The Relationship between the Nutritional Status of Children and KAP of mother feeding their Children in a Rural Community

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LIST OF ABBREVIATIONS

WAZ	weight for age z score
WHZ	weight for height z score
HAZ	height for age z score
KAP	knowledge, attitude and practice
SES	socio-economic status
SNN	Southern Nations and Nationalities

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ABSTRACT

A cross-sectional study was conducted to assess the KAP (Knowledge, Attitude and Practice) of mothers towards feeding their children aged 6 months to 5 years in Hawa.Michael Kebele, Bugna Wereda North Wollo Zone of Ethiopia. The study encompassed all children in the study population. The area is typically drought stricken and famine is very frequent.

A total of 818 children were enrolled in to this study. Data were collected using a structured questionnaire. Intensive training was given to data collectors and supervisors. Rigorous supervision was carried out during weight and height measurements in order to improve the validity of measurement.

The overall malnutrition level for height based on age was 28%, weight for height 12% and weight for age was 26% . Neither knowledge, practice nor attitude were found to have an association with the nutritional status of the children in the study area. Multi variate analysis showed number of children adjOR=1.621(1.030-2.549) and sex adjOR=1.601(1.062-2.414) to be significantly associated with underweight and sex adjOR=1.038(1.007-1.995) to be significantly associated with stunting in children.

The level of malnutrition in this study is unexpectedly lower than previous studies done in other parts of the country. The seemingly inconsistent finding may be due to the continuous food aid provided by various donors to the study population in response to recurrent drought. Besides, the food aid which is given to all people might have affected the association between knowledge, attitude and practice with the nutritional status of children. In conclusion, the study did not show an effect of knowledge, attitude and practice of mothers on the nutritional status of their children when various confounders are considered. It is recommended that food aid continue since the rate of malnutrition

is still unexceptably high.

1. INTRODUCTION

UNICEF reports malnutrition coupled with other diseases causes 40,000 children deaths every day (1). Coupled with dehydration due to diarrhoea, malnutrition is the leading child killer in the world (2). Poor feeding practices is a major cause in childhood nutritional status decline after six months of age in most African countries (3). Long standing moderate food shortages combined with poor utilization and misuses of available foods leads to chronic food shortages and malnutrition (4). Negative feeding practices include egg and cheese food taboos, stopping or reducing food during diarrhea and late introduction of solid food (5). Withholding food from children with diarrhoea accelerates malnutrition (6).

Malnutrition in Ethiopia is a serious problem. Various organizations and the government are involved in improving the nutritional status of the Ethiopian population. Nonbehavioral factors related to malnutrition include acute and chronic food shortages, diseases such as acute respiratory infection and diarrhoeal and poor sanitation and lower socio-economic status . An Ethiopian Nutrition Institute survey demonstrated children show weight increase pattern similar to developed countries up to six months and reach a maximum decrease up to 90% of the harvard standard at about two years (7). Children fed three or more times per day have better nutritional status than those fed two or less times a day (8). Studies in Ethiopia revealed a high prevalence of malnutrition especially in arid areas, and areas affected by famine and war . Seasonal factors, family income, mother's education, sex and birth order are important determinants of malnutrition (9).

The level of malnutrition particularly in children can be easily assessed using anthropometric measurements. Some studies have attempted to correlate various nutritional practices of Ethiopian

mothers with the nutritional status of their children using anthropometric findings (10, 11).

There is a strong association between poor nutritional status as determined by anthropometric measurements and various childhood diseases such as acute lower respiratory infections. A one year cohort study in Addis Ababa to determine the nutritional and dietary risk factors of acute lower respiratory infection (ALRI) in under-five children in Addis Ababa was undertaken with 1,992 children under five to quantify the relationship between protein-energy malnutrition(PEM), dietary vitamin A and breast-feeding and ALRI. Nutritional assessment, using anthropometric measurements was conducted from, of 97 ALRI incident cases with a rate of 48.7 per thousand in one year follow-up. This study determined that children with a weight for height z score less than -3 standard deviations (SD) of the harvard standard of weight for height had more than a fourfold increase in ALRI than children with greater than -2SD of the harvard weight for height standard. T he risk of ALRI was 50% lower among breast fed children younger than two years. The authors suggest that this study supports the importance of interventions to control PEM and promote breast feeding (12).

An examination of child mortality, conducted from 1987 to 1992 which totaled 656 in Gondar Hospital pediatrics ward, delineated the cause of death and gave the following results: PEM- 24.5%, bronchopneumonia- 12.2%, pyogenic meningitis-8.4% septicemia-7% and disseminated tuberculosis-6.1%. Seventy-four percent of these deaths occurred in the under-five population. The risk of death from malnutrition was highest between one and three years old (52.8%). The author recommends, among other interventions, the provision of health education against harmful traditional practices (13). From the above description many investigations have tried to assess the causes of malnutrition. This is because malnutrition (in this study and the preceding ones) is defined in terms of anthropometric

measurements and investigations have determined that children with a weight for height less than -3SD of the harvard standard are at acute risk of death. But the situation is more complicated because of environmental factors. Malnutrition exposes children to increased risk of disease. Environmental factors also contribute to disease. Thus in a situation of famine a child with slightly less than -2SD harvard standard weight for height who is in his original environment may have a markedly better prognosis than a child with a similar nutritional status in a famine relief camp (14).

This study can add to the body of information of the relationship of mothers' feeding their children knowledge, attitude and practice with their children's nutritional status. A strong relationship between a mother's child feeding KAP and her children's nutritional status may suggest to policy makers that nutritional education may have a beneficial effect of children's nutritional status.

