). Induced abortions still occur today in secrecy using traditional techniques. This is seen as a private family concern and is only moral acceptable if the mother is unmarried and the abortion is performed in the first months of the pregnancy (Brewis 1992).

2.5 Environmental contamination on Tarawa

The postwar period brought rapid urbanisation and increasing centralisation of social services and employment opportunities on Tarawa. Hundreds of outer-islanders migrated to South Tarawa to create better opportunities for their families. Today one third (35%) of the total population live on the urbanised South Tarawa, where the effects of socio-cultural changes are most apparent, however they are spreading very rapidly into the rural areas of Kiribati. The population density is extremely high on South Tarawa about 1610 persons per Sq/Km, this population density is according to UNCED (1992) expected to rival that of

¹² "uea" is the Gilbertese word for high chief.

Hong Kong by the late 1990s.

The houses on South Tarawa are more congested than on the north due to higher population density. On South Tarawa the population density are 1610 persons per sq.km compared to 239 persons per sq.km on North Tarawa (Kiribati Statistics Office 1990). The houses are very crowded on South Tarawa with an average household size of 7.3 person compared to 6.2 persons on North Tarawa (Kiribati Statistics Office 1990). Many people still live in traditional houses with thatched rooves and woven pandanus walls, according to the 1978 Statistics 39% of the households lived in a traditional house compared to 94% of the households on North Tarawa (Kiribati Statistics Office 1978). Although these figures are quite old, the housing situation has not changed much on Tarawa, building materials are scarce on Betio and pandanus thatching is too expensive for most people. Research indicates that infectious diseases such as influenza, pneumonia, tuberculosis and measles are more prevalent in poor overcrowded housing than in better housing, as density increases the risk of contracting an infectious disease (Tupasi et al. 1988, World Health Organisation 1988).

Rapid urbanisation and high population densities cannot be sustained without serious implications for the atoll' natural resources and the fragile environment on Tarawa. The people living on Tarawa are now facing serious environmental degradation problems such as contamination of groundwater, contamination of the lagoon, contamination of reef shellfish from human and animal excrement and air pollution through the increase of motor vehicles (UNCED 1992, Jones 1993).

Many health problems on Tarawa, especially diarrhoea and gastro-intestinal illness, are attributable to the pollution of ground water due to the absence of a domestic waste disposal site and faecal contamination from animals and humans (UNCED 1992, Kelly 1993). Faecal pollution due to lack of proper sanitation is a very common cause of food- and waterborne diseases in many developing countries (Motarjemi et al. 1993).

Although no study has been done on the impact of no sewage disposal on weaning food contamination on Tarawa, research from other developing countries provides evidence for high levels of faecal contamination of weaning foods due to the lack of organised sewage disposal (Black et al. 1982, Imong et al. 1989). Most of the population on Tarawa rely on open or protected well water for drinking, washing clothes and bathing. Water is taken from the well with a rusty tin can, which carries germs and faeces. Kelly (1993) found that throughout South Tarawa the well water was so contaminated that it was unsuitable for both consumption and bathing, none of the 18 wells he examined met the WHO standard for potable water. Facilities exist for distribution of chlorinated water to villages, however these are under-utilised. Chlorinated water is comparatively expensive for a low income family, and many families who have access to chlorinated water turn off the chlorinated tap water, because they simply cannot afford it. People living in houses with metal roofs are able to collect rainwater in rainwater tanks, however only 4% of the households on North Tarawa and about 20% of the households on South Tarawa use rainwater as their main source of drinking water (Kiribati Statistics Office 1990). 51% of the households

in this study were dependent on well water as their main source of consumption, 21% were dependent on tap water and 28% utilised rainwater.

The health of the lagoons ecosystem is affected by inputs of sewage into the water. Approximately 70% of the households on North Tarawa and about 40% of the households on South Tarawa defecate along the beaches or in the lagoon (Kiribati Statistics Office 1990). Sewerage systems with public toilets were constructed in 1982 to resolve the problem, however this system is only accessible to a small group of the population, approximately 13.5% of the households on North Tarawa and 36% of the households on South Tarawa use public toilet facilities. Only 14% of the households on Tarawa have a home flush toilet (Kiribati Statistics Office 1990).

Today many of the existing toilet facilities are not utilised because they have not been cleaned and maintained properly. Geddes (1984) mentions that less than six months after opening the public toilets, people started to use the beach again. He (1984:311) argues that the planners of the toilet scheme failed to consider the amount of toilet utensils, cleansers and paper used in toilets in Western countries. Traditionally the I-Kiribati used pandanus leaf to cleanse themselves after defecating (Geddes 1984). Because toilet cleaning utensils, soap and particularly toilet rolls, (toilet rolls cost from 60 cents each to 1 A\$), are very expensive to purchase the I-kiribati continue to use pandanus leaf, which block the toilets. Most I-kiribati people prefer to defecate on the beach instead of using filthy and smelling public toilets.

Naidu et al. (1991) found that faecal pollution of the lagoon water in 1991 was at a level higher prior to the sewerage system construction in 1983. Kelly's (1993) results were consistent with Naidu et al. (1991). He also found that contamination of the lagoon had worsened, especially with an increase in contamination of lagoon water eastward towards Beikinibeu.

Defecation on the beaches and in the lagoon is also responsible for the microbiological contamination of shellfish. Kelly (1993) found that shellfish contamination was very high, faecal coliforms in edible shellfish exceeded U.S. health standards for consumption on all the sites Kelly examined. Faecal contamination of shellfish contributes to the high rate of diarrhoea and Hepatitis A on South Tarawa (Kelly 1993).

The I-kiribati people's habits, attitudes and beliefs make it difficult to improve the sanitary conditions. The traditional Gilbertese way of life caused little damage to the environment. There were no problems with disposal of waste, everything was made of organic products which were all disposable. With low population densities the methods of disposing of sewage by tidal action close to the ocean side was very efficient. Excrement from pigs, goats and poultry was no problem, since these animals were not introduced before the arrival of the whalers. Without a disposal site and a more efficient sewage system the islanders will continue to do what they have done through generations.

The I-Kiribati people's understanding of the concept of cleaning (kaitiaki) arose from their old traditions. This example illustrates the I-Kiribati understanding of cleaning (kaitiaki):

"Some time before the 15 year independence celebration, there was an announcement on the radio requesting the people on Tarawa to clean up the environment before the big celebration day. The Islanders were busy cutting down the plants and trees, and weeding the grass around their houses and along the road side. Doing what they were used to do before a big celebration. The next day a new announcement was heard in the radio: please, do not cut down more trees and weed the grass, we want you to clean up tin cans, batteries and other solid waste."

Most I-kiribati persons do not possess the knowhow to clean and maintain modern western facilities such as latrines properly. Where would they get the maintenance skills from? When they grew up these facilities were not available. Neither can the Islanders afford to buy utensils to clean and maintain these facilities.

The implications of environmental degradation such as contaminated water on the infant and young child feeding practices will be discussed further in the following chapter

CHAPTER THREE

INFANT FEEDING PRACTICES ON TARAWA

This chapter concerns infant and early childhood feeding practices on Tarawa. As will be noted the infant feeding practices are influenced by a combination of tradition and contemporary constraints of food availability, its cost, taste preference, maternal employment and commercial advertising.

Since European contact the Kiribati society has undergone significant changes affecting the infant feeding pattern. Tradition still dictates many practices such as the choice of the first supplemental foods. Many children received flesh of the coconut (te marai) because, as most women said: "feeding our children flesh of the coconut is an old tradition on Tarawa, we know this food". However in the process of change other traditional practices are dying out. Food taboos are no longer observed: only one woman in the sample practised food taboos, never giving her child octopus because she believed it would cause sores. An investigation of the interrelation between traditional values and the more modern practices is important for an understanding of the infant feeding pattern in order to improve these practices.

3.1 Breastfeeding practices on Tarawa

The practice of breastfeeding on Tarawa is not declining as in other Pacific countries. 92.2% (178) of the mothers in the study initiated breastfeeding. This result is similar to Jansen's

results from 1977, he reports that 91.8% of the children on Betio were breastfed within the first three days of birth (Jansen 1977).

Breastfeeding is important to the women and they take several precautions to ensure plentiful and healthy milk. Women who have problems with breastfeeding are encouraged to eat plenty of protein by local nurses and health professionals. Eating of shark and beach crab was traditionally believed to give the richest breast milk on Tarawa. Today local healers massage the breast to increase the milk and also encourage the mothers to eat plenty of fish and corned beef. Corned beef is considered very good and tasty food, it is rich in protein but far too fatty and salty for an infant. Drinking lots of toddy and coconut milk is also believed to promote plenty of breast milk. One mother who was able to breastfeed her own son and granddaughter simultaneously believed that drinking copious amounts of tea mixed with toddy during the day increased the milk flow. Brewis (1992) mentions that landcrab and coconut are considered the best food on Butaritari to promote breast milk.

Traditionally a lactating woman would also avoid sunlight and cover her head with a mat and her breast with a skirt made from coconut leaves believing that sunlight would dry up the milk (Grimble 1989). Brewis (1992) reports that the women on Butaritari still take precautions to avoid direct sunlight whereas very few lactating women bother to keep this custom on Tarawa today.

Approximately 8% (15) of the women did not initiate breastfeeding (see table 3.1). The most common reason for not

initiating breastfeeding was insufficient breast milk. In surveys from both developed and developing countries inadequate milk supply is often given as the reason for not initiating breastfeeding, beginning supplemental feeding earlier or for cessation of breastfeeding (Gussler and Briesemeister 1980). Many medical practitioners suggest that mothers give insufficient milk supply as a convenient excuse for not initiating breastfeeding. On the other hand insufficient milk supply may be true in cases where the child is premature, the mother had a caesarean, where there is a short interval between births and in cases where the mother is malnourished. No matter what the cause of insufficient milk is, the mothers genuinely believe that they have an inadequate milk supply and are therefore not able to initiate breastfeeding or continue to breastfeed if they have initiated breastfeeding. Other reasons for not initiating breastfeeding were as shown in table 3.1 that the mother was very sick, had problems with sore and infected nipples or the child was adopted.

Table 3.1 Numbers and percentages of reasons for not initiating breastfeeding.

Reason	no & %
Insufficient breast milk	8 (53.3%)
Mother ill	3 (20.0%)
Problems with nipples	2 (13.3%)
Child adopted	2 (13.3%)
Total	15 (99.9%)

Most mothers who were not able to breastfeed fed their children infant formula, Sunshine full cream milk powder or coconut drink (moimoto). 73.3% (11) of the women who were not initiating breastfeeding used infant formulas. Few brands of

formula are sold in the shops on Tarawa, these are S-26 (Wyeth) and Lactogen (Nestlé). The infant formulas are all imported from Australia and are very expensive. Prices range from 12.80 A\$ per 900 gr to 16.22 A\$ per kg. Many women may overdilute these products due to misunderstanding as all the products have only English on the labels. Other women overdilute these products because they are simply too expensive. 20% (3) of the women used Sunshine milk, and some of the mothers sweetened the milk with sugar or mixed it with milo. Only one woman fed her child coconut drink (moimoto). Traditionally if a woman could not breastfeed and there was no other lactating woman in the household, the infant was fed coconut drink (moimoto) mixed with the flesh from the young coconut (te marai). One woman had raised three children on this mixture and they all seemed to be quite healthy.

