RELATIONSHIP BETWEEN SELECTED MALNUTRITION PROBLEMS AND CHILD FEEDING PRACTICES:

Implications for Nutrition Education

By

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DEDICATED TO

JAMES, NANA AKUA

and

OSEI KWAME

FOR THEIR LOVE AND UNDERSTANDING

ABSTRACT

A retrospective study was designed to examine the relationship between child feeding practices among mothers and occurrence of severe protein-energy malnutrition (PEM) in children. The background information on socio-economic status, literacy, housing, sanitation, marital status and employment, which could have influence on the above relationship, were also considered.

A total of two hundred and fifty (250) mothers were interviewed, using a pretested structured interview schedule. The group consisted of mothers of 77 kwashiorkor, 73 marasmic and 100 healthy children, who acted as controls. The malnourished and control children were matched for sex and age, all being between 0 and 3 years. The mothers of the malnourished groups were those who reported at the General Out-Patients' Department (G.O.P.) of the University College Hospital (U.C.H.) between November, December 1978 and January 1979, without selection. Kwashiorkor, marasmic and control were defined according to the Wellcome Classification.

The results showed that females suffer more from malnutrition than males and the kwashiorkor children were older than the marasmic ones. The birth order of

the child, marital status and age of the mother did not appear to contribute to the causation of severe protein-energy malnutrition. The education and occupation of the mother and father were found to have a significant influence on predisposing a child to the disease. The type of housing, quality of sanitation, furniture and appearance of the mother, were all found to be significantly better in the control group.

Feeding practices were also significantly different between the control and malnourished groups, in terms of breastfeeding, frequency of breastfeeding, difficulty in breastfeeding and age of complete weaning. The methods of supplementary feeding and sterilization of bottles were found to be superior among the mothers of the control group. The qualitative and quantitative intakes of food after weaning, during the week before the illness and on the day previous to the interview, were also found to be far better in the control group, as compared to the malnourished ones.

The control mothers were also found to be superior in their knowledge with respect to diets during pregnancy, lactation, weaning and sickness of the child. Most importantly, the mothers of the malnourished groups were

not even aware that severe PEM was a disease of dietary origin.

On the basis of these findings, the implications for nutrition education were discussed and recommendations made.

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CERTIFICATION

We certify that this work was carried out by M. R. Osei (Mrs) in the Department of Preventive and Social Medicine, University College Hospital, University of Ibadan, Ibadan, Nigeria.

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Definition of Terms

(1) Child feeding practices - patterns of all the activities carried out by mothers in relation to the feeding of their children (breastfeeding, weaning, types of food, how much, how it is given and when it is given).

(2) Knowledge - is the condition of possessing with mental grasp, through instruction, research or experience, one or more truths, facts, principles or other subjects or perception about a subject.

(3) Complete weaning or stoppage of breastfeeding - when the mother stopped giving breastmilk to the child.

(4) A week before the illness - the week prior to when the mother realised that her child was sick.

(5) Family compound - a big compound enclosing a number of houses belonging to members of an extended family.

(6) Retrospective - refers to the study of past feeding practices of mothers.

INTRODUCTION

Although mortality rate among preschool children could be said to have fallen considerably in the last fifty years (Bengoa 1974), it still constitutes a major health problem to many developing countries (Muller 1976). Contributory factors range from ignorance and poverty to poor diet and inadequate medical care, both in terms of therapy and prevention. In this context, malnutrition plays a considerable and an important role.

The vast majority of these early childhood deaths have been attributed to infectious diseases (Borg 1968). Yet most, if not all, of the diseases are preventable. The cause of the deaths, we now know, is not always the infection itself but usually the malnourished condition of the child at the time of the attack. In other words, malnutrition weakens the defences of the body to such a degree that it is incapable of resisting what would otherwise be a passing infection. Indeed more than 50% of these deaths are found to have malnutrition as an associated and/or underlying factor (Bengoa 1974), apart from acting as a direct cause in 20% of cases (Bailey 1975).

In Bengoa's (1974) conservative estimation, there are 100 million PEM children in the world, most of them in the developing countries. Out of these, 10-20 million are

severely malnourished. In Africa alone, 2.7 million children suffer from severe protein-energy malnutrition while 16.2 million live under the scourge of mild to moderate conditions of the same health problem (Bongoa, 1974). In Nigeria, Brock (quoted by Collis et. al. 1962), contended that for every one case of kwashiorkor there were 100 cases of protein malnutrition in the pre-kwashiorkor condition. Working on this premise, it was estimated that at any one moment, there would be 20,000 and 30,000 cases in Ibadan and Ilesha and its districts, respectively. Morley (quoted by Collis et. al. 1962), was getting 300 cases of kwashiorkor at the Wesley Guild Hospital, Ilesha, in one year, while Hills (1960) reported 450 cases for two years in her nutrition clinic at U.C.H. Bassir (1953) also reported that 70% of infants admitted to a hospital in Eastern Nigeria suffered from malnutrition.

The African woman has been acclaimed by many workers (Jolliffe, 1953; Trowel et. al. 1954; Brock and Autret 1953; and Williams 1933) as good lactators. This cherished and natural role of motherhood continues, sometimes for about 2 years or even more, when the child is completely weaned. Yet despite the uniqueness, importance and advantages of

breast milk in human nutrition (Jelliffe and Jelliffe, 1978; Jolliffe, 1976; Omololu 1975), many African children start to be malnourished as early as the third month (Whitehead, 1976; Botha-Antoun et. al. 1968; and Janes, 1974).

The main reasons for such an unsatisfactory situation in the developing countries are said to be:

(1) decline in breast feeding,

(2) availability of commercial milk formula and switching onto it by many mothers, leading to over dilution of the milk and contaminated feeding,

(3) scarcity of local weaning and supplementary food and reluctance of the mothers to use locally available foods,

(4) introduction of weaning food too late and too little in amount to cater for the nutritional needs of children,

(5) lack of knowledge of food values, superstitions and food taboos,

(6) unhygienic environment leading to high infection rate,

(7) unstable family life,

(8) unplanned families characterized by short birth intervals and large family size,

(9) inadequate MCH services,

(10) low educational level among mothers, and

(11) low socio-economic status.

(Bailey 1975, Jelliffe 1976, Morley 1968, Ogbeide 1976, Shah 1975).

Inspite of this awareness, surprisingly, little information is available in the literature on the feeding practices of mothers in quantitative terms, in Nigeria, which is essential for any intervention programme. In the present dissertation information has been presented on the feeding practices involving two specific syndromes of PEM, both in quantitative and qualitative terms and correlated with other socio-cultural variables with the hope of filling some of the gap in our knowledge in this essential field. Hopefully, this will help us to formulate educational intervention programmes more realistically.

A: A Kwashiorkor Child.

B: A Healthy Child.

C: A Marasmic Child.

CHAPTER I

THE PROBLEM OF SEVERE PROTEIN-ENERGY MALNUTRITION

The term protein-energy malnutrition consists of a broad spectrum of clinical syndromes, all of which are accompanied by retardation of growth and development. Two severe clinical forms are recognised; nutritional marasmus and kwashiorkor. An intermediate form with features of both is known as marasmic kwashiorkor.

'Kwashiorkor' the name given to the disease by the Accra people of Ghana, was first introduced into medical literature by Cecily Williams (1933). It means 'the disease the child gets when the next baby is born', that is the sickness of the child deposed from the breast. Since then many nomenclature have been proposed to describe similar syndromes in different countries by different workers. Trowel (1941) described the syndrome as infantile pellagra while it was known as Gillian's disease (Kenya), avitaminosis (Costa Rica) and William's disease (West Africa). However, the name 'kwashiorkor' still remains the most widely used.

While nutritional marasmus results from insufficiency of energy containing foods in the diet, kwashiorkor is due primarily to a protein deficiency with varying levels of caloric intake (Bailey 1975, Alleyne et. al. 1976). Depending on his circumstances, a child may proceed to become either a marasmus or kwashiorkor case. Similarly, interchange

of cases from marasmus to kwashiorkor and from kwashiorkor to marasmus, can occur in actual practice.

In field situations, these two severe cases are distinguished from each other by two main features, namely, the body weight of the child in relation to his age as compared to a reference standard* and the presence or absence of oedema (Wellcome Trust Classification, 1970). A child is, thus, said to be suffering from marasmus when his weight is less than 60% of the standard* and there is no oedema. Kwashiorkor on the other hand, presents with obvious oedema with the body weight between 60% and 80% of the standard. However, in order to exclude other medical conditions, other characteristics are usually looked for. These include hair changes, skin changes, mental apathy in kwashiorkor and loss of subcutaneous fat gross muscle wasting and obvious growth retardation in marasmus.

Marasmus and kwashiorkor are primarily childhood diseases, occurring mainly in the first four years of life. They are greatly influenced by the age of weaning, the types of weaning foods used, the form in which they are presented to the child and the amount of each food served, that is, the quantity reaching the child. Consequently, marasmus is predominantly found among children who are weaned early and in most cases, abruptly, onto little carbohydrate and protein solid foods. Kwashiorkor, on the other hand, is more

*Standard = 50th percentile of the Havard Standards

prevalent among prolonged breastfeeders who are given sufficient quantity of carbohydrate-rich family diet, in most cases. The pattern of weaning then determines to some extent, the distribution of marasmus and kwashiorkor among the infant groups (Jelliffe 1953; Bailey 1975; Gurson et. al. 1975; and Omer et. al. 1975).

In Iran, Hedayat et. al. (1968) found that marasmus outnumbered kwashiorkor in the ratio of 4 to 1 during the first year of life, the cases of kwashiorkor almost equal those of marasmus in the second and then occurred more frequently in children over two years of age. In Philippines, the distribution by age is not as clear cut as both syndromes seem to be equally distributed among infants (W.H.O. 1968). The incidence of marasmus has been reported to be twice as high as kwashiorkor in poor Indian communities (Someswara et. al. 1959).

In Ibadan, Laditan and Reeds (1976) found no significant differences between the mean ages of kwashiorkor and marasmic children. However, at the national level evidence indicates a higher prevalence of marasmus, 3.4% as against 1.1% for kwashiorkor, during the first year of life (W.H.O. 1976). The differences between national figures and those of Laditan and Reeds could have resulted from many factors. Their series included only 19 and 20

cases of kwashiorkor and marasmus respectively, Further, their sample was taken from a teaching hospital which mainly caters for a particular locality while the national figures are more broad based and more representative of Nigeria. Again, reports from other countries also support the national statistics (W.H.O. 1976).

Kwashiorkor and marasmus are, thus, important health problems in children under 5 years of age, and are well known to the medical profession and extensively studied. Many factors are responsible for their causation but infant feeding practices have been reported to play a decisive role in their occurrence.

Child feeding practices and severe PEM

Since 1933 when physicians, pediatricians and nutritionist started to become aware of the effects of malnutrition on the growing child, a lot of resources have been redeployed to ascertain the etiology of the diseases involved. And many are the factors that have been elucidated as causative. Infact, Morley and his co-workers (1968) came out with as many as nine significant factors which predispose the child to protein-energy malnutrition, especially marasmus and kwashiorkor.

One of the most significant factors was found to be the pattern of child feeding practices. Breastfeeding, its duration, methods of cessation of breast feeding, types and quantities of supplementary food and foods given to the child

after completo weaning, were all found to be very important. This supposed rolationship has thoreforo, boon oxamined by a number of workers in different countries (Hijazi, 1974; Hodoyat et. al. 1968; Jansen 1977; Ogboido 1976; and Jolliffe 1953). Despite the regional, community and ethnic differences, thore seems to be a common trend which suggests a strong rolationship between child feeding practices and the occurrence of kwashiorkor and marasmus. However, it is worth noting that most, if not all, of these workers dealt with the qualitative value of the different diets, thus neglecting the quantitative aspect.

In 1955 (W.H.O. 1973) The World Health Organisation established a small group of eminent clinical nutritionists and pediatricians to advice on the safety and nutritional usefulness for infants and young children of various protein foods and supplements in relation to malnutrition. In its report, the group emphasized the great inadequacy of both protein and calories actually reaching the pre-school child, in most developing countries. It also named cultural practices as one of the ways young children are denied sufficient access to protein foods. As a remedial measure, therefore, the group suggested the utilization of more of the locally available legumes and animal protein foods for weaning and toddler diets.

Writing on kwashiorkor, Brock and Autret (1953) reported on child feeding practices in Senegal in relation to this disease. They observed that breastfeeding continues till the latter part of the second year. However, supplementary food consists of gruels of boiled and fermented millet together with snacks from the adult diet. They further reported that from the age of 18 months onwards, the child is given the softer portions of the family diets composed mainly of starchy foods. These are eaten with a rather spicy stew and this obviously leads to irritative type of diarrhoea. The cumulative effect of this poor diet and frequent diarrhoea set the stage for the occurrence of kwashiorkor, they concluded.

Among Iranian children, Hedayat et. al. (1968) elucidated the basic cause of severe PEM as inadequate breastfeeding and early weaning onto a bottle-fed diet of low nutritional value and high bacterial contamination. They observed further, that the habit of giving sweetened tea or water to children and thereby providing on the average 40gm. of sugar a day, contributed to the occurrence of kwashiorkor. Also, in Sudan, the pattern of protein-energy malnutrition was found to be determined to a large extent by the duration of breastfeeding and the method of weaning. As many as 59% of the children suffering from marasmus and kwashiorkor were weaned abruptly while only 12% of them had been gradually

weaned onto a mixed diet at an average age of 15.6 months (Omer et. al. 1975). In many instances, supplementary foods which were offered in the second year were too little and meant for taste rather than nourishment, they emphasized.

Careful studies in India (Gopalan 1968) did not show any qualitative and quantitative differences between the diets of children who developed kwashiorkor or marasmus. The diet of the children, however, were found to be deficient both in protein and calories. Jelliffe (1976) examining the World trends in infant feeding, highlighted the need for and the advantages of breastfeeding. He attributed the high prevalence of late marasmus and kwashiorkor in developing countries, to the shift from breastfeeding to the use of artificial milk, scarcity of weaning and supplementary foods and the reluctance of mothers to use the locally available foods. Poor and nutritionally inadequate supplementary feeding was also reported to be a significant factor in the otiology of protein-energy malnutrition in Turkey (Gürson et. al. 1975).

Considering the social and cultural aspects of severe PEM in Jordan, Hijazi (1974) reported that the mean weaning age for marasmic group was 15.0 months, while the kwashiorkor children were weaned at a mean age of 15.8 months. In addition as many as 55% of the malnourished cases were abruptly weaned as against 10% for the control group.

Furthermore, solid foods were introduced to 85% of the malnourished cases at the age of 8 months while the control group started at the age of 6 months. He also observed that eggs, yoghurt, cereals, meat and fruits were the main weaning foods for the control group, while bread, tea, rice and biscuits formed the principal food items for the malnourished children.

In Tanzania, Okeahialam (1975) also found that 76% of his sample (n = 150) were breastfed for more than six months. However, supplementary foods which consisted mainly of ugi, a local maize gruel, and sugar were generally introduced about the 6th month. He observed further, that while few mothers added milk to the mixture, vegetables, eggs, fish or meat were not introduced by this period. Out of the 150 children, only 15 had been fed on fish, meat or eggs before the age of 1 year.

From the analysis of the records of paediatric patients for consecutive years at Cocody hospital in Abidjan, Adou (1975) found that 23% of 128 children suffering from severe PEM were weaned early onto artificial milk, although the mothers had neither the means nor the knowledge necessary to bottlefeed a baby correctly. Also, in Freetown, Robbin-Coker and Jalloh (1975) reported that 13% of 123 cases of severe malnourished children had never been breastfed while 89% aged less than 6 months, were

already off the breast. Further, supplementary foods consisted mainly of rice and imported grain products like custard and cornflour which were beyond the purchasing power of many mothers.

Nigeria, just like other developing countries, is saddled with many childhood diseases with PEM figuring prominently. Consequently, a sizable number of surveys and researches have been carried out on the etiology of PEM as it relates to feeding patterns.

In a pilot nutrition survey carried out by Nicol (1953) in the Western state of Nigeria, many nutritional problems were identified, including kwashiorkor. With respect to this disease, he reported that caloric intake was lower than the optimum and was mainly from carbohydrate sources such as gari and yam. In the same year, Jelliffe gave a detailed account of infant feeding among the Yorubas of Ibadan. He reported that breastfeeding continued for nearly 2 years for most children who were fed on demand rather than by schedule. However, supplementary foods were introduced rather earlier than usually considered to be the case in West Africa. These consisted almost exclusively of carbohydrates with a low content of protein, vitamins and minerals. He emphasized that meat and fish were rarely given to those children.

Again, in their study of the 'Ecology of Child Health and Nutrition in Nigerian villages', Collis et. al. (1962)

reported on the documentation of daily dietary intakes of 5 kwashiorkor and 4 non-kwashiorkor children by Olaniyan. Considering caloric intakes, the kwashiorkor child received 837 as against 1,371 for the non-kwashiorkor child. For these values, the kwashiorkor child derived as much as 73.3% of it from carbohydrate source while the non-kwashiorkor child obtained 64.8% of his calories from the same source. Conspicuously and significantly absent was meat from the diet of the kwashiorkor child. In contrast, the non-kwashiorkor child received 2-4gm. of meat a day. Fish was present in the quantities of 0.2gm. and 0.5gm. for the kwashiorkor and non-kwashiorkor children respectively. From this analysis, an inference was made on child feeding patterns and the occurence of kwashiorkor.

Working on the same problem of malnutrition in Imesi, Morley and his colleagues (1968) reported that it is the custom to start giving solid foods during the first year. This is mainly pap (ẹkọ) made from maize, which due to the traditional method of preparation, loses a high proportion of its protein content. This observation confirms that of Jelliffe as found in Ibadan (1953). Another solid food is steamed bean cake ("ole") which is introduced 4-5 months later than the maize pap. However, the popper content is so high that the amount the child actually takes is virtually insignificant.