Some other studies have shown a relationship of mothers' practices of feeding their children with the nutritional status of children in Ethiopia while taking various confounders into account while many other studies do not show a relationship between various knowledge and attitude factors with the nutritional status of children. This study will again look at mothers' KAP and children's nutritional status in a famine prone community. The aim of this study is to increase knowledge about behavioral factors which may or may not relate to children's nutritional status.

2. LITERATURE REVIEW

2.1 Nutritional status of children in Ethiopia

In 1998 the Health and Nutrition survey used anthropometric measurements to assess the nutritional status of under five children of Ethiopia (15). The three indices weight for height, height

for age and weight for age were measured by comparing the children to a U.S. standard population (harvard standard). Causes of poor height for age in Ethiopian children are considered to be related to a cumulative growth deficit caused by chronically inadequate food intake, ill health, sustained incorrect feeding practices and low socioeconomic status. In this survey the proportion of stunted Ethiopian children (-2 SD) of 3 to 5 months was 13%, of 6-11 months was 37%, of 12-23 months was 55%, 24-35 months was 54.5%, 36-47 months 54.6% and 48-59 months was 55.4%. Although the magnitude differs from other African counties, the age pattern is similar. The same survey showed that overall 52% of all under five old children were stunted, 53% of males and 50% of females. This is lower than the 1982 nutritional survey which showed 60.7% in round one, 63.1% in round two and the 1992 National Nutritional Survey's rate for stunting was 64%. In addition this survey showed stunting was more prevalent in rural area (53% versus 39% in urban areas) and twice as high in children of illiterate than literate mothers. Prevalence was highest in Amhara region (60%) and lowest in Dira Dawa (32%) (15).

The above 1998 Central Statistics Authority country wide nutritional survey describes weight for height, measuring current nutritional status by the proportional of wasting (-2SD). Malnutrition is caused by recent inadequate food intake, incorrect feeding practices and ill health (15). The above nutritional survey describes prevalence of wasting as 6% for 3 to 5 month children, 13% for 12 to 23 month children, was 10% for males and 8% for females. It was highest in Tigray (13%) and lowest in Addis Ababa (6%). The prevalence of wasting was inversely proportional to the educational level of the mother. Of the total 3-59 month children 9% were wasted and. National rural nutritional survey of 1999 showed 8% wasting (15). The prevalence of -2SD was lowest (6%) was for 3-5 month

children and the highest (50%) was among 12-23 month children. Malnutrition was greatest among the second child and children with illiterate mothers. Total underweight proportion was 42%, greatest in Tigray (54.4%), second in Amhara(52.4%) and best for Addis Ababa(20%) (15).

2.2 Childhood feeding practices

The same Health and Nutrition Survey(15) suggests the rate of breast feeding and introduction of weaning foods influences the growth and development of children and fertility rate of a mother. Breast feeding was equal among sexes, highest in Amhara region (95%) and lowest in Addis Ababa (70%). Increased female education was inversely related to the number of children breast fed. Thirty-one percent of mothers age 15 to 19 were breast feeding two year old children and above while 17% of mothers above 40 years of age had breast fed children more than two years old. Ninety-eight percent of children less than one year, 88% less than two years, and 53% less than 3 years were breast fed. Proportion of urban children less than 12 months who stopped breast feeding was twice as large as rural children. Four percent of mothers stopped breast feeding before six months with no education and 20% with 12th grade education. The proportion who took supplementation during pregnancy and lactation was higher among educated women. Supplementation in pregnancy or lactation was lowest in Somali region (46%) and highest (83%) in Southern Nations and Nationalities (SNN) (15).

A dietary study in two Ethiopian villages one in northern Gondar near Gondar Town and another in eastern Tigray near Mekele investigated dietary customs and consumptions in both areas. This study in Gondar and Tigray concluded the customary diet is deficient for adults and older children in vitamin A and ascorbic acid and in addition for toddlers the diet is also deficient in calories, calcium, riboflavin and niacin. The same study describes about food taboos in the Gondar villages

which includes milk and eggs. Also this research explains that during festivals the major portion of food went to adult men. Children in both villages were given supplementary weaning foods after six months composed of porridge with milk added and started on injera and wat after one year. They were usually given a separate portion while those above three years old ate with adults. The author noted that since this survey was conducted during harvest time, it can be assumed that the nutritional situation during other times of the year is even worse (16).

According to a study by ENI in 1988 (17) childhood feeding practices show tremendous variation in southern and southwestern Ethiopia. Regarding the duration of breast feeding, the Sidama stop breast feeding between 1 and 1.5 years, Guji and Gedeo between 1.5 and 2 years, the Wolaita, Burji, Coira, Gofa, Ari, Male, Hamer, Geleb, Konso, Hamo, Mesketo Dorze and Melo between 2 and 3 years and the Borena breast feed more than 3 years (17). The Geleb, Borena, Guji Coira, Gamo and Dorze give the best food to children under five, second to mothers and lastly to adult males. In general people's diet in southern and southwestern Ethiopia is based on root crops except for pastorals whose diets are based on animal products (17).

Food taboos among mothers of Hadiya, another southern people are especially important. A cross-sectional study assessing food taboos and their socio-economic correlations was carried out among 295 healthy pregnant women. Milk and cheese was taboo by 44.4% linseed 16% and fatty meat 11.1%. Reasons for food taboo included perceived difficult delivery(51%), discoloration of fetus(20%), and abortion(9%). Education and income were significantly associated with food taboos ($P< 0.05$). Four times as many women who did not attend secondary schools as those who did and whose income was below 250 birr/month as those above 250 birr/month experienced food taboos (18).

