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Prevalence of under-nutrition among sick children and maternal awareness of their nutritional needs at the eldoret municipality health facilities

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Abstract

Background: A major proportion of under-nutrition among sick children is associated with ignorance, family size, maternal and paternal education, poverty. The study aimed at investigating the prevalence of under-nutrition among sick children attending Eldoret Municipality Health facilities. **Study design:** Cross sectional survey. **Study setting:** Eldoret Municipality Health Facilities. Methods Questionnaires were used to collect data on maternal knowledge, anthropometric measurements were analyzed using the WHO Anthro calculator. Z-scores were used to determine prevalence of under nutrition. Summary statistics were generated using SPSS V.12. **Results:** Mean age (months) was 9.96(sd.4.7). More than half -53.6% children were stunted, 36.5% wasted while 22.8% underweight. 59.1% mothers chose vitamins as food group that is needed to boost the child's immune system, 85.5% said the sick child loses nutrients. 268(70%) needed to know more on how nutrition of the sick child should be handled. **Conclusion:** Most of the stunted children were severely stunted. Although most mothers knew that the nutritional needs of the sick child are different and that they need vitamins to boost the immune system, they did not have a comprehensive knowledge on how to handle underweight, stunting and wasting. Most nutritional problems went unnoticed by the medical staff.

Keywords: *Under nutrition, Sick child, Maternal knowledge*

1. Introduction

During the 2008-09 KDHS, the rate of under-five mortality was 74 deaths per 1,000 live births. This implies that one in every 19 children born in Kenya dies before its first birthday, while one in every 14 does not survive to age five. However, under-five mortality has declined by 36% from 115 deaths per 1,000 in 2003 KDHS to 74

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deaths per 1,000 in 2008-09 KDHS. Socioeconomic, environmental and biological factors that influence child mortality are place of residence, mother's level of education and relative socioeconomic status. A mother's level of education exerts positive influence on children's health and survival. Malaria still remains the leading cause of mortality and morbidity in Kenya, children under-five being among the most vulnerable groups. A total of 49% of the children were sick two weeks before the survey but it's not known how many of them were undernourished (KDHS 2008-09).

Anthropometric measurements are not routinely done in most sick child clinics; sick children therefore miss the opportunity for nutritional assessment and therefore detection of under nutrition. This was evident in Ghana where it was noted that the clinical setting offered the best opportunity for assessment of under nutrition in children under five (Antwi, 2008).

Under nutrition is one of the leading causes of morbidity and mortality in children aged five years and below. Socio economic factors, poverty and incomplete immunizations are some of the factors leading to under nutrition (Ayaya *et al.*, 2004). About 75% of the deaths of children aged 0-4 years worldwide are due to diarrhoeal illness, acute respiratory infection, malaria, measles and under nutrition (Pelletier *et al.*, 1995). Under nutrition exacerbates diarrhea, malaria and respiratory infections and vice versa. Although the association is complex, improved nutritional status lessens the severity of morbidity episodes and results in fewer deaths. Deficiencies in vitamin A, zinc, iron, folate, as well as other micronutrients are responsible for a substantial proportion of these morbidities and mortalities (Laura *et al.*, 2004). Along with other international health issues, the Millennium Development Goals emphasize reducing childhood mortality as a priority. More than 10.6 million children under five die each year from neonatal disorders, diarrhoeal diseases, pneumonia, malaria, AIDS and measles, 98% of these deaths occur in developing countries. Under nutrition is implicated in over half of these deaths and the international health community recognizes that many of its causes are mainly preventable. In response to the goal of reducing the under-five mortality rate by 2015, World vision Canada (WVC) and the Canadian international development agency (CIDA) were working together in partnership to improve the child survival Through Key Nutrition and Health Interventions (Moreira, 2005).

Nutrition is a basic element of health and should not be overlooked during disease. Proper nutrition and regular physical activity can help us avoid taking drugs. When body is in a detoxification stage (like during cold or flu when bowels, secreting cells and mucous membranes become more active), it is simply trying to eliminate the buildup of toxins we consumed throughout the longer period of time. Eating lightly (especially fruits and vegetables) and drinking more liquids (clean, fresh water and herbal teas), supports the cleansing process (Perse, 2007).