Laditan and Roeds (1976) did not find any differences in the dietary histories of children with marasmus and kwashiorkor at the UCH. They reported that the weaning diets consisted of solely maize-starch gruels with no supplementation of protein or vitamins for both groups. Ogbeide (1976) also reported that malnutrition among children of the mid-western state of Nigeria was associated with the poor nutritional state of mothers, resulting in inadequate supply of breastmilk, bad weaning practices, and early weaning.

From this limited review of literature on weaning practices in Nigeria and elsewhere, a certain set pattern is evident. Weaning starts around 6 months of age, mainly with starchy gruels. Most of the data are qualitative and very little on the quantitative intake of nutrients have been reported for Nigeria.

Admittedly, the dietary aspect of such a tremendously important health problem should be studied in much more detail so as to help us to put nutrition intervention measures on a firmer scientific basis.

The Decline in Breastfeeding and PEM

Breastfeeding is the traditional and ideal form of infant nutrition, usually capable of meeting the child's nutritional needs for his first four months of life. Even after the essential introduction of supplementary foods,

human milk can serve as an important continuing source of a child's nutritional well-being. From the sixth to the 12th month, it can supply up to three quarters of a child's protein needs and a significant portion for some months beyond (Gopalan (1968). As Omololu (1975) pointed out, breastfeeding is so natural that its significance in the growth and well-being of a child has been taken for granted in many communities.

Indeed, many workers have emphasized the qualitative advantages of breastmilk as against commercial formulas for the better health of the child (Jelliffe and Jelliffe, 1978; Harfoucho 1970; Omololu 1975 and Borg, 1968). Breastmilk is healthful and clean, thus lowering the risk of intestinal illness and general infections. Furthermore, it provides a host of protective factors making the baby resistant to malaria and other infections caused by bacteria or viruses. Since it is easily digestible, the baby is generally receptive and since it is readily available, it requires no preparation. This allows the mother to go about her business without the interruption needed for preparation and yet give immediate answer to the baby's feeding demands, when necessary. Another dimension to the issue is the birth control aspect of breastfeeding.

Yet, despite the numerous advantages, decline in breastfeeding has been found to be on the increase and contributes

in no small measure, to the etiology of severe PEM, especially marasmus. Reasons for this decline given by mothers and workers of different countries are complex and as varied as numerous. Among these are:

- the changing role of women as traditional housewives and farmers to income earners,
- urbenization which imposes economic and psychological strains on mothers,
- the tendency for mothers to look down on breaot-feeding
- aiding and abetting by some members of the medical profession
- pressures of commercial advertising, and
- low educational level and ignorance among mothers

(Ogbeide, 1968, Ogbeide and Goyea, 1975; Adou, 1975; Okeahialam, 1975; Jelliffe 1976; and Jelliffe and Jelliffe 1978; Ogboide 1976). While we would not attempt to diocuss the reasons in detail, few references would highlight the problem under roview.

Twenty years ago, 95% of Chilean mothers breaotfed their children beyond one year. But, by 1969 only 6% did so and only 20% of the babies were being nursed for as long as two months (Monckeberg 1969). In Singapore, the decline has been reported to be quite dramatic. Between 1951 and 1960, there was a decrease from 71% to 12% of children in low income families who were breastfed at least 3 months

(Berg 1973). In Kelantan, Balakrishnan et. al. (1977) found that 95% of mothers breastfed their children at least twice a day but out of these, only 18% breastfed for at least 3 months while the percentage ie still lower, 9% for up to 6 months.

In many traditional communities in Africa, the age for complete weaning had been reported to be at least 1 year (Jelliffe, 1953; Trowel et. al. 1954; Morley et. al. 1968). In most cases, the child would be walking by thie time and could take softer parts of the family diet, with the breastmilk serving as a supplement. The African child has lived among relatives and other community members who act as teachers, most of the time indirectly, of breastfeeding to her. Thus, she grows up with the cherished hope of breastfeeding her babies later. Yet, due to the changes in life pattern in the name of urbanization and modernity, few are the mothers who realize this hope. This unfortunate situation has not only caught up with mothers of the high income group who, in many respects, could afford the financial and sanitational demands of bottle feeding, but also, mothers of low-income group who can hardly make ends meet.

The cost of this decline could be computed in many ways. In terms of child morbidity and mortality, the loss is tremendous. Apart from malnutrition per se being a killer (Bengoa, 1974 and Bailey 1975), the child is made all the

more vulnerable to other infectious diseases like measles, broncho-pneumonia and gastro-enteritis which are responsible for a considerable proportion of infant mortality (Scrimshaw et. al. 1959). This is partly because the anti-bodies conveyed through breastmilk in the child are greatly reduced when the period of breastfeeding is curtailed. The cost involved in hospitalization and treatment of these children are yet to be worked out for many African countries, but a cursory look at the number of cases reporting at various hospitals indicate that the cost would be enormous.

In the Caribbean Commonwealth, Lowenstein (1971) on the basis of previous work done, estimated the cost to be U.S. $422,500.00 in 1967. This figure represents 3% of the total health budget of these islands! Coupled with the unfortunate decline is the pressure brought to bear on many governments to import commercial formulas since these cannot be produced locally and furthermore, weaning foods made from local foodstuffs are not available. This constitute a major slash in the hard earned and scanty foreign exchange reserves of most of these countries. In Singapore, the decline in breastfeeding would have needed U.S. $1.8 million annually to purchase formulas as replacement for the breastmilk lost (Borg 1973). In Columbia, as breast-feeding declined milk imports increased rapidly, in 1968

imports were 7 times greater than 1964-67.

The individual families are also affected equally if not more. In a recent investigation carried out in Los Angeles (Jelliffe & Jelliffe, 1975) it was found that these formulas are 3 times as expensive as the cost of supplying the additional nutrients to the mother in the form of everyday foods. In African countries the cost would definitely be more than 3 times! So considering the low earnings of most workers in developing countries, the purchase of adequate quantities of the formula would take 25-50% or more of the family's earnings. A labourer in Uganda may need to spend as much as 33% of his daily wage to feed his baby on milk, in Chile 20%, in Tanzania 50% (Berg 1973). These percentages do not include costs of bottles, teats, cooking utensils and perhaps, most importantly, medical care which is frequently ten times greater than for breastfed babies. No wonder then, mothers in periurban slums are feeding their children with dilute milk formulae, thus, adding to the number of marasmic children.

What about the cost in terms of wastage of the much needed breastmilk protein which in many instances, especially in poor communities, serves as the determining factor for the survival or death of the child. Though direct computation may be difficult, an estimate on the basis of the amount of milk produced by mothers of

different communities for the first 6 months post-partum, could be found. Gopalan (1959) found in poor Indian communities that a child who is nursed through the first two years of life receives an average of 375 litres of breast milk. This is nutritionally equal to 437 litres of cow's milk which cost about $65, not insubstantial portion of most family incomes in developing world. Addy (1975) shared the same view that the decline in breastfeeding constitutes a great loss of first class protein (as breastmilk). He observed further that the estimated loss in Chile in 1970 was 78,000 tons while in Kenya, in terms of financial loss the figure is $11.5 million annually.

Another loss in relation to the decline in breastfeeding is its curtailed birth-spacing ability (Jelliffe 1976 and Omololu 1975). Average birth intervals have been reported to be about 1 year in the non-breastfed, 2 years with natural lactation and 3 years with natural lactation plus postpartum sexual abstinence (Van Balen and Ntabomvura quoted by Jelliffe 1976). Thus, with a decline in breast-feeding, these intervals might be shortened with resultant rapid successive pregnancies, which are neither in the interest of the mother nor the child. In the African context, it means a child deposed from the breast who will be a potential candidate for kwashiorkor.

In considering the cost of the decline in breast-feeding it might be worthwhile to examine the emotional implication of the problem. From the recent work undertaken on mother-infant interaction, it seems increasingly clear that there is a critical or sensitive period after birth when species-specific reflex action occure between mother and child which facilitate 'bonding' between the two (Klaus et. al. 1970). There is also the contention that the apparent increase in child abuse in some parts of the world has been found to be disorder of mothering, related to many factors including inadequate mother-neonate interaction (Lynch 1975). Though the problem of child abuse could be said to be non-existent in most developing countries, there is a high probability of it appearing soon, in view of the number of women taking on income-earning jobs and, consequently, resorting to bottle feeding. Again, the high rural-urban migration with its attendant social problems, could in the long run contribute towards the emergence of child abuse in the developing world. The cost then is far higher than anticipated.

The decline in breastfeeding among many mothers of poor countries constitutes a major public health problem not only in terms of morbidity and mortality, but also, in terms of financial losses. These losses affect both the individual families as well as countries concerned with

reapect to purchase of formulas, paying for medical care for an artificially-fed child (which is far higher than for a breastfed child), hoapitalization, importation of formulae and the loaa of breastmilk protein, ao vitally necessary to prevent P.E.M., in poorer communities where weaning diets are mostly formulated on foods of vegetable origin.

In addition, there is the problem of quicker succession of ~~pregnancies~~ seen in mothers who do not breastfeed their children or stop breast feeding quite early. Some of the resources utilized on setting up family planning centres in most developing countries could be more usefully diverted to education programmes centred on breastfeeding as a means of birth control, good health for the mother and the child and as a guard against child abuse. This can also reduce the number of marasmic children which outnumber kwashiorkor in about 3.1 ratio in many countries of the world, including Nigeria.

The Health and Social Significance of Marasmus and Kwashiorkor

The health and socio-economic significance of kwashiorkor and marasmus should not only be gauged from the mortality and morbidity caused by them but also, from the permanent sequelae found in the survivors. Those include small body size for age and poor mental development. All of these have tremendous socio-economic implications in terms of loss of productivity, suboptimal mental performance,

human suffering and cost of hospitalization and can thus, become a handicap for national development. Since 1935, a voluminous literature has been accumulated on various aspect of kwashiorkor and marasmus (WHO, 1968; Ogbeide and Goyea, 1975; McLaren 1966; Monckeberg, 1968, 1969; Jelliffe 1976; Brown et. al. 1974) to mention a few. A limited review of the pertinent literature is presented here to highlight the health and social significance of severe PEM.

(i) Morbidity

Kwashiorkor and marasmus are basically diseases of early childhood. Though no age is immune, classically, the diseases affect children under 5 years of age (Jelliffe 1953; Hedayat et. al. 1968; Omer et. al. 1975; Hijazi 1974; Laditan and Reeds 1976; Jenson 1977 and Doesetcr 1975). Ahn Borg (1968) stated that as many as two-thirds of the children in most developing countries suffer from some degree of malnutrition including marasmus and kwashiorkor. In 1972, W.H.O. reviewed 33 community surveys in 26 countries for the year 1952-1966. There was a strong indication that the prevalence of severe protein-energy malnutrition up to 5 years of age ranged from 0.1% to 10%.

Hospital data from some African countries also portray the situation more vividly. In Madagascar severe malnutrition as percentage of admissions in 1973 stood at 8.3% while Mali had 8.1%. For Malawi, the percentage was 0.49%.

From the annual report of the Tanzania District Nutrition Services (1972), 24,588 (6.0%) out of 430,628.00 children seen at the Nutrition Clinics were severely malnourished (Okeahialam 1975). At the Ahmadu Bello Hospital, Dossetor (1975) reported a total admission of 230 children with severe PEM in 1972. Again in Freetown, 717 patients of severe PEM were admitted within a period of 1 year (Robbin-Coker and Jalloh 1975). Although statistical figures were not available, Adou (1975) contended that severe malnutrition was at the bead of the list of admissions at the Cocody Hospital in Abidjan. In Nigeria, 19.6% represented the per-centage of admissions at Massey Street Children Hospital in 1968 (WHO 1976). Bassir (1953) also reported that 70% of infants admitted to a hospital in Eastern Nigeria suffered from malnutrition while for the North, the percentage stood at 31%. Most of these cases were PEM of severe grades.

In considering morbidity in relation to malnutrition, one cannot overlook the relationship between malnutrition and other diseases. The synergistic relationship between malnutrition and other diseases has been well documented by Scrimshaw et. al. (1959). With the body's defences lowered during malnutrition, the child becomes more susceptible to other infections. The severity and outcome of these diseases are significantly related to the nutritional status of the child at the time of attack.

(2) Mortality

The severe forms of PEM contribute to the exceedingly high number of deaths in children under 5 years of age in developing countries. The Food and Agriculture Organisation (Berg 1973) reported that malnutrition is the biggest single contributor to child mortality in developing countries. Apart from its being a direct cause, it acts as an associated and/or underlying cause of deaths.

In Brazil, children under five years of age constitute less than one-fifth of the population but account for four-fifths of all deaths; in India for 65% of all deaths and in Egypt for 68%. In Pakistan, the percentage of 1-4 year olds who die is 40 times higher than in Japan and 80 times higher than in Sweden. While the death rate in Egypt is 107 times higher than in Sweden, in Gambia it is 111 times higher (Berg 1973). Indeed, in some African countries the mortality rates are so high that couples have no alternative but to have large families as a security for old age. In Libya, for example, it is reported that a mother must have five children to assure that one reaches the age of fifteen. In North-east Brazil, 48% of children do not survive the first year of life and by the age of four, 63% have succumbed (Berg 1968). Bengoa (1972), estimated deaths due directly to malnutrition as of the order of 50,000 to 60,000 yearly in Latin America.

Through the Inter-American Investigation of Mortality in Childhood, the Pan-American Health Organization found that 8% of deaths in children 6 months to 2 years, have severe malnutrition as the underlying or main cause of deaths and 57% as an associated cause (PAHO 1968). In Congo malnutrition was found to be responsible for 20% of child deaths, in Central African Republic, 11% and 30% in Ivory Coast. In Tanzania the rate was 50% while in Zambia it stood at 17% (Bailey 1975). At Imesi in Nigeria, Morley (1963) reported that mortality among the 1-4 age group was more than 20 times that of England and Wales. In another village, Osegore, in the same country, Omololu (1972) puts the rate as 14%, while 33% of deaths in children 2-3 years old, were due to malnutrition.

Even among the few numbers of children reporting at hospitals, mortality rates are quite high. In Sudan, Omer and his colleagues (1975) working with malnourished children, reported 16.1% deaths out of the 143 children admitted for both marasmus and kwashiorkor. And this was within a period of just 8 months. Mortality rates as high as 24% among malnourished children in health units and 8.1% outside health units were reported in Senegal. In Sierra Leone, the rate was 5.1% while in Madagascar it was as high as 31.2% (W.H.O. 1976). In Freetown, out of 717 patients admitted for severe PEM, 13.6% died (Robin-Coker and Jalloh, 1975).

In 1953, Bassir also reported a total of 31% admissions made for malnutrition in the eastern part of Nigeria, out of which 41% died. Again, in a longitudinal study in Igbo-Ora in the same country, severe malnutrition accounted for 4% out of 209 deaths (Wennen 1968). In Massey Street Children Hospital, Lagos, the mortality rate was 19.6% in 1968 (W.H.O. 1976).

In addition to the high death rates even under good hospital conditions (Hills 1960; Gomez et. al. 1956), the survivors who are discharged as recovered have a slim chance of continuing to live (Cook 1971). In a follow-up study in Bombay, Ramathan et. al. (1955) reported a recurrence of 30% and mortality rate of 20% at home, in discharged cases. And this is precisely because the children are taken back to the same form of poor environment and in most cases, the mothers are never taught the importance of diet in the treatment of these children at the hospitals.

It is worth noting that the figures under review exclude those for cases which due to one reason or the other never got to the hospitals. In many rural areas in developing countries where no association is drawn between feeding patterns and the disease and also where, in some cases, the disease is considered as normal occurrence at the appearance of the subsequent pregnancy, many of the affected children die without medical attention. If these

deaths are ever to be computed, the task of preventing marasmus and kwashiorkor would become all the more important, deserving the highest priority.

In addition to increasing morbidity with respect to other diseases, malnutrition causes otherwise minor childhood diseases to become killers. For example, respiratory and gastro-intestinal infections in Nicarragua are responsible for 15.3% of all deaths compared to 0.4% in North America. In Guatemala, it is reported that 500 times as many pre-school children die of diarrhoal diseases as in the United States.

The death rate from measles, which is considered as a virulent killer when accompanied by malnutrition, was more than a thousand times greater in Guatemala than in the United States in 1965 (Borg 1973). At Osogoro in Nigeria (Omololu 1972), measles accounted for 17% deaths among the 0-4 year group.

(3) Body Weight and Stature

Body weights and stature have been accepted as one of the parameters of children's nutritional status (Jolliffe 1966). For assessing the nutritional state, the usual practice is to compare the body weight and height of children with a reference standard, either international or national. When national standards are available, it is preferred. Fortunately, such a local standard for Nigeria

is available (Jane& 1974). Studies from many countries of the world (Shakir et. al. 1972; Gomez et. al. 1956; Seoane and Latham 1971; Laditan and Reeds 1976) where malnutrition is common, almost universally reported weight and height deficits in under five children.

For those children who survive severe PEM, they go through life with permanent scars. Studies have shown that these children have height and weight deficits as compared to other children of their ethnic background and social strata (Nwuga 1977 unpublished Ph.d thesis).

Through a controlled study, Ashworth (1969) demonstrated that compensatory growth was very rapid at the beginning of the recovery but that when the expected weight for height was reached, food intake fell abruptly by 30% and growth rates dropped to the level of normal children of the same weight and height but of younger age. In effect, these children become stunted after recovery.

As far back as 1941, Trowel established this relationship and pointed out that the child who suffers severe malnutrition during his childhood:

> never reached his full stature, had a higher probability of falling a ready victim to infections and finally ends in premature senility.

The problem of under stature does not hold significance only for the survivors but also their offsprings, especially

in the case of girls. Naeye et. al. (1969) found out that infants of poor mothers in New York city were at delivery, smaller than infants of non-poor mothers. Working on stature and socio-economic level, Richardson (1966) also found a strong relationship between adult stature and socio-economic statue. This means that mothers of lower-socio-economic status tend to have small babies, a factor which reduces the chances of survival of these babies.

In a group of primigravidae under 20 years of age, caesarian section and perinatal deaths have been reported to be significantly higher in those whose heights were 60" or less compared to others whose heights were more than 61" (Thomson 1968). Recently body weight has been reported to be the single most important factor that is related to the work capacity of adult factory workers in India (Satyanarayana et. al. 1978). Similar association have been reported for boys and adolescents (Satyanarayana et. al. 1978). This means that a small adult body size due to early malnutrition especially due to severe PEM can be a significant factor in low productivity in populations where PEM is very common.

