Original article

Child-feeding practices as predictors of nutritional status of children in a slum area in Addis Ababa, Ethiopia

Gugsa Abate[1], Wambui Kogi-Makau[2], Nelson M. Muroki [2]

Abstract: In a across-sectional study carried out in four purposefully selected slum kebeles of Addis Ababa, the nutritional status of 758 children aged 6 - 36 months was measured and subsequently classified into malnourished and well nourished groups. Child-feeding practices of randomly selected mothers of the two groups of children were compared with the view of identifying practices that contribute to child-nutrition insecurity in the study area. The result indicated that the majority of the mothers (i.e. 99.5% in the malnourished and 98.4% in well nourished groups) had initiated breast-feeding, and no significant difference was found either in the median or mean duration of breast-feeding between the two groups of mothers. After adjustment has been made (through logistic regression) for covariates, the study established that exclusive breast-feeding beyond four months, feeding low quality diet with a frequency of less than four times and giving porridge with feeding bottle as well as low household income are the risk factors contributing to young children's nutrition-insecurity in the slum section of Addis Ababa. Hence, demonstrative and sustained education focusing on appropriate child-feeding is recommended together with initiation of income generating projects with a view of empowerment of those families whose monthly income is low. [*Ethiop. J. Health Dev.* 1999;13(3):229-2

Introduction

About 79% of the population of Addis Ababa lives in low-grade, congested slum areas (1). Studies which address nutritional problems have found that malnutrition continues to be a serious health problem in the slums (2-5). One study in Nairobi slum (6), where 86.2% of the preschoolers were reported to have been stunted, provides a good basis for understanding that slum children are most vulnerable to malnutrition. Hofvander and Eksmyer (7), who found about 3% prevalence of severe PEM, reported that PEM is the main nutritional problem for young children in the slum of Addis Ababa.

It is a well established fact that malnutrition manifests itself as a function of many and complex factors (8-10). It is directly linked to poor dietary intake and diseases, which in turn result from an interaction of various underlying factors which include crisis in household food security, inappropriate child care and feeding practices, unhealthy place of residence, and insufficient basic health services (8-11). An unfavourable health environment caused by inadequate water and sanitation can increase the probability of infectious diseases and indirectly form certain types of malnutrition (8-11). Further, poor socio-economic variables, cultural beliefs, and lack of parental education, especially that of mothers, are all cited to affect a person's nutritional status (8-13).

Thus, nutrition planning and advice to a community needs to be grounded on good information and knowledge of which individual variables of the aforementioned factors are contributing to a high risk of malnutrition in that community.

[1]Ethiopian Health and Nutrition Research Institute, P.O. Box 5654, Addis Ababa, Ethiopia; [2]Unit of Applied Human Nutrition Programme, P.O. Box 41607, Nairobi, Kenya

Despite many nutritional studies in the urban and rural areas of Ethiopia (7,13-15), very little is known about which attributes of child feeding practices are associated with the nutritional status of infants and young children in the Ethiopian slum settings. This study, therefore, was intended to

demonstrate those child-feeding practices that contribute to the prevalence of child-nutrition insecurity among infants and young children in a slum area of Addis Ababa.

The findings of this study are expected to enrich the knowledge of all interested parties in the area of applied child-nutrition and provide information to policy-makers to take intervention actions to reduce the risk of malnutrition in the slum areas.

Methods

In 1978, the World Bank identified seven kebeles (smallest administrative units) as typical slums and the most congested parts of Addis Ababa (16). An integrated urban development project with a nutrition- intervention component operates in three of the seven kebeles, identified as such by the woreda (district) authorities. This study was carried out from March to May, 1997 in four purposefully selected slum kebeles which were out of the intervention programme. Despite it's drawbacks of over-or under-selection of population elements (17), a convenience sampling procedure was applied to exclude the three intervention kebeles from the study. Because, it is highly probable that the socio-economic situation and child-feeding behaviours of families in these kebeles have been influenced by the existing intervention programme and that this may bias the study results. All the four kebeles are located in woreda 3, and are named Kebele 31, kebele 34, kebele 44, and kebele 45. The populations of these kebeles are estimated to be 7529, 4879, 9011 and 3293 for kebele 31,34,44, and 45, respectively (18). The population composition of the study kebeles is heterogeneous consisting of various ethnic groups with different languages and cultural backgrounds.