Wetnursing, defined as an infant being breastfed by a woman other than its biological mother either for payment or charity is practiced on Tarawa in particular circumstances. Wetnursing commonly occurs when the child is adopted by a relative who is already breastfeeding her own biological child. The woman who nurses the adopted infant generally has no negative feelings towards the practice, the adopted child is accepted as the woman's own child, the woman looks on it as breastfeeding her own "biological" child, not another woman's child. 3 women in the study were breastfeeding an adopted child, one had adopted her sister's child because the sister was not able to breastfeed, one had adopted her granddaughter because the mother ran away, another child was adopted from a relative and breastfed for about 18 months, but because the child was uneasy and cried a lot, she

was returned to the biological mother. Adoption of a relative is very common on Tarawa. Adoption practices have both advantages and disadvantages. A very important disadvantage is that many women never initiate breastfeeding, or terminate breastfeeding earlier, because the child has been requested for adoption by a relative.

At the time of the study approximately 35% (67) of the mothers who had initiated breastfeeding were not breastfeeding anymore. Prolonged breastfeeding up to three years of life is still widely practiced on Tarawa. The continue breastfeeding rate (1 year) was 0.54 and the continue rate (2 years) was 0.33¹³. During the first year of life only about 20% of the children were taken off the breast and during the third year of life 19% of the mothers were still breastfeeding. The mean age of terminating breastfeeding in this study is 9.23 months, with a standard deviation of 6.17 and a range of 1-24 months of age.

¹³ These rates give an indication of breastfeeding respectively beyond one year and of breastfeeding practices towards the end of the second year of life (WHO 1991). The definition of these rates is respectively children 12-15 months of age who are breastfed divided by children 12-15 months of age. And children 20-23 months of age who were breastfed divided by children 20-23 months of age.

Table 3.2 Numbers and percentages of children fully weaned¹⁴ at the time of the study.

Age (months)	No. of children	Fully weaned	%
0-2	9	0	-
3-5	21	3	14.3
6-11	48	10	20.8
12-17	38	18	47.4
18-23	29	17	58.6
24-29	27	17	63.0
30-36	21	17	81.0

Large percentages of women had stopped breastfeeding because of insufficient milk supply, the mean age of termination for this sub sample was 6.4 months with a range of 1-12 months. A distinction should be made between the phenomenon (insufficient milk syndrome) when it occurs before breastfeeding is initiated, during exclusive breastfeeding and when it occurs once complementary feeding has begun. Most women who gave insufficient breast milk as the reason for cessation of breastfeeding in this study stopped breastfeeding when the child was around 3 months old or at 12 months. The breasts begins to produce milk instead of colostrum in the first few days postpartum, and the milk supply quickly increases. Most women's breasts become engorged; human milk production is dependent on the frequency of suckling and around the 1 to 3 month stage of lactating the milk becomes relatively stable, having regulated itself to suit the need of the breastfed child, and the breasts are no longer engorged. Many women who are lactating for the first time do not fully

¹⁴ Both children who have been taken off the breast and children who have never received breast milk are included among fully weaned children.

understand this process and assume that less pressure in the breasts means that the milk has decreased. They start to replace breast milk with complementary feeding or increase the use of supplements which again leads to less sucking at the breast, less nipple stimulation, lower levels of prolactin and therefore reduced breast milk. The custom of supplementing the breast milk with additional fluids is common on Tarawa. This custom may cause a reduction in suckling which results in lower milk production, especially if the supplements are provided in a feeding bottle.

Another common reason for terminating breastfeeding was that the mother was pregnant again, due to the widespread belief that a pregnant woman should not continue to nurse an older child. This reason shows that the traditional custom which prohibits a lactating mother from sexual intercourse with her husband for more than one year after birth, because of a belief that the child would not thrive or would be weak and puny, is not taken seriously anymore on Tarawa. The mean age of terminating breastfeeding for this sub sample was 13.2 months with a range of 9-24 months. Another common reason was that the child was adopted. 14.9% of the women had stopped breastfeeding because the child was adopted by a relative. The mean age of terminating breastfeeding for this subsample were only 6.4 months with a range of 1-18 months. Other reasons for cessation of breastfeeding included: mother sick (10.4%), child did not wanted the breast milk anymore (9.0%), child sick (6.0%)¹⁵, mother

¹⁵ Some mothers stop breastfeeding when their child is sick believing that the breast milk had become bad and caused the sickness.

working (6.0%), child too old (6.0%), mother was worried that the child did not want to eat any food and only wanted to drink breast milk (4.5%), mother had problems with sore nipples (3.0%), personal problems (3.0%), mother too busy to continue breastfeeding (1.5%), too painful for the child to suck the nipples because of problems with two rotten teeth (1.5%). Two women (3%) could not give a specific reason why they had taken the child off the breast.

3.2 Complementary feeding

Although most women breastfeed their children on Tarawa, few do so exclusively. Nearly all women supplement their breast milk with other fluids, frequently from the first day of life. All women in this sample except one introduced supplementary fluids such as coconut drink (moimoto), water or toddy mixed with water, within a day after birth (see table 3.3). This practice of supplementing breast milk with other fluids is very deep rooted in the I-Kiribati culture. Traditionally the Gilbertese believed that the child in the mother's womb was a spirit (anti), when the infant was born it became a human being. The meconium was thought of as the spirit's excrement (te buta anti) and was a sign of the infant's transformation from the spirit world to the human world. The only way to clean the baby's digestive system and the meconium was by giving the newborn baby coconut drink (moimoto) soon after birth in addition to the colostrum. The coconut drink (moimoto) is still today believed to possess healing and cleansing properties and it is always offered to sick infants and adults.

The custom of giving newborns coconut drink (moimoto) is still widely practised on Tarawa today, 39.4% (76) of the children in the study received moimoto shortly after birth. This practice seems to be more common among women who bear their children at home. At the hospital infants are more often given boiled water by the nurses to keep the newborn infants moist and to prevent dehydration. In cases where the child is premature or the mother had a caesarean the newborn receives infant formula, S-26 being the most commonly used formula.

Table 3.3 First fluid supplements given to the newborns in the first days of life.

First fluids	%
Water	2.6%
Boiled water	33.2%
Toddy mixed with water	12.4%
Coconut drink (moimoto)	39.4%
Infant formula	6.7%
Powdered milk	0.5%
Cordial	0.5%
Only breast milk	0.5%
Do not remember	4.7%
	100%

The women on Tarawa categorise breast milk as food, and other fluids/liquids as drink. They themselves can not exist without food and drink, therefore they believe that their infants need both breast milk (food)¹⁶ and additional fluids. Traditionally the children occasionally received toddy, coconut drink (moimoto) and water in addition to the breast milk. The custom of supplementing breast milk with other fluids seems to

¹⁶ Infant formulas are also considered to be food. A few women in the study supplemented their breast milk with infant formulas, because they believed that they have an insufficient milk supply.

have increased since western arrival, probably due to the introduction of powdered milk, and later to the introduction of infant formulas and the widespread use of feeding bottles which makes complementary feeding much easier. Jansen (1977) in his study on feeding practices on Betio, Tarawa reports that most infants under 6 months of age received only breast milk, although the author suspects that a number of children received small amounts of toddy in addition to breast milk. This result could be due to recall biases because the women, according to Jansen (1977), were asked what their children had eaten during the last 24 hours and not what they had eaten and drank, remembering that most women distinguish between foods (breast milk) and fluids.

During a 24 hour recall 15 children who were breastfed when the study was undertaken received no supplemental fluids, however this does not mean that they were all exclusively breastfed, only 5% (6) were exclusively breast-fed during the 24 hour recall (see table 3.4). In the age group between 0-2 months all the four children were exclusively breastfed. Between 3-5 months only 2 of the five infants were exclusively breastfed, the others had received beikost. Between 6-8 months only one infant was exclusively breastfed and in the age group from 9 to 11 months, the child was only fed breast milk and no other complementary foods because the child was vomiting and suffering from severe diarrhoea.

Table 3.4 Liquid given to currently breastfed children according to age in months during a 24 hr recall.

Liquids	0-2	3-5	6-8	9-11	12-23	24-36	Total
Toddy & water	3	5	4	8	20	11	51 (45.9%)
Sugar & water	0	0	0	3	5	2	10 (9.0%)
Cordial	1	0	1	0	3	0	5 (4.5%)
Powder milk	0	0	0	1	1	0	2 (1.8%)
Milo & sugar	0	0	0	1	0	0	1 (0.9%)
Milk & sugar	0	0	2	0	1	0	3 (2.7%)
Tea & sugar	0	0	0	1	0	0	1 (0.9%)
Water	1	7	5	6	1	0	20 (18.0%)
coconut drink	0	1	0	0	0	1	2 (1.8%)
Breast milk	4	5	4	1	1	0	15 (13.5%)
Do not remember	0	0	0	1	0	0	1 (0.9%)
	9	18	16	22	32	14	111 (100%)

Toddy diluted with water, plain water and water mixed with sugar are the most common supplemental fluids on Tarawa today. Toddy is still collected by most families on Tarawa¹⁷, and is used widely because it is very refreshing and cheap. Toddy is rich in vitamin C, but when it is prepared for infants, it is diluted with 1 part toddy to 2 parts water and boiled for some time whereby most of the C vitamin is lost. Other popular supplemental fluids are cordial, milo, powdered milk, sweetened condensed milk, and fruit juice. However these drinks are far too expensive for a family living on an average I-Kiribati income and are not consumed as much as water and toddy.

The most serious problem associated with the introduction of supplemental fluids is the exposure of the infant to contamination pathogens. Cordial, milo and powdered milk are all mixed with water, in many cases the water is not boiled. The I-

¹⁷ Toddy is often collected by a younger and stronger male member of the family. However on Betio where land resources are scarce, this tradition is not as prevalent as in the other villages on Tarawa.

kiribati conception of boiled water is very different from a western view. Most women use kerosene stoves or wood fires for cooking, kerosene costs money and it also takes a very long time to boil water using kerosene or wood. Therefore many women only heat up the water and regard it as being boiled. 73% of the women in the study relying mainly on well water for consumption said they always boiled the water, another 6.9% said they only boiled water for the children. 70% of the women relying on tap water for consumption boiled the water always, and 57.4% of the women relying on rainwater for drinking boiled the water. These figures are far too high; women are aware of the risks involved in giving young children water which is not boiled and will not admit to an I-Matang (a white person) that they do not boil the water. Research also indicates that boiling of water does not always guarantee safe drinking water, if the utensils are not clean (Imong et al. 1989).

Studies (Almroth & Bidinger 1990, Almroth 1978) indicate that supplementing breast milk with other fluids is not needed in healthy infants younger than four-six months who are exclusively breastfed, even under hot and arid conditions such as in Kiribati. Most studies (Victora et al. 1989, VanDerslice et al. 1994) document that exclusive breastfeeding protects against death from diarrhoea. Breastfeeding protects infants from diarrhoeal diseases because it contains anti-infective properties. It also reduces or eliminates exposure to waterborne pathogens (Victora et al. 1989, VanDerslice et al. 1994). Infants who are fed supplemental fluid in addition to breast milk are at

a greater risk of contracting diarrhoeal diseases. Even small quantities of contaminated water can, according to Vanderslice et al. (1994) double the risk of diarrhoeal disease.

The significance of exclusive breastfeeding over supplemental feeding with teas, water and other fluids in addition to breast milk has been documented by studies conducted in Brazil (Victora et al. 1989). This study found that infants who received supplementary fluids such as tea, water or juice in addition to breast milk were at increased risk of diarrhoeal death, possibly due to contaminated water for dilution or inadequate washing of utensils. The risk of infants being exposed to highly contaminated supplementary fluids is greatest in areas where sanitary conditions are poor such as on Tarawa, consequently these infants may particularly benefit from the protective effects of exclusive breastfeeding. Studies document (Butz et al. 1984, VanDerslice 1994) that the protection of exclusive breastfeeding is especially important among infants living under poor environmental conditions. VanDerslice et al. (1994) found that the protective effects of exclusive breastfeeding were strongest when drinking water was contaminated, and breastfeeding was more protective among infants living under overcrowded and contaminated conditions.