Data from recent anthropometric surveys in selected countries in Africa and Asia were analyzed by urban or rural residence and by differing socio-economic groups where possible. In general, children under five years of age in urban areas are less underweight and stunted than children in rural areas. For some countries the prevalence of acute malnutrition (wasting) is nearly the same in urban and rural areas, while chronic malnutrition (stunting) and underweight tend to be higher in rural areas (FAO, 2009).

In a study done in Western Kenya, the health and nutritional status of children aged 5 and under was assessed in three villages in Siaya District. Through anthropometry, the prevalence of underweight, stunting and wasting were determined: 30% were underweight, 47% were stunted, and 7% were wasted. Children in their second year of life were more likely to be underweight and stunted. Children who were introduced to foods early had an increased risk of being underweight. Up-to-date vaccinations were protective against stunting (Emily *et al.*, 2004).

In its efforts to ensure health for all Kenyans, the Ministry of Health's strategic plan (1999-2004) aimed among other targets at: reducing under nutrition among under five year olds by 30%; reducing the proportion of under-fives morbidity and mortality rates attributable to key childhood diseases and malnutrition from 70 to 40% and eliminate vitamin A deficiency in under five year olds. However, these targets have not been fully achieved and according to a study carried out in Moi Teaching and Referral hospital-Eldoret, the key risk factors predisposing children to severe protein energy malnutrition were under nutrition, poverty, social conditions, sex of the child, incomplete immunization (Ayaya *et al.*, 2004). The war against under nutrition needs to begin with fighting these factors (Kabubo-Mariara *et al.*, 2006).

It's evident from literature that morbidity and mortality rates are still high among the under-fives yet anthropometric measurements are not routinely done in sick child clinics. It's also evident that under nutrition among the under-fives is still high and that the relationship between under nutrition and infection is a vicious cycle. This study therefore sought to find out the proportion of undernourished among the sick children.

2. Materials and methods

2.1. Study design

The study design used was cross sectional survey. The advantages of this design are that it gives the prevalence of the condition, easy to conduct, cheap and can link potential causes to the outcome.

2.2. Study setting

The study was carried out in Eldoret Municipality Health centres. Eldoret town is the headquarters of the large Uasin Gishu District in Rift Valley Province of Kenya. The municipality covers an area of 147 km² with a population of 300,000 people (CBS: 1999 Census). The annual population growth rate is estimated at 3.35%, thus projecting current population at about 500,000. The municipality is divided into 5 locations: Kibulgeny, Kapyemit, Pioneer, Chepkoilel, Kapsoya.

The economic status of the town is fair, most of the champion athletes come from the region therefore the money they earn end up in the town which contributes to the economic status of the town. Economic activities within the municipality are milk processing, maize milling, timber treatment, soda production and fabric production and knitting. Those surrounding the municipality are large scale maize and wheat farming, cattle and chicken rearing. Other facilities which contribute to the economic status of the town are Moi University, University of East Africa-Baraton and banks including the Central Bank of Kenya.

Eldoret is one of the fastest growing towns in Kenya located 65 km north of the equator and at an altitude of 2,085 meters above the sea level and moderate temperatures of 27 °C highest and 8 °C lowest. There is one main highway in the town and around seven streets perpendicular to the highway. The town hall with a small garden and the municipality offices are situated in the middle of the town.

Eldoret municipality has six health facilities: Kapiemit Health centre situated in *Maili nne* along Uganda Road, West health centre and maternity situated along Uganda road, Kipkenyo health centre situated opposite Huruma along Uganda road, Kapsoya health centre situated in within Kapsoya estate, Kimumu health centre situated along Iten road and Pioneer health centre situated along Kisumu road.

2.3. Study population

The study population comprised of the mothers bringing their sick children to the health facilities, health care providers and the sick children. All the sick children were targeted irrespective of their illness as long as they met the inclusion and exclusion criteria. Children with different illnesses like malaria, flu diarrhea and fever were studied. The health workers who were treating the children at that moment were studied. The estimated target population was 36,000 though a sample size of 384 was studied.

2.4. Inclusion criteria and exclusion criteria

Only mothers and children above 6 months and below 2 years were included into the study. Children below 6 months and above 2 years were excluded from the study. Children with serious and chronic illnesses like diabetes, sickle cell anemia, cancer, congenital heart problems and HIV/AIDS were excluded from the study, this was because the conditions had adverse effects on the nutritional status of the child and needs special management. The researcher was able to do this by checking the child's outpatient card for the medical history and asking the mother what the child was suffering from.