This was a cross-sectional study, comparative in nature, and with descriptive and analytical components. The sampling frame was a list of all households in the study areas with children aged of 6-36 months. Six hundred and thirty two households with children of 6-36 months of age (270 from kebele 31, 103 from kebele 34, 184 from kebele 44, and 75 from kebele 45) were identified in all the four kebeles through a house-to-house preliminary survey by which all children in the above age bracket were registered from each household. Age and sex as well as weight and height measurements of 758 children were recorded to determine the nutritional status of the target children. The anthropometric data were collected based on the methods described by the United Nations (19). Two weight measurements were obtained using a Salter weighing scale and the average calculated and recorded to the nearest 0.1 kg.

The children were weighed with minimal clothing and without shoes. For measuring height, two types of wooden scales were used-one for recording recumbent length of children under two years of age and the other for taking standing height of the older children. In any case two measurements were recorded and the average calculated and written to the nearest 0.1 cm.

The anthropometric data were analyzed in terms of weight-for-age, height-for-age, weight for height and by use of the Anthro package, Z-scores were generated and the numbers of malnourished and well-nourished children were determined among the total children in the four kebeles. The weight-for-age (WFA) index was used to classify the children into the categories of malnourished and well-nourished. This process facilitated polarization of households into two groups: the wellnourished households and the malnourished households.

After the households were classified as malnourished and well-nourished, samples were drawn from among the household list of each group using a random sampling method. A total of 384 households (192 for each group) were selected. The statistical formula recommended for comparative studies (17) was used to calculate the desired equal sample size for each group of households.

Data on breastfeeding, weaning practices and types of weaning foods as well as household income were collected from sampled households of both groups through inter-viewing of mothers or persons feeding the index child, using a preplanned structured questionnaire as the data collection tool. For those households which had more than one child, interview was made in relation to the youngest child.

The diets of children, especially porridge prepared from basic or multi-mixes, was identified as enriched and that made solely from cereal sources was labelled as non-enriched.

The data were collected with the assistance of two field workers who had completed grade twelve level of education. The two had also participated in other surveys and as such, were familiar with interviewing and anthropometric measuring techniques. However, further training in anthropometry and interviewing techniques was done. Pre-testing of the questionnaire was undertaken and modifications made prior to its application.

Data validity and reliability were achieved through the close supervision of enumerators by the principal investigator. Immunization card was used to ascertain the age of the child. However, mothers in the survey areas were easily able to recall the ages of their children below two years of age. When reliable documentary evidence was not available interviewers used a local event calendar to determine the month and year of a child's birth. At the end of each day, the completed questionnaires were checked to ascertain that all questions had been answered correctly and consistently. A two kilogram iron bar was used to regularly check scale accuracy and make sure measurements are correct.

The data were analyzed using a computer in which SPSS/PC+ software was installed. Comparison of the various parameters of child- feeding practices in the two groups of households (malnourished and well-nourished) was done by administering chi-square and t-test at p value less than 0.05 level of significance. Ranking of risk factors of malnutrition was made by carrying out step-wise multivariate analysis involved the use of multiple logistic regression.

Result

Age and sex composition of children in the study area: Out of the 758 children, 51.2% were males and 48.8% were females. There were more females in the age group 6-12 months, while the number of males was greater than that of females among the age categories of 13-24 and 25-36 months)

Table 1: **Distribution of malnourished children by study area, Addis Ababa, 1997**

Study area	Below-2 SD of NCHS**			
	N	Underweight	Stunted	Wasted
Kebele 31	294	138(46.9)b*	166(56.5)b	9(3.1)+
Kebele 34	121	33((27.3)a	50(41.3)a	4(3.3)
Kebele 44	220	59(26.8)a	98(44.5)a	0(4.6)
Kebele 45	123	33(26.8)a	53(43.1)a	3(2.4)
Total	758	263(34.7)	67(48.4)	26(3.4)

+Figures in parenthesis are percentages
*any two figures followed by different letters in any one column are significant at P<0.01
**NCHS-National Centre for Health Statistics

Nutritional status of children in the study area: For the four kebeles covered in the study, as shown in Table 1, slightly over a third (34.7%) of the children were underweight (low weight-forage), nearly half (48.4%) were stunted (low height-for-age), and a small number (3.4%) were wasted (low weight-for-height). A significantly higher prevalence of underweight and stunting was observed in kebele 31 than was observed in the other three kebeles (P<0.01).