On Tarawa 58% (112) of the children received fluid in a feeding bottle in addition to breast milk. Fluids provided in infant feeding bottles are particularly dangerous in Kiribati and other third world countries because feeding bottles and rubber nipples are very difficult to sterilise where sanitary conditions

are poor. A study conducted in Peru, which assessed the levels of contamination in feeds given to infants found that in Peru, 35% of bottle teats and 23% of the feeding bottles were faecally contaminated (Black et al. 1989). Another study conducted in the Philippines found according to Saadeh (1993) that 88%-96% of the feeds served in feeding bottles to infants were faecally contaminated.

Another danger of the feeding bottle is that many children consume excessive amounts of fluids in the bottle. On Tarawa many children consumed up to 32-40 oz of fluid (often toddy or water with sugar) a day depending on the child's age and thirst. Overconsumption of fluids fills up the infant's small stomach and creates a dietary imbalance by replacing breast milk with non-nutritious and often contaminated fluids. Smith & Lifshitz (1994) study indicates that excessive fruit juice consumption among toddlers leads to an inadequate dietary intake by displacing more calorie- and nutrient dense foods. Fruit juice should not be administered by feeding bottles because infants with teeth may contract "nursing bottle caries". Several studies (Roberts et al. 1993) indicate that bottle-fed infants have higher levels of dental caries than breastfed children, however Roberts et al. (1993) study does not mention what was in the feeding bottles, and if there were different feeds in the bottles whether there was any difference in the prevalence of caries.

Bottle feeding also interferes with breast-feeding. A study (Martinez et al. 1989) conducted in Brazil found that infants who received water and tea, or juice in addition to breast milk in

the first days of life were more likely to breastfeed for a shorter period. Many children prefer to drink from the feeding bottle instead of the breast, because it is easier for them to suck from the teat than the nipple. On Tarawa 9% of the women who were not breastfeeding at the time of the study had terminated breastfeeding because the child no longer wanted the breast after being used to drinking from a feeding bottle.

3.3 Weaning practices

The term weaning has many definitions in the literature. The word wean is derived from the Anglo-Saxon "wenian", meaning "to accustom" (Birckbeck 1982, Birckbeck 1992). In this thesis, weaning applies to the process occurring over a period of time, whereby a young child's dietary intake changes from breast milk or other milk to beikost¹⁸. Through this process the child gradually becomes accustomed to the usual family diet. It does not mean abrupt termination of breastfeeding (Birckbeck 1982, Birckbeck 1992, Wharton 1989). Weaning should be introduced when the breast-milk no longer satisfies the child's nutritional requirements, depending on each child.

In this thesis I distinguish between complementary feeding (supplemental fluids) and weaning foods. Complementary feeding means the introduction of any supplement with the objective of maintaining breast-feeding for as long as possible, often the

¹⁸ The word beikost is used in this thesis to refer to any type of semi solids or solids employed during the period of weaning.

start of complementary feeding represents the first step of weaning (Ballabriga 1991). The supplementary fluid is offered to the infants believing that the fluid will prevent dehydration whereas weaning foods are introduced to the child to accustom it to the daily family diet.

Traditionally, infants on Tarawa received no food until the child was old enough to eat the family's soft food. The appearance of several teeth was a sign that the child was mature enough to eat beikost. An earlier weaning pattern has emerged on Tarawa today. Earlier research (Willmott 1968, Jansen 1977) suggests that malnutrition among children on Tarawa was related to the custom of introducing beikost at too late a stage. This is not the case today, the average age at introduction of beikost was 3.7 months with a standard deviation of 1.40 and a range from 1-9 months. By the age of 3 months 67.2% of the children had received beikost. The change in introduction of weaning foods and also the high rate of breastfeeding is mainly due to the teaching and work of local nurses, local health workers, the Kiribati National Women's federation known as Aia Maea Ainen Kirimati (AMAK) and other agencies which have assisted the women by visiting them and by running national workshops in the villages and in AMAK's headquarters. Health problems today on Tarawa are not so much related to the time of introduction of weaning foods as to the hygienic and nutritional quality of the food.

Weaning foods should be nutritionally well balanced, high in energy, low in fibre and of low allergenicity (Jansen 1980, Birckbeck 1992). However weaning foods on Tarawa are not selected

because of the nutritional content of the food, rather the selection is restricted to beikost that is easily available, low cost, convenient to prepare, very soft and requires least chewing.

Before European arrival the first foods introduced to the children were soft jelly-meat from the coconut (te marai), germinated coconut (te bebe) soup made from pandanus, mashed breadfruit or paw-paw. Fish was normally not introduced until the child was more than a year old, because of a belief that fish caused sores and loose stools. The most common first food today is the same as always; the flesh of the coconut (te marai) (see table 3.5). 77.6% of the children in the study received the flesh from the coconut as their first beikost. The flesh of the coconut is popular because there is hardly any work involved in preparing it for the infant, and the soft flesh of the coconut is also believed to contain similar healing properties to the coconut drink (moimoto), especially considered good for the bowel movement. The flesh of the coconut is a good energy food which also contains small amounts of protein, fat, iron, thiamine, riboflavin, niacin and fibre.

Paw-paw is another widely used beikost. Paw-paw was chosen by many mothers because it prevented the child from getting a "blind eye". Paw-paw is rich in vitamin A and local nurses have encouraged mothers to feed children ripe mashed paw-paw to prevent vitamin A deficiency. Other common local first soft foods are breadfruit and pumpkins. Breadfruit and pumpkins are first cooked and then mixed with condensed milk or water and sugar

before being fed to the infant. The practice of feeding paw-paw, breadfruit and pumpkins to the infants and young children may be of disadvantage to them because these vegetables are low in calories, high in fibre and less digestible than fibre free food. In contrast to the situation for adults, fibre intakes in relation to infants and young children should be low because high levels of fibre in weaning foods may increase bulk and low calorie density, irritate the gut mucosa, reduce digestibility and reduce vitamin and mineral availability (Jansen 1980).

The consumption of commercial products and commercial baby food preparation for weaning foods has increased since research in the 60`s and 70`s. Mothers depend more on imported products for baby and infant feeding, because these foods are, more convenient and often cheaper to buy than the indigenous food. Refined carbohydrates can in fact satisfy infant energy requirements more easily than bulky and filling staples such as taro, breadfruit and bananas but many mothers do not understand the nutritional value of the different imported foods and are unable to combine and prepare a nutritionally sufficient diet for their families.

6.9% of the children in the study received Heinz baby food either in a jar or in a tin as their first soft food, 3.6% (7) women considered baby food in a jar to be the best and healthiest food for an infant mainly because the infant liked the taste of it. Watties and Heinz are the only two brands available in the shops, Heinz egg custard being the most popular type. A jar of Heinz egg custard costs from 0.90 to 1.10 A\$, the preparation is

very convenient as it is ready to use and requires no reconstitution with water, which decreases the risk of exposing the child to waterborne pathogens.

Farex cereal is another imported product used as supplementary food for children although no child in this study received Farex as their first soft food. Farex costs around 3.78 A\$ and one packet provides up to ten servings. It contains essential vitamins and minerals but as it requires reconstitution with other fluids, it greatly increases the risk of exposing the child to waterborne pathogens.

Custard powder and wheat flour are other imported products widely used as baby food. Custard powder is normally mixed with water, in a few cases with powdered milk or sweetened condensed milk. Custard powder is not very nutritious and contains only cornflour, colour and sugar. Pudding made of wheat flour, sugar and water is a little more nutritious than custard powder, especially if it is mixed with vegetables. The wheat flour contains some proteins compared to the cornflour. However neither custard powder nor flour puddings should be encouraged as infant food.

Table 3.5 Numbers and percentages of first beikost received by the children.

First beikost	no. & %
Flesh of the coconut (te marai)	135 (77.6%)
Paw-paw	17 (9.8%)
Breadfruit	3 (1.7%)
Pandanus fruit	1 (0.6%)
Heinz egg custard	12 (6.9%)
Custard powder	4 (2.3%)
Flour & vegetable	2 (1.1%)
	174 100%

Fruits such as ripe paw-paw or banana and root vegetable such as taro were either mashed or chewed (pre-masticated) by the mother and then fed to the baby; older children would eat the food as it was served. 33% of the women in the study chewed fruits such as paw-paw and bananas before feeding it to the child. Pre-masticated rice-based foods in Thailand were found to be significantly more contaminated than other rice-based foods (Imong et al. 1989). However an older study conducted on the Solomon Islands (Emmanuel and Biddulph 1969) found that where pre-mastication was prevalent infant diarrhoea was low and where it was discouraged diarrhoea was a problem. This is possibly due to protective antibodies in the saliva from the mother. Imong et al. (1989:16) reports of another study which found that pre-mastication adds maternal IgA to the food, that partially offsets the increased bacterial load.

3.4 Contamination of weaning foods

The period of weaning is a dangerous transitional phase.

This transition can take place without risk if the foods consumed are nutritionally adequate, easily digested and hygienically safe. Although no study has been done on weaning food contamination on Tarawa, research (Black et al. 1982, Imong et al. 1989, Henry et al. 1990) conducted under similar sanitary conditions as on Tarawa document that beikost is not hygienically safe and is frequently the origin of weanling diarrhoea¹⁹ due to the use of contaminated weaning foods or to the bad quality of water used in the preparation. Food contamination can lead to long term damage to health, it is a major contributor to diarrhoeal diseases, and can lead to the dehydration and malnutrition associated with them. According to WHO (1993) up to 70% of the 1400 million world-wide episodes per year of diarrhoeal disease occurring in children under the age of five are due to the transmission of pathogens through weaning foods.

Sources of food contamination are many. Motarjemi et al. (1993:84) mention: "nightsoil, polluted water, flies, domestic animals, unclean utensils, dirty hands, a polluted environment caused by lack of sanitation". Raw foods are also mentioned as a frequent source of contaminants. On Tarawa many islanders eat raw fish and raw shellfish. The custom of eating raw shellfish on Tarawa is associated with high incidence of diarrhoea, neurotoxic shellfish poisoning and hepatitis A (Kelly 1993).

¹⁹ The term weanling diarrhoea describes the risk of diarrhoea associated with the period over time, whereby the infant's diet change from exclusive breastfeeding to an adult pattern. The first three months after terminating breastfeeding is the period of greatest risk (Ahmed et al. 1993).

During the cholera epidemic in the late 70s, the practice of eating raw shellfish from the lagoon served as a route of transmission of cholera (Kuberski et al. 1979).

High standards of food safety are necessary to protect the children from food borne diseases. Preparation of food several hours prior to consumption, and storing it at ambient temperatures is considered a critical factor (Black et al. 1982, Henry 1989, WHO 1993). On Tarawa most women cooked only once in the afternoon. In this study 50.3% of the women cooked once a day, 21.8% cooked twice a day and another 3.6% cooked 1-2 times a day.

Most islanders do not own a 'fridge or other proper storage facilities therefore the leftover food is kept in many cases uncovered at high temperatures, the average daily temperatures on Tarawa range from 26-32°C. Although some families have a 'fridge they may not know that cooked food should be stored in it between meals. The family I stayed with borrowed a 'fridge while I was staying with them, however they never used it for storing leftover foods, they used it only for storing fresh fish and for cooling water. The children and other family members do often eat leftover food, particularly leftover rice for breakfast. 25.4% of the children in the study had leftover rice for breakfast. Re-heating of foods before consumption reduces the risk of contamination by eliminating pathogens, but on Tarawa leftover foods were rarely reheated.

Basic personal hygienic practices such as washing hands before handling food are another very important factor in

reducing the level of environmental contamination. Studies (Imong et al. 1989, WHO 1993) reveal that personal hygienic practices of the mother can considerably reduce the levels of bacterial contamination of weaning foods.