Common negative food practices in African societies include food taboos which usually involve foods high in protein and relying on prestige foods which are usually factory produced and very expensive. The third negative food practice is using a monthly wage in the first few days primarily for non food items (19).

Traditional food practices are highly variable in various parts of Africa, Ethiopia and various parts of Amhara region. This may also be true of food supply, infant and child vital statistics e.g. Northern Shoa has favorable child and infant vital statistics. The infant and under five child mortality are 101 and 145 respectively (20). Perhaps the following description may be related to the relatively good health statistics of northern Shoa.

The structure of breakfast in Wogda northern Shoa as described by Amare's "Household resources, strategies and food security in Ethiopia: a study of Amhara households in Wogda, northern Shewa" (21) is as follows: the following groups eat separately:

1. Husband and older boys who help with agriculture tasks
2. Wife and older girls who help with domestic tasks
3. Toddlers who may be assisted by mother or older female siblings if cannot eat alone

During the day after breakfast children younger than seven eat on demand. The male household head gets his choice food. During months when harvest reserves become depleted, only children below six years old are allowed to eat between breakfast and dinner, on demand. When shortages become more prevalent, pulses in increasing proportion are mixed to make injera.

Breast feeding continues until the next child is born and weaning foods are introduced at six months in the form of cow's milk and dissolved barely. Adult food (injera and wat) is begun at one

year and bread is given for children only on demand up to age six or seven regardless of food shortages. Food consumption patterns are not related to gender differences. When food supplies are on famine level, adults drastically reduce their intake and children below age of seven are given boiled pulses throughout the day. After age seven children are expected to adopt to adult food patterns and partake in religious fasts. Mothers complain that their breast milk reduces when they are in the fields doing heavy labor most of the day and don't have time to snack (21).

2.3 Relation of socio-economic status, mothers' nutritional knowledge and behavioral factors to malnutrition of children in Ethiopia

A study in Debark and Adi Arkay, North Gondar Zone which collected data on 400 subjects of communities towards rich sources of vitamin A and iron, found knowledge that lack of iron caused nutritional anaemia was known by 44.1% of respondents, vitamin A deficiency was a cause of blindness by 47.1% and contributed to measles by 36.3%. Good attitude with respect to the same questions was noted in 48,5% 31.9% and 22.2% of the respondents respectively with regard to the same questions (22). Results differed significantly by age, income, educational status and occupation ($P<0.05$).

The association of children s nutritional status to maternal education in Zigbabot, Guragie Zone was noted to be significant using with bivariate analysis (23). The study based on 231 children showed a total underweight prevalence of 44.2%, children of illiterate mothers to be 52.2% and of literate mothers 22.2%. A multivariate analysis showed that keeping the mother s education constant, changes in income, prenatal follow up of the mothers', fathers' literary status nor family size was statistically associated with the proportion of children who are underweight. The statistical significance of literate

mothers was only lost if the child was bottle fed (23).

Knowledge of nutritional information such as understanding of growth charts (24) and that sunlight prevents rickets (25) neither promotes growth among children nor reduces the incidence of rickets. But another study showed using questionnaires that mothers' recollection of giving foods rich in vitamin A was a good indication of the level of vitamin A in children's blood (26).

A study of 400 children in Zigbaboto Gurage Zone found that certain characteristics of their mothers which were associated with poorly nourished children were sometimes but not necessarily the converse of the mothers' characteristics of well nourished children. These children were divided into thirds by best well nourished, medium nourished and poorly nourished. Moslem, old, illiterate and poor mothers were more likely to have children in the low tercile than middle tercile while mothers who breast fed their children on average 18 rather than 21 months, younger mothers and those who attended prenatal clinics were more likely to have children in the higher tercile than middle terciles (10). Only maternal body mass and maternal height differences were associated with all terciles of their children' s height for age. In conclusion mothers' factors which are associated with good nutritional status of her children are not necessarily the reverse of mothers' factors which are associated with poor nutritional status of their children.

Some nutritional practices are found to be associated with nutritional status of children. A study found that some child-feeding practices were associated with the nutritional status of children in a slum area in Addis Ababa. Seven hundred fifty eight children of 6 to 36 months were divided into well and poorly nourished groups and various feeding practices of their mothers were examined. The study concluded that exclusive breast feeding more than four months, feeding porridge by a bottle, feeding

a child a low quality diet such as unenriched porridge, feeding the child less than four times a day and the mother's low income were associated with a poor nutritional status of the child. While keeping constant the other three variables, children who are exclusively breast fed more than four months are three and a half times more likely to be malnourished than those who are given weaning foods by four months. All four variables continued to remain significantly associated with nutritional status in Multi variate analysis (11).

The previous discussion has shown that some knowledge, attitudes and practices are associated with nutritional status of children and some are not. This study will assess if such a correlation exists in the study population with regard to some selected KAP variables.

3. OBJECTIVES

General objective:

To assess the KAP of mothers toward feeding of 6 months to 5 years old children and determine the relation between maternal KAP regarding feeding their children and nutritional status of their children in Hawa Michael Kebele, Bugna Wereda, North Wollo Zone, Amhara Region, Ethiopia

Specific objectives:

1. To determine the magnitude of malnutrition in children within the age six months to five years
2. To assess the relationship of mothers' KAP on feeding with nutritional state of children
3. To assess the relationship of socio-economic characteristics of mothers with the nutritional status of their children.

