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THE EFFECT OF INFANT FEEDING HABBIT ON HEALTH AND NUTRITIONAL STATUS OF INFANTS AN LACATING MOTHERS IN NSUKKALGA

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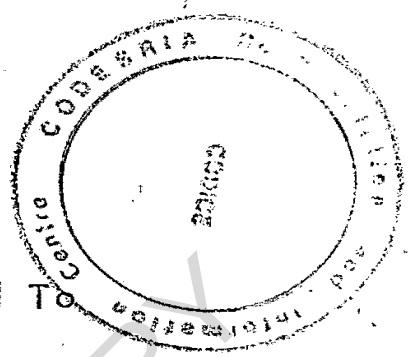

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In Partial Fulfilment of the Requirement for the Award of Masters in Education (M.Ed) in Home Economics

By

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CERTIFICATION

IGWENAZOR, U.I., a Postgraduate student in the Department of Vocational Education and with the Registration Number PG/M.ED/95/21692 has satisfactorily completed the requirement for the degree of Master of Education in Home Economics. The work embodied in this Thesis is original and has not been submitted in part or in full for any other diploma or degree of this or any other University.

30-07-98
Dr. C.I. Igbo
(Supervisor)

6/8/98
Prof. R. N. Oranu
(Head of Department)

DEDICATION

This work is dedicated to my loving and caring parents, Mr. and Mrs. Igwenazor and to the glory of God.

ACKNOWLEDGEMENT

My sincere gratitude goes to God Almighty who provided me with good health throughout this work.

I wish to express my profound gratitude to my understanding, patient and loving Supervisor Dr. C.I. Igbo, for her numerous help, advice and directions throughout the period of this work.

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ABSTRACT

This study was aimed at the pattern of infant feeding and its effect on health and nutritional status of infants and lactating mothers. This study was borne out of persistent infant mortality in Nigeria in recent times. To achieve the broad objective of this study, five specific objectives and two null hypotheses were formulated.

The sample for the study consisted of 240 lactating mothers and 200 infants selected at random. Data was collected with questionnaire, 24 hours dietary recalls and anthropometric measurements. Data was analysed with correlation, chi-square and frequency distribution table.

It was found that infant feeding habbit affected infant's and mother's health and nutritional status. Specifically, factors such as income, educational background and occupation affected the infant feeding practices, nutritional and health status. Dietary recall showed that infants had a low intake of protein foods. Infection such as diarrhoea, measles and boils were also dictated among the infants especially during the weaning period. Also some health problems were dictated among lactating mothers (vomitting, loss of appetite etc).

Based on the findings, the doctors, nurses, dietitians, nutritionists and home economists should

counsel mothers on the need to know what the current practices and problems of breast feeding, provision of adequate health care services in rural communities which can help to reduce rate of infection and disease in young children were among the recommendations.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Since earlier historical times, the detailed pattern of infant feeding had changed from place to place and from one culture to another. This development is due to empirical adoption of ways of life to available local feeds, harmful and superstitious practices sometimes almost designed to make child rearing difficult (Abosede, 1992).

The feeding behaviour on the part of the mother is crucial to the nutritional and emotional well being of the infant. The use of foods to nourish and not to substitute for emotional deprivations, the way in which new foods are introduced and the timing of this procedure contributes to the development of good eating habits.

The success with which a mother feeds her infant is a major determinant of that child's health and mother's health as well. In order to meet the demands of rapid growth rate of infants, the nutritional requirement of proteins, carbohydrates, fats, vitamins, minerals and fluids must be met either by breastfeeding or artificial feeding. Traditionally, breastfeeding has been the oldest

and accepted child bearing practice known to mankind (Neville, 1991). For some 200 million years the nutritional needs of the infant had been successfully met by breastfeeding (Mahalauabis, 1991).

Many factors account for the uniqueness of breast-milk. Breastfeeding provides a balanced hygienic nutrition needed for the healthy growth of the infant (Fagbule, 1987). Breastfeeding is much cheaper than feeding breast-milk substitutes. It has anti-infective properties that promotes the infant from infection in the early months.

Apart from all these benefits of breastfeeding, recent trend indicate that the practice of breast-feeding is declining in developing countries in favour of bottlefeeding (Koyi, 1998). Unfortunately, this downward trend in breastfeeding and use of cows milk has been attributed to the rapid expansion of milk technology, the advertisement and sales of infant formula, introduction of ubiquitous feeding bottle, a symbol of status and affluence amongst the low income mothers. With urbanization, women are encouraged to seek salaried employment usually distant from their homes. As a result of this, in the face of unhygienic environment, poverty and illiteracy, the substitution of breastfeeding with bottlefeeding has resulted in gastroenteritis, vomitting,

diarrhoea, dehydration, failure to thrive and increasing incidence of protein-energy malnutrition.

Food is the basic factor in attaining and maintaining desirable nutritional status and in preventing malnutrition. The nutritional status and health of infants are affected by the food they eat both the amount and kind of food are important (Mabilay and Subingsubin, 1992). Mahalanabis (1991) reported that optional nutritional status depends on adequate food supply which itself depends on a good system of food distribution; inequalities in distribution within the family, availability of nutrients in food. Since the nutritional status of the child is partly dependent on the mother's nutritional status, effort should be made to promote maternal nutrition and therefore child's health.

In view of the above, the investigation into the effect of infant feeding habit on the health and nutritional status of infants and lactating mothers becomes very important.

1.2 Statement of the Problem

The important roles played by the women in the development of any economy can scarcely be overemphasized. Among these roles, feeding infants appears to be the

important. This is because increase in infant morbidity and mortality and behaviour of the infants later in life has been attributed to the kind of food given to the infant during their first few months of age (Alakija and Ukoli, 1980; Fomon and Anderson, 1995). In Nigeria, for example, 180 out of every 1000 babies still die before their first birthday (UNICEF, 1990). Bentley (1990) reported an estimate of 100 million children who are suffering from protein-energy malnutrition. Other researchers, Mata (1988), have attributed this development to poor nutritional status of both the mother and the child. Even though the clinical syndromes in infants present themselves between the ages of $1\frac{1}{2}$ and 3 years, the process of undernourishment begins around the age of 3 months.

The most significant causes of high levels of malnutrition found among infants in Nigeria is the way they are fed. Gross departure from the ideal pattern of infant feeding, that is, several months of exclusive breastfeeding to widespread shift of bottlefeeding and inadequacy of local weaning foods have long been considered to be the major factor in causing malnutrition among the infants (WHO, 1985). In addition, nutrition education has not been extended to the villages. More still mothers are inadequately fed (due to culture and

discrimination) and since this does not stop the flow of milk, the mother's own stores of nutrients are drawn upon. This leads to malnutrition of the mother and the child. This phenomenon poses a great danger to development.

More still, Hulton (1989) reported that babies fed with cow milk tend to behave like cows, that, they unlike breastfed babies have little or no bound with their mothers. In other words, increase in bottle fed babies are likely to increase the recent crime waves in the society.

In view of the declining trend in breastfeeding among the lactating mothers, many factors affect a mother's decision on breastfeeding. These include, social attitude, level of knowledge, difficulties encountered in breastfeeding itself, availability and promotion of breast milk substitutes (Hijazi, 1977; Ebrahim, 1983).

For babies who breastfed, the weaning period is the time of greatest danger to health and life. Good weaning makes heavy demands of the mother, but knowing when and how to wean a child could drastically reduce child malnutrition in the developing world including Nigeria.

Therefore, there is need for adequate knowledge on infant feeding practices, so as to advise mothers on the

importance of breastfeeding, effects of early introduction of solid food, and how to improve the nutritional status of their children and that of mothers. Hence the study of the effect of infant feeding habit on nutrition and health status of the child and lactating mothers becomes very necessary.

1.3 Objectives of the Study

The broad objective of this study is to investigate into the effect of infant feeding habits on health and nutritional status of the infants and lactating mothers in Nsukka Local Government Area of Enugu State.