(4) Mental Performance

The association between malnutrition in pre-school children and low levels of mental performance has been amply documented in several regions of the world where

malnutrition is highly prevalent (Brown 1965 in Uganda; Graham 1964 in Peru, Stoch and Symethe 1967 in South Africa). In 1968, Monckberg reported that severe malnutrition affects intellectual development especially if it occurs during the first six months of life or possibly in the first two years. So that even though developmental quotients increase during rehabilitation, thus diminishing the difference between mental and chronological age, these children never score the expected values for their respective ages.

Yatkin and McLaren (1970) studied two groups of children recovering from malnutrition, using Griffith's scale. Both groups had the same dietary and medical treatment, the basic difference being the amount of stimulation offered to them. At the end of the observation period (4 months), the stimulated group had a higher performance quotient. However, both groups never reached the expected values for their respective ages. Further, a greater deficit was found to occur in the area of language and communication.

In another follow-up study of 36 Serbian children who had been hospitalized at the age of 4-24 months, Cabak and Najdavic (1965), found that at the ages of 7-14 years their IQ level was 88. This figure was significantly lower than the value of 93 found in a group of normal children of unskilled workers. It is interesting that one third of the

fathers of the rehabilitated children, were either professional or army officers and the rest skilled and unskilled workers.

Liang et. al. (1967) and Champakam et. al. (1969) showed in Indonesia and India respectively, the same relationship. Again, in Mexico the intelligence lag among pre-school children who had suffered severe malnutrition before their 30th month of life was assessed. The results showed that while 9 of the 37 siblings had intelligence quotient below 70, 18 survivors of malnutrition were in this range. In contrast, only 4 malnutrition children scored above 90 while 10 sibling controls obtained these values (Cravioto et. al. 1969). Berg (1973) contends that the antecedents of this mental lag are the suboptimal development of auditory-visual competence and visual-kinesthetic intersensory integration, an ability related to learning to write. Hwuse (1977), in a recent follow-up study in Ibadan found that children who had kwashiorkor had lower levels of certain types of intellectual skills - specifically, the higher cognitive skills at school age than their siblings, classmates and controls except their rural counterparts. He also reported that severe kwashiorkor appeared to have a selective long term effect on short term memory, logical reasoning, perceptual organization and the ability to synthesize and analyse.

Thus, the available information provides strongly suggestive evidence of the effect of nutrition per se on intellectual competence, both directly and indirectly.

In the line of direct relationship, it has been found that severely malnourished children have brains smaller than average size and have been found to have 15-20% fewer brain cells than in well-nourished children (Mönckeborg 1969). It is also known now that the brain achieves 70% of its adult weight by the end of the first year with corresponding 80% of the growth occuring by the first 2 years. During this period the body, on the other hand, achieves 20% of the adult weight (Scrimshaw, 1967; Brown, 1965; and Winnick, 1969). Thus, the first three to four years of development of the young child are very vital for normal growth of the brain and coincides with the critical period of sequential maturation and myelinization of the brain as it integrates into functional units in the development of mental ability. It, therefore, stands to reason, that protein-calorie deficiency serious enough to limit gain in weight and height would also limit brain growth during the first 3 years when the brain is undergoing most of its increase in size.

Indirectly, there is the factor of loss of learning time and as such some months of experience when the child was ill and not reacting with his environment. Secondly,

there is the problem of interference with critical periods of development which may result in disturbance of functions that are both profound and of long term significance. Lastly, is the lack of active interaction between the child and the mother during the illness. One of the first effects of malnutrition is a reduction in the child's responsiveness to stimulation and the emergence of various degrees of apathy. This in turn generates apathy on the mother's side which can have consequences for stimulation, learning, maturation and interpersonnl relations. The subsequent result is backwardness in performing more complex learning tasks.

This clearly implies a higher risk of failure to profit from school exposure (Berg 1968). And this definitely has serious repercussions for the individual families as well as the national development, especially in a pre-industrial society.

Sending a child to school imposes a real sacrifice on the parents and other members of the household. Consequently, the demand for the child leaving school to contribute to the financial strength of the family, and look after his younger siblings could not be over emphasized. But, operating at a lower quotient means additional years in school with repented failures. Oyagie (1971) stated that in Central America, Brazil and India, 26-30% of children

repeat their first school year at least once and 17-26% repeat the second. Sixty per cent of first graders in Pakistan (1959), Central America (1961) and 67% for Mexico (1966), dropped out before the end of the first year. Unfortunntely such figures are not available for African countries to demonstrate the magnitude of the problem.

In any case, despite repeated failures some of these children manage to go through with grades which qualify them to work at a particular level which put a ceiling on the income remuneration. Coupled with this is the tendency for them to marry women of their own level thus, producing children who are bound to suffer the fate of their parents. Winnick (1970) sums up by saying:

> the malnourished infant growing up in poverty is unable to acquire the skills to deal with the complexities of modern society. The result is that he remains poor for the rest of his life and his children are born into the same social and economic conditions. The family does not have the resource to adequately nourish the new infant. He in turn becomes seriously malnourished and if able to survive is handicapped in such a way as to prevent him from extricating himself from the plight of his parents. Thus a condition of poverty is perpetuated and will be passed from one generation to the next.

From this discussion, it appears that severe PEM does not only cause exceptionally high mortality and morbidity in young children, but also, is responsible for sub-optimal growth.

and mental handicap among the survivors. This would prevent optimum human, economic and social development, so vital for improving the level of living in any community and should deserve high priority in resource allocation in its own right.

CHAPTER II

THE STUDY

The Scope

The study dealt specifically with the severe syndromes of protein-energy malnutrition (PEM) namely marasmus and kwashiorkor. The children included in the sample were aged between 0 and 3 years. All of them came from the lower socio-economic group.

The decision to concentrate on marasmus and kwashiorkor instead of examining the wide spectrum of protein-energy malnutrition (PEM) was made on the basis of certain factors.

(1) The problem of definition of the mild to moderate cases of protein-energy malnutrition makes diagnosis quite complicated and non specific. Objectively, there is no strict demarcation between mild and moderate cases. On the other hand, marasmus and kwashiorkor could be said to be the two ends of the spectrum with distinguishable signs clinically, physiologically and biochemically.

(2) Infant mortality resulting from severe PEM even under best hospital conditions is high and when untreated, it carries exceptionally high mortality and as such requires elaborate understanding for instituting specific nutritional management and intervention.

(3) Again focusing on the two severe cases. provided the opportunity to examine and compare the different diets fed to these children.

(4) Lastly, time and financial contraints would not permit the examination of the whole spectrum of protein-energy malnutrition (PEM).

Objectives of the Study

The objectives of the study are:

(1) To study the child feeding practices among mothers of marasmic and kwashiorkor children.

(2) To identify other relevant background informa-tion which might affect these practices significantly.

(3) To recommend health education measures that would help improve feeding practices of these mothers and prevent the occurrence of marasmus and kwashiorkor.

Hypotheses

On the basis of available data on malnutrition in developing countries, it is possible to state a number of directional hypotheses concerning child feeding patterns and marasmus and kwashiorkor.

Hypothesis 1

Child feeding pattern is an important factor in the occurrence of kwashiorkor and marasmus.

Hypothesis 2

The quantitative and qualitative dietary intakes of children contribute towards the causation of kwashiorkor and marasmus.

Hypothesis 3

Social characteristics such as the marital status, educational level and nutritional literacy of mothers, play a major role in the occurrence of marasmus and kwashiorkor.

Materials and Methods

The Setting

The University College Hospital (UCH) in Ibadan, Oyo State (part of the former Western State), is the oldest hospital in Nigeria. It enjoys the services of a number of specialists, highly qualified nurses and other health personnel. Equally, it sees every day a number of complicated health problems, most of which are referred cases from the health centres and smaller hospitals in Ibadan and the whole federation of Nigeria.

In view of the type of cases which report there, it serves as a suitable teaching hospital for the University of Ibadan Medical School. Every morning at the General Out-Patients' Department (G.O.P.), a big crowd is seen. This is made up of patients of all kinds of

diseases, including malnutrition. As the day's routine work starts, the patients are screened by health visitors. Malnutrition cases are put at one end of the waiting hall. Later, a medical doctor examines the children and the mothers are then given chits to register. The sample of the study was made up of the registered consecutive cases of marasmus and kwashiorkor.

Materials

Mothers of both malnourished and healthy children served as respondents in this study. In all 250 mothers were interviewed, consisting of 77 kwashiorkor, 73 marasmus and 100 controls. All new cases of marasmus and kwashiorkor children, 0 - 3 years, who attended the General Out-Patients' Department between November 1978 and February 1979, were included in the sample without any selection.

Criteria for diagnosis

Basically the Wellcome Trust Classification (1970) of P-M was followed to select both malnourished and control children. However, the following specific criteria were used for selecting children in each group for the present study.

Marasmus

(1) Weight for age: less than 60% of standard
(2) Gross loss of subcutaneous fat

(3) Obvious growth retardation in relation to age

(4) Muscle wasting.

Kwashiorkor

(1) Weight for age: between 60 and 80% of standard

(2) Oedema at the lower legs, face or generalized

(3) Hair changes

(4) Skin changes

(5) Moonface syndrome

Controls

Healthy children weighing 80% or above of the standard weight for age and matched for age and sex with the malnourished children, were taken as controls. They were selected from the same family compound as the sick children. This was done to limit as much as possible the environmental characteristics of the mothers of the two groups. To help locate the control group, the interviewers were introduced by mothers of the sick children to other mothers in the family compound who had children of the same sex and age, as their own. In most cases, more than three children had to be weighed before a suitable control child could be found. After weighing the child, the mother was interviewed. All the malnourished children were however, weighed at the General Out-patient's Department. A way master and

a wester bathroom scales were used to weigh the toddlers and infants respectively. Both were calibrated in kilograms and checked regularly for accuracy against known weights.

Methods

Formulation of Questionnaire

In order to ensure that the schedule would measure what it was intended to measure, it was first drawn in the English language and then translated into the Yoruba language. This was to ensure that the interviewers knew the exact Yoruba equivalent of the content. The schedule was then discussed with some Yoruba medical personnel, my supervisors and the senior statistician of the Department of Preventive and Social Medicine, to determine the content and face validity. Their comments and suggestions related to the logical order as well as the addition of two more questions. The revised schedule was administered to 30 representative mothers at the General Out-Patient's Department of the University College Hospital. The pre-testing resulted in the addition of weight and sex columns for the child and restructuring of certain questions.

The final schedule had basically 4 sections:

1. Personal characteristics: Included questions on age, marital status, number of children

and literacy of the respondents and their husbands.

2. Economic characteristics: Questions asked in this section consisted of those on the couple's occupation and the approximate income of mother. (Income in this context meant the amount of money available to the mother for house keeping).

3. Child Feeding Practices: Respondents were asked questions on how and what they have been feeding their children right from birth till the time of interview. The age at which breast-feeding was stopped, when supplementary foods were introduced, the preparation and the number of times each was served were probed. Questions on difficulties in breast-feeding were also asked.

4. Knowledge: Here respondents answered questions on the types of foods suitable, and unsuitable for a pregnant woman, lactating mother and a weaned, growing and sick child.

Reasons for their answers were sought for. A visual assessment was made of the home situation of the mothers, in terms of:

(a) Type of housing

(b) Furniture, and

(c) Quality of sanitation

The mother's appearance was also assessed. For each of these, the grades 60% = Good, 40% = Fair and 20% = Poor, were worked out.

Criteria used for grading those parameters:

Type of Housing

Good.

(1) Concrete house with firm roofing and enough windows - above 5

(2) Water source: inside the house or public stand pipe within ½kilometer distance

(3) Proper toilet facility within the house or within a ½ kilometer distance

(4) Approximate number of persons per room - 4.

Fair

(1) Strong brick house with firm roofing and 5 windows

(2) Water source: public stand pipe beyond ½kilometer distance

(3) Proper toilet facility within ½ kilometer distance

(4) Approximate number of persons per room - 5.

Poor

(1) Dilapidated house with less than 3 windows

(2) Water source: well, stream or river

(3) No toilet facility at all beyond ½ kilometer distance

(4) Approximate number of persons per room - 6 and above

Furniture

Good

4 pieces or more of furniture consisting of a bed and chairs which are well maintained.

Fair

4 pieces and not well maintained

Poor

Less than 4 pieces and not well maintained.

Quality of sanitation

Drainage refuse dump and compound

Good

Drainage and refuse dump present and well maintained.

Very clean compound

Fair

Both present but not maintained

Fairly clean compound

Poor

None present. Dirty compound.

Appearance of Mother

Good

Clean clothes and hair (if visible)

Fair

Reasonably clean clothes

Poor

Dirty clothes

Methods of Dietary Survey

In order to have an idea about the amount of food given to the children, a 24 hour recall schedule was used. In the field, calibrated plastic bowls, cups and spoons of different sizes and weights were used. Mothers were shown the different utensils and asked to equate any of them to what they use at home. Thus for each food mentioned, the quantity was estimated in terms of these bowls, cups and spoons. For such foods as boiled yam and fried plantain, the interviewers requested for and saw the size of the slices. Where possible, mothers were asked to give the equivalent price in the market for the quantities of food they give to the children. This helped in validating the quantities of food given by mothers and also to obtain the correct weight for analysis. The author personally prepared pap (maize porridge) of different consistencies as mentioned by mothers and

dried them for water content. Other foods prepared were eba (cooked gari), dodo (fried plantain) boiled yam, cooked rice, asaro (yam pottage) and cooked beans. Amala (cooked yam powder), different vegetable soups, moinmoin (boiled bean cakes), akara (fried bean cakes), agidi (solidified maize pap) and poufpouf (fried flour mixture) at different prices, were bought from vendors and weighed for analysis.

Each food was analysed on the basis of 100 gm edible portion. Where the food contained more than one foodstuff, it was broken down to the different components. These were then converted to their equivalent edible portions from which the calorie and protein contents were worked out, using FAO (1968) composition tables and composition of local foods available in the Department of Human Nutrition. The recommended allowances for protein and calories were taken from FAO table (1973).

Data Collection

This was done in two phases

Phase I: was at the General Out-Patients' Department at the University College Hospital. Here the name, sex, age and weight of the sick child were recorded. The names and addresses of parents were also obtained from the mothers.

Phase II: Consisted of visiting the mother at home for interviewing. The decision to interview mothers at home was made in view of the tense atmosphere at the hospital which could affect the validity of the mothers' responses. Further, interviewing at home created the nooessary rapport which helped in locating the control group, the mothers of which were interviewed on the same day as mothers of the sick children.

The interviews were conducted between November 1978 and February 1979, by three students of the Faculty of Social Sciences, University of Ibadan, who were very familiar with the Ibadan city. Training was provided to ensure consistent interpretation of the questions in the local dialect and to standardize interview techniques. The author was present every morning at the General Out-Patients' Department to help pick and weigh the cases. To obtain maximum cooperation from the health staff, the author was officially introduced to the Acting Head of the Department who in turn introduced her and the interviewers to the hospital staff. Also mothers were told briefly what the study was about in order to allay fears and for them to co-operate.

Limitations of the study

(1) Since each community has its own distinct child feeding patterns, generalisation should be done cautiously. However the findings of the present study could serve as a starting point for similar investigations in other communities.

(2) It would have been more appropriate to have chosen the study sample from the community in order to overcome the problems of selectivity of hospital cases. Nevertheless, this was not possible due to time constraints and the problem of onset finding in the community. However, there is no reason to believe that child feeding patterns would have been different from what has been reported in the present study, if we had picked our cases from the community.

(3) The study is a retrospective one and as such suffers from all the drawbacks of recall.

CHAPTER III

RESULTS

For clarity and convenience of presentation, the results of the study were grouped under three major descriptive headings - personal and economic characteristics, feeding practices of mothers and dietary intakes of children and knowledge of mothers with regard to food.

Personal and economic characteristics

(1) The children

The composition and weights (Table 1)

In accordance with the study design, the mean body weight of the marasmus group was found to be lower than that of the kwashiorkor group and further lower than the mean body weight of the control group. However, kwashiorkor was found to be more common (53%) among males while marasmus was more frequent among female children (63%). The results thus suggested a slight sex preferance by both syndromes.

TABLE 1

Weight Records and Composition of Groups

Groups	Mean Weight (kg)	Female		Male		Total	
		No	%	No	%	No	%
Marasmus WT.<60% STD	5.2±1.2	46	63.0	27	37.0	73	29.2
Kwashiorkor WT. 60-80% STD	7.8±1.2	36	46.8	41	53.2	77	30.8
Control Above 80% STD	8.6±1.6	46	46.0	54	54.0	100	40.0
Total	-	128	51.2	122	48.8	250	100

(2) Age distribution (Table 2 and Fig. 2)

While as many as 61.6% of the marasmus group were between 0-12 months, only 20.7% of the kwashiorkor were found to be within this age range. Most of the kwashiorkor cases occurred between 1 and 2½years of age (71.4%). Only 38.3% of the marasmus group were within that age range. The mean ages of kwashiorkor (18.4 months) and marasmus (12.1 months), however, were found to be statistically significantly different.