3.5 Food pattern of the children from 12-36 months of age

When the child is approximately 1 year old, it no longer receives special beikost, rather the child gets a representative portion of all the foods eaten by other family members²⁰. In traditional Gilbertese thinking the concept "meal" did not occur. Most Pacific people did not follow any regular meal schedule, they ate when food was available (Pollack 1992). Still today, there are no fixed times for meals, however it was possible for me to ask questions about what the children had at a particular meal as the islanders were familiar with the European concept of meals and generally eat in the morning, about noon and again about dusk.

Food distribution among children within families was not based on gender. In some families the very young children and the father of the family were favoured over others, however there were no general rules. Brewis (1992:109) states:

"There are clear patterns of food distribution and meal allocation in households. Men eat before women and children, taking the 'prize' (and often protein rich) components of the household meal. Women and children eat a significantly greater proportion of

²⁰ Although the child no longer receives special beikost, many women continue to breastfeed their child, about 40% of the children were still breastfed during their second year of life.

rice with each meal, and sometimes they will have fish water rather than fish."

Brewis did her research on Butaritari, where social and cultural changes may not be as apparent as on the main island. I found a very irregular food allocation pattern within the household. Often the women would feed the younger children first, and often they would let the men eat first, but there seemed to be no regular pattern.

As shown on tables 3.6 through 3.8 the diet of the children as reported by the women during the 24 hour recall and by participant observations reveals a high dependency on imported products and can be characterised as very monotonous. The diet was high in carbohydrates such as rice, breadfruit, wheat and sugar. Moderate in protein and low in fruit and vegetables, particularly low in green leafy vegetables.

Tarawa atoll lies on the equator line and the climate has little seasonal variability, therefore seasonality of food has few implications for nutrition on Tarawa. Breadfruit is one of the few locally grown seasonal products, the season is from May to December. When the study was conducted breadfruit was in season. During the breadfruit season breadfruit is an essential part of the diet, particularly among those people who have access to a breadfruit tree²¹. Approximately 20.8% of the children older than 12 months eat breadfruit for lunch either alone or with some other foods. And another 20% of the children over 12 months had

²¹ In 1990 had 87.8% of the household on North Tarawa and 68.1% of the household on South Tarawa a breadfruit tree (Kiribati Statistic Office 1990).

breadfruit for dinner.

Rice mainly imported from Australia (Trukai) and fortified with iron, thiamine and niacin was the most important staple eaten with most meals. Wheat products are another important imported staple. Approximately 52% of the children older than 12 months consumed wheat in the form of bread, pancakes or donuts for breakfast. Wheat products were also part of the children's lunch and dinner. Bread was sometimes eaten with butter or margarine, however on Tarawa it is not the custom to put jam, honey or peanutbutter on bread or pancakes. These products are available but far too expensive.

Sugar is among those foods eaten frequently and provides a large portion of the children's caloric intake and is therefore regarded as a staple. Many mothers sweetened the children's food and drinks before feeding it to the children. Especially foods such as plain rice, coconuts, fish, shellfish, octopus, and mashed breadfruit were commonly sweetened with sugar. The practice of eating snack foods such as sweet desserts, candies and chips is not widely practised, although in this study a few children received chewing gum, ice blocks and arrowroot biscuits between meals. The addition of sugar increases energy density, but also increases tooth decay.

The main protein staple is fresh fish, alternative sources of protein are shellfish, tinned fish, corn beef, chicken and eggs. Today fish is considered important, good and healthy food for an infant in contrast to just 20 years ago when few young children received it. 10.8% of the women in the study recommended

fresh fish as good and healthy food for an infant. Fresh fish was considered good for an infant today because most infants loved the taste of it, and many women also believed that feeding the children fish prevented them from getting sick. However fish liver which is very rich in vitamin A is still not fed to children. Feeding fish to young children on Tarawa may be a concern because of a higher risk of paralytic illness and diarrhoeal disease due to ingestion of lagoon and marine fishes containing neurotoxins derived from dinoflagellates. 10% (1219) of the diarrhoea cases reported in Kiribati in 1990 were due to fish poisoning.

Green leafy vegetables are a healthy food, but only few varieties grow on Tarawa, these include pumpkin leaves, taro leaves, "zebuka" and "nembele²²". Unfortunately many local green leaves and vegetables, which are very high in vitamins and minerals, are still considered inferior to imported foods. They are regarded as famine foods or pig food and were traditionally only eaten during hardship or famine (Willmott 1970, Schoeffel 1992). Today they are fed to the children thanks to the campaign of local health workers. Other locally grown vegetables are swamp taro (baibai), pumpkins, chinese cabbage and cucumbers. Swamp taro has never been as important for daily consumption on Tarawa as on the northern atolls. Only one child received swamp taro according to the 24 hour recall data because fewer people grow taro on South Tarawa, where the study was conducted. Only

²² Unfortunately I have not yet been able to find the english names for those two edible plants.

approximately 11% of the households on South Tarawa grow swamp taro in contrast to North Tarawa where 88% of the households grow taro (Kiribati Statistics Office 1990). Pumpkins are eaten by the children however no children in this study consumed chinese cabbage and cucumbers during the 24 hour recall. Vegetables brought in from overseas consumed by the children are mainly onions, potatoes and tinned vegetables. Unfortunately the heating process used to preserve vegetables in tins destroys half the nutritional value.

Few fruits are grown on Tarawa, mainly pandanus, paw-paw and bananas. Pandanus keys are eaten raw by the older children usually as a snack between meals. The smaller children receive pandanus juice made from boiled and strained pandanus keys. Only two children consumed bananas during the 24 hour recall. Although bananas are available on Tarawa they do not grow in abundance and are therefore rather expensive, they cost 15 cents each at the market. Many women were aware of the importance of introducing more fruit and vegetables into the diet, 28.8% of the women said that locally grown fruit and vegetables were the most healthy food for the children and another 17.1% said that all kinds of fruit and vegetables were the best food for the children. These foods were considered best for an infant because: the nurses had told them so, the foods are rich in vitamins, the foods prevent the children from getting a blind eye, and they prevent the children from getting sick.

Table 3.6 Breakfast of the children in numbers and percentages.

Breakfast	0-5	6-11	12-23	24-36	no. & %
Breast milk only	23	11	1	0	35 (18.1%)
Rice	1	0	2	2	5 (2.6%)
Rice & shell fish	0	0	1	0	1 (0.5%)
Rice & fish	0	0	1	3	4 (2.1%)
Rice & breadfruit	0	0	1	0	1 (0.5%)
Rice, fish & greens	0	0	1	0	1 (0.5%)
Rice & pumpkin leaves	0	1	0	0	1 (0.5%)
Rice & coconut	0	0	0	1	1 (0.5%)
Egg	1	0	1	0	2 (1.0%)
Egg & paw-paw	0	0	1	0	1 (0.5%)
Bread	0	7	27	12	46 (23.8%)
Bread & fish	0	0	1	2	3 (1.6%)
Bread & coconut	0	0	0	2	2 (1.0%)
Bread & paw-paw	0	0	1	0	1 (0.5%)
Pancakes	0	1	0	3	4 (2.1%)
Donuts	0	2	6	6	14 (7.3%)
Biscuit	0	1	3	1	5 (2.6%)
Custard powder	1	0	1	0	2 (1.0%)
Flour pudding	0	0	0	1	1 (0.5%)
Heinz egg custard	1	2	0	0	3 (1.6%)
Farex rice cereal	1	0	0	0	1 (0.5%)
Weetabix	0	5	7	0	12 (6.2%)
Oatmeal porridge	0	0	0	1	1 (0.5%)
Paw-paw	1	5	4	1	11 (5.7%)
Flesh of the coconut	1	4	0	1	6 (3.1%)
Breadfruit	0	4	3	3	10 (5.2%)
Breadfruit & fish	0	1	1	3	5 (2.6%)
Breadfruit & octopus	0	0	0	1	1 (0.5%)
Breadfruit & coconut	0	0	0	2	2 (1.0%)
Pandanus	0	1	1	0	2 (1.0%)
Soup with rice & meat	0	0	1	0	1 (0.5%)
Fish & flour	0	0	1	2	3 (1.6%)
Noodles	0	1	0	0	1 (0.5%)
Child sick	0	1	1	0	2 (1.0%)
Do not know/remember	0	1	1	0	2 (1.0%)
Total	30	48	67	48	193 100

Table 3.7 Lunch of the children in numbers and percentages.

Lunch	0-5	6-11	12-23	24-36	No. & %
Breast milk only	19	13	1	0	33 (17.1%)
S-26	8	0	2	0	10 (5.2%)
Rice	0	2	1	4	7 (3.6)
Rice & Shell fish	0	2	4	5	11 (5.7%)
Rice & fish	0	6	15	12	33 (17.1%)
Rice & octopus	0	0	1	0	1 (0.5%)
Rice & saltfish	0	0	0	1	1 (0.5%)
Rice & crabmeat	0	0	1	0	1 (0.5%)
Rice, fish & breadfruit	0	0	1	0	1 (0.5%)
Rice, fish & greens	0	0	1	1	2 (1.0%)
Rice, fish & paw-paw	0	1	1	1	3 (1.6%)
Rice & coconut flesh	0	1	0	0	1 (0.5%)
Rice, flour & coconut	0	0	1	2	3 (1.6%)
Rice & tinned fish	1	2	2	0	5 (2.6%)
Rice & corned beef	0	1	2	0	3 (1.6%)
Rice & pumpkin	0	0	1	1	2 (1.0%)
Rice & fish soup	0	0	1	2	3 (1.6%)
Rice & octopus soup	0	0	1	0	1 (0.5%)
Rice & breadfruit	0	0	1	0	1 (0.5%)
Rice & paw-paw	0	0	1	0	1 (0.5%)
Rice & chicken	0	0	1	1	2 (1.0%)
Bread	0	0	2	2	4 (2.1%)
Biscuit	0	1	0	0	1 (0.5%)
Custard powder	0	1	0	0	1 (0.5%)
Farex rice cereal	1	0	0	0	1 (0.5%)
Pandanus	0	1	1	0	2 (1.0%)
Pandanus juice	1	1	0	0	2 (1.0%)
Paw-paw	0	3	4	0	8 (4.1%)
Banana	0	0	1	0	1 (0.5%)
Bananas & apples	0	0	1	0	1 (0.5%)
Breadfruit	0	3	2	1	6 (3.1%)
Breadfruit & fish	0	5	6	3	14 (7.3%)
Breadfruit & shell fish	0	0	2	5	7 (3.6%)
Breadfruit & shark soup	0	0	0	1	1 (0.5%)
Breadfruit & cornedbeef	0	0	1	0	1 (0.5%)
Breadfruit & salt fish	0	0	0	1	1 (0.5%)
Coconut	0	0	1	0	1 (0.5%)
Coconut & shell fish	0	0	0	1	1 (0.5%)
Pumpkin	0	1	0	0	1 (0.5%)
Potato & onion	0	0	1	0	1 (0.5%)
Shell fish	0	0	0	2	2 (1.0%)
Octopus	0	0	0	1	1 (1.0%)
Fish & paw-paw	0	2	1	0	3 (1.6%)
Corned beef	0	0	1	0	1 (0.5%)
Swamp taro	0	0	0	1	1 (0.5%)
Child sick	0	1	1	0	2 (1.0%)
Do not know/remember	0	2	1	0	3 (1.6%)
Total	30	48	67	48	193 100%