The specific objectives of this study are to:

(1) investigate the different patterns of infant feeding in the study area;

(2) ascertain the relationship between the pattern of infant feeding; and health status of the infants and lactating mothers;

(3) determine the levels of food intake in the community and nutrient deficient in poor diet;

(4) determine the relationship between the mothers occupation and nutritional status of the infants;

(5) make recommendation based on the findings.

1.4 Hypotheses

This study will be guided with the following null hypotheses:

(i) There is no significant relationship between the pattern of infant feeding and nutritional and health status of the infants.

(ii) There is no significant relationship between the mothers' occupation and nutritional status of the infants.

1.5 Significance of the Study

Infancy is a very delicate period. This is because infancy is the time of life when faulty nutrition may be expected to have its greatest effect. In addition, the food given to the infant during few months after birth determines the wellbeing of the child in adulthood (Nerlove, 1989; Hijazi, 1977). It is therefore of prime importance that the food given to the young baby should be as perfect as nature. However, feeding practices has a direct relationship with nutrition and health status of the child (Atimo, 1993; Fleck, 1981). Therefore, this study is hoped to bring to focus the problems of infant feeding habit to the mothers and how their own nutrition will also be enhanced.

Women practice bottle feeding and breastfeeding. Bottle feeding has been criticized on the ground that its usage presents a greater health risks in developing countries. Despite this, the use of breast milk continue to decline among the lactating mothers. This study hopes to educate lactating mothers and would-be mothers on the two methods available to them. It will also educate them on the consequences of both methods of feeding the infants.

Though a lot of research work has been conducted on health and nutritional status of women (Jacobson, 1991), very little has been addressed specifically on the effect of infant feeding practices on child health. This study will no doubt provide information on this area of health concern where enough information at present seems inadequate.

The nutritionists and the extension workers will use the findings as a basis for advising pregnant and nursing mothers.

1.6 Limitations of the Study

The major limitations of the study are as follows:

(1) Some of the women may be unwilling to cooperate.

(2) Most of the women are not always in their homes and so it is difficult to keep to appointments due to the nature of their work or business hours.

(3) Some of the rural women were not able to tell the exact ages of their children and this makes it difficult to have accurate anthropometric estimates.

(4) Most of the infants get scared at the site of scales and measuring meters. This means that much time is needed to carry out measurements. When it becomes difficult, the mother is weighed with the infant and weighed again without the infant and the difference is taken.

In spite of all these limitations, the results of this study are good approximation of the effect of infant feeding habit on health and nutritional status of infants and lactating mothers in Nsukka Local Government Area.

CHAPTER TWO

LITERATURE REVIEW

This Chapter reviews literature on the different patterns of infant feeding and nutritional status. This Chapter is sub-divided into the following headings; duration, beliefs and attitude of mothers towards breast-feeding; Constitution of breast milk and its importance, artificial feeding in tropical countries; mixed feeding; causes of decline in breastfeeding; weaning practices; and assessment of health and nutritional status.

2.1 Duration, Beliefs and Attitude of Mothers Towards Breastfeeding

Breastfeeding is the normal way of feeding infants in all African societies. In a worldwide study of 45 different cultural and ethnic group, it was found that on the average, the infant is breastfed for $1\frac{1}{2}$ years, though 4 years was not uncommon and in some communities, it may continue for as long as 6 years (Omololu, 1975). Jelliffe (1978) in a study among Yorube mothers of Ibadan, observed that breastfeeding which was started on the first day was continued up to 4 years. Kashyap et al (1989) observed that breastfeeding was universal and continued for up to three years and sometimes longer.

Prolonged breastfeeding is vitally necessary for growth and survival, as breast milk is the only available source of good quality protein and it contains all the essential amino acids. After the age of six months, even an optimal flow of breast milk is inadequate for both calorie and protein requirements and hence its main value is as an important protein and calorie supplement to other foods (Fomon and Anderson, 1995).

The actual length of prolonged breastfeeding is uncertain and is often limited by a second pregnancy, but can be advised to last one-and-a-half to two years (Ebrahim, 1978). Evidence in several of the studies reviewed indicate that prolonged breastfeeding (18-24 months) the nutritional pattern, has not decreased in all rural communities since no social or economic conditions exist to favour artificial feeding. In 4 regions in Tanzania, Kimati (1983) noted in his study in 1977 that majority of the mothers appeared to stop breastfeeding between 18 to 24 months. A study carried out by Agarwal et al (1982) revealed that the practice of prolonged breastfeeding continued till the next pregnancy and the discarding of colostrum was still common.

Fagbule (1987) examined the knowledge, beliefs and attitudes of Ilorin mothers toward breastfeeding and found that large proportion of the mothers (56%) would practice prolonged feeding for 12-18 months irrespective of their age. Orwell (1984) found that at 2-6 months post partum, only 83% of urban mothers were still breastfeeding while 96% rural women were still breastfeeding.

Although prolonged breastfeeding continues to be a universal practice in rural areas and among most low income groups in urban areas, the mean duration of breastfeeding is becoming increasingly shorter among the elite mothers. The duration of breastfeeding varies widely ranging from 2 to 18 months or more. Okeahialam (1986) observed that breastfeeding was practised from birth by 78% of the urban mothers and by 3 months only 68% still breastfeed but this decreased to 38% at 6 months. Beyond 9 months, 16% of the urban mothers still breastfed. In a study carried out by Franklin et al (1983), revealed that breastfeeding was universal at birth and remained near or above 90% until 9 months of age. Over 80% were still breastfeeding at 13 months of age and 15% at 16 months.

Breastfeeding is the ideal way to feed an infant. It is more nutritious, more and more economical than any breast milk substitute ever produced (Omololu, 1972). The greatest single factor contributing to the survival

of most African children has been accepted as the Universal acceptance of breastfeeding as the normal way of life by African women (Kazimi and Kazimi, 1979). To rural mothers of Tanzania, the breast milk is the automatic natural and traditional method to feed the child to ensure its survival.

2.2 Constitution of Breastmilk and Its Importance

Breastmilk is known for its importance and because of this, it is generally accepted in many societies because:

(i) It is recognized and agreed that breastmilk is safe from pathogenic organisms and supplies the necessary ingredients for the human infant in the correct proportion and form for the first 4 months of life (Jelliffe, 1978). No artificially produced baby foods attains the digestibility and utilizable percentage of breastmilk in infant feeding (Omololu, 1975).

(ii) From an economic point of view, breastfeeding is the cheapest means of feeding a child during the first six months of life (Fagbule, 1987).

(iii) Mata (1978) established that the cost of the extra calories needed by the mother to secrete the volume of milk required by the infant. Victoria (1987) stated that breastmilk economizes on household expenditure on food and requires no utensils, water or fuel for preparation, although lactating women do have higher nutrient requirement. Kiamti (1975) reported that the minimum wage earner will spend about 36% of his monthly earning if his child is on full artificial feeds and this has disastrous economic effects on the rest of the members of the family.

(iv) From a psychological perspective, the bond between the mother and child is strengthened by breastfeeding (Fagbule, 1987). The baby derives security and sense of belonging in the early mother-child relationships fostered through breastfeeding (Mata, 1978; Fleck, 1981).

(v) Early breastfeeding helps in the involution of the uterus (Morley, 1973) and increases the level of the hormone prolactin which suppresses ovulation resulting in adequate childbirth spacing and good material and child health (Horfouche, 1970).

(vi) According to Pittard (1979), breastmilk is an immunological agent. It has anti-infective properties that protect the infant from infection in the early months (Cameron and Hofvander, 1983). Fully breastfed babies are less likely to develop respiratory, gastrointestinal infections, kwashiorkor, and colic, infantile allergies and eczema (Cameron and Hofvander, 1983). On the whole, there is decreased morbidity and mortality in breastfed babies (Clavano, 1982). Victoria (1987) reported that weaned infants had 14.2 times the risk of death from diarrhoea and 3.6 times the risk of death from respiratory infections than breastfed infants with no milk supplements.

2.3 Artificial Feeding in Tropical Countries

Breastfeeding is fortunately still the normal manner of feeding young babies in most rural tropical countries although decreasing in urban areas (WHO, 1985). However, circumstances may arise when breast feeding becomes impossible as for example if the mother dies in child birth or becomes mentally deranged. In such situations, it is the accepted cultural practice in some societies for

a wet nurse to be hidred or for another lactating relative to breastfeed the child (Jelliffe, 1978).