FIGURE 2

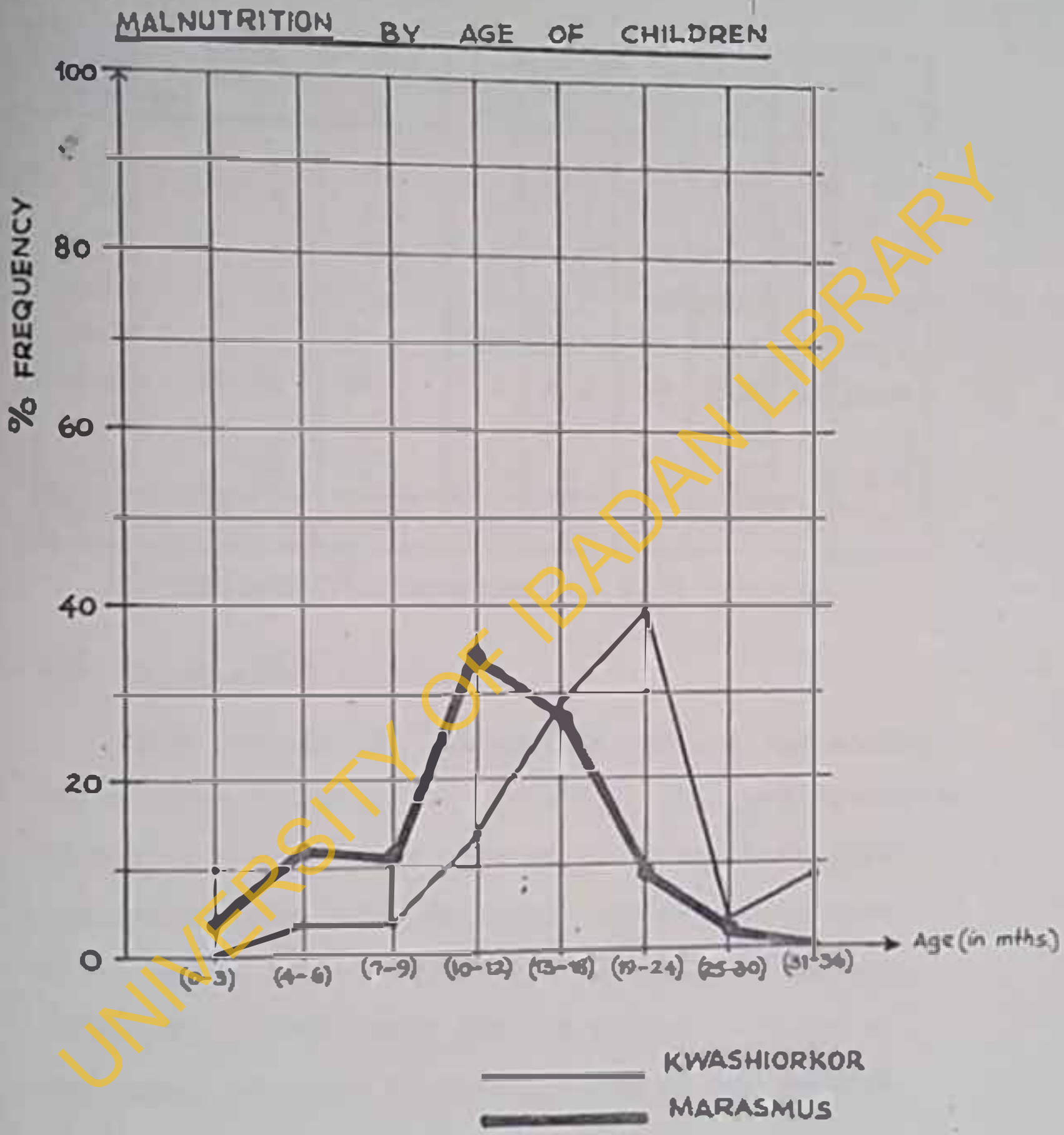


TABLE 2

Percentage Distribution of Children by Age

Age (Months)	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
0-3	-	-	3	4.2	2	2.0	5	2.0
4-6	3	3.9	9	12.3	6	6.0	18	7.2
7-9	3	3.9	8	11.0	10	10.0	21	8.4
10-12	10	13.0	25	34.2	22	22.0	57	22.8
13-18	22	28.5	20	27.4	28	28.0	70	28.0
19-24	30	39.0	6	8.2	21	21.0	57	22.8
25-30	3	3.9	2	2.7	6	6.0	11	4.4
31-36	6	7.8	-	-	5	5.0	11	4.4
Total	77	100	73	100	100	100	250	100

Kwashiorkor Vs Marasmus $t = 6.27$ $p < 0.001$

(3) Birth order (Table 3)

Both control and malnourished groups had similar birth order distribution ($P > 0.10$). The results however seemed to suggest that more of the first born (36%) and second born (40%) children were suffering from marasmus and kwashiorkor respectively. Furthermore, increasing birth order did not appear to increase the number of cases of malnutrition in the present groups.

TABLE 3

Distribution of Children by Birth Order

Birth Order	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
1	22	28.5	27	36.9	30	30.0	79	31.6
2	31	40.3	17	23.3	45	45.0	93	37.2
3	16	20.8	17	23.3	16	16.0	49	19.6
4	6	7.8	7	9.6	5	5.0	18	7.2
5	-	-	4	5.5	2	2.0	6	2.4
6	2	2.6	1	1.4	2	2.0	5	2.0
Total	77	100	73	100	100	100	250	100

x^2 = 9.97 on df 10 P>0.10

(a) The mother

(i) Age and marital status (Tables 4 and 5)

Ninety six (96%) percent of the mothers were between 15 and 34 years of age and therefore very young. Ninety four percent (94%) of them were married. The remaining 6% consisted of single women, widows and mothers who have been separated from their husbands. Mothers of both malnourished and control groups were found to have similar age distribution and marital status.

TABLE 4

Distribution of Mothers by Age

Age (yrs)	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
15-19	8	10.4	8	11.0	14	14.0	30	12.0
20-24	38	49.3	40	54.8	43	43.0	121	48.4
25-29	21	27.3	12	16.4	32	32.0	65	26.0
30-34	9	11.7	11	15.1	6	6.0	26	10.4
35-39	1	1.3	2	2.7	3	3.0	6	2.4
40-45	-	-	-	-	1	1.0	1	0.4
45 and above	-	-	-	-	1	1.0	1	0.4
Total	77	100	73	100	100	100	250	100
Mean age	24.2		24.2		24.4			
S.D.	4.4		4.9		5.4			

Kwashiorkor vs Marasmus: $t = 0.03$ $P > 0.6$
Kwashiorkor vs Control $t = 0.27$ $P > 0.5$
Marasmus vs Control $t = 0.28$ $P > 0.7$

TABLE 5

Distribution of Mothers by Marital status

Status	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Single*	1	1.3	3	4.1	6	6.0	10	4.0
Married	75	97.4	66	90.4	94	94.0	235	94.0
Widowed*	1	1.3	3	4.1	-	-		1.6
Divorced	-	-	-	-	-	-	-	-
Separated*	-	-	1	1.4	-	-	1	0.4
Total	77	100	73	100	100	100	250	100

$x^2 = 3.25$ on df 2 $0.5 > P > 0.3$

* combined for statistical analysis

(2) Education of mother (Table 6)

Mothers of the control group were found to be more educated than the mothers of both the kwashiorkor and marasmic children and those differences were statistically significant ($P < 0.01$). This indicated a strong predisposing influence of mothers' education in the occurrence of severe PEM. No significant relationship was, however, found between education and breastfeeding (Appendix B), or education and commencement of breastfeeding (Appendix B).

TABLE 6

Distribution of Mothers by Education

Educational Level	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Illiterate	43	55.8	52	71.2	36	36.0	131	52.4
Literate	34	44.2	21	28.8	64	64.0	119	47.6
Total	77	100	73	100	100	100	250	100

$x^2 = 21.52$ on df 2 $p < 0.01$

(3) Occupation of mother (Table 7)

Like educational level, a significant difference was found between mothers of malnourished and control groups in terms of occupation ($P < 0.01$). The mothers of the control group were employed in more gainful occupations than the mothers of the malnourished children. Thus, occupation of the mothers might have a significant association with severe PEM.

TABLE 7

Distribution of Mothers by Occupation

Occupation	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Housewife	47	61.0	48	65.8	44	44.0	139	55.6
Petty Trader	29	37.7	23	31.5	45	45.0	97	38.8
Others	1	1.3	2	2.7	11	11.0	14	5.6
Total	77	100	73	100	100	100	250	100

$x^2 = 15.02$ on df 4 $p < 0.01$

(4) Living conditions of mothers (Table 8 a-d)

Mothers of the control group had access to better living conditions than the malnourished group in terms of housing ($P < 0.01$), quality of sanitation ($P < 0.005$), type of furniture ($P < 0.005$), even though they were living in the same family compound. In terms of appearance the control group was again better ($P < 0.005$). However, no significant difference was found between the mothers of kwashiorkor and maramic groups with respect to these parameters ($P > 0.05$).

TABLE 8A

Type of Housing

Grades	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Good	8	10.4	5	6.8	24	24.0	37	14.8
Fair	39	50.6	50	68.5	70	70.0	159	63.6
Poor	30	39.0	18	24.7	6	6.0	54	21.6
Total	77	100	73	100	100	100	250	100

Marasmus vs Control: $x^2 = 18.63$ on df 2 $p < 0.005$

Kwashiorkor vs Control $x^2 = 30.34$ on df 2 $p < 0.005$

Kwashiorkor vs Marasmus $x^2 = 4.95$ on df 2 $p > 0.05$

TABLE 8B

Quality of Sanitation

Grades	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Good	3	3.9	1	1.4	20	20.0	24	9.6
Fair	45	58.4	40	54.8	66	66.0	151	60.4
Poor	29	37.7	32	43.8	14	14.0	75	30.0
Total	77	100	73	100	100	100	250	100

Marasmus vs Control: $x^2 = 27.06$ on df 2 $p<0.005$

Kwashiorkor vs Control: $x^2 = 19.10$ on df 2 $p<0.005$

Kwashiorkor vs Marasmus: $x^2 = 1.34$ on df 2 $p>0.05$

TABLE 8C

Type of Furniture

Grades	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Good	2	2.6	4	5.5	38	38.0	44	17.6
Fair	45	58.4	35	47.9	48	48.0	128	51.2
Poor	30	39.0	34	46.6	14	14.0	78	31.2
Total	77	100	73	100	100	100	250	100

Marasmus vs Control: $x^2 = 34.52$ on df 2 $p<0.005$

Kwashiorkor vs Control: $x^2 = 35.93$ on df 2 $p<0.005$

Kwashiorkor vs Marasmus: $x^2 = 2.06$ on df 2 $p>0.05$

TABLE 8D

Appearance of Mother

Grades	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Good	4	5.2	5	6.8	42	42.0	51	20.4
Fair	52	67.5	47	64.4	55	55.0	154	61.6
Poor	21	27.3	21	28.8	3	3.0	45	18.0
Total	77	100	73	100	100	100	250	100

Marasmus vs Control: χ^2 = 40.02 on df 2 $p < 0.005$

Kwashiorkor vs Control: χ^2 = 42.71 on df 2 $p < 0.005$

Kwashiorkor vs Marasmus: χ^2 = 0.26 on df 2 $p > 0.05$

(3) The father

Occupation of the father (Table 9)

Fathers of control children were generally more skilled than the fathers of malnourished groups ($p < 0.005$). No significant differences were, however, found between the fathers of kwashiorkor and marasmic children. Occupation of the father, thus, seemed to have a predisposing influence in the occurrence of severe PEM.

TABLE 9

Distribution of Mothers by Occupation

Occupation	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Unskilled worker (Labourer, farmer, etc)	46	59.7	49	67.1	25	25.0	120	48.0
Semi-skilled (Mechanic, driver, etc)	26	33.8	22	30.1	43	43.0	91	36.4
Others	5	6.5	2	2.8	32	32.0	39	15.6
	77	100	73	100	100	100	250	100

Marasmus vs Control: $x^2 = 37.74$ on df 2 $p < 0.01$

Kwashiorkor vs Control: $x^2 = 27.58$ on df 2 $p < 0.005$

Marasmus vs Kwashiorkor: $x^2 = 1.61$ on df 2 $p > 0.05$

Feeding practices

(1) Distribution of mothers according to breastfeeding

Table 10 shows that breastfeeding was more common among mothers of marasmic group as compared to the other groups. The difference between the control and kwashiorkor groups appeared to be insignificant.

TABLE 10

Distribution of Mothers by Breastfeeding

Answer	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Yes	57	74.0	66	90.4	78	78.0	201	80.4
No	20	26.0	7	9.6	22	22.0	49	19.6
Total	77	100	73	100	100	100	250	100

$x^2 = 6.99$ on df 2 $0.05 > p > 0.02$

(2) Foods offered to the child before breastfeeding

(Table 11)

Plain water and glucose water were the commonest items offered to the children before starting of breastfeeding by majority of the mothers. 'Agbo-omo', a local concoction prepared by boiling local herbs and bark of trees, was offered to children by some of the mothers before breastfeeding. These practices were found to be significantly different between the groups involved ($p < 0.05$).

TABLE 11

What was Given the Child before Breastfeeding

Items	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Nothing	6	10.5	10	15.1	14	17.9	30	14.9
Water	32	56.1	48	72.7	47	60.3	127	63.2
'Agbo-omo'	7	12.3	4	6.1	1	1.3	12	5.9
Glucose Water	12	21.1	4	6.1	16	20.5	32	16.0
Total	57	100	66	100	78	100	201	100

Marasmus vs Control: $x^2 = 8.74$ on df 3 $p < 0.05$
Kwashiorkor vs Control: $x^2 = 8.05$ on df 3 $p < 0.05$
Kwashiorkor vs Marasmus: $x^2 = 8.40$ on df 3 $p < 0.05$

(3) Frequency of daily breastfeeding (Table 12)

Among the three groups the kwashiorkor group had the highest percentage of mothers (93.0%) who breastfed as often as possible while the control group had the lowest percentage (57.7%). The marasmus group had the intermediate position (65.2%). These differences were found to be statistically significant which indicated that the increasing frequency of breastfeeding do not have any significant influence on the prevention of PSM.

TABLE 12

Number of times of Breastfeeding in a Day

Frequency	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
2 times	-	-	-	-	-	-		
3 times	-	-	6	9.1	-	-	6	3.1
4 times	-	-	8	12.1	15	19.2	23	11.4
5 times	4	7.0	9	13.6	18	23.1	31	15.4
As often as possible	53	93.0	43	65.2	45	57.7	141	70.1
Total	57	100	66	100	78	100	201	100

Marasmus vs Control: $x^2 = 10.25$ on df 3 $p < 0.02$
Kwashiorkor vs Control: $x^2 = 21.82$ on df 3 $p < 0.01$
Kwashiorkor vs Marasmus: $x^2 = 16.39$ on df 3 $p < 0.01$

(4) Difficulty in breastfeeding (Table 13)

The marasmic group had the highest positive answers (21.2%) and the control group, the lowest (3.8%). The kwashiorkor group was in between with 7% positive responses. These differences were statistically significant ($p < 0.01$). Thus, the mothers who had difficulty in breastfeeding were more likely to have children with severe PEM.

TABLE 13

Whether or Not a Mother had Difficulty during Breastfeeding

Answer	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Yes	4	7.0	14	21.2	3	3.8	21	10.4
No	53	93.0	52	78.8	75	96.2	180	89.6
Total	57	100	66	100	78	100	201	100

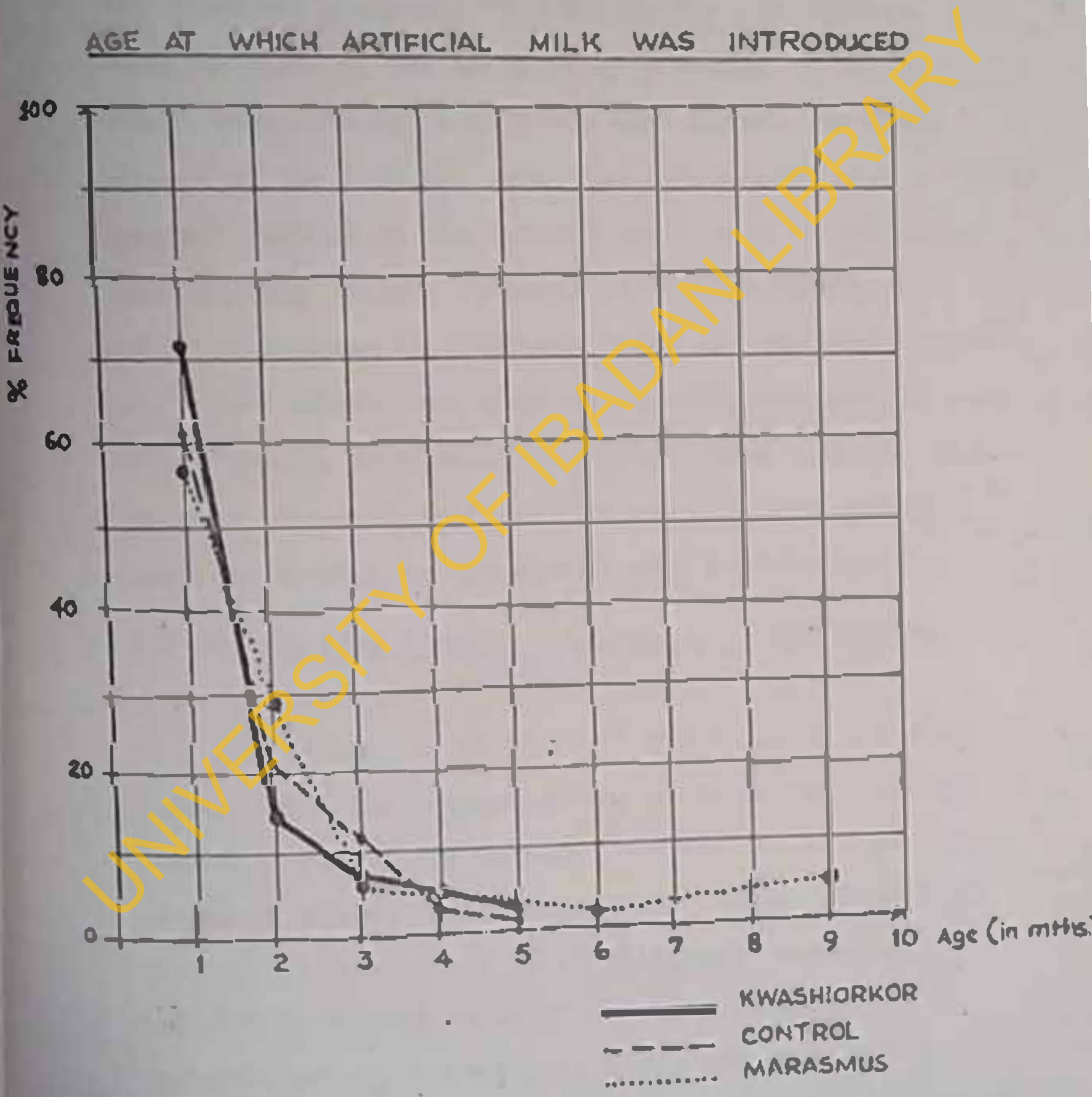
$x^2 = 12.51$ on df 2 $p < 0.01$

The most prominent difficulty encountered by these mothers was 'illness of mother' for the kwashiorkor and control groups, 75% and 100% respectively. 'Primary failure of lactation' was more common in mothers of marasmic children (42.9%).