The breastfeeding situation: Both the malnourished and well-nourished groups of households had invariably initiated breastfeeding as a great majority of the mothers (99.5%) in malnourished households and 98.4% in well-nourished households had at some time breastfed their children. About the same proportion of mothers, (about two thirds i.e. 66.7% and 65.1% in the malnourished households and well-nourished households, respectively) had practiced exclusive breastfeeding for the first three months of life (Table 2). However, a significantly higher proportion of mothers in the malnourished households (23.9%) had practiced exclusive breastfeeding up to 4-6

Table 2: **Distribution of mothers by duration of exclusive breastfeeding, Addis Ababa, 1997**

Age of exclusive Bf* practised (months)	malnourished households (No=192)	well-nourished households(N=192)	X^2	P-value
<4	128 (66.7)+	125(65.1)	0.05	NS
4-6	46(23.9)	14(7.3)	18.9	<0.001
7-9	21(11.0)	8(4.2)	5.4	<0.05

+Figures in parentheses are percentages
NS= not significant at p<0.05
B f= breastfeeding

months than had mothers in the well nourished households (7.3%) (p<0.001). Further, the proportion of mothers in the malnourished households (11.0%) continued exclusive breastfeeding beyond six months was significantly higher than in well-nourished households (4.2%) (p<0.05). A significantly higher proportion of households in the malnourished group (84.8%), which exclusively breastfed for more than four months, earned ≤250 Birr than those households in the well nourished group which was 50.0% (p<0.05).

There was no significant difference in mean duration of breastfeeding between the two types of households (i.e. 18.2±10.1 and 16.8±10.4 months in malnourished and well nourished households, respectively) (t=0.95, p=0.34). However, a relatively higher median duration of breastfeeding was observed among the households of the malnourished group (22.5) months) than that among the well nourished households (15 months).

The result indicated that the two groups of mothers were not the same in the duration of exclusive breastfeeding as the malnourished group continued for a longer period. However, the two were not different in the length of general breastfeeding.

Types of supplementary foods, feeding frequency and method of feeding: The mean age at which supplementation was started in malnourished households (4.9±2.9 months) was significantly higher than in the well nourished households which was 4.2±2.4 months (p<0.05). There was a significantly a higher proportion of mothers in malnourished households (44.3%) who fed nonenriched porridge than there were in the well nourished group of households (19.8%) (p<0.0001) (Table 3). Cow-milk was fed by most mothers as first food (i.e. 48.4 and 47.9% in malnourished and well nourished groups of households, respectively) and close to 20% fed bread with tea and "injera fetifit". Mashed potatoes were fed by more mothers in well nourished households (16%) than in malnourished households where about 10% did, although no significant difference was observed.

Table 3: **Distribution of children by first foods given at the time of weaning, Addis Ababa, 1997**

Type of weaning foods	malnourished households N=192	well-nourished households N=192	X^2	P-value
cow-milk porridge	93(48.4)+	92(47.9)	0.0	NS
(not enriched) porridge	85(44.3)	38(19.8)	25.3	<0.0001
(enriched)	78(40.6)	121(63.0)	18.4	<0.0001
injera fetifit	43(22.4)	35(18.2)	0.8	NS
bread+tea	41(21.4)	36(18.8)	0.3	NS
mashed potato	19(9.9)	31(16.1)	2.8	NS
canned milk	15(7.8)	25(13.0)	2.3	NS
others	11(5.7)	11(5.7)	0.1	NS

+Figures in parenthesis are percentages NS-not significant at p<0.05
Others:- Boiled flax water, fenugreek water, rice, orange juice and banana. percentages do not add up to 100 because some children consumed more than one type of food

As shown in Figure 1, a significantly higher proportion of households in the malnourished group (53.6%) had fed children 1 - 3 times than had households in the well-nourished group (26.5% ; p<0.001). However, the proportion of households with a daily feeding frequency of more than or equal to four times was significantly higher in the well-nourished group (73.5%) than in the

malnourished group which was 46.4% ($p<0.0001$). The mean feeding frequency among children in the well nourished households (four times) was significantly ($p<0.01$) higher than in the malnourished households where this was 3.4 times.