In some societies where such practices are not accepted, the child will have to be reared artificially (that is by feeding with protein rich breastmilk substitutes) usually some form of modified milk, most often cow's milk.

It has been observed that there is an unfortunate trend towards shortening of duration of lactation and more extensive use of milk substitutes in developing countries (WHO, 1985); Garrard, 1974). Okeahialam (1986) observed that in the urban areas, most of the mothers introduced infant formulae early between 1-2 months after birth to ensure that the babies adapted to bottle feeding before they resumed duties and by the sixth month over 90% were still on formula feeds. In the rural areas, 45% of the mothers introduced artificial feeds between 3-6 months after delivery. This was mainly due to the status symbol attached to bottle feeding especially among the young non-elite mothers. Most of the illiterate mothers started feeding milk substitutes between 1 and 3 months. UNICEF (1991) noticed that bottle feeding was found to be used as a supplement to breastfeeding not as a replacement.

The danger of artificial feeding in usual tropical homes cannot be overstressed and in many low socio-economic circumstances, chances of success are slight. The result is only too likely to be a development of nutritional maramus from over diluted mixtures and associated infective diarrhoea from the use of contaminated feeds given in unclean utensils (Jelliffe, 1978). Nagra et al (1987) observed that irrespective of the socio-economic status, the constitution of artificial feeds were found to be inadequate. In the middle socio-economic group generally and in the lower group especially animal milk was much diluted with a belief that dilution make the animal milk quantitatively identical to the mothers milk (Harfouche, 1970). It can be stated with confidence that bottlefeeding under the changing pattern of protein-energy malnutrition from the kwashiorkor type occurring between 18-30 months, to the infantile marasmus type (Hyazi, 1977).

2.4 Mixed Feeding

Mixed feeding is presently the commonest pattern of infant feeding found in most communities. It involves breast and bottle feeding given together in the first few months or later and sometimes continuing through 1 to 2 or more years.

UNICEF (1991) on infant feeding and health in Ibadan, found out that a combination of breast and bottle feeding was the pattern adopted by 74% of the mothers. Almroth (1982) noted in his study on breast feeding practices in rural Jamacia that a combination of breast and bottle feeding was the method of feeding that predominated from the age of one to eight months. Breastfeeding without concurrent bottle feeding was rare, even at young ages. Nagra et al (1987) observed in his study that amongst those reported as given mixed feeding 60-80% of the feeds were by bottle and 40-20% on the breast. Artificial feeding comprises mostly of the commercially available formula milk, example, Similac and Lactogen. In Lagos, between 50% and 60% of the children were both breast and bottle fed shortly after birth and the proportion diminished after 9 months of age (Orwell, 1984). A study of the patterns of infant feeding among mothers in Benin City revealed that of 237 mothers interviewed, 221 mothers combined breast feeding and bottle feeding (Alakija and Ukoli, 1980). Infants receiving mixed feeds are at increased risk of gastro-intestinal infections when the home environment is poor and mothers do not know about the precautions needed to prepare the supplements hygienically.

2.5 Causes of Decline in Breastfeeding

In recent years many developing countries have experienced a steep decline in breastfeeding. The decline is more common in large towns and cities, but similar trends are also present in the rural areas. Several factors which have contributed to this are as follows:-

(a) Urbanization

Rapid urbanization in much of West Africa has resulted in large shifts of population from the rural to the urban and peri-urban areas. This has resulted in the increasing trend in the bottle feeding of infants (Hutton, 1976). According to Kimati (1983), movement into the urban and peri-urban areas has necessitated many mothers who are on paid employment to breastfeed their children for a very short time. Furthermore, Hutton (1976) stated that it also removes mothers from customs and mores of most traditional societies in West Africa which demand a prolonged period of breastfeeding.

(b) Advertising and Marketing of Infant Formula

Wennen-Van der May (1969), noticed that more and more mothers were starting to use powdered milk for

feeding their infants even when breastmilk was abundant. In his study, on decline of breastfeeding in Nigeria, he reported that one hardly believes one's eyes when, a few minutes after leaving Lagos airport, one sees on the left hand side of the road a panoramic poster, measuring three by eight meters featuring a fat bouncing baby saying: Welcome to Nigeria where babies are happy and healthy. Kimati (1983) also observed in his study among Indian Ismaili Moslem mothers that after delivery, milk companies gave milk tins with a feeding bottle as a present in the hospitals. Neville (1991) further reported that some of the sellers of milk substitutes had misinformed the Urhobo fathers that their children would grow better on being fed bottle milk rather than being breastfed. Also it has been reported that the use of communication media such as radio, T.V. and Women's Magazines by milk firms to promote their products has provided a constant message concerning alternatives to breastmilk (Bentley, 1991).

(c) Women Going Out to Work

Lactating mothers who go out to work and engage in other activities face a lot of problems in the society. The choices are usually to express milk from the breast, use artificial feeds during mother absence and breastfed

when she is at home, or to wean the infant completely. Several studies have shown that a need to go to work can interfer with breastfeeding especially among lower-income women whose work situation may offer little flexibility for feeds. A 1981 study in the USA found that only 20% of mothers whose infants were 6 months old were breastfed if the mother was fully employed compared to 50% of mothers who were not employed (Livingstone et al, 1985). Okeahialam (1986) stated in his study among Nigerian Igbo mothers that the average Nigerian mother in the city attempts to fulfil multiple roles including that of a nursing mother, a worker, a business woman and an active member of several societies and that there is no doubt that all these culminate in an "Urban Stress" which is a major factor affecting disturbed breastfeeding.

(d) Cultural Attitudes

Richardson (1986) stated that with the trend away from breastfeeding, the primary role of the breast was no longer regarded as that of an organ of nutrition for the infant in some communities, but rather as an enhancement to the female figure. This retrogressive trend was regarded by Call (1959) as being related to an increased cultural definition of the breast as an exclusively sexual

organ. Berg (1973) stated that of crucial concern to women in an increasing number of societies was the fear that breastfeeding would ruin the shape of their breast.

(e) Insufficient Milk

Gutherie et al (1983) stated that many of the reasons for early termination especially those involving reduction or termination of milk can be attributed to a disruption of secretion of either prolactin or oxytocin, or both. He further stated that any factor, commonly work away from the home, that restricts the frequency and duration of breastfeeding is likely to limit the prolactin secretion and hence milk production. Kaine (1984) suggested that American mothers experience lactation failure in large numbers at 6 to 8 weeks post partum because they are separated from the babies during working hours become anxious and fatigued. With ineffective social support, they turn to social foods to meet the child's needs that they feel they are failing to meet with their breastmilk.

(f) Breaking Up of Family System and Sex Taboos

According to Ervy (1964) the opportunity to breastfeed is reduced because of the breakdown of traditional

polygamous family structures and sex taboos. Husbands cannot be expected to abstrain from sexual relations for two years, whereas in a nuclear structure, nursing mothers must also be wives whether bottlefeeding is initiated to honour the sex taboos, or pregnancy results because it is not respected, in either case, the baby is weaned from the breast prematurely. The problem of "bad milk", believed to be a sorcery provoked conditions prevented 2-8% from feeding "Lethal" maternal milk to baby of any age (Martin, 1975; Garette, 1981).

2.6 Weaning Practices

Weaning is the period of transition during which a child whose main food was milk changes over to adult food (Ebrahim, 1978). According to Cameron and Hofvander (1983), the term "to wean" is described as the process by which the infant gradually becomes accustomed to the full diet. Kaine (1984) has also defined weaning as the process by which a baby's diet is changed from a milk to a solid or adult diet.

The period of weaning is one of the most critical periods in a child's life. It is well known that there is higher rate of infection, particularly of diarrhoea disease during weaning than any other period of life (Cameron and Hofvander, 1983). This is because the diet

changes from clean breastmilk which contains anti-infective factors, to foods which are often prepared, stored and fed in unhygienic ways. In addition, foods given to infants are based on cereals, roots and tubers which lack essential nutrients due to poor supplements and poor preparations.