Table 3.8 Dinner of the children in numbers and percentages

Dinner	0-5	6-11	12-23	24-36	No. & %
Breast milk only	20	10	1	0	31 (16.0%)
Rice	1	1	0	1	3 (1.6%)
Rice & shell fish	0	0	3	3	6 (3.1%)
Rice, shellfish & bread	0	0	0	1	1 (0.5%)
Rice & fish	0	8	24	15	47 (24.4%)
Rice, fish & coconut	0	0	0	1	1 (0.5%)
Rice, fish & greens	0	0	2	1	3 (1.6%)
Rice, fish & paw-paw	0	1	2	0	3 (1.6%)
Rice & tinned fish	0	1	3	2	6 (3.1%)
Rice, greens & tin fish	1	1	0	1	3 (1.6%)
Rice & saltfish	0	0	0	2	2 (1.0%)
Rice & octopus	0	0	0	1	1 (0.5%)
Rice & corned beef	0	1	2	1	4 (2.1%)
Rice & mixed vegetable	0	1	0	0	1 (0.5%)
Rice & paw-paw	0	1	0	0	1 (0.5%)
Rice & chicken	0	0	1	0	1 (0.5%)
Rice & lamb	0	0	1	0	1 (0.5%)
Rice & fish soup	0	0	1	0	1 (0.5%)
Rice & octopus soup	0	0	1	0	1 (0.5%)
Rice & corned beef soup	0	0	1	0	1 (0.5%)
Rice & breadfruit	0	0	1	0	1 (0.5%)
Farex rice cereal	1	0	0	0	1 (0.5%)
Custard powder	3	2	0	0	5 (2.6%)
Heinz egg custard	0	3	1	0	4 (2.1%)
Weetabix	0	1	0	0	1 (0.5%)
Donuts	0	0	1	1	2 (1.0%)
Donuts & shell fish	0	0	0	1	1 (0.5%)
Bread & chicken	0	1	0	0	1 (0.5%)
Biscuit & fish	0	1	0	0	1 (0.5%)
Biscuit & paw-paw	0	1	0	0	1 (0.5%)
Pumpkin	0	1	0	1	2 (1.0%)
Pumpkin & fish	0	0	1	1	2 (1.0%)
Flesh of the coconut	2	1	0	0	3 (1.6%)
Paw-paw	1	1	3	0	5 (2.6%)
Paw-paw & fish	0	1	1	0	2 (1.0%)
Breadfruit	0	3	1	3	7 (3.6%)
Breadfruit & shell fish	0	1	2	0	3 (1.6%)
Breadfruit & fish	0	2	7	7	16 (8.3%)
Breadfruit & cornedbeef	0	0	2	0	2 (1.0%)
Pandanus	0	1	0	0	1 (0.5%)
Fish, flour & coconut	0	0	1	1	2 (1.0%)
Egg & chicken	0	0	1	1	2 (1.0%)
Egg & paw-paw	0	0	1	0	1 (0.5%)
Corned beef	1	0	0	0	1 (0.5%)
Corned beef & noodles	0	0	0	2	2 (1.0%)
Noodles & shell fish	0	0	0	1	1 (0.5%)
Can of mixed vegetable	0	1	0	0	1 (0.5%)
Child sick	0	1	1	0	2 (0.5%)
Do not know/remember	0	1	1	0	2 (0.5%)
Total	30	48	67	48	193 100%

3.6 Factors affecting the dietary pattern on Tarawa

Not all the women had an opinion regarding specific foods, 29.0% said that all edible foods were good for an infant, while another 4.1% said they had no idea of what were good or bad for an infant. A high percentage of the women had some idea of what constituted a healthy diet for an infant and others knew that protein, fruit and vegetables were essential to the children.

The dietary pattern of the children was more influenced by food availability in the community, the individual household's socio-economic conditions and ease of preparation rather than the nutritional content of the foods. Taste preference, maternal employment and commercial advertising were other factors affecting the dietary pattern of the young children.

The islanders have to import most of their food because Tarawa is, as mentioned in Chapter Two an isolated coral atoll with infertile soil where only a few crops can grow. There is no overall insufficiency of food in the urban area on Tarawa but there is a shortage of nutritious traditional food²³ primarily taro, bananas, breadfruit and paw-paw. Locally grown products are harder to get because Tarawa is densely populated, and especially on Betio islet there is no land available for extensive cultivation. The Foundation for the People of the South Pacific and other organisations have encouraged islanders with some land to cultivate more vegetables. Programs to encourage cultivation have not succeeded because these vegetable gardens are constantly

²³ The term traditional food means in this thesis diets derived from locally produced foods. I use the term aboriginal diet/food, when I refer to food habits before European arrival.

threatened by drought and the islanders have to put a lot of effort and work in to be able to grow them. The people on Tarawa were traditionally fishermen and not agriculturalists.

Socio-economic conditions are another important factor.

Low income families have to live off their land if they have any. Almost all locally grown foods are more expensive to buy than imported foods such as rice, flour and sugar which are lower in essential vitamins, minerals and proteins. Breadfruit costs about 50 cents per lb at the market in Bairiki²⁴, this price is too high for a staple food. The high price of traditional products is an indicator of scarcity (Thaman 1982).

Harvesting of shellfish in the lagoon is another means of getting a cheap meal for a poor family. Shellfish consumption has always been regarded as a low status food, considered food for people who were too poor to own a canoe or a fishing net, or too unskilled to catch any fish (Lewis 1981). Shell fish are very tough and rubbery, they are too difficult for a young child to eat and should therefore only be eaten by older children and adults. In Lewis (1981), a study conducted both on Marakei atoll and Betio, Tarawa, no consumption of shell fish was reported during a 24 hour recall. On Tarawa today more people seem to be consuming shell fish on a regular basis; in this study 16.5% of the children older than 12 months received shellfish for lunch and another 9.5% eat shellfish for dinner. This change could be due to recall bias, or maybe shellfish are no longer considered a low status food among the people on Tarawa, or people are

²⁴ All prices on food products in this thesis are from July 1992.

becoming poorer on Tarawa.

The force of "gustatory subversion"²⁵ has been a strong influence in sharpening new tastes and attitudes towards food. Due to long exposure to imported and non-indigenous food many Pacific Islanders have acquired a preference for imported foods and at the same time have developed an aversion to many traditional foods (Thaman 1982, Schoeffel 1992). Grimble (1930:30) wrote:

"Tinned milk is bought for children as a rule on medical grounds only; it is regarded with complete aversion by most adults, who can not understand the white man's linking for milk puddings, and consider that all food of this class is 'te bai ni kumumuta' (a thing to make vomit)".

Grimble's statement about milk in the 1930s is a good example of change in food preference over time. Today milk drinking is very popular, both adults and children consume a great proportion of sweetened condensed and evaporated milk²⁶.

Certain food habits, including attitudes and beliefs affect the consumption pattern. Imported foods have acquired a high prestige among the I-Kiribati because they are associated with images of Western life style and power. Wartime experiences in particular have contributed to the myth that the Western world

²⁵ Lewis (1981 & 1988) formulated and uses frequently the concept of "gustatory subversion". Kahn & Sexton (1988:11) define this concept more specifically as the historical process through which explorers, traders and, more recently multinational corporations have influenced Pacific islanders' demands for Western foods, beverages, and other products and their need to produce cash crops to pay for newly acquired needs.

²⁶ Imports of milk powder or tinned milk have increased in Kiribati. In 1988 they imported 54,085 kg of milk powder and 65,509 kg of condensed and sweetened milk and cream (Kiribati Statistics Office 1989).

(especially America) is rich in weapons and overflowing with delightful food (Lewis 1988, Kahn & Sexton 1988). Lewis (1988:87) makes this remark about the Marakei peoples' memories of the war:

"Two features stand out in these accounts: the awesome power used to dislodge the Japanese from Tarawa, Butaritari, and Abemama, and the mountains of food, tobacco, and beer that the conquering Americans generously shared with the Gilbertese. These gifts assuaged deep cravings for tobacco, tea, and imported foods, all of which had been unavailable since the Japanese conquest in late 1941."

The buying pattern of the individual person is also influenced by the convenience of the imported commodities. The imported products such as rice dishes, tinned fish and tinned meat require less time to prepare and permit more time for involvement in other activities (Rody 1978, Lewis 1988)

Women in developing countries have to accommodate their feeding and child-rearing practices to changes in food habits and other social, cultural and economic changes. Rural women who migrate to urban areas leaving close relatives behind and working mothers, are particularly vulnerable to changes (Raphael 1984). These women have to adjust to a new lifestyle and many are forced to redefine their roles as mothers and wives, to be able to survive in the new environment. For a working mother it is often easier and more practical to introduce beikost at an earlier age.

A major change in the world social situation has been the role of the wage earning woman in society. The increasing involvement of women in wage work has influenced family lifestyle. Research on the effect of maternal employment on the infant-feeding pattern varies and the results are not always consistent. Some studies suggest that the initiation of

breastfeeding is not affected by employment, however studies document the fact that employment is a factor in the introduction of bottle feeding and earlier supplementation (Subbulakshmi & Udipi 1990). Tognetti (1990) concluded in her research in Thailand that employment was not the critical factor in determining the infant feeding pattern. Rather it was the context in which employment takes place. Conditions of work, including attitudes of employers and fellow-workers affect the infant feeding pattern (Maher 1992b).

In Kiribati only 9% of the women over 15 years of age are engaged in paid work (Kiribati Statistic Office 1990). 15% of the mothers in this study were working, however not all them were engaged in paid employment, a few were working as missionaries for their local church group and others were working for a family business. Maternal work roles did not affect the initiation of breastfeeding on Tarawa, but was strongly associated with the introduction of supplementary bottle feeding. The widespread availability of feeding bottles and infant formulas makes it possible and convenient for the mother to extend the period between feeds.

Maternal employment played a small part in the length and duration of breastfeeding. Women who were engaged either in paid employment or non paid work tended to breastfeed for a shorter time. 6% (4) of the women who had initiated breastfeeding, but were not doing it at the time of the study gave employment as a reason for termination of breastfeeding. The mean age of terminating breastfeeding for this sub sample was 5.3 months with a range of 3-8 months.

Women who were working breast fed their infants in the morning before leaving for work, the caretaker normally bottle-fed the child during the day and the mother breast-fed the infant again immediately after returning from her work. A nursing mother working for the government is entitled to take half a hour off twice a day during working hours to feed her child (Pulea 1986). The question is: how many women actually use the provision? Many women find that they do not have sufficient time to breast-feed their children because it often takes them more than 10-15 min. to come home.

Commercial advertising has played a role in the shift from breastfeeding to bottle feeding in developing countries. Research suggests that women who are exposed to commercial advertising are more likely to use manufactured weaning foods (Jelliffe & Jelliffe 1979). Other studies report that female reliance on friends and relatives has a greater influence on their decision making about feeding practices than the media (Raphael 198, Marshall & Marshall 1979). The media provides information, but as Raphael (1984) states the media cannot force anyone to act against their will. According to Marshall & Marshall (1979) there has been an increase in the use of commercial formulas in Truk. This increase seems to be influenced by factors other than advertising because large scale advertising campaigns have never been mounted in Truk.

Most women on Tarawa rely mainly on other women, particularly their mothers and local nurses for advice concerning infant feeding. Although commercial advertising has neither been mounted in Kiribati, mothers have been exposed to breast milk

substitutes and feeding bottles. The majority of the women were familiar with feeding bottles and S-26, the most common infant formula brand sold in the shops on Tarawa. Although there is no clear link between commercial advertising and increase in the use of breast milk substitutes and feeding bottles, the wide-spread availability and use of breast milk substitutes and feeding bottles may influence the infant feeding pattern.

In the following chapter, the health implications of weaning and feeding patterns will be explored. The complex interrelation between the disease process and the nutritional health status of the children will also be discussed.