Other facilities which were not managed by the Municipal council were excluded from the study.

2.5. Sample size

To obtain a representative sample size, Fisher's formula was used (Fisher *et al.*, 1998).

$$N = \frac{Z^2pq}{D^2}$$

Where N is the desired sample size when the population is greater than 10,000; Z is the standard normal deviate at the required confidence interval (95%). p is the proportion in the target population estimated to have the characteristics being measured-under nutrition and D is margin of error.

$N = 1.96^2*0.5*0.5/0.05^2$

$N = 384$

Sampling procedure: Consecutive sampling was employed where every other patient was selected for the study (child and mother) waiting to see a Health Care provider and the members of staff who treated the child.

2.6. Data collection tools and methods

Data collection tools: A semi-structured questionnaire was used by the principal investigator and the research assistants to collect data from the mothers (Appendix B1) and a structured questionnaire from the members of staff (Appendix B2). Anthropometric measurements of the sampled children were taken. Weight was taken using a basin weighing scale, height was taken using a length board and MUAC was taken using a marked non stretch tape.

Data collection procedures: Data was collected with assistance of trained research assistants. One research assistant together with the facility nurse began by taking the Anthropometric measurements of every child above 6 months and below 2 years waiting to be treated. The results were recorded on the Anthropometric measurements form (Appendix B3). After the child was treated, the mother of the child then responded to the interviewer administered questionnaire (Appendix B1) done by another research assistant and the principal investigator then finally gave the self-administered Questionnaire (Appendix B2) to the member of staff treating the child.

There were two different Questionnaires, one for the mothers and the other for the health facility staff. Questionnaire B1 had three sections: section one collected demographic data of the mother and child: age and sex of the child, marital status and education level of the mother. Section two collected data on maternal knowledge on the nutritional needs of the sick child: maternal knowledge on appropriate food for the sick child, maternal attitude on feeding the sick child, maternal knowledge on the effects of sickness on the nutritional status of the child and her opinion on the need for advice on how to handle the nutrition of the sick child. Section three collected data on the nutritional counseling received by the mother from the health care giver concerning the sick child: the kind of advice received apart from that concerning illness, mother's attitude on the necessity of someone advising her on the nutritional needs of the sick child, maternal knowledge on factors contributing to the child's illness and if nutrition is one of the factors, whether the mother was given nutritional counseling, if according to her the information given would help improve the nutritional status of the sick child and if she would like to learn more on how to handle the nutrition of a sick child.

A fully structured questionnaire (Appendix B2) was used to collect data from members of staff. This was administered to the member of staff treating the children and they responded differently for each sampled child they saw. The questionnaire consisted of two sections: section one collected demographic data of the member of staff: job position, sex, level of education and nutritional training or background. Section two collected data on the type of nutritional counseling that had been given to the mother concerning the sick child: whether the member of staff noticed any problem with the child's nutritional status, what they did about the problem and how they assessed the mother's response on the advice given. This was administered by the investigator. Five research assistants were recruited on merit then trained on how to administer the questionnaires with minimal interviewer bias.

Anthropometric measurements were taken on the children to collect data on their physical dimensions and the gross composition of the body and degree of nutrition. This was done by the nurse in charge, the investigator and the research assistants. Measurements that were taken were age, weight, length, and mid upper arm circumference.

2.7. Anthropometric measurements

Weight, recumbent length and MUAC of children were taken. Length was taken for purpose of uniformity because the target age bracket includes young infants of 6 months upto children of 24 months. Readings were taken by a single investigator to avoid inter-observer variations. The measuring tools figures and calibrations were large, distinct and clearly legible hence reading error was unlikely to occur.

2.8. Mid upper arm circumference

A centimeter non stretch tape was used to measure MUAC. The child was put to sit down with the left arm flexed on the front, measurement were taken by measuring and locating the mid-point between the acromial process of the scapular and olecranon process of the elbow, the circumference of that point was then taken accurately in centimeters. Two readings were taken to the nearest 0.1 cm and average calculated.