The age at which solid food are introduced varies in different communities from a few weeks until the end of the first year or even the second year of life. In this part of the country a cheap maize gruel (Akamu) is the traditional weaning food. There is no rule as to when the body should be weaned from the breast. However, the success with which a mother feeds her infant is a major determinant of that child's health and welfare. Jelliffe and Bennett (1964) observed that after the first months of life usually the first dish to introduce to the infant should be a gruel, a soft paste or a portion of some local staple food. Illingworth (1975) also suggested that there is a critical period at which children are developmentally ready to chew solids as distinct from the thickened food. This is normally 6 to 7 months but depends upon the general development of the child.

Several studies done by Nigerian researchers show that weaning starts from the third month or earlier. Badorudeen and Hendricks (1992) studied infant feeding practices of Igbo mother in Owerri and discovered that majority (85%) of the mothers gave their babies semi-solid foods at ages ranging from 3-7 months. Also Uwaegbute et al (1987) observed among Igbo mothers that urban mothers started weaning their children at 3 months of age. Arinze (1984) in her study on the pattern of weaning in different socio-economic groups in Nsukka observed that urban mothers introduced supplementary foods earlier (0-3 months) than the rural mothers who introduced foods such as pap and mashed yam at a later stage. Nnanyelugo (1980) also reported that urban mothers in Anambra State introduced supplementary food which comprised of milk preparation, pap, glucose and fruit from 2-3 months, while the rural mothers on the other hand introduced solid foods from 4-5 months.

In spite of the above early weaning practices, Thomason (1986) found that in New Guinea, weaning started late, the timing being linked to the eruption of deciduous teeth. The first supplementary foods introduced were sweet potatoes, riped banana and breadfruit.

2.7 Assessment of Health and Nutritional Status

Assessing the health and nutritional status of any population is important in detection of protein-energy malnutrition. According to Jelliffe (1964) anthropometry and food consumption surveys are the simplest and most reliable methods of assessing the health and nutritional status of the people in the community.

Nutritional anthropometry is concerned with the measurement of the variations of the physical dimension and gross composition of the human body at different age levels and degree of nutrition (Jelliffe, 1966). Measurements of heights and weights are important tools in assessing nutritional status of a population. The Joint FAO/WHO Committee (1962) has established that anthropometric data are of value as indicators of nutritional and health status of the population. Malnutrition whether primary or associated with infection results in retarded growth and development while improving the nutritional status of the malnourished children increases their growth rate.

Anthropometric data are usually compared with standard of healthy well fed subjects either from the

same locality or internationally recognized standards. Ford (1964) has collected evidence that well nourished infants of various genetic background attain weight level so near those obtained in Havard longitudinal studies, that these may be used for assessing nutritional status.

Food consumption surveys are conducted for nutritional, medical and economic purposes. The aim of all dietary surveys whether made on individual or on groups is to discover what the persons under investigation are in the habit of eating and also possible deficiencies and faults (Marr, 1971).

Therefore, the nutritional status of an infant is interrelated to the their health status. When the nutritional status of infant is assessed equally the health status of the infant is equally assessed.

CHAPTER THREE

METHODOLOGY

This Chapter deals with the population surveyed, sample size and sample selection methods, technique of data collection, technique of data analysis, anthropometry, weighed food intake and laboratory analysis.

3.1 Population of the Study

The population of this study consisted of all the lactating mothers in urban and rural areas within Nsukka Local Government Areas. It also consist of all the infants born within the last two years. These data were obtained from the Ministry of Health in Nsukka, Women Organizations and Health Centres within the population of the Study.

3.2 Sample Size and Sampling Techniques

Random sampling techniques were used to select the respondents for this study.

(a) Selection of Infants

The names of all infants born within the last two years were obtained by the researcher from the Ministry

of Health in Nsukka and Health Centres. From infant population, random sampling technique was used to select 50 infants each from the following health centres in urban and rural areas in Nsukka Local Government Areas. They are presented in the table below:

Table 3.1: Sample Size for Infants

Health Centres	Sample Size (Infants)
Eziani (rural)	50
Ibagwa (rural)	50
Ede-Oballa (rural)	50
Nsukka Town (urban)	50
Total	200

Source: Field Data, 1998.

(b) Selection of Lactating Mothers

A random sample of 60 lactating mothers were made from the following Centres:

Table 3.2: Sample Size for Lactating Mothers

Health Centres	Sample Size (Lactating Mothers)
Eziani (rural)	60
Ibagwa (rural)	60
Ede-Oballa (rural)	60
Nsukka Town (urban)	60
Total	240

Source: Field Data, 1998.

Therefore, the sample size for this study comprised of 200 infants and 240 lactating mothers randomly selected.

3.3 Technique for Data Collection

Data for the research were collected by means of pretested questionnaire. The questionnaire was designed to get information on mothers' background, mothers' health, breastfeeding practices, infant formula practices, weaning practices and anthropometric measurement of infants.

The background information includes babies age, sex, mothers' occupation, educational attainment, mother's age, estimated family income and number of people that live and feed in the family.

The mothers' health include whether mothers attended antenatal clinics, number of pregnancies, illness suffered during lactation and treatment received.

The breastfeeding practices ranged from first food given after birth, reason for breastfeeding, mothers' work and breastfeeding and duration of breastfeeding.

Infant formula practices examined include age at introduction of infant formula, reasons for introducing them.

Episodes of illnesses including diarrhoea, vomitting, fever, measles, boils, edema, scurvy, chickenpox and rashes were examined.

The questionnaires were validated by lecturers in Home Science and Nutrition, Statistics and Vocational Teachers Education Department, University of Nigeria. After the validation, a pretest was carried out. Amendments were made on the questionnaire from the results of the pilot test before the final questionnaire was distributed.

3.4 Techniques for Data Analysis

The responses in the questionnaire were coded on a Computer Coding form, key punched and analysed by Computer.

programme SPSS. Frequency distribution of all variables and percentages, cross tabulation of variables, correlations for some variables and Chi-square were computed and results put in tables to give clearer picture of the results. In dietary recall food were grouped according to their food groups and compared with the recommended number serving per day. Proximate analysis and weighted food intake were carried out and results obtained were compared with the FAO recommendations.

Anthropometry

The anthropometric measurements of all infants under this study were conducted using height, weight, chest and head circumference.

Height

The height was measured using tape measure calibrated in centimeters. The method of the crown heel length was used on which the calibrated tape measure was pasted on. The infant was put flat on the board, the head was positioned firmly against the fixed headborad. The knees were extended by applying pressure so that correct measurement are taken.

Weight

The weight was taken with a bathroom scale of 120kg capacity. Each child was weighed with minimum clothing. For infants who could not be weighed alone, the mothers or any other adult was first weighed with the child then the mother was then weighed alone. The difference between the two measurement were recorded as actual weight of the infant.

The head and chest circumferences were measured using flexible cloth tape and results recorded to the nearest 0.1cm.

The standard used for the nutritional and health status evaluation was NCHS Standard (National Centre for Health Statistic, 1980) whose cut off values are

75th - 25th Percentile	=	Normal
10th - 5th Percentile	=	Moderate malnutrition
< 5th Percentile	=	Severe malnutrition.

The indicators used for the analysis were:

(1) Height for age to evaluate stunting
(2) Weight for age to evaluate overall nutritional status
(3) Weight for Height to evaluate wasting.

Weighed Food Intake

The food intake of 12 randomly selected infants were used in the study - six male and six female were used. The food intake of each infant was carried out for three days consisting of two week days and one week-end day. The uncooked food ingredients and plates were first weighed and recorded. When the subject had finished eating, the plate, waste and left over (if there was any) were weighed and substracted from the original weight and actual food taken was obtained.

Laboratory Analysis

The food samples collected were stored in a freezer till after the period of the food intake survey. The samples were brought out, thawed and homegenized by grinding the food in the mortar. Two grams were removed for moisture analysis while the remaining of the thawed homogenized samples were dried in an oven for 24 hours at $60^{o}C$. The dried samples were milled into fine powder and used for analysis of the following protein, Ash, fat extract, crude fibre and minerals (Calcium and iron).