CHAPTER FOUR

CHILD HEALTH ON TARAWA

This chapter concerns the health status and well being of the children on Tarawa. The infants' and children's susceptibility to diseases is due to poor nutrition and to unclean food and contaminated water given in infancy and weaning. As will be noted in this chapter the nutritional health status of the children is not only affected by complementary feeding and weaning practices but also by the disease process and the islanders' beliefs and attitudes. In particular the I-kiribati peoples' resistance to full acceptance of western educated medical practitioners and western medicine can contribute to more serious infections and prevent them from receiving effective treatment.

Nutritional status is a problematic concept. Studies of the well being of young children have usually focused on the way infant feeding practices affect the children's nutritional status and have not acknowledged the impact of the disease process. Diseases such as parasitic diseases, infectious diseases, diarrhoea and other diseases undermine the nutritional status of the children and can cause malnutrition by reducing intake of food due to a loss in appetite, by reducing nutrient absorption because of mucosal damage and by wasting nutrients through fever and other metabolic processes (Leslie 1987). Children who have poor nutritional status due to a nutritionally inadequate and contaminated weaning diet have lower resistance to infections and parasitic diseases and have therefore less chance of recovering

from their nutritional losses.

23% of the children attending the medical examination in this study were afflicted with at least one ailment, and a range of 9%-45% of children in each village evidenced some ailments. The majority of the children's ailments were minor, such as a feverish cold, a bad cough, multiple sores or conjunctivitis. Surprisingly, on average more children on North Tarawa were suffering some ailments than on South Tarawa and Betio. The average number of children infected with some ailments in this subsample was 29% with a range of 23%-45% in each village. 25% of the children on South Tarawa were suffering from some ailment with a range of 10%-40% of children infected in each village. The children on Betio did not suffer from more disorders than the children in the other villages. The average number of children afflicted with some ailment from this subsample was 18%. Although the children on Betio suffered from fewer ailments than the other children, anaemia and respiratory diseases such as bronchitis, pneumonia and tuberculosis were more prevalent on Betio.

The most common diseases affecting the nutritional health status and the morbidity state of the children on Tarawa revealed by the medical examination and further lab tests were, as shown in table 4.1: respiratory diseases, diarrhoeal diseases, parasitic infestations, eye diseases and skin diseases.

Table 4.1 The most common causes of morbidity for the children under five on Tarawa.

Diseases	nb & %
Nutritional deficiency diseases:	47 (1.4%)
Malnutrition	2 (0.06%)
Anaemia	23 (0.7%)
Vitamin B2 deficiency	22 (0.6%)
Diarrhoea	64 (1.8%)
Parasitic infestations	40 (1.2%)
Respiratory diseases:	352 (10.1%)
Cough	10 (0.3%)
Common cold	56 (1.6%)
Otitis media	69 (2.0%)
Sinusitis	2 (0.06%)
Ear discharge	58 (1.7%)
Bronchitis	45 (1.3%)
Pneumonia	15 (0.4%)
Tuberculosis	30 (0.9%)
Influenza	7 (0.2%)
Other	51 (1.5%)
Skin diseases:	135 (3.9%)
Multiple/infected Sores	88 (2.5%)
Scabies	30 (0.9%)
Impetigo	2 (0.06%)
Allergic dermatitis	4 (0.1%)
Dermatitis	2 (0.06%)
Ringworm	2 (0.06%)
Abscess	5 (0.2%)
Other	2 (0.06%)
Eye diseases:	96 (2.8%)
Conjunctivitis	93 (2.7%)
Sty	2 (0.06%)
Sore eye	1 (0.03%)
Infectious diseases other than ARI:	3 (0.09%)
Chicken pox	2 (0.06%)
Hepatitis	1 (0.03%)
Prenatal malformations	10 (0.29%)
Diseases of the circulatory system:	35 (1.0%)
Lymphadenopathy	30 (0.9%)
Lymphadenitis	2 (0.06%)
Other	3 (0.09%)
Other diseases	25 (0.7%)

4.1 Nutrition and diet related diseases

Nutritional studies conducted in the Pacific state that dietary adequacy and nutritional status have declined with increasing dependency on imported products in both adults and in weaned children (McGee 1975, Thaman 1982, Schoeffel 1992). Malnutrition has been found to be associated with a significant impairment of the immune system; defects in granulocytic function and deficiency of vitamins and minerals predispose the children to malnutrition which in turn are aggravated by infection (Neuman et al. 1989).

Anthropometric surveys (Willmott 1968 & 70, Crawford and Willmott 1971, Jansen 1971 & 77, Roberts et al. 1981) conducted on Tarawa in the 60s, 70s and 80s to determine the nutritional status of young children document an increase in malnutrition and micronutrient deficiency on Kiribati since contact. It is most likely that malnutrition also was prevalent among children before contact, especially in infancy when breast milk decreased and low protein, low calorie and high bulky weaning foods were inadequate for the child's requirement (Lundsgaarde 1966, Parkinson 1982, Coyne 1984). These studies (Willmott 1968 & 70, Crawford and Willmott 1971, Jansen 1971 & 77) also found that the infants in Kiribati have good birth weights but after about six months of life infants and children show much poorer rates of growth.

Crawford and Willmott (1971), using anthropometric measurements, analysed the height and weight of about 300 children under the age of five years on Maiana and Betio and found that many children were in low weight for age categories, however few cases of protein-energy malnutrition were obvious in

clinical examinations. Another study conducted on Tabiteuea and Betio (Jansen 1971 & 77) found that 19.7% of the children on Tabiteuea were below the malnutrition border line compared to 10.7% of the children on Betio. It must be noted that Jansen's study was conducted shortly after a severe drought on Tabituea. Jansen (1971 & 77) classified by inspection 9.4% of the children on Betio as poorly nourished and 1.3% as malnourished, cases of both marasmus and kwashiorkor were observed. Roberts et al. (1981) found a few years later that 14% of the children examined on urban Tarawa had a weight for age that was less than 80% of Harvard Standard.

These previous studies have been criticised for mainly emphasising the occurrence of clinical signs of malnutrition for not reporting the nutrition intake adequately and for not describing the sampling procedures adequately (Pargeter et al. 1984). The prevalence of malnutrition reported in these studies should be interpreted with caution because these studies used the Harvard Standard which is not used anymore; as the growth of the children in many other societies is slower than in Western populations and the children do not approximate the Harvard Standard reference values. Today the NCHS (National Center for Health Statistic) standard are used in the screening of children in the Pacific.

Our observations based on a clinical inspection revealed that many children suffered more from subnutrition due the combination of a marginal, uniform diet and disease, which further reduces the children's food intake. Frank and Jurgensen (1985) who studied 50 children during their first year of life

on Abemama Atoll report similar findings. However malnutrition is present in Kiribati, in 1990 there were 338 cases of malnourished children recorded (Kiribati Statistics Office 1990). In this study²⁷ were only two children on South Tarawa, both under the age of three, classified as severely malnourished by the medical examination. They showed typical symptoms of malnutrition such as oedema, apathy and dermatosis. Another five malnourished children were admitted to the hospital during the study period²⁸. Those who were examined during the study and those admitted to the hospital, tended towards marasmus rather than kwashiorkor.

Causes of malnutrition on Tarawa are not due to food scarcity on Tarawa, they are more linked to an interaction of many cultural and economic factors. The next two case stories illustrate how cultural, social and economic factors can affect the nutritional status of young children on Tarawa. The first case story of an 18 month old girl who was admitted to the hospital due to kwashiorkor is a good example of how of poverty can lead to malnutrition:

"The little girl was breastfed until she was 9 months old, the mother terminated breast feeding because the girl had diarrhoea, believing the breast milk caused the diarrhoea. When she stopped receiving breast milk, she received mostly Sunshine powdered milk, toddy mixed with water and water mixed with sugar in a feeding bottle, up to 40 Oz a day. According to the mother the girl had refused to eat rice and pumpkin,

²⁷Anthropometrical measurements were not obtained in this study because this was not the purpose of the study. However discussions with medical doctors revealed that the prevalence of malnutrition has not changed significantly since the last research.

²⁸ I was able to interview three of the mothers.

she only wanted the feeding bottle. The child was rarely fed protein as the family was poor and the only cash income came from fishing. Like many fishermen today the father was now catching fish to sell in the market, where before he would have worked only to provide for his family.

The second case story of a 10 month old boy who was admitted to the hospital due to marasmus shows how socio-cultural factors can lead to malnutrition:

"The little boy came from Abaiang. When he was three months old a relative requested him for adoption as the mother was a widow and very young. He was only breastfed until he was adopted and after the adoption his adoptive parents had according to the biological mother, fed him only toddy mixed with water and a little mashed breadfruit. The biological mother got the child back when he was severely malnourished and she admitted him to the hospital".

According to the medical profession malnutrition on Tarawa seems also to be strongly related to a high prevalence of parasitic diseases. Most of the malnourished children admitted to the hospital suffered also from parasitic diseases, particularly *Giardia lamblia* and Amoebiasis. This case story illustrate how a parasitic infection and socio-cultural constrain can promote malnutrition:

"A 29 month old boy from Betio was admitted to the hospital due to marasmus. After performing a stool test he was also diagnosed with *Giardia lamblia*. The mother said that the child had problems with recurrent diarrhoea since he was very young. He was like many children, fed water mixed with sugar in a feeding bottle besides breastfeeding. When he was 12 months old the mother terminated breastfeeding. The diarrhoea worsened and the mother decided to see a local healer. The child was treated unsuccessfully by the healer and by the time the child was severely malnourished, he was admitted to the hospital".

Micronutrient deficiencies affects the nutritional health status of the children. Deficiencies in vitamins and minerals

affect antibody production and decrease the infant's ability to resist infection. (Popkin et al. 1986). Specific micronutrient deficiencies known to be prevalent on Tarawa are: Vitamin A deficiency, vitamin B2 (riboflavin) deficiency, and iron deficiency (anaemia).

Vitamin A deficiency, leading to xerophthalmia is a serious health problem in Kiribati, being a frequent cause of preventable night blindness in children. Vitamin A deficiency is not a proximal determinant of death but is associated with higher rates of morbidity as vitamin A deficiency alters the incidence and severity of infections and impairs the child's resistance to infections by altering immune capacity or tissue integrity (Popkin et al. 1986, West et al. 1989). Experiments show that vitamin A treatment can considerably reduce the number of death from severe infections (Sommer et al. 1986).

Susan Parkinson (1983) states that Vitamin A deficiency in Kiribati is a new phenomenon, appearing in the form of poor vision in children and lowering the children's ability to withstand infections. She further argues that this deficiency is a direct result of changes in the food consumption pattern.

Assessment of the incidence of vitamin A deficiency in Kiribati was carried out on six atolls in 1989. The survey (Danks et al. 1992 & FSP 1989) found that the prevalence of xerophthalmia exceeded the WHO criteria, 14.7% of the surveyed children had one or more active signs or symptoms of xerophthalmia. The study also found that the prevalence of xerophthalmia was higher in males and that the risk of deficiency

increased with advancing age. No children in this study showed any clinical signs or symptoms of xerophthalmia. This could be due to two main reasons. First, since the Vitamin A survey was performed in 1989 a vitamin A treatment programme has been carried out in children to 12 years of age on a regular basis. 71% of the children in this study had received vitamin A supplements. The second reason is that children are fed a diet containing more vitamin A, because of a strong promotion of local products by local community nurses and other health professionals.

The women did not understand what vitamin A was nor what implications vitamin A deficiency had, but they were fully aware that if you did not feed your child any local vegetables, fruit and green leaves then your child will "get a blind eye". A common saying among women on Tarawa today is:

"Ngkana arona bwa kanam bon ti te raiti ao te buraua
ao ko na matiki iai" (if you eat only rice and flour
you will go blind).