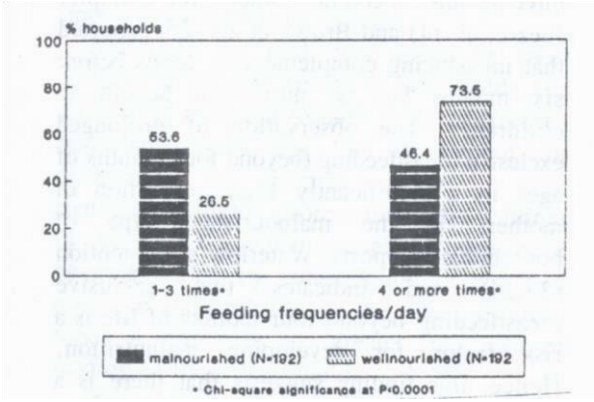

Figure 1: **Distribution of households by feeding frequency of Children**

The number of households which used the bottle to feed milk was practically the same (i.e. 70% in well-nourished and 73% in malnourished groups of households) (Table 4). However, there were significantly higher numbers of mothers in malnourished households (28.8%) who used the bottle to feed their children porridge than there were in well nourished households (8.2%; $p<0.0001$). In general the two groups of households were not the same in the types of supplementary foods, feeding frequency and method of feeding as the malnourished

Table 4: **Distribution of households by methods used to feed milk and porridge to children, Addis Ababa, 1997**

Feeding Method	malnourished households	well-nourished households	X_2	p-value
Milk	n=108	n=117		
Spoon	29(26.9)+	35(29.9)		
Bottle	79(73.1)	82(70.1)	0.13	NS
Porridge	n=163	n=159		
Spoon	116(71.2)	46(91.8)		
Bottle	47(28.8)	13(8.2)	21.3	<0.0001

+Figures in parentheses are percentages
NS-not significant at $p<0.05$

households provide low quality diet with a lesser frequency using feeding bottle.

Multivariate analysis of logistic regression was performed to examine the effect of each variable while controlling for the confounding effects of others and adjusted risk odds ratios were estimated. Exclusive breastfeeding beyond four months, feeding frequency, provision of non-enriched porridge, partaking of porridge with bottle, and household income were the variables selected for multivariate analysis due to their apparent statistical significance in the bivariate analysis. The variable enriched porridge is excluded as it can be best expressed by non-enriched porridge. All the variables remained significant as illustrated in Table 5. The risk ratios showed that children who exclusively breastfed for more than four months are about three and a half times more likely to be exposed to malnutrition than those who do not ($p<0.01$).

Table 5: **Logistic regression coefficient and the adjusted relative odds of malnutrition by household income and feeding practices**

Characteristics	Coefficients	Adjusted Relative Odds	95% confidence Limit

Exclusive BF			
≤4 months $	-	1.00	
>4 months	1.231*	3.42	(1.54-7.63)
Feeding frequency			
≥4 times$	-	1.00	
<4 times	0.810*	2.25	(1.28-3.96)
Households income (Eth. Birr)			
>250$	-	1.00	
≤250	1.059**	2.88	(1.63-5.12)
Feeding non-enriched			
Porridge			
Yes$	-	1.00	
No	-2.029	0.13	(0.07-0.24)
Giving porridge			
with feeding bottle			
Yes$	-	1.00	
No	-1.735***	0.18	(0.08-0.38)
Constant term	-2.172***		

$ Reference category in the dummy variable regression
* Significance at p<0.01 **
Significance at p<0.001
*** Significance at p<0.0001

Similarly, the risk of malnutrition is also approximately two times more likely to occur in children who do not get four or more meals per day than those who did (p<0.01).

The likelihood of occurrence of malnutrition among children of households which earn a monthly income of ≤250 Birr is about three times greater than among those whose households had an income of more than 250 Birr (p<0.001). The risk of childhood malnutrition in households having the practice of feeding children with non-enriched porridge is about eight times greater than the risk among households which had no such practice (p<0.0001). Finally, children receiving porridge with feeding bottle have five and a half times the risk of malnutrition compared to those who were not taking porridge with the use of bottle (p<0,0001).

Discussion

Prevalence of malnutrition: The prevalence of stunting and underweight in the study area was found to be relatively high as compared with the findings made by Wolde-Michael and Demeke in 1985 (15). However, even the kebele with highest rates of underweight and stunting (Kebele 31 with prevalence of 46.9% and 56.5%, respectively) had much lower prevalence than those found in a slum area of Nairobi in 1996 where these were 58.4% and 86.2%, respectively. Prevalence of wasting (3.4%) was, however, higher than the one found in the Nairobi slum (1.9%) by Waihenya et al. (11).

Child Feeding practices and nutritional status: As in other developing countries, the initiation rate of breastfeeding was found very high regardless of the type of household. Similar studies conducted in Ethiopia and Libiya (14,20,21,22) also observed a comparatively high initiation rate of breastfeeding. In the present study, this indicates that the value attached to breast-feeding by both types of mothers is the same. For this study, therefore, initiation of breast-feeding was not picked as a risk factor for malnutrition.