Moisture Content Determination

The moisture content was determined by using the hot oven method (AOAC, 1980). Aluminium dishes were washed, dried in the oven at 100°C for 24 hours and allowed to cool in a dessicator. The dishes were weighed and weight recorded. Two grams of the sample was measured with the dishes and kept in the oven for elimination of moisture. The oven was kept at 100°C for 24 hours. After 24 hours of drying, the dishes containing the samples were brought out, cooled in a dessicator to prevent reabsorption of moisture. After cooling, it was weighed; the drying and weighing continued until a constant weight was obtained. The percentage moisture was calculated as follows:

$$\% \text{ Moisture} = \frac{\text{Weight loss after drying}}{\text{Weight of Sample}} \times \frac{100}{1}$$

Protein Determination

Protein was determined by micro-kjeldahi method as described by AOAC, 1980. Two grams of each sample was weighed into a 500ml kjeldahi flask. The following was then added into the flasks:-

(a) 5 grams of anhydrous Sodium sulphate
(b) 1 gram of hydrated Cupic sulphate
(c) a pinch of selenium powder
(d) 1N concentrated suphuric acid H_2SO_4).

The flasks were placed on an electric coil heater in a flame chamber, the mixture was gently boiled at first until a black colour appeared. Heat was increased as solution cleared. Heating was continued for at least one hour after solution had cleared. The flasks were allowed to cool, the neck was nused down with distilled water and the content was heated for a further period until all specks disappeared. After cooling, the contents were transfered with several washing into 25ml Volumetric flasks and made up to 100mls.

Five miligrams of the sample was placed in the sample chamber of the apparatus. Steam was passed through the Markhan distillation apparatus for about 10 minutes. 5ml each of boric acid indicator was placed in 100ml conical flasks. The conical flask was placed under the condenser such that the condenser's tip was under the liquid. The cup of the apparatus was closed to prevent the passage of steam to the sample and 5ml of 60% NaoH was added. This was let in carefully leaving behind a little to prevent NH_3 escapaing. Steam was then let through for about 5 minutes. The amount of the liquid in the conical flask was about twice its original quantity and the purple boric acid and mixed indicator was titrated with 0.01NHCl. The end product was purple.

$$\% \text{ Nitrogen} = \frac{\text{Titrex Normality} \times \text{dilution Factor} \times N_2}{\text{Sample Weight} \times 1000} \times 100$$

$$\% \text{ Protein} = \% \text{ Nitrogen} \times 6.25$$

Ether Extract

Ether extract was done by extracting method using Soxhlet Extractor. The extraction flask was washed, dried, allowed to cool and weighed. The weight was recorded. 2g of each sample was weighed into a filter paper and introduced into a dry Soxhlet thimble. Petroleum ether was placed in the flask, apparatus set up and extraction was carried out for 6 hours at 120°C. After 6 hours, the solvent was recovered, leaving only the extract in the flask. The extract was dried in the oven for 15 minutes at 100°C to drive off any remaining solvent. It was then cooled in the dessicator and weighed.

$$\% \text{ fat} = \frac{\text{Weight of oil}}{\text{initial wt of sample}} \times \frac{100}{1}$$

Carbohydrate

Carbohydrate was determined by difference ie 100 - (Protein + Ash + Moisture + Fat + Crude fibre).

Energy Estimation

Energy was estimated by the "Atwater" factor. The energy value of the sample was calculated by multiplying the value of the proximate composition of fat, protein, and carbohydrate of each sample by

Atwater factors

fat = 9kcal/g

Carbohydrate = 4kcal/g

Protein = 4kcal/g

Ash Determination

Two grams of the sample was weighed into a weighed crucible. According to AOAC (1980) the content was heated in a furnace at a temperature of 600°C for about 3 hrs. The crucible was put in the dessicator to cool and then weighed.

$$\%\text{Ash} = \frac{\text{Wt of Crucible + Cash-wt of Crucible}}{\text{Wt of Sample}} \times \frac{100}{1}$$

Minerals

The ashed samples were separately filtered with 5ml of 2NHCl and hot water, made up to 100ml with deionized water in preparation for reaching the minerals. The minerals determined were calcium and iron. For other

minerals Food and Agriculture Organization (FAO) composition tables was used. The minerals were determined by atomic extraction method and the readings were taken in mg/100g.

CHAPTER FOUR

DATA PRESENTATION

4.1 Background Information

Out of 200 infants surveyed, 55% were males and others 90 (45%) were females. Table 4.1 shows the age ranges of infants under the survey. It was observed that the highest proportion (20.5%) of the infants were within the age range of 0-3 months while minority (3%) were within 19-21 months. The mean age was 11.8 months (Table 4.1).

Table 4.1: Age Distribution of Infants

Age Range (months)	Frequency	Percentage
0 - 3 months	40	20
4 - 6	33	16.5
7 - 9	26	13
10 - 12	24	12
13 - 15	14	7
16 - 18	16	8
19 - 21	6	3
22 - 24	41	20.5

Source: Field Data, 1998.

Observation on the different occupations of the mothers showed that majority (25%) of the mothers interviewed were farmers while 20.5% were traders and only 3.5% were University lecturers. The distribution of the other occupation are shown in Table 4.2.

Table 4.2: Mothers' Occupational Distribution

Occupation	Frequency	Percentage
Teachers	32	16
Housewife	26	13
Trader	41	20.5
Civil Servant	14	7
Farmer	50	25
University Lecturers	7	3.5
Students	15	7.5
Others	15	7.5

Source: Field Data, 1998.

The educational level of mothers is shown in Table 4.3. It was observed that the highest (51.5%) percentage of the respondents were educated up to primary school level followed by University or its equivalent (20.5%). Others completed teachers training (TTC) (12.5%), secondary school (10.5%), ordinary diploma (OND) (3%)

and nursing education (1.5%). Only 0.5% had no formal education.

Table 4.3: Mothers' Educational Distribution

Educational level	Frequency	Percentage
No education	1	0.5
Primary school	103	51.5
Secondary school	21	10.5
T.T.C.	25	12.5
O.N.D.	6	3
Nursing	3	1.5
University or equivalent	41	20.5

Source: Field Data, 1998.

Table 4.4 illustrates the age ranges of the respondents. Most (60.5%) were within 20-30 years followed by (31.5%) within 31-40 years. It was also observed that only 0.5% was over 50 years.

Table 4.4: Mothers' Age

Age Range	Frequency	Percentage
20 years	11	5.5
21 - 30 years	121	60.5
31 - 40 years	63	31.5
41 - 50 years	4	2
Above 50 years	1	0.5

Source: Field Data, 1998.

The estimated family income for a month summarized in Table 4.5 shows that majority (30%) had an estimated monthly income of ₦5,001 - ₦10,000 followed by 26.5% with less than ₦5,000. Only .5% had over ₦25,000 while .5% could not estimate the monthly family income.

Table 4.5: Monthly Income

Income per Month	Frequency	Percentage
Less than ₦5,000	53	26.5
₦ 5,001 - ₦10,000	60	30
₦10,001 - ₦15,000	19	9.5
₦15,001 - ₦20,000	26	13
₦20,001 - ₦25,000	40	20
Over ₦25,000	1	.5
None	1	.5

Source: Field Data, 1998.

4.2 Mothers' Health

Out of 230 questionnaire distributed to mothers, 154 were completely filled. It was observed that majority (72.5%) had attended antenatal clinics while only 4.5% did not. Reasons given by mothers who did not attend antenatal clinic were that they personally did not want to go (3.5%) while only .5% were not used to it.

When the mothers were asked how many pregnancies they had, majority (27%) responded that they had over four followed by 15.5% which had 1 and 14% with 2. The interviews show that 44% of the respondents have good appetite and eat well during pregnancy while 11.5% have little appetite and 15% prefer to eat light food. Few (3% and 3.5%) eat a lot of pica and special meals for pregnant women respectively. It was also observed that food liked most during pregnancy were food containing vegetables (32.5%), boiled and steamed food (13%) and fried foods (10%). Some (4%) liked breadfruit with maize while 17.5% had no special preferences.