(5) Age of introduction of artificial feeding (Fig. 3)

Artificial feeding was started among most of the children at one month. Percentage of children receiving artificial feeding at one month was highest among kwashiorkor (71.5%) and lowest among the marasmic group (56.8%). The control group had 61.0%.

FIGURE 3



(6) Age of stoppage of breastfeeding (Table 14)

The mean ages at which the children were completely weaned were 14 months for kwashiorkor, 9.0 months for the marasmic group and 12.0 months for the control. As many as 68.2% of the children were weaned by the ninth month among the marasmic group with only 17.9% being weaned at the same age among the kwashiorkor group. Forty percent (40.0%) of the control group were weaned within the same age range. Majority of the kwashiorkor children, however, (71.9%) were taken off the breast after the tenth month. The mean ages at complete weaning were significantly different between the three groups. This clearly indicated that early weaning favours marasmus and late weaning is associated with kwashiorkor.

(7) Reasons for complete stoppage of breastfeeding (Table 15)

The reason 'child too old' stood out as the most common among the mothers of the three groups - 66% for kwashiorkor, 45% for marasmus and 77% for the control. Pregnancy was the second commonest reason for complete weaning in kwashiorkor (21%) while not 'enough milk' and 'child refused to suck' were the second most frequent reason for marasmus (19%) and control (12%) respectively. These differences between the groups were statistically significant ($p < 0.01$).

TABLE 14

Age at which Breastfeeding was Stopped

Age (Months)	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
1-3	-	-	6	9.1	-	-	6	3.0
4-6	2	3.6	10	15.2	3	3.8	15	7.5
7-9	8	14.0	29	43.9	25	32.0	62	30.8
10-12	11	19.3	4	6.1	15	19.2	30	14.9
13-15	13	22.8	6	9.1	19	24.4	38	18.9
16-18	17	29.8	8	12.1	8	10.3	33	16.4
19-21	6	10.5	3	4.5	8	10.3	17	8.5
Total	57	100	66	100	78	100	201	100
Mean age S. D.	13.08 4.04		9.4 4.82		12.07 4.18			

Marasmus Vs Control: $t = 3.61$ $p < 0.001$

Kwashiorkor Vs Control: $t = 2.38$ $p < 0.01$

Kwashiorkor Vs Marasmus: $t = 5.53$ $p < 0.001$

TABLE 15

Reasons for Stopping Breastfeeding

Reasons	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Child refuse to suck	4	7.0	13	19.7	10	12.8	27	13.4
Not enough milk	3	5.3	13	19.7	-	-	16	8.0
Pressure of work	-	-	-	-	6	7.7	6	3.0
Sored nipples	-	-	6	9.1	1	1.3	7	3.4
Pregnancy	12	21.0	4	6.1	1	1.3	17	8.5
Child too old	38	66.7	30	45.4	60	76.9	128	63.7
Total	57	100	66	100	78	100	201	100

$\chi^2 = 39.62$ on df 6 $p < 0.01$

The pattern of complete weaning was however found to be similar with majority of the mothers stopping breastfeeding gradually in the three groups due to some special reasons (Appendix B).

(8) Method of feeding (Table 16)

Majority of the mothers used feeding bottles followed by cup and spoon. In addition, about 8.0% of mothers of the marasmic and kwashiorkor children, forced fed their children. Bottle feeding, however, was more frequently used by control mothers. These feeding practices were found to be significantly different between the malnourished and control groups ($p < 0.01$). This indicated that bottle feeding practice as such, is not an important predisposing factor in the causation of the syndromes. No significant difference, however, was found between the marasmic and kwashiorkor groups ($p > 0.05$).

TABLE 16

Method of Feeding (supplementary food)

Method	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
By hand	11	14.3	9	12.3	6	6.0	26	10.4
Cup and spoon	24	31.2	22	30.2	27	27.0	73	29.2
Forced feeding	6	7.8	6	8.2	-	-	12	4.8
Feeding bottle	36	46.7	36	49.3	67	67.0	139	55.6
Total	77	100	73	100	100	100	250	100

Marasmus vs Control: x^2 = 12.53 on df 3 $p < 0.01$

Kwashiorkor vs Control: x^2 = 14.23 on df 3 $p < 0.01$

Kwashiorkor vs Marasmus: x^2 = 0.18 on df 3 $p > 0.05$

(9) Method of sterilization (Table 17)

Most of the mothers, especially of the kwashiorkor and marasmic groups (97% and 90% respectively), used soap and water to keep their feeding utensils clean. In addition 44% of the control mothers either boiled for 5 minutes and over or soaked them in milton after washing. These differences in the sterilization practices were found to be significantly different between the malnourished and control groups ($p < 0.005$) but no such differences were found between the malnourished groups. It appeared then, that the unsatisfactory method of

sterilization might be a significant predisposing factor in the causation of severe PEM in the group.

TABLE 17

Method of Sterilization

Method	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Boil for 5 mins and over after washing	-	-	4	5.5	22	22.0	26	10.4
Soak in milton after washing	2	2.6	3	4.1	22	22.0	27	10.8
Wash with soap and water	75	97.4	66	90.4	56	56.0	197	78.8
Total	77	100	73	100	100	100	250	100

Marasmus vs Control: $x^2 = 24.09$ on df 2 $p < 0.005$

Kwashiorkor vs Control: $x^2 = 39.09$ on df 2 $p < 0.005$

Kwashiorkor vs Marasmus: $x^2 = 4.67$ on df 2 $p > 0.05$

(10) Qualitative groupings of food forming the diet of the children at specific points in time (Tables 18-20)

The diet of the children after weaning, a week before illness and the day previous to attendance in the hospital were qualitatively divided into three food groups - body building, energy giving and protective. It was found that mothers of the malnourished children mentioned more of energy giving foods with little

reference to the body building and protective foods than the control group. The quality of the diet of the control group was also found to be significantly better ($p < 0.01$), after weaning and on the day previous to attendance in hospital, than the malnourished children. Among the malnourished, the kwashiorkor group generally laid more emphasis on energy foods than the marasmic group. However, differences between the malnourished groups were not significant ($p > 0.05$).

TABLE 18

Qualitative grouping of Foods forming the usual Diet of the Child

*Group	Kwashiorkor		Marasmus		Control		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Body building	20	24.0	19	25.7	65	50.0	104	36.2
Energy giving	56	67.6	45	60.8	45	34.6	146	50.9
Protective Foods	7	8.4	10	13.5	20	15.4	37	12.9
Total	83	100	74	100	130	100	287	100

Marasmus vs Control: $x^2 = 14.22$ on df 2 $p < 0.01$

Kwashiorkor vs Control: $x^2 = 21.98$ on df 2 $p < 0.01$

Kwashiorkor vs Marasmus: $x^2 = 1.25$ on df 2 $p > 0.05$

* a mother could have mentioned foods belonging to more than one food group. Hence, the difference between number of respondents in each group and the total figures under Freq. This applies to all the tables with Freq.

TABLE 19

Qualitative grouping of Foods forming the Child's Diet a Week before the Illness

Group	Kwashiorkor		Marasmus		Total	
	Freq	%	Freq	%	Freq	%
Body building	12	15.0	16	19.8	28	17.4
Energy giving	65	81.3	58	71.6	123	76.4
Protective food	3	3.7	7	8.6	10	6.2
Total	80	100	81	100	161	100

Marasmus vs Kwashiorkor: $x^2 = 2.56$ on df 2 $p > 0.05$

TABLE 20

Qualitative grouping of Foods forming the Child's Diet the Previous Day

Group	Kwashiorkor		Marasmus		Control		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Body building	16	20.0	18	21.9	55	44.0	89	31.0
Energy giving	60	75.0	54	65.9	40	32.0	154	53.7
Protective foods	4	5.0	10	12.2	30	24.0	44	15.3
Total	80	100	82	100	125	100	287	100

Marasmus vs Control: $x^2 = 22.89$ on df 2 $p < 0.01$

Kwashiorkor vs Control: $x^2 = 37.22$ on df 2 $p < 0.01$

Marasmus vs Kwashiorkor: $x^2 = 2.98$ on df 2 $p > 0.05$

(11) Distribution of food at home (Table 21)

The old tradition of wives serving their husbands first is still practised by a majority of these mothers, 61% for kwashiorkor, 60% for marasmus and 48% for control. However, 38% of the mothers of the control children as against 21% for kwashiorkor and 12% for marasmus served the children first. These differences were statistically significant ($p < 0.01$). Thus, the control children had a much better chance of getting better food than the malnourished ones.

TABLE 21

Distribution by Who is Served First at Home

	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Father	47	61.0	44	60.3	48	48.0	139	55.6
Mother	9	11.7	17	23.3	14	14.0	40	16.0
Children	21	27.3	12	16.4	38	38.0	71	28.4
Total	77	100	73	100	100	100	250	100

Marasmus Vs Control: $x^2 = 10.01$ on df 2 $p < 0.01$

Kwashiorkor Vs Control: $x^2 = 13.06$ on df 2 $p < 0.01$

Kwashiorkor Vs Marasmus: $x^2 = 4.91$ on df 2 $p > 0.05$

Dietary Intake

Energy and protein intakes

The average protein and energy intakes of marasmic, kwashiorkor and control children at three specific points in time (after weaning, a week before the illness and a day before the interview) are presented in Table 22. The intakes were then expressed in terms of kilogram body weight per day on the basis of expected and actual body weights and compared with the recommended allowance (Tables 23 and 24). This was done in order to compare the groups directly in terms of unit body weight. The results indicated an extremely low intakes of energy and protein in the malnourished children, compared to what is recommended for them (W. H. O. 1973).

On the basis of expected body weight, energy and protein intakes were found to be low even in the control group though they were consuming a significantly higher quantity than the marasmic and kwashiorkor children. No significant differences were, however, found in energy and protein intakes of the marasmic and kwashiorkor children, on the basis of expected body weight.

Comparison on the basis of per kilogram actual body weight still indicated low intakes of energy and protein in all the three groups. The control group was, again, much better off than the malnourished groups. The kwashiorkor group was, however, taking the least amount of energy and protein among the three groups, which was mainly due to a relatively lesser reduction of body weight due to oedema.

Energy intake was found to be significantly higher in the control group than that of the kwashiorkor but it was not so between the control and marasmic groups. Higher per kilogram energy consumption in marasmic children was due to their extremely low body weight. Protein intake was however found to be significantly different between the three groups.

TABLE 22

Mean Energy and Protein Intakes of Control Kwashiorkor and Marasmic children

Groups	Energy (Cals)				Protein (gm)			
	After weaning	A week before illness	One day before interview	Average intake	After weaning	A week before illnese	One dey before interview	Average intake
Control (100)	629* ± 115	-	662* ±115	645 ± 115	14.1* ±2.8	-	15.0* ± 2.9	14.6 ±3.8
Kwashiorkor (77)	469* ± 102	455* ± 111	483* ± 106	469 ± 106	9.0* ± 2.5	8.1* ±2.5	8.3* ± 2.6	8.5 ± 2.5
Marasmus (73)	392* ± 86	391* ± 85	374* ±108	385 ± 93	6.8* ± 1.8	6.7* ± 1.4	6.4* ± 1.7	6.6 ± 1.6

* Not significantly different between figures in a row.

Figures in the parenthesis indicate total number in groups.

TABLE 23

Energy and Protein Intakes of Control and Malnourished Children Expressed in terms of per Kilogram Expected Body Weight compared to Recommended Allowance (Mean + SD)

Groups	Energy (Cals)			Protein (gm)		
	Recommended	Intake	% Adequacy	Recommended	Intake	% Adequacy
Control (100)	100	52.9 ± 9.4	53	2	1.2 ± 0.23	51
Kwashiorkor (77)	100	36.1 ± 8.1	36	2	0.64 ± 0.19	32
Marasmus (73)	103	33.8 ± 8.2	33	2.2	0.58 ± 0.14	26

Energy and protein intakes of the three groups were statistically different (See text).

TABLE 24

Energy and Protein Intakes of Control and Malnourished Children Expressed in terms of per Kilogram Actual Body Weight compared to Recommended Allowance

Groups	Energy/Kg/day			Protein/Kg/day		
	Recommended	Intake	Adequacy	Recommended	Intake	Adequacy
Control (100)	100	75 ± 13.6	75	2	1.7 ± 0.33	85
Kwashiorkor (77)	100	60.1 ± 13.6	60	2	1.1 ± 0.32	55
Marasmus (73)	103	74 ± 17.9	74	2.2	1.3 ± 0.31	59
	Energy Intakes Control Vs Kwashiorkor $P < 0.001$ Marasmus Vs Kwashiorkor $P < 0.001$			Protein Intakes Control Vs Marasmus $P < 0.001$ Control Vs Kwashiorkor $P < 0.001$ Marasmus Vs Kwashiorkor $P < 0.05$		

Knowledge of mothers

(1) Suitability of breastmilk in infant feeding (Table 25)

With respect to infant feeding, 100% of control and kwashiorkor and 98% of the mothers of the marasmic group considered breastmilk as good food for the baby. This showed that most of the mothers were aware of the usefulness of breastmilk in infant feeding.

TABLE 25

Answers to Whether Breastmilk is Good for a Baby or Not

Answer	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Yes	77	100	72	98.6	100	100	249	99.6
No	-	-	1	1.4	-	-	1	0.4
Total	77	100	73	100	100	100	250	100

$x^2 = 2.43$ on df 2 $0.30 > P > 0.20$

(2) Reasons why breastmilk is good for a baby

Various reasons were given by mothers to substantiate their assertion that breastmilk is good for a baby. Among these were it is the 'natural food', 'it helps in growth' and 'it gives strength'. However, only 2 mothers (1.9%) of the control group mentioned

the fact that breastmilk prevents diseases.

(3) Foods mentioned as good for a weaned child (Table 26)

Almost all the foods mentioned by mothers of the three groups are mostly carbohydrate foods with the exception of beans. These differences were found to be significant between the control and malnourished groups ($p < 0.01$). But no differences were found between the malnourished groups ($p > 0.05$). Thus it appeared that there is a strong relationship between the disease and the mothers' knowledge of the right foods for a weaned child.

TABLE 26

Foods mentioned as Good for a Weaned Child

Foods	Kwashiorkor		Marasmus		Control		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Beans	41	19.1	30	17.0	70	22.7	141	20.1
Eko (Pap)	26	12.1	36	20.5	26	8.4	88	12.6
Rice	50	23.3	42	23.9	73	23.6	165	23.6
Dodo (fried plantain)	20	9.3	11	6.2	37	12.0	68	9.7
Eba (Cooked gari)	22	10.2	15	8.5	30	9.7	67	9.6
Amala	39	18.1	26	14.8	40	12.9	105	15.0
Yam	17	7.9	16	9.1	33	10.7	66	9.4
Total	215	100	176	100	309	100	700	100

Marasmus Vs Control: $x^2 = 18.87$ on df 6 $p < 0.01$

Kwashiorkor Vs Control: $x^2 = 16.66$ on df 6 $p < 0.01$

Kwashiorkor Vs Marasmus: $x^2 = 6.76$ on df 6 $p > 0.05$

(4) Suitable and unsuitable foods for pregnant women, lactating mothers and growing children

Various food items have been mentioned as suitable and unsuitable for these groups by the respondent mothers. The results are shown in Tables 27, 28, 29, 30 and 31. Fairly consistent statistically significant differences between the control and malnourished groups were found. These differences were not very striking but appeared to suggest that the control mothers had better knowledge about the foods for these groups. Particularly relevant in the context of the present study, is the diet of the growing child.