4. MATERIALS AND METHODS

4.1 Study area:

The study area in Hawa-Michael Kebele, Bugna Wereda, North Wollo zone which is located 600 Km North West of Addis Ababa. The area is rural and people exist mainly on subsistence farming. The total population of Hawa Michael Kebele is 7621. The study area was chosen because of its proximity to an airport and because it was a control population to a nutritional intervention.

4.2 Study design:

A cross-sectional study was conducted to determine the level of malnutrition and compare the nutritional status of children in relation to their mothers knowledge, attitude, practice and their socio-demographic characteristics in Hawa Michael Kebele, Bugna Wereda, North Wollo Amhara region Between January and February 2000.

4.3 Study population:

All households having children 6 months to 60 months old in the selected kebele were included in the study.

4.4 Sampling procedure:

Hawa-Michael Kebele, a food insecure kebele similar to other rural kebeles of Bugna Wereda, was selected. This kebele was more accessible than other kebeles because it contains an airport and a road suitable for mechanized vehicles. All households in the selected kebele having children in the age range of 6 month to 5 years were included in the study.

4.5 Data collection and management:

Information was collected from all mothers of the children using pretested and structured questionnaire by thirty enumerators who completed 12th grade and above recruited from the study community. A questionnaire was prepared which asked several socio-economic questions and questions relating to a mother's feeding her children knowledge, attitude and practice. Originally the questionnaire was prepared in English and then translated to Amharic, a local language, to be used for data collection and then translated back into English to compare accuracy with the original questionnaire. The enumerators/interviewers were given an intensive five days training on how to administer the questionnaires and information was collected under close supervision by a trained supervisor who is a health assistant by profession and the principal investigator in order to achieve reliable and valid data. At the end of each day, the completed questionnaires were checked to ascertain that all questions were answered correctly and consistently. Information on age, socio-demographic characteristics, knowledge of mothers, attitude of mothers feeding practices of mothers on their children and the anthopometric measurements of their children was collected.

Six other trained and experienced measurers took the children's height and weight measurements. Two-weight measurement was obtained using a salter weighing scale and the average calculated to the nearest 0.1 kg. Children were weighed with minimal clothing and height measurement was taken using wooden scales graded to the nearest centimeter for recording recumbent length of children under 5 years of age and standing height for children older than 24 months. Two measurements were recorded and the average was taken to the nearest 0 .5 cm.

Age was recorded in birth dates and a local event calendar was used to ascertain the exact birth date when mothers are not sure of the exact birthday of their children and later on converted to age in months during data entry.

The principle researcher checked randomly questionnaires and randomly all weight measurements. All mistakes were corrected by re-interview. The principle researcher also observed interviews of selected interviewers if he had any uncertainty of the recorded responses, on a daily basis. Also the principle researcher carefully supervised the supervisor.

4.6 Data analysis

The three indices of nutritional status (height for age, weight for height and weight for age Z-scores) of the children were computed to estimate the proportion of stunting, wasting and underweight, respectively, using the WHO/ CDC/ NCHS reference values contained in the anthropometric (ANTHRO) Software. A cut-off point of less -2 Z-score age was considered as low nutritional status, -3Z score considered severely low nutritional status and values greater than or equal to -2 Z-score were considered as normal for the three indices of nutritional measurement. Knowledge, attitude and practice of mothers was assessed using a questionnaire of all mothers of six months to five year old children in Hawa Michael Kebele. The correct answers were given one point each and incorrect answers were given no points. The cumulative and partial point totals were analyzed dichotomously and compared to children's nutritional status.

Good knowledge was viewed as mothers associating nutritional disorders as being related to quantity and quality of food consumption rather than superstitious or religious beliefs. Good attitude was viewed as a mother being favorable to give food priority to under five children as opposed to other

family members. Good practice was considered giving children sufficient and high protein food more than three times a day.

Knowledge, attitude and practice of mothers towards feeding their children was categorized as sufficient or good and insufficient or bad depending on the number of correctly answered questions, Sufficient knowledge, attitude and practice was considered to be if the mother got better than two-thirds of the questions correct in each category. Otherwise she is categorized as having insufficient or bad knowledge, attitude or practice. This was done to facilitate multi regression analysis since dividing the mother's in this manner gave sufficient numbers of mothers in each category. Underweight is considered less than -2SD deviations of the mean weight of the harvard standard. Stunting is considered to be less than -2SD of the mean height of the harvard standard and wasting is considered less than -2SD of the weight to height of the harvard standard. Data entry was carried out using EPI INFO and analyzed with SPSS/PC software. To compare proportions simple descriptive statistics, bivariate analysis, logistic regression and X-2 were performed.

4.7 Ethical considerations

After having ethical clearance from the Department of Community Health of Addis Ababa University, verbal informed consent was obtained from the head of household and mothers of the children. The identity of respondents were protected by a code. Information on malnourished children can be offered to the government for relief services if the mother consents.

5. RESULTS

5.1 Socio-demographic characteristics of mothers

Out of a total of 770 mothers which have six months to five years old children in Hawa Michael Kebele, 680 mothers were enrolled in this study making the response rate 88%. Ninety mothers could not be reached at the time of interviews. Because some mothers have more than one child and the focus of the study is the child, some mothers were counted more than once depending on the number of children she had between six months and five years old. Thus for analysis the mothers of 818 children were analyzed. Socio-demographic characteristics of the parents of children aged 6 months to 60 months are displayed in table 1. The first table discusses the characteristics of 680 mothers. Tables 3 through 10 discuss the characteristics of the mothers of 818 children and the association with the children's nutritional status. Most of the mothers of the children were housewives (99.6%) and were illiterates (97.8%). Orthodox Christians were dominant (94%) and nearly 80% were married. Eighty percent of the mothers (547) had only 1 under five child and nineteen percent had two under five children. Only five have three under five children. Nearly all (99.7%) of the fathers of the children were farmers and most (84%) were illiterate.