B-group vitamins have been found to be deficient in the diet on Kiribati, mainly vitamin B2 (Riboflavin) deficiency. Vitamin B2 deficiency is not a proximal cause of disease, but can contribute to various disabilities because vitamin B2 has an essential role in the oxidative mechanism of the cells of all body tissues. A deficiency produces: angular stomatitis, sore swollen lips, painful tongue and redness at the edges of the cornea of the eye. Wilmott (1968 & 70) found that the incidence of angular stomatitis among children on Betio was 60% compared to 20% on Maiana, however he found no evidence of very severe

riboflavin deficiency such as cheilosis. He (1970) further argues that the higher incidence of angular stomatitis on Betio is due to a greater reliance on refined food products. B-group vitamins are lost during the milling and polishing of rice and the manufacture of flour from rice (Willmot 1970). Jansen (1971 & 77) found that 17.4% of the children he examined on Betio showed angular stomatitis, again severe riboflavin deficiency was far less common. Surprisingly only 0.6% of children in the study showed clinical signs of riboflavin deficiency such as angular stomatitis and sore tongues. This result could be due to biases in the clinical examination or may be due to a more frequent distribution of vitamin supplements in Kiribati: about 47% of the children had received multivitamin supplements. A third reason could be the greater consumption of fish, shellfish, eggs, vegemite and powdered milk among children today as they are all rich sources of riboflavin. Breadfruit was also in season at the time of the study and breadfruit also contains a small amount of riboflavin.

Iron deficiency anaemia is widespread in Kiribati, in 1990 there were 421 cases²⁹ of anaemia recorded in Kiribati (Kiribati Statistics Office 1990). Iron deficiency anaemia in Kiribati is more common among pregnant women, infants and children, as these groups have higher iron requirements. Iron requirements increase during pregnancy for the growing foetus, placenta and expanded

²⁹ The statistics data concerning health statistics are not very specific. The data only reports how many cases were recorded in Kiribati in 1990, they are no further information about the age group, sex or Island.

blood volume. Infants and children needs iron for their growing body tissues and red cell mass. Iron deficiency anaemia in infancy can impair learning and the ability to resist disease. Anaemia in pregnant women contributes to high maternal mortality rates, to increased risk of low birth weight and higher infant mortality.

Jansen (1977) found that 65% of the children he examined on Betio had haemoglobin levels under 11g% and 84.2% of the children on Tabituea-North had haemoglobin levels under 11g%. Roberts et al.'s (1981) study found that the prevalence of anaemia among the children in his study was less than in the previous study, 18.6% of the children had haemoglobin levels less than 10g%. Roberts et al. (1981) state that most of the anaemia on Tarawa is due to nutritional causes, however a marked increase of anaemia due to hookworm was noted. In this study haemoglobin measurements were only made from those children showing clinical signs of anaemia, therefore only 0.7% of the children in this study were classified as anaemic.

This study showed a decrease in the incidence of vitamin A deficiency, vitamin B2 deficiency and iron deficiency anaemia since the last studies from the 70s and 80s. However this result should be interpreted with caution, because the health status of the children in this study was mainly based on a clinical examination, and only those children who showed clinical signs of any disorders were sent to further lab tests. If it had been possible financially and time wise to send all the children to either blood tests or stool tests, the incidence of vitamin

deficiencies, particularly iron deficiency anaemia and intestinal parasites, would have been much higher.

Non communicable diseases in Kiribati and other Pacific countries have been closely related to dietary changes in diet and other aspects of lifestyle. Non communicable diseases such as diabetes mellitus hypertension, obesity and coronary heart disease are more prevalent among mature adults on Tarawa than young children, however precursor states may date from childhood. Adult obesity and hypertension is increasing in Kiribati. Hypertension was absent in Kiribati in 1960 (Maddocks 1961) but has increased to 453 recorded cases in 1988 (Kiribati Statistic Office 1988). This increase is attributed by Lewis (1981) to a significant amount of sodium in the diet and a high stress rate.

Dental caries, a diet related non communicable disease was very common among the children on Tarawa. Although dental examination of the children was not performed in this study, it was obvious that many children had dark brown mottling on their teeth. The development of dental caries among young children on Tarawa may be accelerated by infant feeding practices such as the heavy consumption of toddy and water mixed with sugar. Dental caries may always have been an existing problem in Kiribati due to the high consumption of toddy, although this has not been the case in other Pacific countries. Wilkes (1845:48) was surprised to observe tooth decay on Tabiteuea because he had not seen it on any other islands in the Pacific. Lewis (1981 & 1988) found that tooth loosening began in young adulthood, and that an average man in the age group 40-49 had lost about 6.51 teeth and

a female in the same age group had lost 7.86 teeth.

4.2 Diarrhoeal diseases and parasitic infestations

The group of diarrhoeal diseases is one of the most important public health problems on Tarawa today. Infantile diarrhoea is often the result of parasitic infections, and remains one of the major causes of morbidity among children in Kiribati and other Micronesian countries (Kelly 1993, Prasad 1992). The term diarrhoea is used to describe a variety of acute illnesses, characterised by three or more loose stools in a day, sometimes combined with vomiting, fever and weakness. Diarrhoea affects the amount of water which is absorbed into the child's body. During episodes of diarrhoea water and electrolytes (body salts) are lost from the body of the child, leading to dehydration, which without treatment, can result in death (Black 1984). A synergism between diarrhoeal diseases and nutritional status has been accepted for many years. Diarrhoea decreases the absorption of nutrients into the body and thereby affects the growth and nutritional status of the children.

12193 cases of diarrhoeal diseases were reported in Kiribati in 1990, approximately 12% of the reported diarrhoeal disease was due to food poisoning, another 10% was due to fish poisoning (Kiribati Statistics Office 1990). Fish poisoning due to dinoflagellates are a serious health problem in Kiribati today. The primary symptoms are gastrointestinal, neurologic and occasionally cardiovascular symptoms. 1.8% of the children in this study suffered from diarrhoea during the medical examination.

Many others had problems with recurrent diarrhoea. The incidence of diarrhoea was probably under reported in this study. Many I-kiribati have loose stools due to a high fibre diet, and a person/child is not considered to have a diarrhoeal disease unless the bowel movements are watery.

The most common aetiologic agents of diarrhoea includes: Bacteria such as *Escherichia coli*, *Shigella*, *Salmonella*, enteric viruses such as rotaviruses and intestinal parasites such as *Giardia lamblia* (Black 1984, Motarjemi et al. 1993). Transmission of *Escherichia coli* is associated with contaminated water and food. Studies of the transmission of *E. coli* reveal that the transmission of *E. coli* to young children is particularly associated with weaning foods. Black et al.'s (1982) study conducted in Bangladesh found that 41% of the samples of food items fed to children contained *E. coli*. The proportion of food samples that contained *E. coli* was also found to be significantly related to the child's annual incidence of diarrhoea, due to enterotoxigenic *E. coli*. Bacterial contamination of supplementary weaning foods and water fed to infants has also been studied in Northern Thailand by Imong et al. (1993). The study found that bacterial counts were above internationally recommended safe levels. They also found that the bacterial count of water was not affected by boiling because of unhygienic utensils or food handling. Foods consumed by children have also been found to contain other enteric bacterial pathogens such as *Shigella* and *V. cholera* (Henry et al. 1990).

In the investigation of the large cholera epidemic on Tarawa

in 1977 it was found that V. cholera was responsible for the cholera epidemic (Kuberski et al. 1979, Roberts et al. 1979). Robert et al.'s (1979) study documents that the hospitalisation rate was high among children under the age of five. The study also found that the incidence of cholera increased in malnourished children.

Rotavirus is another frequent cause of diarrhoea, particularly in children under two years of age, because older children and adults usually have had one or more infections in early childhood and have acquired some natural immunity to the virus (Black 1984). It is spread by fecal-oral transmission, the usual mode of transmission is directly from person to person or by contact with faecally contaminated water (Black 1984). Rotavirus is, according to De Zoysa & Feachem's (1985) estimate, responsible for about 6% of all diarrhoea episodes and 20% of all diarrhoeal deaths among under 5 year olds in developing countries.

It is likely that prior diarrhoeal disease is associated with susceptibility to some parasitic diseases (and vice versa) due to compromised intestinal lining. Intestinal parasitic infections are prevalent world-wide. 2358 cases of parasitic infestations were recorded in Kiribati in 1990 (Kiribati Statistics Office 1990). Multiple worm infections on Tarawa are very common. Approximately 1.2% of the children in this study were infected with one or more types of parasites. Although the collective term intestinal parasites is used, the parasitic species have differences in their biology and are different in

the form and severity of the diseases they cause (WHO 1987). Two main types are: protozoa, which are single celled microscopic animals and worms or helminths which are much larger, usually visible to the naked eye (Bradley and Keymer 1984). The most important intestinal protozoa and intestinal helminths reported in this study were: giardia lamblia (protozoa), amoebiasis (protozoa), trichuris (whipworm) and hookworms (helminth).

Giardia lamblia and amoebiasis are prevalent world wide. They are among the most commonly occurring food borne parasitic infections and a high prevalence of both giardia lamblia and amoebiasis has been found in weaning age children (Shetty et al. 1990, WHO 1987). Giardia lamblia is spread by drinking or eating food contaminated by faeces. The disease causes abdominal pain and diarrhoea, it is among the most common causes of acute or persisting diarrhoea in developing countries. In cases of heavy infections of the small intestine malabsorption occurs. Amoebiasis occurs in active and cystic forms, and is a common cause of diarrhoea and bloody dysentery. Two children in the study suffered from dysentery due to severe amoebiasis infection. Sometimes an amoebiasis infection can spread from the large intestine to involve other organs such as the liver and can cause amoebic liver abscesses. The mortality from liver abscesses is, according to WHO (1987), up to 10%. Amoebic dysentery has a fatality rate of 0.5%-27% (WHO 1987).

The whip worm, trichuris was often found together with giardia lamblia in this study. The degree of morbidity due to trichuriasis is related to the seriousness of the infection;

however, manifestations such as fever, muscle pain and petechial hemorrhages are common. Iron deficiency anaemia and hypoalbuminaemia are also associated with this parasite (WHO 1987).

Hookworm infections (*Ancylostoma* and *Necator*) have increased in Kiribati, particularly on the wetter northern Islands. Fredortchenko (1971) performed 989 stool examinations on Tarawa and found only 3 hookworm cases. Roberts et al. (1981) however found that 10.9% of the children he examined on Tarawa were infected with hookworms and 42.3% of the children on Butaritari were infected with hookworms. Only two children in this study were infected with hookworms, but as mentioned earlier the prevalence of hookworm and other parasitic infestations in this study would probably have been higher if a stool examination had been performed on every child. Hookworms have a major impact on the nutritional status of infected children because they cause iron-deficiency anaemia due to chronic bleeding and depletion of the body's iron stores (WHO 1987).

The vast majority of parasitic diseases are not fatal however they interfere with the absorption of nutrients from food and with the utilisation of many nutrients. There is evidence that nutritional deficiency diseases, such as protein-energy malnutrition, iron deficiency anaemia and vitamin A deficiency, are associated with chronic intestinal parasites (WHO 1987).

4.3 Respiratory diseases (ARI)

Respiratory diseases (ARI) are a leading cause of morbidity

affecting children under the age of five on Tarawa today. 85,353 cases of respiratory tract infections were recorded in 1990, 69% (59,234) of the recorded cases were influenza. 10.1% of the children in this study suffered from respiratory illnesses.

The respiratory system can be divided into two parts the upper respiratory tract and the lower respiratory tract. Upper respiratory tract infections primarily affect the structures above the larynx. The most common upper respiratory tract infections on Tarawa were: coughs, common cold (1.6%), sinusitis (0.06%), otitis media (2.0%) and ear discharge (1.7%).

These diseases are not major causes of mortality on Tarawa, however they are associated with a high morbidity rate. The incidence of upper respiratory tract infections is similar in developing and developed countries, but because of fewer resources to treat the diseases, lack of adequate housing facilities, lack of access to health services and often poor nutritional status, upper respiratory tract infections are a more serious problem in developing countries.