TABLE 27

Foods mentioned as Not Suitable for a Pregnant Woman

Foods	Kwashiorkor		Marasmus		Control		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Nono	22	24.7	15	20.3	18	14.0	55	18.9
Eba	25	28.1	25	33.8	45	35.2	95	32.6
Yam	12	13.5	16	21.6	31	24.2	59	20.3
Too much milk	8	9.0	7	9.5	7	5.5	22	7.6
Banana	8	9.0	3	4.0	10	7.8	21	7.2
Snakes	11	12.3	5	6.8	4	3.1	20	6.9
Okro food	-	-	3	4.0	5	3.9	8	2.7
Sugary food	3	3.4	-	-	8	6.3	11	3.8
Total	89	100	74	100	128	100	291	100

Marasmus Vs Control: $x^2 = 9.39$ on df 7 $p > 0.05$

Kwashiorkor Vs Control: $x^2 = 18.94$ on df 7 $p < 0.01$

Marasmus Vs Kwashiorkor: $x^2 = 11.20$ on df 7 $p > 0.05$

TABLE 28

Foods mentioned as Good for a Pregnant Woman

Foods	Kwashiorkor		Marasmus		Control		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Beans	40	24.0	47	28.3	61	26.2	148	26.2
Eggs	7	4.2	11	6.6	8	3.4	26	4.6
Meat & Fish	11	6.6	4	2.4	19	8.2	34	6.0
Rice	41	24.5	41	24.7	54	23.2	136	24.0
Amala	32	19.2	9	5.4	33	14.2	74	13.1
Dodo	16	9.6	9	5.4	29	12.4	54	9.5
Yam	-	-	20	12.1	-	-	20	3.5
Fruits and vegetable	20	11.9	25	15.1	29	12.4	74	13.1
Total	167	100	166	100	233	100	566	100

Marasmus Vs Control: $x^2 = 48.5$ on df 7 $p < 0.005$

Kwashiorkor Vs Control: $x^2 = 2.96$ on df 6 $p > 0.05$

Kwashiorkor Vs Marasmus: $x^2 = 40.13$ on df 7 $p < 0.005$

TABLE 29

Foods mentioned as Not Suitable for the Lactating Mother

Foods	Kwashiorkor		Marasmus		Control		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
None	37	42.5	17	21.8	54	60.6	108	42.5
Gari	17	19.5	29	37.2	21	23.6	67	26.4
Starchy foods	11	12.6	11	14.1	7	7.9	29	11.4
Too much starch	10	11.5	8	10.3	7	7.9	25	9.9
Cocoyam	7	8.1	6	7.7	-	-	13	5.1
Okro	5	5.8	7	8.9	-	-	12	4.7
Total	87	100	78	100	89	100	254	100

Marasmus Vs Control: $x^2 = 31.25$ on df 5 $p < 0.005$

Kwashiorkor Vs Control: $x^2 = 16.99$ on df 5 $p < 0.005$

Marasmus Vs Kwashiorkor: $x^2 = 7.09$ on df 5 $p > 0.05$

TABLE 30

Foods mentioned as Good for the Lactating Mother

Foods	Kwashiorkor		Marasmus		Control		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Beans	24	18.9	38	29.4	15	13.4	77	20.9
Milk	5	3.9	2	1.6	3	2.7	10	2.7
Meat & Fish	19	15.0	14	10.9	25	22.3	58	15.8
Eba	10	7.9	-	-	-	-	10	2.7
Amala	29	22.8	9	6.9	10	9.0	48	13.0
Rice	17	13.4	24	18.6	23	20.5	64	17.4
Dodo	4	3.1	10	7.8	25	22.3	39	10.6
Pounded Yam	8	6.3	15	11.6	-	-	23.	6.3
Fruits & Veg.	11	8.7	17	13.2	11	9.8	39	10.6
Total	127	100	129	100	112	100	368	100

Marasmus Vs Control: $x^2 = 35.05$ on df 7 $p < 0.005$

Kwashiorkor Vs Control: $x^2 = 46.0$ on df 8 $p < 0.005$

Marasmus Vs Kwashiorkor: $x^2 = 33.07$ on df 8 $p < 0.005$

TABLE 31

Foods mentioned as Unsuitable for a Growing Child

Foods	Kwashiorkor		Marasmus		Control		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
None	43	58.1	32	39.1	25	34.7	100	43.9
Unripe fruits	12	16.2	5	6.1	10	13.9	27	11.8
Excess gari	5	6.7	23	28.0	19	26.4	47	20.6
Pounded yam	-	-	10	12.2	8	11.1	18.	7.9
Sugary foods	-	-	5	6.1	10	13.9	15	6.6
Dirty foods	7	9.5	7	8.5	-	-	14	6.1
Rice	7	9.5	-	-	-	-	7	3.1
Total	74	100	82	100	72	100	228	100

Marasmus Vs Control: $x^2 = 11.19$ on df 5 $p < 0.05$

Kwashiorkor Vs Control: $x^2 = 45.09$ on df 6 $p < 0.005$

Marasmus Vs Kwashiorkor: $x^2 = 37.76$ on df 6 $p < 0.005$

(5) Foods for children during diarrhoea and fever

The three groups showed inadequate understanding of what should be given to a sick child (Tables 32 and 33). Responses of the mothers confirm their practices of virtually denying their children most of the protein-rich foods. Majority of the children were fed on watery starchy gruels with little sugar and no milk.

Furthermore, fruits, semi-solid foods and beans were withheld by a substantial number of mothers. Significant differences between the mothers of the <u>malnourished</u> and control groups existed in terms of food afforod ($p < 0.005$) and foods withheld ($p < 0.005$), during diarrhoea and fevor. These practices might have strong influence in predisposing to malnutrition in the present group.

<u>TABLE 32</u>

<u>Some of the Foods a Mother Would Not Give a Child with Diarrhoea and Fever</u>

Foods	Kwashiorkor		Marasmus		Control		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
None	22	25.9	19	33.3	28	24.8	69	27.1
Sugary foods	24	28.2	17	29.8	29	25.7	70	27.5
Semi-liquid foods	-	-	-	-	25	22.1	25	9.8
Beans	21	24.7	12	21.1	16	14.2	49	19.2
Fruits e.g. Pawpaw & Oranges	11	13.0	3	5.3	15	13.2	29	11.4
Cold food	7	8.2	6	10.5	-	-	13	5.0
Total	85	100	57	100	113	100	255	100

Marasmus Vs Control: $x^2 = 30.72$ on df 5 $p < 0.005$

Kwashiorkor Vs Control: $x^2 = 30.72$ on df 5 $p < 0.005$

Kwashiorkor Vs Marasmus: $x^2 = 3.12$ on df 4 $p > 0.05$

TABLE 33

Some of the Foods a Mother Gives the Child during Diarrhoea and Fever

Foods	Kwashiorkor		Marasmus		Control		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Every food	22	21.4	16	19.0	29	29.3	67	23.4
Amala	10	9.7	-	-	-	-	10	3.6
Eko (Pap)	15	14.6	27	32.1	24	24.2	66	23.1
Eba (Cooked Gari)	25	24.3	6	7.1	16	16.2	47	16.4
Fish and Meat	3	2.9	5	6.0	9	9.1	17	5.9
Bread	16	15.5	14	16.7	-	-	30	10.5
Yam	9	8.7	12	14.3	12	12.1	33	11.5
Glucose	3	2.9	4	4.8	9	9.1	16	5.6
Total	103	100	84	100	99	100	286	100

Marasmus Vs Control: $x^2 = 24.48$ on df 7 $p < 0.005$

Kwashiorkor Vs Control: $x^2 = 37.38$ on df 7 $p < 0.005$

Kwashiorkor Vs Marasmus: $x^2 = 25.56$ on df 7 $p < 0.005$

(6) Relationship between diet and severe PEM (Table 34)

Responses given by mothers as to whether severe PEM is related to diet showed, that 80% of mothers of both kwashiorkor and marasmic children were not aware of the

fact that severe PEM is a disease of dietary origin. The control mothers were not asked because they had no sick children. The responses, thus, strongly indicated that ignorance may play an important role in the causation of the disease.

TABLE 34

Distribution by Whether or Not the Sickness Relates to Food

Answer	Kwashiorkor		Marasmus		Total	
	No	%	No	%	No	%
Yes	15	19.5	9	12.3	24	16.0
No	62	80.5	64	87.7	126	84.0
Total	77	100	73	100	150	100

Marasmus Vs Kwashiorkor: $x^2 = 1.43$ on df 1 $p > 0.05$

CHAPTER IV

DISCUSSION OF RESULTS

In line with the presentation of results, the discussions and comments are also grouped under the same four headings and limited to the important findings of the study.

Personal and Socio-economic factors

In the present series, an overall slight preponderance of females (55%) over males (45%), was found in the malnourished groups (Table 1). Similar findings have been reported in other parts of Nigeria (Morley 1968) and also from other countries (Hijazi 1974 and Dreval et. al. 1973). The reason for such a sex preference was not clear. But it could be due to local culture, boys being better cared for than girls or it could be due to a sampling error in the hospital setting. However, low birth weights have been more frequently reported in female children, both at the rural and urban areas in Ibadan (Oduntan et. al. 1977, and Oduntan and Ayeni 1976). This might also be a predisposing factor for the high incidence of malnutrition in female children in Ibadan.

The age incidence of the present study (Table 2 and Fig 2) again confirmed that severe PEM is a disease of

young children. (Laditan and Reeds, 1976; Hedoyat et. al. 1968; Somaswara et. al. 1959; Hijazi 1974). The mean age of marasmus (12.1 months) was significantly different from the mean age of kwashiorkor (18.4 months) (P<0.001). This age incidence agrees with the findings of workers from Iraq (Shakir et. al. 1972), Jordan (McLaren et. al. 1967), Freetown (Robin-Coker and Jalloh 1975) and also from Nigeria (Jelliffe 1953). However, this finding disagrees with that of Laditan and Reeds (1976) who worked in the same hospital in Ibadan. The present series was much larger than those of Laditan and Reeds and also fit better into the clinical history of the disease and therefore, likely to be more representative.

No statistically significant association between birth order and severe PEM was found up to a maximum of 6 births, recorded in the present study (Table 3). This is in agreement with the study of Morley et. al. (1966) who also found that in Western Nigeria, a family with more than seven children results in a higher incidence of kwashiorkor. Studies in India reported by Gopalan (1968) placed the cut off point at three children. However, the slight preponderance of malnutrition in the 1st and 2nd child indicates that,

inexperience of the mother in child feeding and child rearing, might have played a role in the causation of severe PEM in the present group. This contention is further supported by the very young age of the mothers in the present series (Table 4).

Mothers of the malnourished children were significantly less educated than the controls (Table 6). Similar findings have been reported from elsewhere, (Okeahialam (1975) in Tanzania; Adou (1975) in Ivory Coast; Gurson et. al. (1975) in Turkey and Grewal et. al. (1973) in India). In addition, studies of families of malnourished children have indicated that majority of those mothers had low intelligent quotients (Martinez, et. al. quoted by Nwu ga 1977). This is only expected because a better educated mother is also more likely to be better informed about proper methods of infant feeding.

Even though they were living in the same compounds, mothers of the control group had access to better living conditions in terms of housing, sanitation and home furniture which were actually indices of better socio-economic status (Tables 8a-d). Particularly, significant difference between the control and malnourished

inexperience of the mother in child feeding and child rearing, might have played a role in the causation of severe PEM in the present group. This contention is further supported by the very young age of the mothers in the present series (Table 4).

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Even though they were living in the same compounds, mothers of the control group had access to better living conditions in terms of housing, sanitation and home furniture which were actually indices of better socio-economic status (Tables 8a-d). Particularly, significant difference between the control and malnourished

groups was in terms of sanitation ($P < 0.001$), which protected the control children from exposure to infection and infestation, the role of which in the causation of malnutrition has been extensively documented, (Scrimshaw et. al. 1968 and Gordon et. al. 1963). Special importance of diarrhoeal disease in the causation of severe PEM, has also been stressed by Leditan and Reeds (1976) in Ibadan.

A significant association between severe PEM and occupation of parents were also found (Tables 7 and 9). Majority of the mothers in the malnourished group were housewives and majority of the fathers were also unskilled workers. This means lesser income for the family and perpetuation of poverty, resulting in poor and inadequate feeding of the children. This, coupled with illiteracy and ignorance, generally make the situation dangerous for the child. Similar associations between occupation of parents and severe PEM have been documented by Hijazi (1974) Grewal et. al. (1973) and Okeahialam (1973).

Thus, the above discussion clearly indicates that poverty, illiteracy, poor housing and insanitary surroundings provide the background in which severe PEM in children flourishes. These factors must,

therefore, be improved in any meaningful programme for the prevention of severe PEM.

Feeding practices of mothers

In consonance with tradition in most African countries, the majority of these mothers claimed to have breastfed their children. Infact, as many as 74.0% of kwashiorkor and 90% of marasmus groups as against 78% of control mothers, breastfed the children under consideration (Table 10). Furthermore, most of the mothers (93.0% for kwashiorkor, 62.2% for marasmus and 57.7% for control) (Table 12), breastfed as often as possible. This finding agrees with those of Jelliffe (1953) and Morley (1968) in Nigeria. Other workers such as Balakrishnan et. al. (1977) in Malaysia; Jansen (1977) in Fiji; Omer (1975) in Sudan and Gürson et. al. (1975) in Turkey, have documented such practice among mothers of the different countries.

It seems, therefore, that the problem is not solely whether or not the mother breastfed the child but also for how long, in terms of how much milk the baby was getting in a day and when he was completely weaned from the breast. Consequently, a child who is given 'agbo-omo' through forced feeding (Tables 11 and 16), could at best take in very little milk when put to the

breast, due to exhaustion. Thus, even though the child is put to the breast as often as possible, he actually receives very little milk. Another factor to be considered is the volume of milk available to the child. The effect of maternal nutrition on the volume of milk produced has been documented by Basair (1956), Jelliffe and Jelliffe (1978) and Bosa et. al. (1976). With poor nutritional status, volume of milk production falls. As most of the mothers of the poor socio-economic class in Nigeria are generally malnourished, the volume of milk produced by these mothers might be too low to cater for the needs of these children for a sufficiently long period. So, even though the child was being put to the breast as often as possible, the milk intake could be very little, leading to starvation and the onset of severe PEM.

Though very few mothers reported difficulty in breastfeeding (Table 13), there was a significant association between it and severe PEM. The major difficulty mentioned was illness of mother, and this significant association could be explained in the light of the belief that any illness, in addition to mental one, has harmful effect on the quality of breast milk. Therefore, a mother suffering from fever or diarrhoea

might doprive hor child of his protein sourco by rofusing to broastfood. Again, thors is also the contontion among tho mothors that drugs takon by them affoct tho broast-milk and as such rofrain from broastfooding. Thero is, thus, tho noed to educate mothors on whon to stop brenstfooding with rogard to drugs and illness.

Other problems montionod wors 'child rofusod to suck' and 'no broast milk'. Gonorally, thore should be no physiological reasons loading to a situotion whoro thero would bo no broastmilk in an avorago hoalthy Nigorian mothor. Similarly, no hoalthy child would rofuso suckling with somo porsovorance on the part of the mother. Thoso excuoos offorod by mothors could only bo accoptod on thoir faco valuo. In such situations, however, tho mothor should bo educated and roassurod. Sho must aloo bo impressod upon that the milk will only flow if tho child is put to the broast and allowod to suoklo.

Early woaning apponrs to bo tho rulo in tho oaso of the marasmic children. While as many as 68.2% of tho marasmic children wore put off the broast by tho ninth month, 63.1% of the kwashiorkor children wore weaned after the first year (Table 14). The control group was some what ovonly distributed botwoon those

age ranges. The trend of early weaning for maraemis and late weaning for kwashiorkor is supported by the findings of Hedeyat et. al. (1968); Brock and Autret (1953) and Omer et. al. (1975). Gurson et. al. (1975) also found that duration of breastfeeding was positively related to the occurrence of severe PEM in Turkey where most of the malnourished children were weaned very early.

The reasons given by mothers for stopping breastfeeding (Table 15) could be looked upon as a state of mind more than an actual happening since they were not convincing. This is in view of the current trend among mothers resorting to bottle feeding even though circumstances such as their occupation, which in this case is mainly housewifery, affords them better opportunity for breastfeeding for an adequate period. It could be seen that the outstanding reason given was 'child too old' even among the marasmis group where 68.2% were weaned completely by the ninth month. Definitely, a nine month oldchild cannot be considered as 'too old' to be on the breast under normal Nigerian circumstances. But, to be in vogue means not to breastfeed or to stop breastfeeding at the earliest possible time. This sad decline in breastfeeding has been reported in many countries (Monckberg 1969; Balakrishnan et. al. 1977) and it is now evident in Nigeria. Considering the

cost involved in this decline as already examined, in terms of morbidity, mortality, physical and mental defects and finances, the need to mobilize resources to educate the mothers on the importance of breastfeeding for an adequate period must be a national priority.

The seriousness of the issue could further be examined in relation to the mean age of introduction of supplementary food especially artificial milk. From Fig (3), it could be gathered that artificial milk was introduced as early as the first month among both the malnourished and control groups. Pap was also introduced by the third month for the three groups (Appendix B). This tends to support the findings of Jelliffe (1953) that supplementary foods are introduced unusually early in Nigeria. Such early introduction of artificial milk and other supplementary food was also found in Jordan by Hijazi (1974), in Kelantan; by Balakrishnan ot. al. (1977) and in Kenya by Ongori (1975). The problem of supplementary foods consisting of starchy gruels with little or no protein source has been reported by Brock and Autret (1953); Okechialam (1975); Adou (1975); Jelliffe (1953); Laditan and Reeds (1968); Hijazi (1974); Gurson et. al. (1975); Robbin-Coker and Jalloh (1975) and Ongori (1975). Apart from the absence

of protein source, the consistency is so light that the child takes more water than food. In the present study, it was found that the pap given to children in the malnourished groups contained as much as 62.6% water. Other foods introduced like beans and rice were served unmarshed which means that the child actually receives very little food.

The early introduction of artificial milk could be seen to have many serious health implications. First, there is the obvious reduction in the quantity of breastmilk the child receives. This means a reduction in high quality protein needed by the child for proper growth and development in an environment where supplementary feeding is generally inadequate.

Secondly, the quality of the artificial milk being fed to these children cannot be guaranteed. In terms of preparation, one would have to consider the educational level of these mothers which is an important factor for the right preparation of these formulas. With the low literacy level among mothers, there is the likelihood of the milk being either too concentrated, which could upset the digestive mechanism of the child, or too diluted, which means lower supply of the required nutrients to the child. But, in most cases, the

latter is the rule rather than the exception and this could be understood in terms of the high cost of the formulas and the relatively low income of these families. Jelliffe (1953) found in Ibadan that among the few mothers who used artificial milk, the strength of the formula varied tremendously and the preparation was usually vague and haphazard. Thus, there is the tendency towards economizing on the milk which leads to excessive dilution and the ultimate starvation of the child of nutrients, especially protein and calories. Ongori (1975) found in Kenya that a mother could use a tin of milk for a month. This is amply supported by the fact that marasmus outnumber kwashiorkor in the ratio of 3:1 in Nigeria (W.H.O. 1976). Similar dietary history has been classically reported for marasmic children in other countries (McLaren et. al. 1967; Hedayat et. al. 1968 and Gürson et. al. 1975).

Thirdly, another problem associated with the early introduction of artificial milk is the high probability of it acting as a source of infection. Even though the contention of Jelliffe (1968) that proper standard of sterilization is impossible under the African conditions could not be wholly true, he could still be given the benefit of doubt considering

the inadequate basic amenities and low standard of sanitation prevailing at places where these mothers live (Table 8b). Under similar conditions, other workers have found artificial milk acting as a source of infections to babies (Hodoyat et. al. 1968; Ogbeide and Goyea 1975; Sharma 1956; Welbourn 1955; Adou 1975 and Robbin-Coker and Jalloh 1975). But, it must be realised that artificial milk as such was not found to be a predisposing factor (Appendix B) in this study. The most important factor that was related to malnutrition, was inadequate sterilization of bottles by mothers of the malnourished group which set the stage for the transmissions of infection and infestations.