2.9. Weight

Weight was taken using a pediatrics weighing scale (SECA 770 corporation weighing). The child's excess cloth were removed and was made to sit on the weighing scale. Two readings of the child's weight were taken, recorded to the nearest 0.1 kg and average calculated. Weighing machine was calibrated daily at the beginning and in between the observations (Rosalind, 1990).

2.10. Length

Crown to heel length was measured using a locally developed wooden board device which had a headboard, footboard and was fitted with a metallic tape measuring to the nearest 0.1 cm. The children were placed facing upwards with the feet against the footboard and the body parallel to the long axis of the board. The headboard was then gently moved until it touched the crown of the head. Measurements were taken with the headboard. Two readings were taken to the nearest 0.1 cm and the average calculated.

2.11. Data editing

Editing was continuous throughout data collection and processing. It was done after each session of interview so as to check for errors, any inconsistencies and gaps in the responses from the respondents and clear recording of measurements.

2.12. Pilot study

The researcher and research assistants carried out a pilot study in one of the health facility-west health centre. 10 questionnaires were filled and the findings analyzed but was not included in data analysis.

The pilot study purposed to:

1. Evaluate the overall feasibility of the study.
2. Test the appropriateness of the questionnaires and competency of the research assistants.
3. Evaluate the number of respondents that could be interviewed in a day.
4. Facilitate revising and standardizing the questionnaire.

2.13. Limitations of the study

There could have been some minimal form of interviewer bias during the study; however, this was reduced by conducting an induction training to minimize such errors.

2.14. Variables

The following variables were addressed

2.14.1. Independent variables

1. Socio-demographic characteristics of the members of staff (job position, sex, level of education), parents (marital status, education level) and of child (age, sex).

2. Maternal knowledge on nutritional needs of the sick child.
3. Nutritional counseling given to mothers.

2.14.2. Dependent variables

1. Weight/age Z-score – underweight
2. Length/weight Z-score – wasting
3. Length/age Z-score – stunting
4. MUAC measurements

Data analysis: Data entry was done using Epi-Data. Completeness was checked before entry and exported to SPSS/EPI-INFO. All the analysis was done in Epi-Info and SPSS. Epi-Info was used to generate the Z-sores. SPSS was used to generate frequency tables and measures of central tendency (Mean/Median). T-test and chi-square were used to determine significant relationships.

2.15. Maternal knowledge on nutritional needs of the sick child

In this study a score of "1" was given to mothers if she knew that a sick child should eat differently from the well child and a score of "0" if she did not know. A dietary diversity score was created on the basis of information on the type of food groups to be consumed more by the sick child; "1" for food for growth, "2" for energy food, "3" for food to rebuild body tissues and "4" for all the food groups. This is because a sick child should be given an extra meal high in all the food groups to recover for lost nutrients (Limowreck, 1999).

For choice of food group which boosts immune system "1" was given to carbohydrates, "2" for minerals, "3" for proteins and "4" for vitamins. A score was given for the mother's ability to give example for her choice "0" for no example at all, "1" for one example and "2" for more than one example. Mothers were given a score of "1" if they were able to know that a sick child loses nutrients and "0" if they were not. A score of "1" was given to mothers who wanted to know details of feeding the sick child as per different illnesses and "0" for those who did not want to know. For the mother's ability to know effects of nutrient loss, a score of "1" was given and "0" for those who were unable, a score of "0" was given no an example of effects of nutrients loss, "1" for one example and "2" for more than one example.

A total score of "16" was the maximum score; therefore any mother who scored less than "8" indicated low maternal knowledge while a score of "8" and above indicated high knowledge.

2.16. Nutritional counseling given to mothers

A score of "1" was given if the mother was counseled and "0" if she was not, "1" was scored for one advice given and "2" for more than one advice. If the mother was counseled on how a child loses nutrients during illness a score of "1" was given and "0" of not, a score of "1" was given if further advice was given on the kind of food to give to replace the lost nutrients and "0" of not advised further. A score was given if advice was given on the food group which boosts the immune system; "0" if no advice and "1" if given, a score of "0" was given if a mother wasn't told examples of vitamins, "1" if one example was given and "2" if more examples were given.

A total score of "9" was the maximum score therefore a mother who scored "4" and below indicated inadequate nutritional counseling was given to her while a score of "5" and above indicated adequate nutritional counseling.