Table 1. Socio-demographic characteristics of mothers of children age 6 months to 60 months, Hawa-Michael Kebele, Bugna Wereda, North Wollo, April 2000.

Characteristics	No.	%
Age of mother		
10-20	66	9.7
21-30	310	45.6
31-40	254	37.4
>41	50	7.3
Total	680	
Education of mother		
Illiterate	665	97.8
Read and write	10	1.5
Elementary	5	.7
Secondary	-	-
Marital status of mother		
Married	542	79.8
Divorced	64	9.4
Single	40	5.9
Widowed	34	5
No of under 5 children		
1	547	80
2	128	19
3 above	5	1
Source of water		
Pipe	6	.9
Protected spring/wells	97	14.3
Unprotected spring/wells	154	22.6
Rivers	423	62.2
Religion of mothers		
Christians	640	94
Moslems	40	6
Others		
Latrine ownership		
No latrine	670	98.5
Pit latrine	10	1.5
Others	-	-
No of under 5 children		
1	547	80
2	128	19
3	5	1
Total	680	100

Table 2. Age and sex distribution of children in the study population, Hawa-Michael Kebele, Bugna Wereda, North Wollo, April 2000.

Demographic characteristic	Total children (no.)	percentage (%)
Age of children (months)		
6-12	79	10
13-24	200	24
25-36	183	22
27-48	309	38
49-60	47	6
total	818	100
Sex of child		
Male	431	57
Female	387	43
Total	818	100

5.2 Level of malnutrition in the study population

The median age and mean age of children was approximately equal which indicates that the population is normally distributed. The mean age was 21 month, standard deviation 8 months and the median age was 21.4 month. The weight, measured in kg, ranged from 4 to 22 and the mean weight was 8.9 kg, standard deviation 2.2 kg and median weight was 9 kg. The height, measured in cm, ranged from 54 to 114 and the average 75 cm, standard deviation 8.6 cm and median height was 75.6. Tables 3, 4 and 5 show the distribution of the anthropometric measurements in Z score of children aged 6 month to 5 years.

Severely (<-3 SD) stunted children were 10.7% (88/818), severely wasted 3.4% (28/818) and severely underweight children were 7.3% (60/818) of the study population. Male children have higher malnutrition rate compared to female children in all the three indices of malnutrition (see table 3, 4, and 5). The overall prevalence of low height for age i.e. <-2 SD (stunting) in the study population was 28 % (231/818). On the other hand, the overall level of low weight for height i.e. < -2 SD (wasting) and low weight for age (underweight) was 12 % (101/818) and 26 % (211/818) respectively.

The highest proportion of stunting was observed in the age group of one to two years followed by the age group of 4 to 5 years which was 45.5% and 42.5% respectively; while the highest proportion of wasting and underweight was observed in the age groups 6 months to 2 years. The point prevalence of malnutrition of the three indices in various age groups was statistically significant. The age group one to two years showed higher malnutrition rate compared to other age groups in stunting and underweight. children aged 6-12 month had the highest point prevalence of wasting. (weight for height, height for age and weight for age) (X^2=22.7; p<0.01, X^2=52; p <0.001 and X^2 =31.7; p<0.001 respectively).

5.3 Socio-demographic characteristics and malnutrition

Tables 3, 4, and 5 show that of illiterate mothers, 28% of their children were stunted, 12% wasted and 34.5% underweight while of literate mothers, 33% of their children were stunted, 27.8% wasted and 33% underweight. Upon bivariate analysis educated mothers were significantly more likely to have stunted and wasted children, although there was no association for underweight children.

Of families who possessed no oxen, 45.7% had stunted children, 18.8% had wasted children and 23.0 % underweight children. Of families who possessed one or more oxen, 26% had stunted children, 12% had wasted children and 24.9% had underweight children. On bivariate analysis, families who possessed no oxen were significantly more likely to have stunted and underweight children then those families who possessed oxen but the possession of oxen was not associated with wasting.

Of families who owned less than one hector of land, 45.3% of their children were stunted, 12% wasted and 33.3% underweight. Those families who possessed one hector or more, 25.4% of their children were stunted, 12.4% wasted and 25% underweight. On bivariate analysis, possessing less than

one hector of land was statistically associated with having stunted children but not associated with having wasted or underweight children.

Of families who had one or two children, 25% of these families had stunted children, 16.5% wasted and 26.7% underweight. Of families who had three or more children, 30.3% of the children were stunted, 10.2% wasted and 25.4% underweight. On bivariate analysis, presence of three or more children was statistically associated with stunting, not associated with wasting nor with underweight.

Table 3. Percent of children aged 6 month to 60 month who are stunted by selected social-demographic variables, Hawa- Michael Kebele, Bugna Wereda, North Wollo, April 2000