It would be recalled that most mothers used feeding bottles (Table 16) with the highest percentage coming from the control group, (67%). However, while as high as 90% of the malnourished group used just soap and water to keep their feeding utensils clean, 44% of the control group boiled them for over 5 minutes and also scalded them in milton (Table 17). It seems, therefore, that the problem is basically the use of feeding bottles with inadequate sterilization rather than the use of artificial milk per se. The cumulating effect of these

practices lead to the deplorable nutritional state of the child as early as the third month (Whitehead 1976; Janes 1974 and Botha-Antoun et. al. 1968).

Dietary intake of children

In line with many studies carried out in different countries, (Gopalan 1968; Welbourn 1955; Thomson 1956; and McLance and Widdowson 1968), the present study also found grossly inadequate intakes of energy and protein by the malnourished children. The results of the study do not, however, agree with the common belief that the diet of kwashiorkor and marasmus are significantly different in quality.

Forced feeding, high energy-low protein diets did not seem to be the responsible factor for the causation of severe PEM in the present series. In fact, the kwashiorkor children were found to be consuming less energy and protein as compared to the marasmic children, on the basis of their actual body weight. The energy and protein intakes were not, however, significantly different when expressed in terms of expected body weight. The results of our study, thus, appeared to agree with that of Gopalan (1968) and Laditan and Reeds (1976) who reported no essential

difference between the protein and energy intakes of marasmic and kwashiorkor children. The control group, living under the same environment, were also taking marginally adequate energy and protein, perhaps just enough to maintain their body weight. But, it appeared that the chances of these children becoming malnourished are great, once there are some other superimposed predisposing factors, especially infections. In the case of the kwashiorkor children, the grossly inadequate energy intake might have aggravated their protein nutriture, by utilizing the little protein available to provide for energy needs of the vital functions of the body, thus, causing a much more serious deficiency of protein than indicated by the intake figures.

Absence of animal source of protein from the diets of the children was very conspicious. Considering the high cost of meat and fish in the markets and the low income of these mothers, it is not surprising that they go mainly for plant sources such as legumes, cereals and tubers, thus perpetuating the crisis. A similar finding was made by Olaniyan in Ibadan (quoted by Collis et. al. 1962).

Thus, poor qunlity and quantity of food stand out as the main reasons for severe PEM in those children, but qunntitative deficiency appeared to predominate.

Increasing the quantitative intake of the same kind of food should, therefore, form the core of nutrition education of the mothers. Qunlitntive improvement, whenever possible, should also be insisted upon to strengthen the quality of the diet further.

Knowledge of mothers as it relates to nutrition

Only one mother in the marasmic group thought that breastmilk was not good for the baby (Table 25). But, looking at the high rate of early weaning, it could be argued that the high positive responses were based on intuition rather than any sound knowledge of the nutritive value of breastmilk. From the time they were born, they had seen their mothers and relatives breastfeed their younger siblings who definitely grew, even though it might have been a retarded growth. But, how the breastmilk helps in the growth is completely beyond the knowledge of these mothers. This anomaly could account in the large, for the nonchalant attitude

of mothers towards breastfeeding and doing it for an adequate period.

Qualitative grouping of foods in the three groups (Table 26) clearly indicated that the diet of the control group was superior to the malnourished groups. This strongly suggested that mothers of the control group were more knowledgeable and practicing better food habits than the mothers of the malnourished ones. The inference here is that correct knowledge of foods is an important factor in child feeding. It, thus, appeared that an improvement in the nutritional knowledge of the mother in feeding her children, would help to improve the situation.

Majority of the mothers in the present group were practising various food taboos during pregnancy and lactation (Tables 27, 28, 29 and 30). Reasons that determine the suitability and unsuitability of foods were stated to be many and were culturally determined. Similar taboos and food beliefs were also reported by other workers in Nigeria (Ogbeide 1976; Jelliffe 1966 and Morley 1968). Similar findings in other countries have also been reported by Shah (1975); Bailey (1975) and Malia (1975). Some of these customs and taboos were not only irrational and unscientific but also,

appear to be highly socially biased in favour of males, and could be eradicated only through education and correct knowledge.

During weaning and sickness of children, similar practices were observed among mothers. Some of the foods that are withheld from children as unsuitable for their health and growth are, again, more culturally determined (Table 31). The practice of withholding protein foods from a child during sickness is clearly demonstrated by the response on what to give and what not to give a child during diarrhoea and fever (Tables 32 and 33). It is worth noting that as few as 2.9% for kwashiorkor, 5.9% for marasmus and 9.0% for the control groups, mentioned fish and meat among the foods they would give to a child during diarrhoea and fever. They would rather give the child carbohydrate rich foods such as eba (cooked gari) and amala (cooked yam powder), while withholding sugary and semi-solid foods, beans and fruits. This practice affects the nutritional status of the child adversely because the nutritionally desirable foods are withheld at the time when the child's nutritional needs are very high (Scrimshaw et. al. 1968 and Jelliffe 1953).

The core of the problem is, therefore, the ignorance of the mother in child feeding and this is clearly

portrayed by the responses of the mothers of the malnourished groups, 83% of whom did not know that severe PEM is basically a disease due to inadequate supply of nutrients especially protein and calories (Table 34). No wonder then that the best part of the family meal is given to the father of the house, (Table 21) with the remnants going to the children. For, it is only when the mother knows the requirements and the health implications of inadequate diet, that she would attempt to give the right foods to the child, every other thing being equal. It is absolutely essential that the mothers are educated on how and what to feed their children. This brings out the core of educational problem in terms of prevention and control of PEM.

The results of the study, thus, indicated that early cessation of breastfeeding, introduction of bottle feeding with ~~inadequate~~ sterilization of bottles, inadequate quality and quantity of supplementary food, wrong feeding habits and food taboos, and above all, ignorance of the mother as to the dietary origin of severe PEM, create a complex interrelated environment in which severe PEM flourishes. Any nutrition education programme must, therefore, take all these factors into

account and should better form a part of an integrated health improvement programme. It is hoped, that despite cultural and other ecological differences with respect to food habits, findings as presented in this study, would serve as a baseline for nutrition intervention measures towards the prevention and control of severe PEM in Nigeria and elsewhere.

IMPLICATIONS FOR NUTRITION EDUCATION

Nutrition education, like general education, is concerned with changes in knowledge, feeling and behaviour of people. In its most usual form, therefore, it aims primarily on developing such food habits and practices which would ensure the best possible well-being. Most importantly, nutrition education is expected to ensure permanent and lasting changes in the selection of food by people. Thus, it has a major role to play in the prevention and control of severe PEM. The results of the present study indicated the following major areas where nutrition education can play a decisive role.

(1) *Diet during pregnancy and lactation*

The problem of poor nutritional status among children, takes its root from poor maternal nutrition

at the time of pregnancy (Sueser 1975; Pasamanic 1975; Shah 1975). Consequently, any ~~meaningful programme~~ for nutritional improvement, should start during pregnancy so that better nutritional status of the foetus is ensured through the feeding of his mother. The poor dietary practices of pregnant and lactating mothers, revealed in the present study, makes this almost an imperative starting point. Experience in many countries of the world have indicated that improvement in maternal nutrition during pregnancy, has not only improved the birth weight but also, increased the prospects of survival of the baby (Prema 1978 and Lechtig et. al. 1975). In addition, an improvement in the nutritional status of the mother would build up adequate reserves to subsidize lactation.

Consequently, at the ante-natal clinics, more emphasis should be laid on the diet of mothers in terms of eating enough quantities of the right foods. Foods such as fruits and milk are rarely eaten by mothers during pregnancy. They should be encouraged to take more of other items against which there are unreasonable food taboos. The best way to handle this problem should be to start personal contacts through home visits and encourage the mothers to attend clinics

regularly. In the clinics, demonstrations should be conducted with the participation of the mothers, taking into consideration their socio-economic, cultural and culinary practices.

(2) Feeding practices

Early weaning with introduction of milk under unhygenic conditions as early as the first month of life, appeared to be a core problem for nutrition education. Even though most mothers were aware that breastmilk is good for their children, the mothers, especially those of the malnourished children, were indulging in this harmful and dangerous practice. The poor socio-economic status of the mothers of the malnourished group, makes this type of feeding a lethal weapon in the hands of the mothers. Therefore, nutrition education must be directed to:

1. encouraging mothers to continue breastfeeding for adequate period,

2. making the mothers to understand that starting of artificial feeding at the age of 1 month is not only unnecessary, but also very dangerous for the survival of the child,

3. educating mothers on how best to use local foods to supplement the diet of the child in a more hygenic way.

The study showed that breastfeeding is inherent in the culture of these mothers. However, due to other influences such as economic pressures, neighbours' advice, persuasion of advertising agents and, in some cases, aiding and abetting of health workers, the mothers might be giving up early. The nutrition educator must encourage the mothers to prolong breastfeeding. This could be done through:

1. teaching mothers how to take care of the breast during pregnancy - cleaning the nipples and expressing milk from the breast everyday, six weeks before the baby is due,

2. advising them to give breastmilk only for the first four months after when one would be advised on what to give in addition to breastmilk by the health worker,

3. using examples of healthy breastfed and sickly artificially fed children from the same socio-economic background, as visual aids to impress on mothers the importance of breastfeeding,

4. impressing upon mothers the prohibitive cost of artificial feeding and,

5. drawing on historical examples where their own mothers breastfed them successfully.

Again, for effective reinforcement, a more regular learning situation should be created for the mothers. This means that the educational programme at the ante-natal clinics should be such that a mother would be exposed to these educational measures, at least, four times before

she reaches full term. This affords them enough time to think seriously over what was discussed at the clinic and also, the opportunity to ask questions at the next discussion, if they happen to have any problem with the subject matter.

The practice of giving 'agbo-omo' to babies should be discouraged. The mothers should be exhorted to put their babies to the breast as early as possible. In order to forestall any attempt by mothers to discard colostrum as 'bad milk' for the baby, its role in the prevention of certain diseases, should also be made clear to the mothers.

Although, our pre-occupation here is to convince mothers to breastfeed for an adequate period, we should not lose sight of the special cases where a mother, for one medical reason or the other, cannot breastfeed. In that circumstance, the mother should be exposed to intensive education in the techniques of artificial feeding, with special reference to the sterilization of bottles and the preparation of the formula, using the right quantities of milk. In addition to the mother bringing the baby to the centre for weighing and examination, as a check for nutritional adequacy, a visit to the home of the mother by a health worker,

would provide a better opportunity for further education and supervision.

The subject of supplementary feeding should be tackled as early as six weeks when most of these mothers come back for the post-partum examination. On the visit, the mother should be encouraged to attend the child welfare or an under fives' clinic with the baby and other siblings. At these clinics, much emphasis should be placed on the types of supplementary food to be used, in what quantities and in what form they should be served.

Since most of the mothers come from the lower socio-economic group, they are generally not in the position to buy any elaborate supplementary foods. A meaningful approach to solving the problem of nutritional inadequacy, is to improve upon the usual and familiar supplementary foods used by mothers, which is mainly pap. In terms of dough preparation, the usual practice of milling the maize before grinding into flour, could be substituted with whole grain dough, so that the chaff could be strained off during the preparation of the pap. Better still, protein sources such as ground herrings and groundnut paste could be added to the pap. The introduction of such new foods would have to be done gradually until the

baby fully accepts it. To help the mothers to accept and use these new supplementary foods, it is necessary they are exposed, as much as possible, to the preparation. Regular demonstrations at the child welfare clinics would be of much help.

It could be recalled that most of the mothers, over 80%, did not know that protein-energy malnutrition is basically a problem of food, and their ignorance in this respect, forms the basis of their poor practices, as far as feeding the child is concerned. In this context, nutrition education can play a decisive role in making it clear to the mothers, the strong interplay between food and diseases, especially protein-energy malnutrition. It is only when they understand the roots of the problem that they would be in the position to find a practical solution to it.

It must be realised that for a child, there is always enough in the house, his needs being so small. The problem is that of ignorance on the part of the mothers, as to what is good for their children and how much of it should be given to them. Our efforts, therefore, should be geared towards teaching the mothers to use the available local foods and also, to use adequate quantities.

In health centres, where the road-to-health chart should be used to keep track of the nutritional status of children who visit them, the mother should be taught to interprete every dot which appears on the chart. When the child is doing well, healthwise, the mother should be congratulated and exhorted to go on with the right feeding methods. On the other hand, the mother should be cautioned and helped when the health of the baby begins to deteriorate. Such a set back should be detected as early as possible and this could be done only when the mother visits the clinic regularly, which means that health workers should strive to sell their activities and the numerous advantages of those, to the public. Every mother should be treated as an individual and educational measures should be tailored-cut according to the problem of the individual. This means personal attention needs to be given to each mother by the nutrition educator.

For children who had already suffered from protein-energy malnutrition, nutrition education should be used as a tool and process to provide effective rehabilitation for them. This would be in terms of educating mothers towards the prevention of recurrence by teaching them correct feeding and also correcting any

sequelae where possible.

The education for such a purpose could well start at the out patients' department where those mothers first report with the sick children. The opportunities for personal contact should be fully utilised here. Since the number of mothers reporting with severe PEM is just a handful, the health visitor has a better chance to discuss to a greater precision, the background of a mother, which would put her in a better stead to make meaningful suggestions toward the solution of the problem. With the background in mind, the nutrition educator could discuss the causes of the disease, measures to cure it and to prevent recurrence. Further, in case the mother is referred to the children's clinic, she could be given a chit to see the health educator for further counselling. In support of the counselling, the mother should be exposed, once again, to the preparation of the different mixes, using food stuffs which are locally available and familiar to the mothers. The cooked food should be served to the children after allowing mothers to taste it. The idea here is to convince the mothers that what results from the different mixes, tastes as good as the food they eat at home, if not better.

The pediatric wards also afford health workers good opportunities to demonstrate the role of food in the recovery of the children, to these mothers. It is very true that most mothers never have the chance to know the relationship between the disease and food under the hospital conditions. This constitutes in no small way to the high recurrence rate and home mortalities (Ramanathan et. al. 1955). At the wards, therefore, the mothers should be given the opportunity to know the types of food being given to the children, how they are prepared and their effect on the rapid recovery of their children.

In some countries, (Webb et. al. 1975 in Haiti, Shah et. al. 1974 in India and Obi 1976 in Benin, Nigeria), nutrition rehabilitation centres have been found to be a more efficient forum for health education thus,acting as a better tool in preventing recurrence among discharged children. The homely nature of rehabilitation centres makes mothers more receptive to education and as such health workers operating under such conditions should make use to the maximum, opportunities available to educate mothers. Here, sick children could be used as visual demonstration for the mothers.

In thinking about suitable places for health education, one cannot help but to mention the various

schools as appropriate grounds for preparing the future mothers and fathers for the role ahead of them. At such young age, they are more receptive to education, which should focus on good food habits, personal hygiene and mother-craft. In addition to the students benefiting themselves from such an education, they would carry home to their mothers, whatever they learn at school. Their education, therefore, serves a dual purpose.

Depending on the grades of the children, the health worker together with the tutors should work out appropriate nutrition education programme. The school meal programme could serve as a practical demonstration to the children. The quality of sanitation, maintenance of the toilet and water facilities at the school, should always be used as teaching aids for the children.

(3) Home situation

The unsanitary conditions under which mothers and their children live, provide fertile grounds for malnutrition and infection to thrive. The poor conditions prevailing in those communities are largely attributable to gross negligence due to ignorance of the population. The mothers must as such, be made aware of the health

hazards involved in dirty and unsanitary compounds. The subject of sanitation should be treated in the total context of the health of the family, with special reference to the child. Practices relating to storage of food, water, utensils and the maintenance of refuse and drains, should be thoroughly examined side by side with feeding practices.

The importance of better sanitary practices lies in the fact that poor sanitary conditions could breed infections which have adverse effect on the nutritional status of the child, irrespective of good feeding habits.

(4) Socio-economic status

The association between poverty and malnutrition was, again, clearly demonstrated by the results of the study. The better socio-economic background of the mothers of the control group, protected their children from malnutrition. This implies that nutrition educators who advocate correct feeding habits and better sanitary conditions, should also adopt home economic measures to improve income of the mothers.

The mothers should be encouraged to enter into more gainful employment to help supplement the house keeping money. In this context, the nutrition educator

could help in teaching the mothers skills, such as basket weaving, beadwork, baking and sewing. When thus equipped, they could produce items and share the proceeds accruing from the sales. In addition to these skills, the mothers should be taught the basics of household budgetting so that they could utilize better, the resources available to them. For such a programme to succeed, it should be linked with a broader programme of community and welfare development.

Also, for effective co-ordination, the health worker should work in close co-operation with other community workers, such as, agricultural extension officers, social workers, agencies, compound heads and the representatives of the mothers. They should all be involved right from the diagnosis of the problem through the planning and implementation to the evaluation stage.

However, in order for the nutrition educator to channel his resources efficiently and fruitfully, in all the educational activities, his objectives should be clearly and precisely stated. These would not only guide him but also, help to evaluate his achievements and plan for corrections and reinforcement. Further, he should take into account the conditions under which

people learn, making it as conducive as possible, so that the mothers could benefit more from his educational programmes.

The results of the study, thus, clearly delineated many areas where nutrition education can play a vital role in the prevention and control of severe PEM. Nutrition education, therefore, could be used not only as a tool to change behaviour but also, a process by which opportunities could be provided to effect these changes.

Summary

This study has shown that child feeding practices and socio-economic characteristics of mothers are two major contributory factors to the occurrence of severe PEM in children.

It has also shown that the mothers of the control group had an edge over the mothers of the malnourished children of severe PEM. In terms of child feeding practices, a greater percentage of the mothers in the control group used such proper methods as giving glucose water to the child before the commencement of breast-feeding, using feeding bottles, cups and spoons when feeding their children, employing more effective methods of sterilization and serving their children first at

home, than the application of such outdated and frustrating methods as giving 'agbo-omo' to children before breastfeeding, forced feeding, and serving children last at home. These findings tend to support the first hypothesis that child feeding pattern is an important factor in the occurrence of kwashiorkor and marasmus.