2.17. Ethical considerations

The proposal was reviewed by IREC of Moi University and approval letter was obtained before proceeding to the field. Permission was sought from the Eldoret Munucipal MOH. Before administering the questionnaire, consent was sought from the parents and staff who had been recruited for the study by providing adequate and relevant information about the study (Appendix A). Confidentiality was assured to all participants and it was ensured that the information was used only for the study. All participants were volunteers.

3. Results

3.1. Demographic characteristics

3.1.1. Demographic characteristics of mother and child

A total of 384 mothers and their children were studied. Close to three quarters of the mothers were married and slightly more than half had secondary as highest level of education. More than half of the children 202(52.6%) were female and the mean age (months) was 9.96(sd.4.7) as indicated in Table 1.

3.1.2. Demographic characteristics of health workers

The health facilities had more clinical officers than nurses as indicated in Figure 1.

Majority of the staff had diploma as highest level of education as in Figure 2 of which 86% of all members of staff studied had a nutritional training or background.

3.1.3. Prevalence of under nutrition

Almost half (44%) of the sick children were undernourished. A big percentage of children who had a nutritional problem were stunted as shown in Table 2.

Less than half of the children were stunted with (16%) being severely stunted as shown in the Figure 3. Those categorized as mild had Z-scores of –1 to –1.9; they have not been included in the overall under nutrition percentages.

As regards wasting, 24.9% of the children were severely wasted as indicated in the Figure 4.

Only a few children were underweight of which 2% were severely underweight.

Table 1: Demographic characteristics of mother and child

Characteristic	N(%)
Maternal	
Marital status	
Single	77(20.1)
Married	284(74)
Divorced	20(5.2)
Widowed	3(0.8)
Level education	
Primary	120(31.3)
Secondary	199(51.8)
Middle level colleges	55(14.3)
University	10(2.6)
Child	
Mean age in months (sd)	9.96(4.7)
6-12 months	7.9(2.1)
12-24 months	18.03(3.9)
Gender	
Male	182(47.4)
Female	202(52.6)
Morbidity experience	
Diarrhea	197(51.3)
Malaria	92(24)
Injuries	45(11.7)
Pneumonia	34(8.8)
Measles	16(4.2)