Table 4.6 shows that majority (31%) of the mothers suffered from vomitting while 29% had Anaemia and loss of appetite (27%) during lactation. A few (11%) suffered from typhoid fever.

Table 4.6: Illness During Lactation

Illness	Frequency	Percentage
Loss of appetite	54	27
Vomitting	62	31
Anaemia	58	29
Typhoid fever	5	11

Source: Field Data, 1998.

The data from the questionnaire also revealed that many of the mothers suffering from the sickness in Table 4.6 were always treated in hospital and local treatment.

4.3 Breastfeeding Practices

When mothers were interviewed on what was the first food given to the baby after birth, majority (73.5%) gave water only while 21.5% gave water with glucose and only 5% gave breastmilk only. Table 4.7 shows the result.

Table 4.7: First Food Given After Birth

Food	Frequency	Percentage
Water only	147	73.5
Water with glucose	43	21.5
Breastmilk only	10	5

Source: Field Data, 1998.

It was also observed that majority (83%) of them gave Colostrum but 16% did not. The other 1% did not respond to the question. The reason given by mothers who did not give Colostrum are shown in Table 4.8. The majority said that Colostrum is dirty (13.5%). Two (1%) of the mothers did not feed their baby breastmilk immediately, 1% said it was not traditionally accepted and 1.5% did not like to feed Colostrum.

Table 4.8: Reasons for Giving Colostrum

Reasons	Frequency	Percentage
Not traditionally accepted	2	1
Does not like it	3	1.5
It is dirty	27	13.5
Did not breastfeed immediately	2	1

Source: Field Data, 1998.

Table 4.9 shows the distribution of respondents according to reasons for feeding breastmilk. Over half (52%) of the mothers fed breastmilk because they thought it was more nutritious, 23.5% did so because it was traditional and 9.5% said it was better for the baby. 6.5% and 5.5% said it was cheaper and more convenient respectively and only 2% said baby enjoys it more.

Table 4.9: Reasons for Feeding Breastmilk

Reasons	Frequency	Percentage
Tradition	47	23.5
Cheaper for me	13	6.5
More convenient	11	5.5
Better for baby	19	9.5
Baby enjoys it more	4	2
More nutritious	104	52

Source: Field Data, 1998.

When mothers were interviewed on whether they had facilities for breastfeeding at their place of work, majority 96.5%) said there wasn't, while only (3%) had facilities. When interviewed whether they would like such facilities at their place of work, 52.5% said they wouldn't like it while 46.5% said they would. The reasons for not liking facilities for breast-feeding were: (a) not convenient for working mothers (30.5%), not hygienic (10.5%) and personally would not like it (4.5%).

At the time of the study, it was found that 70.5% of the mothers were still breastfeeding while 29.5% had stopped breastfeeding. Table 4.10 shows the various ages

at which mothers stopped breastfeeding. The distribution of respondents according to duration of breastfeeding showed that some (9%) mothers breastfed their babies for 7-9 months while 7% breastfed for 10-12 months. Others (4.5%) breastfed for 4-6 months and 16-18 months (3%). The mean month for duration of breastfeeding was 11.27 months.

Table 4.10: Duration of Breastfeeding

Duration (Months)	Frequency	Percentage
0 - 3	2	1
4 - 6	9	4.5
7 - 9	18	9
10 - 12	14	7
13 - 15	3	1.5
16 - 18	6	3
19 - 21	7	3.5
22 - 24	3	1.5

Source: Field Survey, 1998.

When mothers were asked the reason why they stopped breastfeeding, some (19%) said they stopped because they thought their babies were old enough. Others (3%) stopped at the traditional accepted age and 4.5% stopped because

of onset of another pregnancy and child became ill (4.5%).

When mothers were interviewed on whether they gave infant formula, 54.5% did while 44.5% did not. It was found that many mothers who combined breast-feeding with formula feeding started from the day of birth to one month (27%) and 1.1 - 3 months (21.5%). Very few introduced formula at 6.1 - 9 months (1%) or later (0.5%) while 44% did not introduce formula.

Table 4.11 shows that the major reasons for using formula were mother going back to work (18%), better for baby (13%), secretion was too small to satisfy the baby (16%) and some mothers thinking it is good for baby (7.5%).

Table 4.11: Reasons for Using Infant Formula

Reasons	Frequency	Percentage
Better for baby	26	13
Baby was too big	15	7.5
Secretion was less	17	8.5
I had to go back to work	36	18
Think it is good for the baby	15	7.5
Any other reasons	3	1.5

Source: Field Data, 1998.

When mothers were asked on how they gave the milk to their babies, majority (46.5%) said they did so with feeding bottle, 9% with cup and spoons or else allowed the baby to drink from the cup (0.5%). Observation on how the mothers made up the formula showed that only 33% of them read the instructions before making up the milk.

The interview also revealed that over half (59.5%) of the mothers reported that their babies were predominantly breastfed, 4.5% were predominantly bottlefed while 36% reported that the children were equally breast and bottlefed.

4.4 Weaning Practices

Out of 170 mothers that gave weaning foods, many (58%) introduced weaning foods to their children's diet at 4-6 months of age while others (25%) did so at 0 - 3 months, 1.5% at 7 - 9 months. Table 4.12 shows the result.

Table 4.12: Age at Introduction of Solid Foods

Age(Months)	Frequency	Percentage
0 - 3	50	25
4 - 6	116	58
7 - 9	3	1.5
10 and above	1	0.5

Source: Field Data, 1998.

The distribution of mothers according to reasons for giving solid food first showed that many (22%) introduced solid foods because they thought breastmilk and bottle milk were not enough and child is old enough to eat them (24%). Other significant reasons were that the age was traditionally accepted (14.5%), child too hungry and crying after breast/bottle fed (13.5%).

From the survey, majority of the infants had suffered from fever (73%), diarrhoea (48%), vomitting (34%). Only 2.0% had suffered from malnutrition.

Table 4.13: Episodes of Illness

Illness	Frequency	Percentage
Diarrhoea	96	48
Vomitting	68	34
Fever	146	73
Measles	18	9
Chicken pox	1	0.5
Boils	25	12.5
Malnutrition	4	2
Edema	2	1
Scurvy	1	0.5
Rashes	8	4

Source: Field Data, 1998.

Note: Multiple Responses was recorded.

Treatment of Child Illnesses

It was observed that among infants that suffered from diarrhoea, 17% received hospital treatment, 9% chemist/patent medicine, 3.5% were treated at home. Few (3%) gave not treatment. Among infants that had vomitting, majority (10.5%) were given hospital treatment while 10% were given no treatment.

4.5 Nutritional Status of Infants

Height for Age

When nutritional status was assessed using Height for age table showed that majority (52%) were normal while few (21.5%) and (26.5%) were moderately and severely malnourished respectively (see Table 4.14).

Table 4.14: Nutritional Status Using Height for Age

Level of Malnutrition	Frequency	Percentage
Normal	104	52
Moderately Malnourished	43	21.5
Severely Malnourished	53	26.5

Source: Field Data, 1998.

Weight for Age

When nutritional status was assessed using weight for age, it was observed that majority (65%) were still normal followed by 18.5% moderately malnourished and very few (16%) severely malnourished (see Table 4.15).

Table 4.15: Nutritional Status Using Weight for Age

Level of Malnutrition	Frequency	Percentage
Normal	130	65
Moderate	37	18.5
Severely	33	16.5

Source: Field Data, 1998.

Height for Weight

When nutritional status was assessed using height for weight, majority (81.5%) were still normal followed by 10.5% moderately malnourished and very few (8%) severely malnourished (see Table 4.16).

Table 4.16: Nutritional Status Using Height for Weight

Level of Malnutrition	Frequency	Percentage
Normal	163	81.5
Moderate	21	10.5
Severely	16	8

Source: Field Data, 1998.