Different authors have different views on the issue of appropriate duration of exclusive breastfeeding and timing of introduction of complementary foods. In this connection, Waterlow et al. (23,24) suggested that breast milk alone is insufficient to meet the nutritional needs of infants after the age of three months. In contrast, others, for example, Juez et al. (4) and Brown et al. (25) reported that introducing complementary foods before six months has no nutritional benefit to children. The observation of prolonged exclusive breastfeeding (beyond four months of age) in a significantly high proportion of mothers in the malnourished type of households supports Waterlow's contention (23,24) and indicates that exclusive breastfeeding beyond four months of life is a risk factor for developing malnutrition. Hence, this finding suggests that there is a need for a further investigation on the appropriate duration of exclusive breastfeeding and review the current recommendation (26), which supports supplementation to be at six months of age.

This study has also shown that the practice of prolonged exclusive breastfeeding (between four and six months and even beyond this age) is a common occurrence among the low income households. This would suggest that delayed introduction of complementary foods which was observed in the malnourished households is a function of household-food insecurity. Thus, an intervention programme that would be initiated in the urban slums should focus on those families whose monthly income falls below 250 Birr.

The relatively higher median duration of breastfeeding observed in malnourished households whose income is low is also another confirmation that mothers in these households have little choice other than depend mainly on breast-milk or may be they are not knowledgeable.

The observation that, there was a higher proportion of malnourished children receiving nonenriched porridge (only cereal preparations) than well-nourished children is in agreement with the finding of Getaneh et al. (13) who demonstrated that malnutrition is highest in children whose diet is cereal-based. The practice of giving only cereal preparations may be due to lack of mothers' knowledge about the importance of enriching weaning foods as better child-care practice or their economic constraints may limit their ability to improve the quality of the diet.

Although cow-milk was given by most mothers in the two groups of households, the amount of milk fed to both types of children may have been very low to account for differences in nutrient intake. The significantly higher protein intake by children in the well nourished households may have been increased by consumption of enriched porridge and probably by the intake of other foods as shown by the greater frequency of feeding in these households.

Most of the traditional weaning foods given to children are known to be bulky and to have low nutrient density. A young child has a limited capacity to manage large amounts of food at a time and, hence, requires frequent feeding to get enough nutrients. Recommendation to date is that feeding frequency be, at least, four times per day (27). The finding that a significantly higher proportion of well-nourished children received four or more meals/day as compared to malnourished children underscores the importance of frequent feeding and confirms that four times is the critical minimum frequency to avoid the risk of malnutrition.

The practice of infrequent feeding of foods which are, in fact, too bulky, as reported widely in many developing countries (28), does not only result in low energy and protein intake but also low intake of micro-nutrient. This could be aggravated by failure to give vegetables and fruits as reported by both types of households and the poor bio-availability of nutrients as most of the weaning foods used by both types of households are composed exclusively of plant sources.

The significantly high use of bottles for feeding porridge in the malnourished households could have resulted in more contamination of the porridge due to poor cleaning of the bottles or prolonged holding of porridge in the bottles. This may have resulted in higher diarrhoeal occurrence in these households than in well-nourished households. Contamination of weaning preparations that are fed through feeding bottles result in marasmus and other types of malnutrition, namely, kwashiorkor and marasmic kwashiorkor as a consequence of infections (29).

In conclusion, the findings of this study led to the realization that prolongation of exclusive breastfeeding beyond four months of age, feeding supplementary diet with a frequency of less than

four times within a day, partaking of porridge using feeding-bottles, and the practice of feeding weaning diets made exclusively from cereal sources are the principal risk factors which brought about nutritional deprivation among children in the slum section of Addis Ababa. Therefore, it is recommended that mothers should be advised not to continue exclusive breastfeeding beyond four months and, instead, supplementation should begin at this age. Since the preparation of weaning diets from a single food group leads to the formulation of low quality diet, demonstrative and sustained nutrition education on preparation of nutritious diets from home- available foods is strongly recommended. The processing of legume-based low-cost weaning foods by women groups can play an important role in making available such an appropriate child food. There is also need to advise the slum communities to avoid the practice of giving porridge with bottle and nutritionists, health workers and other cadres of nutrition should also continue the advocacy of four times a day as the critical minimum feeding frequency.

The study has also led to the conclusion that families whose income is less than 250 Birr are the high-risk group of prolonged exclusive breastfeeding and, inevitably, to child-nutrition insecurity. Hence, an intervention programme that would be initiated in the urban slums with a view of enhancing household income should be planned in favour of these groups.

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