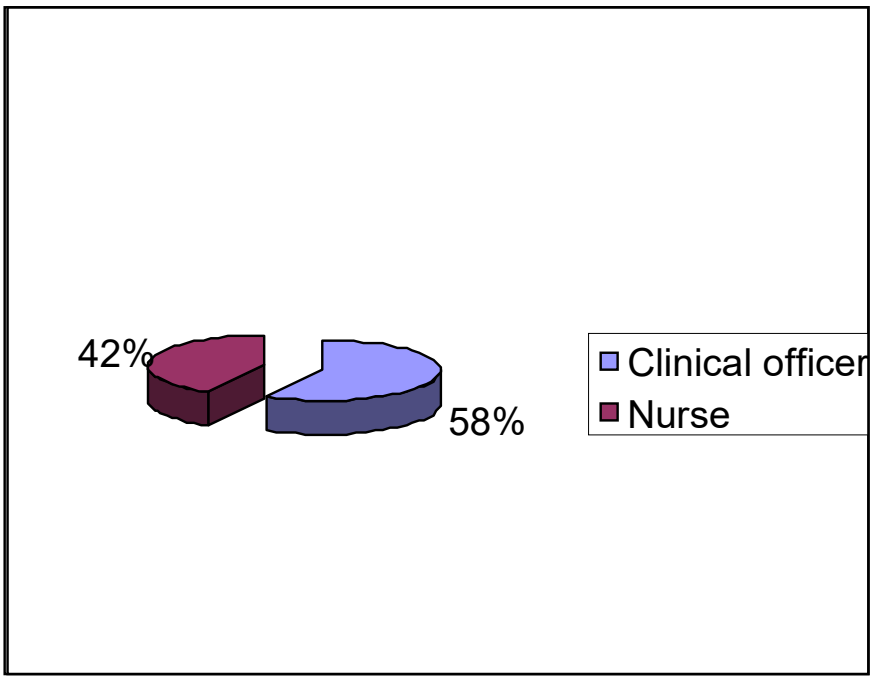

Figure 1: Staff Job description

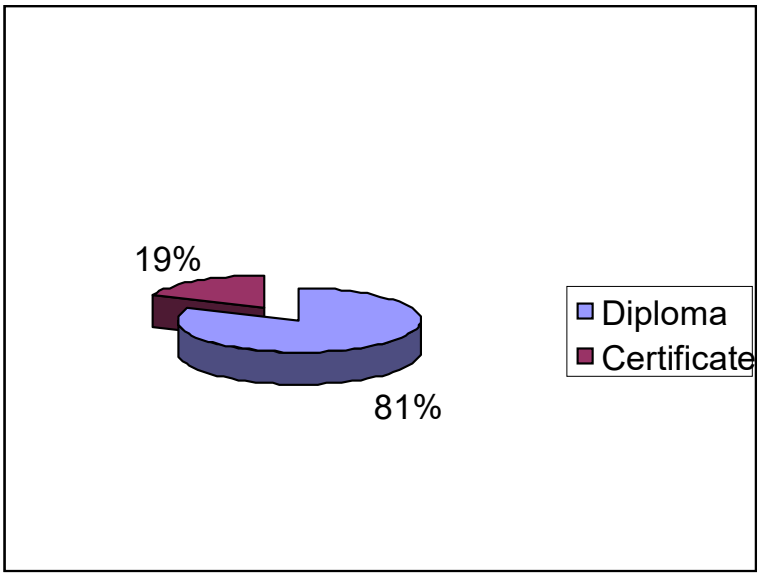

Figure 2: Staff level of education

Table 2: Prevalence of under nutrition

Indicator	≤-2		>-2		p-value
	No. (%)	Mean (sd)	No. (%)	Mean (sd)	
Stunting (length for age)	124(32.9)	-3.40(1.3)	253(67.1)	0.10(1.7)	<0.001
Wasting (weight for length)	45(11.7)	-3.13(1.9)	338(88.3)	-0.40(0.9)	<0.001
Underweight	35(9.4)	-2.70(0.7)	348(90.6)	0.68(1.7)	<0.001