Demographic characteristics	stunted(%)	Normal(%)	Total(n)(%)	odds ratio(CI)
Age of the child				
6-12	19(24)	60(76)	79(100)	X^2= 52 p <.001
12.1-24	91(45.5)	109(54.5)	200(100)	
24.1-36	46(25)	137(75)	183(100)	
36.1-48	55(18)	254(82)	309(100)	
48.1-60	20(42.6)	27(57.4)	47(100)	
Sex of the child				
Male	140(32.5)	291(67.5)	431(100)	1.56(1.13-2.16)
Female	91(23.5)	296(76.5)	387(100)	
Mother's education				
Illiterate	223(28)	571(72)	794(100)	0.78(0.31-2.02)
Read and write	8(33)	16(66.7)	24(100)	
Possession of livestock				
No oxen	42(45.7)	50(54.3)	92(100)	1.86(1.27-3.01)
1 oxen more	189(26)	537(74)	726(100)	
Husband education				
Illiterate	190(30)	438(70)	628(100)	1.58(1.05-1.27)
Read and write	41(21.6)	149(78.4)	190(100)	
Total children				
one to two (N=99)	80(25)	240(75)	320(100)	0.77(0.55-1.06)
Three and more(N=581)	151(30.3)	347(69.9)	498(100)	
Availability of land				
Less than one hector(N=71)	53(45.3)	64(54.7)	117(100)	2.43(1.60-3.71)
One and above(N=609)	178(25.4)	523(74.6)	701(100)	
Weight of mother				
30-50(N=10)	152(30.2)	351(69.8)	503(100)	1.29(0.93-1.80)
51- and above(N=269)	79(25)	236(75)	315(100)	

Table 4. Percent of children aged 6 month to 60 month who are wasted by selected social-demographic variables, Hawa-Michael Kebele, Bugna Wereda, North Wello, April 2000

Demographic characteristics	Wasted (%)	Normal (%)	Total (%)	Odds ratio(CI)
Age of the child				
6-12	16(20)	63(80)	79(100)	X^2= 22.7 p<.001
13-24	39(19.5)	161(80.5)	200(100)	
25-36	17(9.3)	166(90.7)	183(100)	
27-48	23(7.4)	286(92.6)	309(100)	
49-60	6(12.8)	41(87.2)	47(100)	
Sex of the child				
Male	62(14.4)	369(85.6)	431(100)	1.50(0.96-2.35)
Female	39(10)	348(90)	387(100)	
Mother's education				
Illiterate	96(12)	704(88)	800(100)	0.479(0.103-2.225)
Read and write	5(27.8)	13(72.2)	18(100)	
Possession of livestock				
No oxen	9(18.8)	39(81.2)	48(100)	1.70(0.74-3.80)
1 oxen more	92(12)	678(88)	770(100)	
Husband education				
Illiterate	86(12.4)	605(87.6)	691(100)	1.06(0.57-1.99)
Read and write	15(11.8)	112(88.2)	127(100)	
Total children				
one to two (N=99)	46(16.5)	232(83.5)	278(100)	1.75(1.12-2.72)
Three and more(N=581)	55(10.2)	485(89.8)	540(100)	
Availability of land				
Less than one hector(N=71)	9(12)	66(88)	75(100)	.96(0.43-2.08)
One and above(N=609)	92(12.4)	651(87.6)	743(100)	
Weight of mother				
30-50(N=10)	64(12.6)	443(87.4)	507(100)	1.07(0.68-1.69)
51- and above(N=269)	37(12)	274(88)	311(100)	

Table 5. Percent of children aged 6 month to 60 month who are underweight by selected social-demographic variables, Hawa- Michael, Bugna Wereda, North wello, April 2000

Demographic characteristics	underweight(n)(%)	Normal(n)(%)	Total(n)(%)	Odds ratio(CI)
Age of the child				
6-12	23(29)	56(71)	79(100)	X^2= 31.7 p<.001
13-24	75(37.5)	125(62.5)	200(100)	
25-36	49(26.8)	134(73.2)	183(100)	
27-48	49(16)	260(84)	309(100)	
49-60	15(32)	32(68)	47(100)	
Sex of the child				
Male	131(30.4)	300(69.6)	431(100)	1.68(1.20-2.34)
Female	80(20.7)	307(79.3)	387 (100)	
Mother's education				
Illiterate	205(34.5)	595(65.5)	800(100)	0.683(0.143-3.263)
Read and write	6(33.3)	12(66.7)	18 (100)	
Possession of livestock				
No oxen	23(36.5)	40(63.5)	63(100)	1.73(0.98-3.06)
1 oxen more	188(24.9)	567(75.1)	755(100)	
Husband education				
Illiterate	179(25.5)	523(74.5)	702 (100)	0.90(0.57-1.43)
Read and write	32(27.4)	84(72.4)	116(100)	
Total children				
One to two (N=99)	65(26.7)	179(73.3)	244(100)	1.06(0.75-1.52) Three
and more(N=581)	146(25.4)	428(74.6)	574(100)	
Availability of land				
Less than one hector(N=71)	25(33.3)	50(66.7)	75(100)	1.50(0.87-2.56)
One and above(N=609)	186(25)	557(75)	743(100)	
Weight of mother				
30-50(N=10)	140(27.8)	364(72.2)	504(100)	1.32(0.94-1.85)
51- and above(N=269)	71(22.6)	243(77.4)	314(100)	

Table 6. Selected knowledge attributes of mothers relating to feeding their children, Hawa- Michael Kebele, Bugna Wereda, North Wello, April 2000

Attribute	Number	Percentage (%)
Cause of malnutrition		
Shortage of food	327	40
Illness	286	35
Evil eye	164	20
Other causes	41	5
Cause of kwashiokor		
Lack of protein	573	70
Evil eye	204	25
Other causes	41	5
Best food for children		
Injera and shiro	409	50
Milk and eggs	327	40
Other foods	82	10
Good to decrease fluid during diarrhea	597	73

The overall knowledge score of mothers with regard to child nutrition is 65% of which 4.4 % have sufficient knowledge (have answered four and above out of six questions) and 95.6% have insufficient knowledge (have answered three and below questions correctly out of six questions).Table 7 shows the knowledge score of mothers by the level of nutritional status of children. A mother's knowledge was not significantly associated with her child's height for age and weight for height but was associated with weight for age on bivariate analysis. Knowledge was divided into three categories rather than two in order to obtain the above relationship with underweight.