Relationship Between Nutritional Status and Place of Residence

When nutritional status was assessed using height for weight, weight for age and height for age, it was found that a significant relationship exist between the place of residence and nutritional status of the infants ($P < 0.01$). The highest (78%) proportion of urban infants and (52%) of rural infants were normal, while the least (9%) urban infants and (24%) rural infants were severely malnourished (see Table 4.17).

Table 4.17: Nutritional Status and Place of Residence

Place of Residence	Normal	Moderate	Severe
Rural	52%	24%	24%
Urban	78%	13%	9%

Source: Field Data, 1998.

4.6 Infant Nutritional and Health Status Based on Age

When nutritional status was assessed using height for age, weight for height, and weight for age, it was discovered that the highest proportion (60.6%) of normal infants were 4 - 6 months followed by 56.3% within 16 - 18 months. Among infants within 10 - 12 months the highest proportion (33.3%) were moderately malnourished while within 4 - 6 months, the least (9%) were severely malnourished (Table 4.18).

Table 4.18: Relationship Between Age and Nutritional Status of Infants

Age of Baby	Normal (%)	Moderate (%)	Severe (%)
0 - 3 months	52.5	15	32.5
4 - 6	60.6	30.3	9.1
7 - 9	50	23.1	26.9
10 - 12	41.7	33.3	25
13 - 15	50	21.4	28.6
16 - 18	56.3	25	18.8
19 - 21	50	16.7	33.3
22 - 24	51.2	12.2	36.6

Source: Field Data, 1998.

Infant Nutritional and Health Status and Duration of Breastfeeding

When nutritional and health status was assessed with duration of breastfeeding, it was observed that mothers that breastfed for a longer period 19-21 months had the lowest proportion (28.8%) of normal infants, while the highest proportion (100%) of normal infants were those breastfed within 0 - 3 months. It is also significant to note that the highest proportion (57.1%) of severely malnourished infants were those breastfed for 19 - 21 months. Among mothers that had not stopped breast-feeding, 48.6% of the infants were normal while 23.9% were moderately malnourished and 27.5% severely mal-nourished.

Table 4.19: Relationship Between Duration of Breast-feeding and Nutritional Status of Infants

Age (Months)	Normal (%)	Moderate(%)	Severe(%)
0 - 3	100	-	-
4 - 6	77.8	0	-
7 - 9	77.8	5.6	11.7
10 - 12	42.9	35.7	21.4
13 - 15	33.3	33.3	33.3
16 - 18	66.7	16.7	16.7
19 - 21	28.6	14.3	57.1
22 - 24	33.3	33.3	33.3
Has not stopped	48.6	23.9	27.5

Source: Field Data, 1998.

Nutritional and Health Status of Infant and Mothers Occupation

When nutritional status of infant was assessed, there was a significant relationship between mothers occupation and nutritional status ($P < 0.01$). The smallest proportion (26%) of normal infants came from farmers with 44% also severely malnourished while the highest proportion (92.9%) of normal infants came from primary school teachers. Based on this figure, we reject the null hypothesis and accept that mothers occupation affect the nutritional status of the infants.

Table 4.20: Relationship Between Nutritional and Health Status and Mothers Occupation

Mothers Occupation	Normal (%)	Moderate (%)	Severe (%)
Primary School Teacher	92.9	-	7.1
Housewife	46.2	38.5	15.4
Trader	51.2	17.1	31.7
Civil Servant	57.1	21.4	21.4
Farmer	26	30	44
University lecturer	71.4	-	28.6
Secondary school teacher	66.7	16.7	16.7
Student	60	26.7	13.3

Source: Field Data, 1998.

Family Income and Infant Nutritional Status

The nutritional status of the child when examined in relation to the family income was found to be significantly related to income ($P < 0.05$). The proportion of normal children increased with increasing family income. Many (46.3%) with income (₦5,001 - ₦10,000) had normal infants, 24.1% moderately malnourished and 29.6% severely malnourished. Over half (59.3%) of families who earned ₦15,001 - ₦20,000 had normal children, 18.5% had moderately malnourished children and 22.2% had severely malnourished children. Other data are presented in Table 4.21.

Table 4.21: Relationship Between Monthly Income and Nutritional Status of the Infant

Monthly Income (₦)	Normal (%)	Moderate (%)	Severe (%)
Less than ₦5,000	34.1	25	40
5,001 - 10,000	46.3	24.1	29.6
10,001 - 15,000	54.8	25.8	19.4
15,001 - 20,000	59.3	18.5	22.2
20,001 and above	73.2	14.6	12.2

Source: Field Data, 1998.

Infant Feeding Pattern and Their Nutritional Status

Table 4.22 shows the relationship between nutritional status and early infant feeding pattern (breast versus bottlefed). The result shows that highest (81.9%) proportion of normal was found among those who combined breast and bottle and lowest (71.4%) among the predominantly bottlefed. Highest (28.6%) of moderately malnourished were found amongst the bottlefed. However, none of them was severely malnourished but 10% of predominantly breastfed and 5.6% of those equally fed were severely malnourished. The Chi-square conducted to assess the relationship between the pattern of infant feeding and nutritional status of the infant shows a statistically significant value ($P < 0.05$). Therefore we reject the null hypothesis and accept that there is a significant relationship between the pattern of feeding and nutritional status of the infant.

Table 4.22: Relationship Between Pattern of Infant Feeding and their Nutritional Status

Infant Feeding Pattern	Normal (%)	Moderate (%)	Severe (%)
Predominantly breastfed	81.5	8.4	10.1
Predominantly bottlefed	71.4	28.6	-
Equally both	81.9	12.5	5.6

Source: Field Data, 1998.

The age at which solid food introduced has a major implication of the child's health. Infants who were fed solid foods at 4 - 6 months had the highest proportion (52.6%) of normal children and lowest proportion (23.3%) of severely malnourished children compared to the other groups when nutritional status was assessed. However, those fed with solid foods at 7 - 9 months had the highest proportion of severely malnourished and lowest proportion of normal (Table 4.23).

Table 4.23: Relationship Between the Age at Introduction of Solid Food and Health Nutritional Status

Age Range	Normal (%)	Moderate (%)	Severe (%)
0 - 3 months	50	18	32
4 - 6 months	52.6	24.1	23.3
7 - 9 months	33.3	33.3	33.3
10 and above	0	0	100

Source: Field Data, 1998.

4.6 Correlation of Breastfeeding and Age at Introduction of Infant Formula with some Socio-economic Factors

There was a positive but non-significant relationship between the duration of breastfeeding and mothers educational level ($r = .1032$; $P > 0.05$). This shows that the higher the educational level the longer the duration of breastfeeding. The results also showed that there was a non-significant but positive relationship between the duration of breastfeeding and age of the mother ($r = .1144$; $P > 0.05$), a non-significant but positive relationship between the duration of breastfeeding and family income ($r = .0709$; $P > 0.05$).

In relationship between age at introduction of infant formula with some socio-economic factors, the result shows that the age at introduction of infant formula and mothers educational level was positively significant ($P < 0.01$). The age of the child at introduction was significantly correlated with mothers age ($P < .05$) while the relationship between the monthly income and age at introduction of infant formula showed a significant and positive relationship ($r = .3108$; $P < 0.05$).

4.7 Proximate Analysis

Table 4.24 illustrates the mean dietary intake of infants within various ages and their intake as % of FAO (1985) requirement.

The breakdown of the table shows that the infants met their requirement in energy except on infant aged 1 year 1 month. The actual mean intake of protein was adequate when compared with FAO requirement. Calcium intake was low except for 1 year 8 months infants, while iron was generally high for three infants groups. The requirement of Vit A with two infants not meeting their requirements. Intake of thiamine, riboflavin and niacin were regarded as low when compared to FAO requirements while ascorbic acid requirement was met by all the infants in the survey.