The most common lower respiratory tract infections (ALRI) on Tarawa in this study were: bronchitis (1.3%), pneumonia (0.4%), tuberculosis (0.9%), and influenza (0.2%). These lower respiratory diseases are more serious than the upper respiratory tract infections and are among the leading causes of morbidity among the children on Tarawa. Tuberculosis and influenza have historically been responsible for devastating epidemics in Kiribati and throughout the Pacific (Thaman 1988). Tuberculosis control programmes have been carried out on Tarawa and Beru

atolls since 1964. The aim was to detect T.B. sufferers and to vaccinate all newborns with B.C.G. vaccine, however the high incidence of tuberculosis today on Tarawa reflects that the programme is not working. Influenza is still a leading cause of infectious diseases among both adults and children in Kiribati today with 59,234 cases reported in 1990 (Kiribati Statistics Office 1990).

Major contributing factors to the incidence of respiratory diseases on Tarawa are poor living conditions, overcrowded housing and air pollution in the form of smoke pollution from open fires and "passive smoking". The habit of smoking raw tobacco rolled in pandanus leaves is very common among men and women on Tarawa. Several researchers have found that very young children who were passively exposed to cigarette smoke had an increased risk of an attack of pneumonia and bronchitis (Kendall and Leeder 1984).

The islanders' customary belief about medicine are another contributing factor to the high incidence of respiratory diseases and other infectious illnesses. The I-Kiribati strongly believe that medicine should only be taken for three days, which reduces the patient's chances of quick recovery as most western medicine needs to be taken for a longer period of time.

The duration and severity of respiratory diseases is affected by the children's nutritional status. Research (Tupasi et al. 1988) indicate that children who are malnourished and predisposed to pneumonia and other lower respiratory diseases are

at a higher risk of dying from them, mainly because of impaired immune status in the malnourished child. Tupasi et al. (1988) found that malnutrition was the most important determinants of ALRI mortality among children in the Philippines.

4.4 Other diseases

Skin diseases are regularly found in areas where personal hygiene is poor or fresh water supplies inadequate and contaminated. The most common skin diseases in this study were: multiple/infected sores (2.5%), scabies (0.9%), ringworm (0.06%), impetigo (0.06%), abscesses (0.2%), allergic dermatitis (0.1%) and dermatitis (0.06%). The high incidence of infected sores are due to mosquito bites because the children scratch themselves with dirty nails and fingers.

Bacterial and viral forms of conjunctivitis are endemic on Tarawa and other areas of Kiribati. Conjunctivitis is very contagious, 17,559 cases of conjunctivitis were recorded in 1990. 2.7% (93) of the children in this study were infected with conjunctivitis. The high incidence of conjunctivitis may be related to poor hygiene and polluted water supplies. Trachoma, another eye disease which can result in blindness is often found in Kiribati, 527 cases were recorded in 1990, however no children in this study suffered from trachoma.

Infectious diseases other than respiratory diseases, skin diseases and eye diseases in this study were Hepatitis A (0.03%)

and chickenpox (0.06%). Although only one child in this study was infected with hepatitis A. Other studies (Tibbs 1987, Tibbs 1989, Tibbs et al. 1991) document that there is a high prevalence rate of current and past hepatitis A, hepatitis B and hepatitis C in Kiribati. A majority of the children on Tarawa were immunised against hepatitis B.

Measles, polio, tetanus and diphtheria have caused a high mortality rate among young children in Kiribati and throughout the Pacific. Today a majority of the children on Tarawa receive a full course of vaccination against immunizable diseases. The vaccination schedule in Kiribati is B.C.G, oral polio and hepatitis B vaccine after birth, triple antigen, oral polio and hepatitis B at 6 weeks and 14 weeks, triple antigen and oral polio at 10 weeks and measles vaccine at 9 months. Most women in the study knew how many vaccinations their children had received, but they did not know what a particular vaccination was without asking the nurse who was present at the medical examination or by checking the child's health card, nor did the women know why these injections were needed or how they protected their infants.

4.5 Attitudes towards the professional health sector

Although medical services are provided for all islanders without charge and hospital facilities and western medicine are available on Tarawa, many people still seek assistance and advice from traditional healers and indigenous midwives. Indigenous

medical practices have not decreased with the introduction of western medicine, they are an integral part of the culture. The islanders have a deep confidence in the indigenous medical practices and many people even considered them to be better than western medical practices.

The I-kiribati approach with traditional practices is pragmatic and they use several therapies in combination depending on the ailment, if a particular traditional healer's treatment is judged not to be working, help is sought from another healer or from a western medical trained practitioner. Many health professionals educated in western medicine regard the traditional practitioners as being in competition with them and see their work as dangerous superstition. This is in part due to frequent cases of very sick and malnourished children admitted too late to the hospital to permit effective treatment, after treatment by a indigenous practitioner has failed.

Cultural and traditional factors are other reasons for admitting sick persons too late to the hospital. Lundsgaarde (1966:42) states: "Illness is never a solitary experience to the Gilbertese". This statement is still true today on Tarawa where the islanders have access to a modern hospital. On Tarawa it is considered unkind and inappropriate to leave a sick person unattended, so a sick person will always have a group of loving and caring relatives to tend to his/her needs. Although a close relative is permitted to stay with the sick person at the

hospital, the sick person prefers to remain home in a more familiar and loving environment.

Western medical therapies are not always the first treatment used. One reason for that is that the I-Kiribati people think that the western trained doctors are too impersonal and too busy, mainly because they are not emotionally involved with their patient. This question from a man living on Tarawa illustrates the islanders` attitude towards the medical doctors:

"Hospital doctors are very busy, they examine several people during the day, if they can examine so many people in one day, how can they be thorough enough with each patient?"

Often the medical doctor³⁰ working at the hospital is an I-Matang (white person) or another foreigner of a different cultural background than the patient. The foreign practitioners do not speak Gilbertese and need a translator. The interaction becomes too complicated and too impersonal, the patient feels insecure, uneasy and becomes more resentful towards the medical practitioner. This resentment is, according to Geddes (1984:161), commonly expressed in the attitude of the patient to prescribed drugs, in that patients fail to take the prescribed medication. On Tarawa western medicine could be seen lying around outside the islanders` houses.

The I-kiribati peoples` resentment towards western medicine

³⁰ A doctor`s salary on Kiribati is very low around 7000-8000 A\$ a year. The low salary makes it more difficult to employ trained medical doctors, therefore the hospital relies on UN volunteer doctors, stationed on Tarawa on a two year basis.

can also be attributed to traditional medical practices. The traditional practices are based on reciprocity whereas western medicine are supplied free of charge and are therefore not considered a very valuable product. The western medicines are, in many cases discarded before the treatment is finished because, as mentioned earlier, the I-Kiribati believe that medicine should only be taken for three days. Many islanders also complain that they do not know how to take the medicine because the nurses, who in most cases are native do not provide them with clear instructions.

On Tarawa most people have accepted western ideas about illness and health, however some islanders still conceptualise many illnesses, particularly mental illness, as psychic or spiritual in origin, believing that a spirit (anti) has influenced the physical body and caused the sickness. When a person is mentally sick or sick from another illness believed to be caused by a spirit (anti), he will always seek treatment from the indigenous healer, who shares the same cultural values and world views as himself. The indigenous healer will treat the sick person with massage, sometimes accompanied by magic depending on the illness.

Collaboration between western educated practitioners and indigenous practitioners, and training of indigenous healers and midwives in order to provide a culturally holistic approach to illness should be encouraged on Tarawa. A better understanding,

recognition and acceptance between these groups would assist in improving the general health of the population.

The health status of the infants and young children on Tarawa is relatively good taking into account the high incidence of infections, the high exposure to pathogens from the environment via contaminated water and foods and social cultural constraints. This may be due to the fact that a high percentage of the children on Tarawa are, as mentioned in Chapter Three, breastfed, with prolonged breastfeeding up to two-three years of age is very common. Research (Victora et al. 1989, De Zoysa et al. 1991) document that breastfeeding protects infants against diarrhoeal and infectious diseases. Because breast milk is very hygienic and is of better nutritional quality than other foods. Breastfeeding also exposes infants to fewer pathogens and the human milk carries maternal antibodies which protect the infant from infections. Important immunological substances present in breast milk and colostrum are IgA antibodies which have an important role in the local immunity of the gut. Other known immunological substances are: lysozyme, lactoferrin, and lactoperoxidase. Lysozyme present in breastmilk inhibits the growth of *E. coli* and contributes to preferential growth of lactobacilli.

SUMMARY & CONCLUSION

The health status of the children on Tarawa is closely related to the complex interaction of poor infant feeding practices, social and cultural customs, and the quality of the environment and illness episodes, in a cyclical manner.

Complementary feeding and weaning practices on Tarawa pose a risk to the children's health status mainly because of environmental pollution because of the lack of an adequate sewerage system and contamination of the water supply. The supplementation of breast milk with contaminated water and bulky foods can provoke diarrhoea among children, which can lead to dehydration and increased susceptibility to parasites and infectious diseases.

The effects of the infant-feeding practices vary with age, a young infant with an immature immune system is more vulnerable to inadequate and contaminated feeding practices than an older child with a more mature system. Children at about four to six months of age seem to be particularly susceptible to infections, because the level of immunoglobulins are at the lowest at this time due to a decrease in prenatally transferred antibodies (Popkin 1986). Nutritional deficiencies may also occur at this age as most children receive semi solids and solids at this age. However breast milk may protect infants during this period because human milk contains antibodies and exposes the infant to

fewer pathogens.

Infant- and young child health status on Tarawa is also affected by infections and nutritional status. The nutritional status of the children is altered by morbidity. One or more episodes of severe illness may cause nutritional deficiencies attributable to a decrease in appetite, malabsorption and nutrient loss. Poor nutritional status predisposes children to more severe infections and thereby begins/continues a cycle of deterioration of the nutritional status and infections.

Improving the nutritional status of the children on Tarawa has significant benefits, as a healthy nutritional state provides a better defence against infections, parasitic diseases and a lower risk of malnutrition. In the long term improved health are not only beneficial for the individuals overall quality of life but also for the country's future labour force.

Respiratory diseases and diarrhoeal diseases were frequent causes of morbidity among children under five years of age on Tarawa. The high prevalence of respiratory diseases and diarrhoeal diseases found among young children in this study and supported by the health statistics, indicates a high level of environmental contamination on Tarawa. Reducing the level of environmental contamination by providing a safe water supply and improving sanitation facilities on Tarawa may reduce the risk of diarrhoea. Studies (Esrey et al. 1991) document that an improved water supply and sanitation can substantially reduce the rate of

morbidity due to diarrhoeal diseases, hookworm infection, schistosomiasis and trachoma. Although some legislation relevant to environmental concerns exists in Kiribati, the lack of a comprehensive national environmental policy makes environmental protection hard to achieve.

Changes in health-related behaviour can be achieved by improving the level of education of women. The education of women on Tarawa is very important because they train the children from infancy and the infants' feeding practices depend almost exclusively upon them. The women on Tarawa prepare the food, therefore they should learn food safety principles such as washing hands with soap before preparing or serving food, reheating leftover food, and proper storage of cooked and raw food in order to protect the infants and children from water and food borne hazards and to promote nutritional status and a better quality of life of the infants and children.

Other short term solutions are; to encourage the women to breastfeed exclusively up to 4-6 months and thereby decrease the infants' risk of exposure to water and food borne pathogens, encourage the women to feed their children local food resources (if these are available), and to prevent them misusing feeding bottles by restricting the sale of them as in Papua New Guinea, which in 1977 was the first country to pass legislation restricting the sale of feeding bottles.

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