Table 7. Knowledge score of mothers in relation to level of nutritional status of their children, Hawa-Michael Kebele, Bugna Wereda, North Wello, April 2000

Level of nutrition	Adequate Knowledge	Inadequate Knowledge	Odds ratio(CI)
HAZ Score			
<-2.00 SD	10(25)	221(28)	0.84(0.38-1.83)
>-2.00 SD	30(75)	557(72)	
WHZ Score			
<-2.00 SD	9(22.5)	202(26)	0.83(0.36-1.85)
>-2.00 SD	31(77.5)	576(74)	
WAZ Score			
<-2.00 SD	7(18)	157(20)	0.87(0.34-2.10)
>-2.00 SD	32(90)	282(622)	

5.4.2 Practice and attitude of mothers

Decision with regard to feeding of children in the families is reported to be mostly the responsibility of the mother. Almost two-third (64.3%) of the mothers reported to have fed their children three times per day and about 30.2% reported to have fed only twice per day. Very few mothers, 2.2% and 3.3% respectively, reported to have fed their children once per day and four times per day. The median age of commencement of complementary feeding is 12 months and more than 80% started weaning after the age of 1 year. Only few mothers (3%) have started weaning before the age of 4 months. Majority of the mothers (87.2%) gave injera at the time of weaning period. But two-thirds of the mothers preferred to give cow-milk to their children as first food if available, and nearly equal number (58.7%) give priority to children than other member of the family in case of scarcity. These results are shown in table 8.

Table 8. Selected characteristics of mothers' practice and attitude in relation to feeding their children, Hawa-Michael Kebele, Bugna Wereda, North Wollo, April 2000

Characteristic	Number	Percentage (%)
Frequency of feeding / day		
1	16	2.2
2	245	30.2
3	523	64.3
4	25	3.3
Preferred food		
Injera	713	87.2
Cow's milk	546	66.7
Feeding priority to children	480	58.7

The practice and attitude of mothers with regard to the nutritional level of children is shown in table 9. There is significant association between mother's practice and attitude and the nutritional status of their children.

Table 9. Practice and attitude of mothers in relation to level of nutritional status of their children, Hawa-Michael, Bugna Wereda, North Wollo, April 2000

Level of nutrition	Good practice	Bad practice	Odds ratio(CI)	Good Attitude	Bad attitude	Odds ratio(CI)
HAZ Score						
<-200 SD	30(17.8)	201(31)	0.48(0.31-0.75)	23(9)	208(36)	0.18(0.11-0.30)
>-2.00 SD	139(82.2)	448(69)		221(91)	366(64)	
WHZ Score						
<-2.00 SD	13(7.3)	88(16)	0.42(0.22-0.79)	17(8)	84(14)	0.54(0.30-096)
>-2.00 SD	164(92.7)	465(84)		196(92)	521(86)	
WAZ Score						
<-2.00 SD	32(18)	179(28)	0.57(0.37-0.88)	33(11.)	178(34)	0.25(0.16-0.39
>-2.00 SD	145(82)	462(72)		257(89)	350(66)	

5.4.3 Analysis of selected relationships taking into account various confounders

The covariates with regards to knowledge, attitude and practice were analyzed separately for stunting, wasting and underweight; they included: total children, sex toilet possession, land ownership, livestock ownership, mothers' and fathers' education.

Multi variate analysis was performed to see the effect of different covariates on the nutritional status of children by controlling the confounding effect of different variables and adjusted odds ratio was calculated for the three indices of malnutrition. The independent variables adjusted for in the multivariate analysis were presence of child's sex, total number of children in family, child's age, number of draft animals, mothers' and fathers' education and type of drinking water. Knowledge, attitude and practice were not found to have any effect on stunting, wasting or underweight. The child's sex was statistically significant (OR= 1.417(1.007-1.995) but no other covariates had a statistical association with stunting. No statistical covariate was associated with wasting. The child's sex (OR= 1.601(1.062-2.414) and total children (OR= 1.621(1.062-2.414) were statistically associated with underweight. Significant results of logistic regression are shown in table 10.

Table 10. Logistic regression of selected explanatory variables by the three indices of nutritional status Hawa Michael Kebele, Bugna Wereda, North Wollo Zone, April 2000

	STUNTING	
Explanatory variable	Crude odds ratio(CI)	Adjusted odds ratio(CI)
male sex of child	1.56(1.13-2.16)	1.417(1.007-1.995)
number of children	0.77(0.55-1.06)	1.038(0.723-1.489)
practice of mother	0.48(0.31-0.75)	1.216(0.814-1.818)
knowledge of mother	0.84(0.38-1.83)	0.998(0.730-1.363)
maternal education	0.78(0.31-2.02)	1.007(0.302-3.357)
attitude of mother	0.18(0.11-0.30)	1.527(0.422-1.527)
husband's education	1.58(1.05-2.36)	1.052(0.253-1.808)
possession of livestock	1.86(1.27-3.01)	0.945(0.599-6.241)
	WASTING	
Explanatory variable	Crude odds ratio(CI)	Adjusted odds ratio(CI)
sex of child	1.50(0.96-2.35)	1.228(0.856-1.763)
number of children	1.75(1.12-2.72)	0.822(0.565-1.196)
practice of mother	0.42(0.22-0.79)	0.987(0.663-1.519)
knowledge of mother	0.83(0.36-1.85)	0.889(0.639-1.239)
maternal education	0.35(0.11-1.17)	0.479(0.103-2.225)
attitude of mother	0.54(0.30(0.90)	1.962(.305-3.618)
husband's education	1.06(0.57-1.99)	1.197(0.733-1.955)
possession of livestock	1.70(0.74-3.80)	0.910(0.669-1.238)
	UNDERWEIGHT	
Explanatory value	Crude odds ratio(CI)	Adjusted odds ratio(CI)
sex of child	1.68(1.20-2.34)	1.601(1.062-2.414)
number of children	1.06(0.75-1.52)	1.621(1.030-2.549)
practice of mother	0.57(0.37-0.88)	1.260(0.773-2.053)
knowledge of mother	0.87(0.34-2.10)	1.156(0.795-1.682)
maternal education	0.69(0.24-2.09)	0.683(0.143-3.263)
attitude of mother	0.25(0.16-0.39)	0.693(0.141-3.409)
husband's education	0.90(0.57-1.43)	1.095(0.622-1.928)
possession of livestock	1.73(0.98-3.06)	0.745(0.528-1.051)