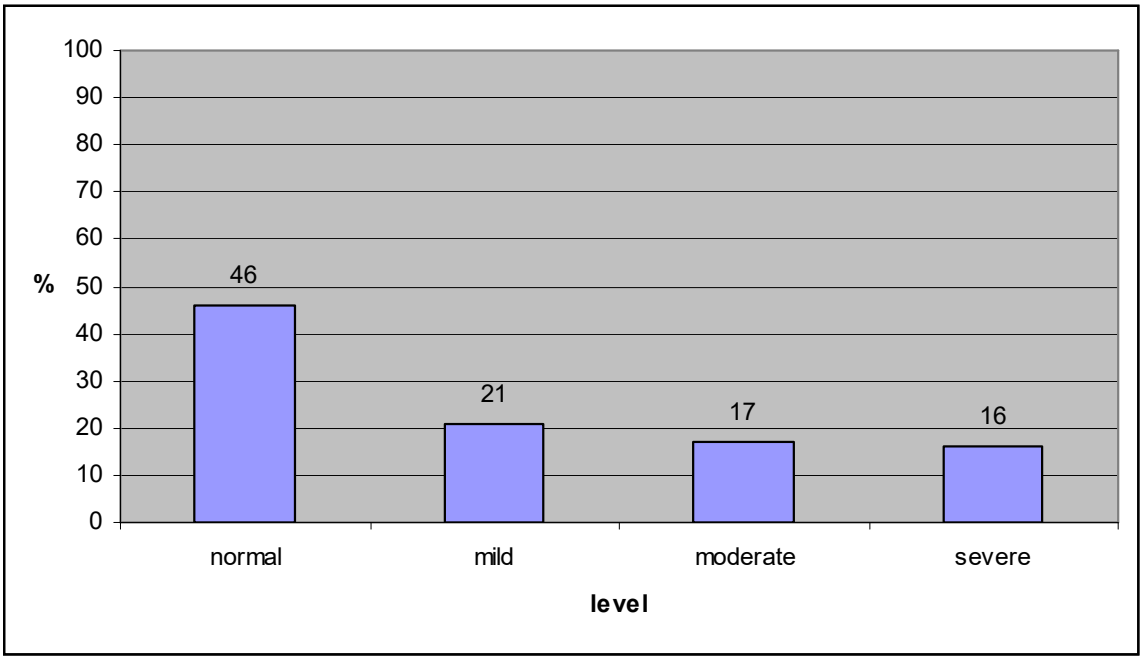

Figure 3: Nutritional status-stunting

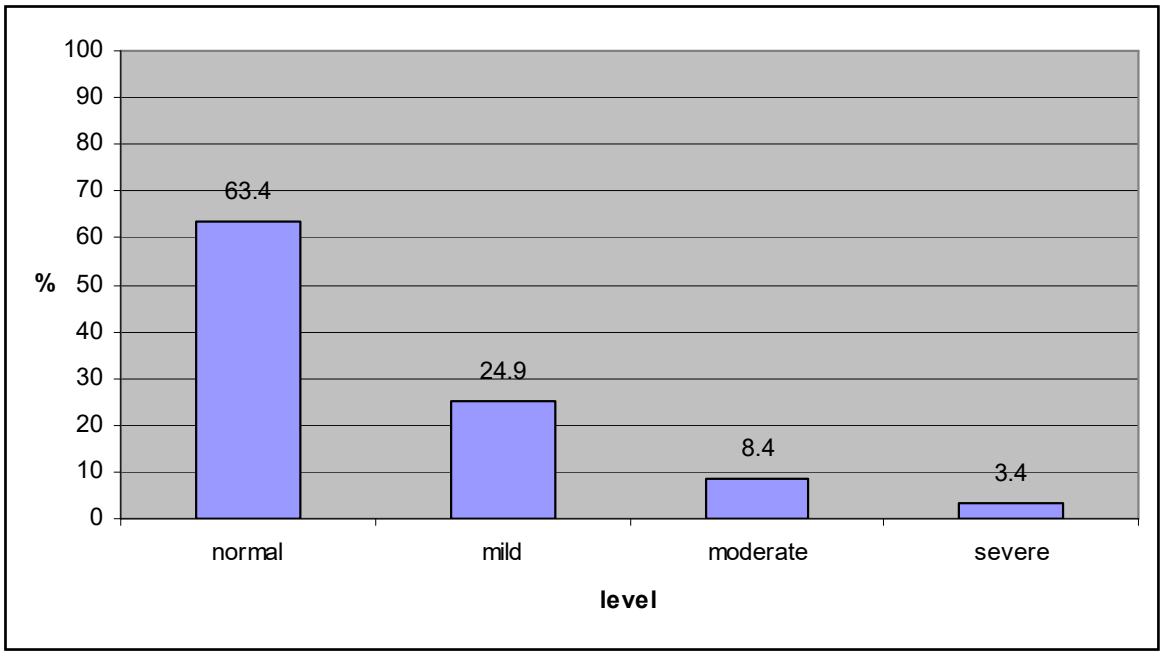

Figure 4: Nutritional status-wasting

Of the children suspected to have a nutritional problem by the health worker, most of them were categorized underweight as shown in the Figure 6.

Only 70(18.3%) of the children were noticed to have a nutritional problem by the health care staff as shown in Table 3.

3.1.4. Common childhood illnesses

The common illnesses among the children were: Diarrhea-51%, Malaria-24%, Injuries-12%, Pneumonia-9%, Measles-4%.