Sex: Female Weight: 7kg Mean Intake	212.10	24.48	154	12.18	223.92	.371	.207	2.37	30.94
Intake % of FAO requirement	42.9%	28.4	34.2%	121.8	111.6	74.2	2.6	28.2	154.7
Age:1yr 8mths Sex: Male Weight: 11kg Mean Intake	522.10	20.42	182.10	28.79	181.04	.34	.656	2.06	62.26
Intake % of FAO requirement	94.9%	150%	40.4%	287	724	68%	8.5	24.5	311
Age:1yr 6mths Sex: Male Weight: 12kg Mean Intake	880.84	19.54	443	20.194	120.52	.315	.515	4.287	95.5
Intake as % of FAO requirement	214%	132.3	98.4	209.1%	48	63%	6.4	50.9%	477

Source: Field Data, 1998.

CHAPTER FIVE

DISCUSSION

The results show that the respondents were mainly multigraded mothers. Many of them were sick particularly with malaria during pregnancy. Inspite of this, only 4.5% of them did not breastfeed their children. This could be due to the fact that over half of them thought that breastmilk is more nutritious while greater responded that breastfeeding was the traditionally accepted method of feeding the infant. This is similar to result of various surveys in Nigeria (Kazimi and Kazimi, 1979) which shows that Nigerian mother has a positive attitude to breastfeeding. Inspite of this, the model duration of breastfeeding was highest within 7-9 months with a mean duration of 11.2 months.

It was observed that the highest proportion of mothers who were primary school teachers, University lecturers and students introduced infant formula from birth at 1 month. The most reason was that they had to go back to work. This reason was also reflected in the work of Greiner and Penny (1981) who noted that the desire for women to go out to work had led to a decline in breastfeeding.

It is significant to note that a very high positive correlation existed between the age at introduction of infant formula with mothers educational level and income while there was a positive but non-significant relationship between the duration of breastfeeding with mothers educational level and family income. This showed that the higher the educational level and income the longer the duration of breastfeeding. This contradicts the report of Kazimi (1979) and Garette (1982). The difference could be due to the resurgence of interest in breastfeeding that has been reported for developed countries. The positive, though not significant relationship reported between duration of breastfeeding and mothers age has also been reported by Garette (1982).

The practice of weaning showed that majority of the mothers introduced weaning food between 4 - 6 months. This is similar to the study done by Osuhor (1980). The reason given for the introduction of solid foods were mostly because they thought that breast and bottle were not enough. This was also similar to the study reported by Kaine (1984).

When nutritional and health status was assessed using anthropometric measurement, it was observed when results were compared to NCHS standards that irrespective of the indicators used, majority of the infants were found

to be normal. In addition, chest/head ratio of 54 out of 108 infants were less than one which strongly suggested the presence of malnutrition among the infants. This is because in protein-energy malnutrition, the chest does not develop well probably due to wasting or poor growth. For all the indices of nutritional and health status used, result showed that health and nutritional status of infants was related to pattern of feeding and occupation of mother.

Considering infant feeding pattern and its effect on nutritional status, it was surprising to note that, irrespective of the parameters used, the children who were equally breast and bottlefed had the highest proportion of well nourished children and lowest level of malnutrition. It could be that the formula helped to supplement the intake of such children rather than replace them. This can be confirmed by the fact that 28.6% of the solely bottlefed infants were severely malnourished. This finding is supported by Kazimi (1979).

Although introduction of solid food is said to be best between 4 - 6 months, the result here showed that children who were fed between 0 - 3 months had the highest rate of well nourished and lower rate of malnourishment. This could indicate that breastmilk

secreted or breast/formula ceased to be adequate for some children before or at 3 months. Mothers had given this as a reason for introducing solid food. However, physiologically the young infant is not ready to accept and utilize solid foods until the age of 4 - 6 months. Fomen (1976) noted that secretion of gastrointestinal amylase is not efficient until 4 - 6 months of age and the extrusion reflex which compels the child to push vigorously against any food is still very active before 3 - 4 months of life. This does not conform with the researchers result.

Weaning is a dangerous time for infants. It is well known that there is a higher rate of infection particularly of diarrhoea during weaning than any other period of life. This is because the diet changes from clean breastmilk which contains anti-infective factor, to foods which are often prepared, stored in and fed in an unhygienic ways.

Furthermore, socio-economic characteristics were shown to have affected nutritional status of the infants. Correlation of nutritional status and family income showed that there was a significant relationship. The proportion of normal infants increased with increasing income. This then shows that with an increase in income families are

able to have increased production of foodstuffs thereby improving the nutritional status of the infants. Also common childhood illnesses like measles, vomitting and diarrhoea disease are known to cause major upsets in the nutritional status of children were among the findings.

The dietary intake of the infants when compared with FAO recommendations showed that almost all the infants had met their energy requirement except one infant aged 1 year 1 month. When the infants weight was compared with NCHS standards, it was found to be severely malnourished. With regard to protein intake, it appeared that all the infants met the FAO requirements. However, this does not guarantee that all the infants met the requirements because when the weights were compared with NCHS standards, it was found that the infant aged 1 year 5 months was moderately malnourished, while the rest were all normal. For minerals, the Calcium intake was poor for an infant aged 1 year 6 months. This could be due to low intake of animal protein foods such as egg, milk and meat among the people of Nsukka. Leafy vegetables if eaten in good quantity could be a good source of calcium. Iron intake were found to be adequate.

With regard to vitamin intakes, it appeared that only some infants did not meet the FAO requirements for Vit A. This could be due to the inadequate wide spread use of red palm oil in a variety of recipes. In addition, Thiamine, riboflavin, and Niacin requirement were low. This could be as a result of the types of food consumed by infants because the above nutrients have their chief sources as milk, eggs and organ meat which are rarely given to infants. Also, it is still common to find unequal distribution of food in the family where the younger children are deprived of these foods because the biggest portion of the food is given to the head of the family.

Although account was not taken during cooking and processing, it is possible that cooking and processing could lead to losses of riboflavin. This is supported by Edijala (1980). The low niacin could also be due to high consumption of maize in their community as observed during the survey. Ascorbic acid was adequate for all the infants which was accounted for high consumption of fruits.

CHAPTER SIX

CONCLUSION AND SUGGESTIONS

6.1 Conclusion

This study has examined the broad topic of the effect of infant feeding habbit on health and nutritional status of infant and lactating mothers. It can be concluded from the above discussions that the infant feeding pattern affected both the nutritional status and health status of infant and lactating mothers.

However, other factors such as mothers level of education and income affected both the infant feeding practices and nutrition and health status. Effect of the practices could therefore rarely be affected by the socio-economic characteristics.

With reference to the 24 hours dietary recall, it is obvious that the infants suffered from severe protein deficiency since protein source foods especially animal proteins and legumes were found to be low in the daily meals of almost all the families.

Infections such as diarrhoea, measles and boils could have caused malnutrition in these infants since majority of them had frequent attack of these diseases. According to Okeke (1988) all the factors can cause

malnutrition in children either by imparieement of nutrient intake or utilization. Dietary intake showed that energy and protein requirements were met but when the weights were compared to NCHS Standards some were moderately and severely malnourished. Finally Calcium, riboflavin, niacin and thiamine intakes were observed to be low when compared to FAO recommendations.

6.2 Suggestions

Having seen the need to practice proper patterns of infant feeding and its effect on nutritional status and health status of the infants. Some suggestions were made.

(1) Doctors, nurses, dietitians, nutritionists and other health personnel should counsel mothers on the need to know what the current practices and problems are through relevant nutrition and health education.

(2) Government should reconsider its policy on condition of service for working mothers since employment has been shown to be one of the problems associated with poor infant feeding practices. Extended maternity leave, provision of places where mothers may feed their children at intervals and

establishment of government subsidized day care centres near the work place are some of the policies that may improve the situation.

(3) Mothers should be told that a child needs three good meals a day. Mothers should not be persuaded to buy protein rich foods of animal origin, this is an unjustified expenses. The increase in consumption of legumes and cereals should be encouraged since they are relatively cheap and excellent sources of energy and protein.

(4) Provision of adequate health care services in rural communities can help to reduce rate of infection and disease in young children.

(5) Also, improvement in the agricultural produce will go a long way to improve nutrition by creating a wide variety of foods at low cost.

(6) Finally, one of the ways of improving the nutritional status of infants in this area is by formulation of weaning foods based on locally available foods that are popularly used for weaning.

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