6. DISCUSSION

The prevalence of malnutrition in the study population is unexpectedly markedly lower than the average prevalence in Ethiopia. In the study population the prevalence of stunting is 28%, wasting 12% and underweight 26% while the national prevalence is 52%, 9% and 42% respectively (15). In a health profile of the same wereda continued long term food aid was considered an important food source in the entire wereda (26). This can explain the unusually good nutritional status of the children under study.

This population is a predominantly Orthodox (94%), married (80%), agricultural (99.7% are farmers) and illiterate society (84%of male and 97.8 female illiteracy). Seventy-three percent of mothers believe it is good to decrease fluid during diarrhea. With such poor health indicators it may be surprising that the nutritional status of children is so good.

Of 818 children only 47 were between the age of four and five years. Possible explanations for this anomaly would be a catastrophic event about four to five years ago or measurement error due to lack of notable events during that time period and extraordinary events the preceding year. Stunting was highest during the second year then decreased dramatically until the fourth year and the dramatically increased in the fifth year. Stunting in a particular child should increase through the second year then not change dramatically through the fifth year. Possible explanations for this abnormality could be extremely variable food supplies in the study population or measurement error.

On bivariate analysis many significant relationships were found between malnutrition and various factors. Educated mothers were significantly more likely to have stunted and wasted children contrary to the study on the association of the children's nutritional status to maternal education (23). in which

to female children (15). Perhaps the more children a mother has the less able she is to provide to each child.

The general paucity of meaningful associations on bivariate and particularly multi variate analysis may be do to a generous long standing and uniform distribution of food aid throughout the entire kebele.

In addition the theoretical relationship of mothers' feeding their children KAP and their children's nutritional status is very complicated. A child's nutritional status is effected not only by the mothers' feeding practices but the child's general disease state and health and disability. The mother's feeding practices are limited by availability of food in the house. These relationships are interrelated. Such relationships and interrelationships are sometimes difficult to quantify. Because of this, deriving a quantified relationship between mothers' feeding KAP and the nutritional status of their children may be difficult to quantify.

7. LIMITATIONS

This study limits itself to a particular kebele in northern Ethiopia and thus the results of this study are probably not generalizable neither to Amhara Region nor the rest of Ethiopia. It is possible that these results are generalizable to kebeles which are recipients of chronic food aid. In particular the food distribution patterns may be quite different even more than other kebeles in Bugna Wereda. Thus the conclusions of this study might only apply to kebeles receiving chronic food aid.

8. CONCLUSIONS

1. The magnitude of malnutrition was determined to be 28% stunting, 12% wasting and 26% underweight.
2. On bivariate analysis a mother's knowledge was not but her attitude and practice were associated with her children's nutritional status.
3. On multivariate analysis neither knowledge, attitude nor practice of mothers' feeding their children were associated with the nutritional status of their children.
4. On multivariate analysis having three children or more and male sex was associated with poor nutritional status of children but no other variables were associated.
5. On bivariate analysis associated demographic variable with :
   A. Stunting were age, male sex, no ox, mothers' literacy and fathers' illiteracy, three or more children in the family and having less than one hector.
   B. With wasting were age of child, mother's literacy, no oxen and three or more children.
   C. With underweight were age and sex of child and no oxen.
6. In areas where food aid is abundant, the effect of mothers' feeding KAP on their children's nutritional status may be less or nonexistent.

9. RECOMMENDATIONS

The results wide survey of mothers' KAP related to their children's nutritional status, may have implications for policy makers of nutrition education. Since the conclusions of this study may be limited only to Hawa Michael Kebele or kebeles receiving chronic food aid, the results of this study do not imply any recommendations to policy makers.

Although malnutrition is lower than in other areas in Ethiopia, the nutritional status of children in the study area is still unacceptably high; therefore food aid should continue in this study population.

If future similar studies are entertained whether the area is a chronic food aid area or not should definitely be ascertained. If the area is a chronic food aid area, the principal investigator should be prepared to detect small differences. This can be achieved with larger sample sizes.

Since a relationship in mothers' feeding practices and children's nutritional status has already been demonstrated in the past in Ethiopia and negative results were found in this study possibly due to food aid, an extremely variable food supply, small sample size and/or measurement error, one might question the need to repeat similar studies in Ethiopia in the future when so many practical questions still need to be answered in the field of Ethiopian public health research.

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I, the undersigned, declared that this thesis is my original work, has not been presented for a degree in this or any other university, and that all sources of materials used for the thesis have been fully acknowledged.

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This thesis has been submitted for examination with my approval as a university advisor.

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