With respect to intakes of food, it was found that the control group was receiving better quality and adequate quantities of food. This is clearly demonstrated by tables 18-24 and supports the second hypothesis, that the quantitative and qualitative dietary intakes of children contribute towards the causation of kwashiorkor and marasmus.

In considering the personal characteristics of the respondents, no significant differences were found between the three groups (kwashiorkor, marasmus and control), in terms of their marital statuses. However, the mothers of the control children were found to be more educated and have adequate knowledge about foods which are nutritionally suitable for a weaned and growing child, a pregnant woman, a lactating mother and also, what to give a child during fever and diarrhoea. Further, the mothers of the malnourished group did not

know the relationship between food and severe PEM. Thus, with the exception of marital status, the third hypothesis which says, social characteristics such as marital status, educational level and nutritional literacy of mothers, play a major role in the occurrence of marasmus and kwashiorkor, is supported.

On the basis of these findings, it has been suggested that a well organized nutrition education programme, taking into consideration the socio-economic background of these mothers, should form the core of any comprehensive and meaningful welfare improvement programme.

CHAPTER V

CONCLUSION

Summary

The general purpose of the study was to explore the relationship between the occurrence of severe PEM and child feeding patterns. Further, personal and economic characteristics and nutritional literacy of respondents were also examined.

The results of the study have indicated that mothers of the control group who were more educated, secured more stable income earning occupations than the less educated mothers of the malnourished children. Again, a majority of the mothers of the control group enjoyed better living conditions than those of the mothers of the malnourished groups. These factors afforded the mothers of the control group, a better opportunity to protect their children against infections and conditions that usually set the stage for severe PEM. In addition, with a better knowledge of nutritionally desirable foods for a weaned and growing child, the control mothers were found to be practicing better food habits. More interesting is the fact that more mothers of the control group than those of the malnourished ones served their

children first at home, which suggested a higher possibility of the children getting adequate quantities of food.

The core of the problem, therefore, seems to be illiteracy, thus making severe PEM, primarily, a social and economic problem than a medical one. With better education and stable working conditions, there is more likelihood of better feeding practices and a subsequent reduction in the occurrence of severe PEM. This is amply supported by the fact that most of the mothers of the malnourished children, did not know that severe PEM is basically a problem of food.

These findings make the need for organized nutrition education programmes imperative. It is suggested that such programmes should form part of a more comprehensive welfare programme, which, in addition to educating the mothers, would teach the disadvantaged mothers skills which would help improve their income earning capacity.

In the context of such a programme, the health worker would have to work in close co-operation with other workers, agencies and institutions. Furthermore, it would be necessary for the health worker to create more learning avenues at the different meeting points

at the hospital, so that a mother goes home, not only with a treated child, but also, with knowledge and skills which would help improve the health of the child in particular and the family in general.

Nutrition education, therefore, should be used as a tool to effect desirable changes and also, ass process to provide suitable conditions for such changes.

Recommendations

The results of the study clearly indicated the complex socio-economic factors - lack of formal education, social taboos and unsanitary conditions- which interact with poor dietary practices to cause severe PEM. Therefore, measures must be taken to improve those factors which provide the social milieu for the disease. The study, therefore, recommends:

(1) Nutrition education should be an integral part of a broader socio-economic and health improvement programmes. Such programmes aimed at eliminating poverty and improving sanitation, housing and the availability of foods, should receive particular attention in the broad based programme.

Responsibilities of the individuals, families, communities and government, at the various levels, should be well defined in the programme formulation.

(2) All avenues, media and institutions should be used to encourage breastfeeding for a longer period.

(3) The introduction of artificial food as early as the first month, should be strongly discouraged. At the same time, the mothers should be impressed upon to introduce supplementary foods between the 4th and 6th months, using enough quantities of the right kinds of locally available foods.

(4) Formal and functional education should be made accessible to the mothers through mass and adult education programmes.

(5) The government should provide more institutional framework in the form of more schools, health institutions, preventive and immunization services for the people.

(6) The existing health services, health education facilities, agricultural avenues and social amenities should be more vigorously and extensively

utilized. The members of staff working in those services, should be given more orientation in the form of inservice training and provided with means and media, to improve their efficiency.

(7) In the under-fives' clinics, the road-to-health chart should be more effectively used to detect the 'at risk' group of children.

(8) The government should seriously explore the possibilities of developing formulas for weaning diets from locally available food items. Such weaning diets should be sold to mothers at subsidized prices.

(9) Training institutions should make nutrition education one of the core subjects in their training programmes. This would sufficiently prepare the future workers for effective nutrition education of the public.

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A P P E N D I C E S

APPENDIX A

Relationship between selected Malnutrition Problems and Child Feeding Practices

Questionnaire for Mothers

Questionnaire No. [1] [2] [3]

Personal Characteristics

1. Name of Child .....
2. Sex: Female Male
3. Age of Child: .....
4. Weight: .....
5. Name of mother: .....
6. Home address of Mother: .....
7. Name of Father: .....
8. Age of Mother:

15-19	1	
20-24	2	
25-29	3	[4]
30-34	4	
35-39	5	
40-44	6	
45 and above	7	

9. Marital status of mother:

Single	1	
married	2	
widowed	3	[5]
divorced	4	
separated	5	

10. Educational level of mother:

Illitorato	1	
Some years in Pr. School	2	
Completed Primary School	3	
Some years at Sec/Comm/ Teacher Training	4	☐ 6
Completed Sec/Comm. Teacher Training	5	

11. Occupation of Mother:

House wife	1	
Petty Trader	2	
Farmer	3	
Prof. worker (Teacher, nurse., etc.)	4	☐ 7
Others	5	

12. Approximate monthly income of mother:

£60-	1	
140-	2	
220-	3	☐ 8
300-	4	
Above 380	5	

13. Living condition of mother:

	Good 60%	Fair 40%	Poor 20%
Type of housing			
Quality of sanitation			
Type of furniture			
Appearance of mother			
Total			

14. Occupation of father:

Unskilled worker (Labourer, farmer, etc.	1	
Semi-skilled worker (Mecbanic, driver, etc)	2	
Skilled worker (technician, artisan, etc.)	3	☐
Prof. worker (lawyer, doctor, nurse)	4	
Others (specify)	5	9

15. How many pregnancies have you had?.....

16. How many live births have you had?.....

17. (a) How many pregnancies were wasted (including still births?).....

(b) At what stage of development? (in months)

1st one
2nd one
3rd one

18. What is the birth order of the sick child?

1st	1	
2nd	2	
3rd	3	
4th	4	☐
5th	5	10
6th	6	

Feeding Practices

19. Did you breastfeed this child?

Yes	1	
No	2	☐ 11

20. If No, Why?

Child could not suck	1	
No breast milk	2	
Mother was ill	3	☐
Child had diarrhoea	4	12

(NOTE:- If No, go straight to No.30 from No. 20)

21. When did you start breaet feeding (after delivery?)

Some hours	1	
Half a day	2	
1 day	3	
2 days	4	13
3 days	5	

22. Until then what did you Give the baby?

nothing	1	
Water	2	
'agbo-omo'	3	14
Glucose	4	

23. How many times a day did you breastfeed the child?

2 times	1	
3 times	2	
4 times	3	15
5 times	4	
as often as possible	5	

24. Did you have any difficulty in breastfeeding?

Yes	1	
No	2	15

25. If Yes, what are they?

Breast sepsis	1	
Inverted nipples	2	
Primary failure of milk supply	3	17
Illness of mother	4	
Others (specify)	5	

26. At what age did you stop breast feeding?

1-3 months	1	
4-6 months	2	
7-9 months	3	
10-12 months	4	18
13-15 months	5	
16-18 months	6	
19-21 months	7	

27. Why did you decide to stop breast feeding?

Child refused to suck	1	
Not enough milk	2	
Pressure of work	3	
Sored nipples	4	19
Pregnancy	5	
Child too old	6	

28. How did you stop breast feeding?

Gradual	1	
Abrupt	2	20

29. If 2, why did you stop abruptly?

No reason	1	
Illness of mother	2	
Had to send him away	3	21
Pregnancy	4	

30. What supplementary foods did you give the baby? (Code later)

	Type of food	Age started (in months	No. of times served/ day	Preparation	Consistency
1.					
2.					
3.					
4.					

31. How did you give it?

by hand	1	
cup and spoon	2	
forced feeding	3	
feeding bottle	4	22

32. Did you give the baby any milk from the bottle?

Yes	1	
No	2	23

33. If Yes, why?

Not enough milk	1	
Had to go to work	2	
Others were doing it	3	
No reason	4	24
Others (specify)	5	

34. At what age did you start giving the milk?

1-3 months	1	
4-6 months	2	
7-9 months	3	
10-12 months	4	25
13-15 months	5	

35. How did you keep the bottles and other feeding utensils clean?

Boil for 5 minutes and over after washing	1	
Soak in milton	2	
Wash with soap and water	3	
Others (specify)	4	26

36. How many times did you give the milk/day?

Once	1
2 times	2
3 times	3
4 times	4
5 times	5

27

37 What foods formed the usual diet of the child after complete stoppage of breast feeding? (Code later)

Meal	Types of food	Quant./Pr.	No. of times served	Preparation
Breakfast	1.			
	2.			
	3.			
Lunch	1.			
	2.			
	3.			
Dinner	1.			
	2.			
	3.			
Snacks				

38. What were you giving the child a week before the illness (Code later)

Meal	Types of food	Quant/Pr.		No. of times served	Prepa-ration
Breakfast	1.				
	2.				
	3.				
Lunch	1.				
	2.				
	3.				
Dinner	1.				
	2.				
	3.				
Snacks					

39. What did the child eat yesterday (Code later)

Meal	Types of food	Quant/Pr		No. of times served	Prepara-tion
Breakfast	1.				
	2.				
	3.				

Lunch	1.				
	2.				
	3.				
Dinner	1.				
	2.				
	3.				
Snacks					

-- Knowledge-

40. Do you think breast milk is good for a baby?

Yes	1	28
No	2	

41. If Yes, why? (Code later)

1.
2.
3.

42. If No, why? (Code later)

1.
2.
3.

43. What foods are good for a weaned child? (Code later)

1.
2.
3.

44. Did you give these to your child?

Yes 1

No 2 [29]

45. If No, why? (Code later)

1.
2.
3.

46. What are some of the foods not suitable for a pregnant mother? (Code later)

1.
2.
3.
4.

47. Why are those not suitable for the pregnant mother? (Code later)

1.
2.
3.

48. What foods are good for the pregnant mother? (Code later)

1.
2.
3.

49. Why are these good for her? (Code later)

1.
2.
3.

50. What are some of the foods not suitable for the lactating mother? (Code later)

1.

2.

3.

51. Why are those not suitable? (Code later)

1.

2.

3.

52. What foods are good for the lactating mother? (Code later)

1.

2.

3.

53. Why are those good for her? (Code later)

1.

2.

3.

54. Mention some of the foods not suitable for a growing child? (Code later)

1.

2.

3.

55. Why are these not suitable? (Code later)

1.

2.

3.

56. What are some of the foods you would not give a child during diarrhoea and fever? (Code later)

1.
2.
3.

57. Why not? (Code later)

1.
2.
3.

58. What foods do you give the child during diarrhoea and fever? (Code later)

1.
2.
3.

59. Do you think the present sickness relates to food?

Yes	1	
No	2	30

Home Situation

60. Who is served first at home?

Father	1	
Mother	2	31
Children	3	

61. How do the children eat?

Individually	1	
Together	2	32

Diagnostic features

Marasmus

(1) Gross loss of subcutaneous fat

(2) Muscle wasting

(3) Obvious growth retardation in relation to age

(4) Weight for age: <60% std

Kwashiorkor

(1) Weight for age: 60-80% std.

(2) Oedema-lower legs, face or generalized

(3) Skin changes

(4) Hair changes

(5) Moonface syndrome

APPENDIX B

(1) Use of artificial milk (Table 1)

No significant relationship was found between the use of artificial feeding and severe PEM and no differences were found between the three groups ($p > 0.05$).

TABLE 1

Distribution by Artificial Feeding

Answer	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Yes	38	49.4	34	46.6	62	62.0	134	53.6
No	39	50.6	39	53.4	38	38.0	116	46.4
Total	77	100	73	100	100	100	250	100

$x^2 = 4.90$ on df 2 $p > 0.05$

(2) Breastfeeding and education (Tables 2-5)

No significant relationship was found between education and breastfeeding or education and commencement of breastfeeding.

TABLE 2

Education Vs Commencement of Breastfeeding Kwashiorkor

Educational Level	Some hours		Half a day		1 day		2 days		3 days	
	No	%	No	%	No	%	No	%	No	%
Illitorate	11	55.0	8	72.7	9	45.0	3	50.0	-	-
Some years in primary school	6	30.0	3	27.3	6	30.0	2	33.3	-	-
Completed primary school	3	15.0	-	-	5	25.0	1	16.7	-	-
Some years in Sec/Comm/T.Tr.	-	-	-	-	-	-	-	-	-	-
Completed Sec/ Comm/T.Tr.	-	-	-	-	-	-	-	-	-	-
Total	20	100	11	100	20	100	6	100	-	-

$x^2 = 3.90$ on 6 df $p > 0.05$

TABLE 3

Education Vs Commencement of Breastfeeding Marasmus

Educational Level	Some hours		Half a day		1 day		2 days		3 days	
	No	%	No	%	No	%	No	%	No	%
Illiterate	16	72.7	4	40.0	13	68.4	8	80.0	5	100.0
Some years in Primary School	3	13.6	3	30.0	6	31.6	2	20.0	-	-
Completed primary school	3	13.6	3	30.0	-	-	-	-	-	-
Some years in Sec/Comm/T.Tr.	-	-	-	-	-	-	-	-	-	-
Completed Sec/ Comm/T.Tr.	-	-	-	-	-	-	-	-	-	-
Total	22	100	10	100	19	100	10	100	5	100

$\chi^2 = 6.97$ on 5df $p > 0.05$

TABLE 4

Education Vs Commencement of Breastfeeding Control

Educational Level	Some hours		Half a day		1 day		2 days		3 days	
	No	%	No	%	No	%	No	%	No	%
Illiterate	5	33.3	5	27.8	10	33.3	6	46.1	2	100.0
Some years in primary school	6	40.0	5	27.8	8	26.7	3	23.1	-	-
Completed primary school	3	20.0	8	44.4	8	26.7	2	15.4	-	-
Some years in Sec/Comm/ T.Training	1	6.7	-	-	4	13.3	2	15.4	-	-
Completed Sec/ Commercial/ T. Training	-	-	-	-	-	-	-	-	-	-
Total	15	100	18	100	30	100	13	100	2	100

$\chi^2 = 9.00$ on 10df $p > 0.05$

TABLE 5

Education Vs Breastfeeding

Educational level	Kwashiorkor				Marasmus				Control			
	Yes		No		Yes		No		Yes		No	
	No	%	No	%	No	%	No	%	No	%	No	%
Illiterate	31	54.4	12	60.0	46	69.7	6	85.7	28	35.9	8	36.4
Some years at primary school	17	29.8	3	15.0	14	21.2	-	-	22	28.2	8	36.4
Completed primary school	9	15.8	5	25.0	6	9.1	1	14.3	21	26.9	5	22.7
Some years at Sec./Comm/ Teacher Tr.	-	-	-	-	-	-	-	-	7	8.0	1	4.5
Completed Sec/ Comm/Teacher Training	-	-	-	-	-	-	-	-	-	-	-	-
Total	57	100	20	100	66	100	7	100	78	100	22	100

$x^2 = 2.03$ on 2 df
$p > 0.05$

$x^2 = 1.89$ on 2 df
$p > 0.05$

$x^2 = 0.92$ on 3 df
$p > 0.05$

(3) Method of complete weaning (Table 6)

No significant differences were found between the control and the malnourished groups with respect to how they stopped breastfeeding($p > 0.05$)

TABLE 6

Distribution by Method of Complete Weaning

Method	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
Gradual	41	71.9	50	75.8	62	79.5	153	76.1
Abrupt	16	28.1	16	24.2	16	20.5	48	23.9
Total	57	100	66	100	78	100	201	100

$x^2 = 1.04$ on df 2 $p > 0.50$

(4) Reasons for weaning abruptly (Table 7)

No significant differences were found between the malnourished and control groups with respect to their reasons for weaning abruptly ($P > 0.05$).

TABLE 7

Reasons for Stopping Breastfeeding Abruptly

Reasons	Kwashiorkor		Marasmus		Control		Total	
	No	%	No	%	No	%	No	%
No reason	7	43.7	5	31.3	11	68.7	23	47.9
Illness of mother	2	12.5	3	18.7	1	6.3	6	12.5
Had to send him away	4	25.0	2	12.5	2	12.5	8	16.7
Pregnancy	3	18.8	6	37.5	2	12.5	11	22.9
Total	16	100	16	100	16	100	48	100

$\chi^2 = 6.81$ on 6 $0.5 > P > 0.3$

(5) Number of Pregnancies

No significant differences were found between the three groups with respect to the number of pregnancies a mother has had ($p > 0.10$). However, it is worth noting that high percentages of mothers of the three groups had at least one pregnancy wasted (76.5% for kwashiorkor, 84.2% for marasmus and 60% for the control).

(6) Mean ages of introduction of pap (Table 8)

There were no significant differences between the three groups with respect to the mean ages of introduction of pap ($p > 0.05$)

TABLE 8

Mean Age of Introduction of Pap

Food	Kwashiorkor		Marasmus		Control	
	Mean age (mths)	S.D.	Mean age (mths)	S.D.	Mean age (mths)	S.D.
Pap (Eko)	3.8	1.72	3.7	1.76	3.5	1.79

Kwashiorkor Vs Control $t = 1.44$ $p > 0.05$

Marasmus Vs Control $t = 0.43$ $p > 0.05$

Kwashiorkor Vs Marasmus $t = 0.93$ $p > 0.05$