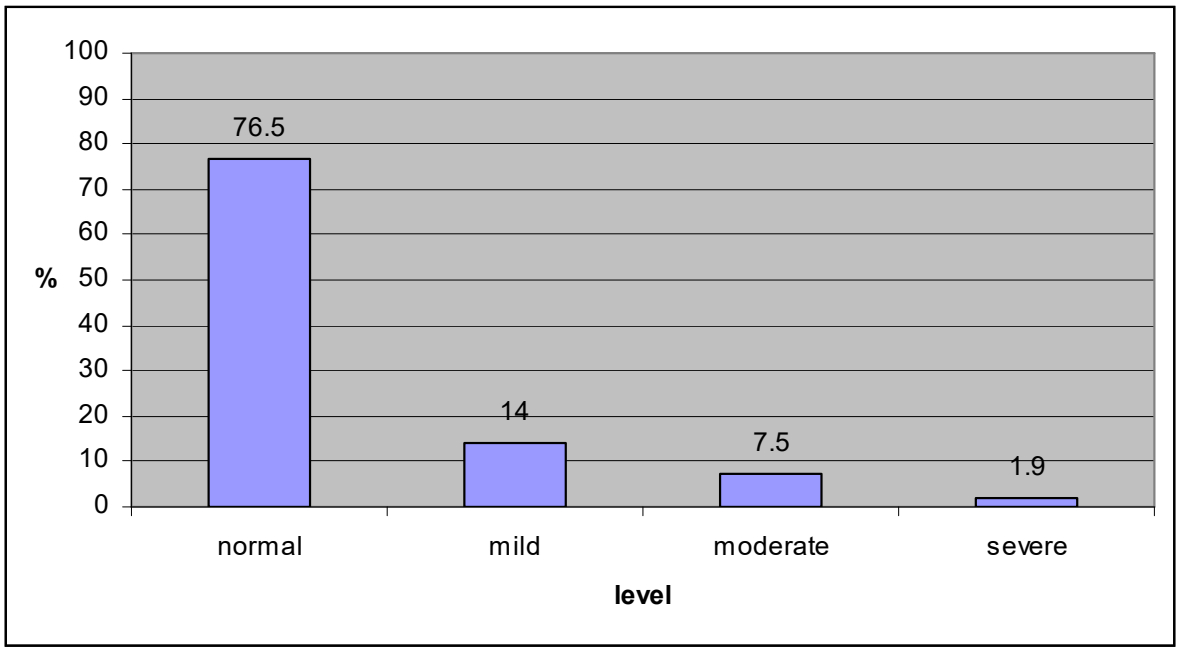

Figure 5: Nutritional status-underweight

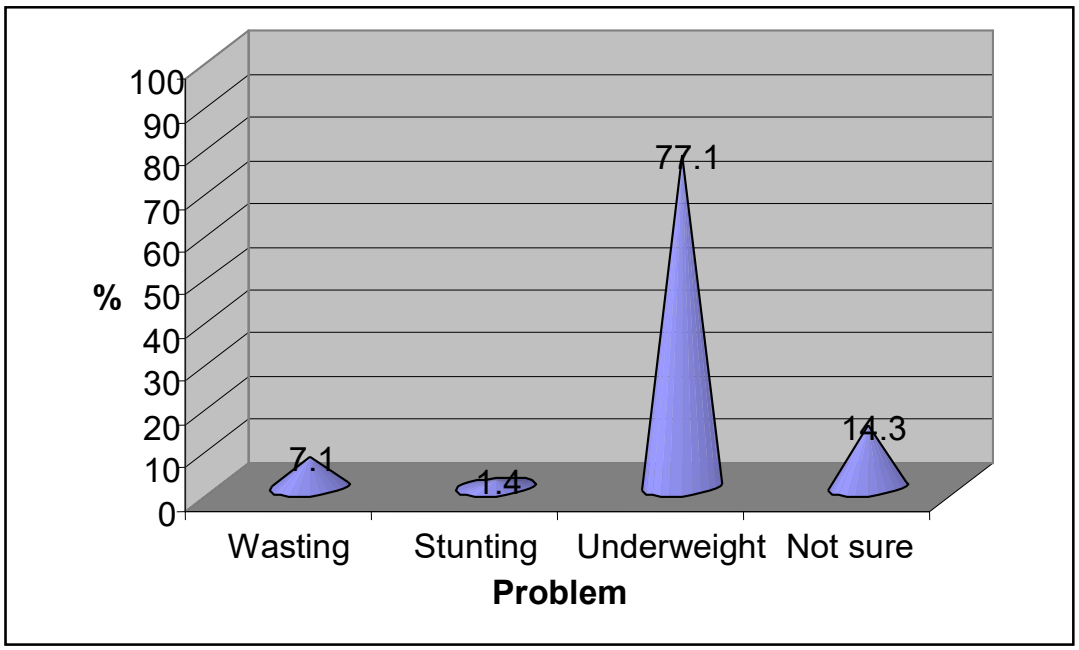

Figure 6: Health care giver perceptions on under nutrition

Table 3: Health workers' perceptions and actual percentages of under nutrition

Indicator	Actual percentages (WHO)	Health workers' perceptions
Stunting	124(32.9%)	1(1.4%)
Wasting	45(11.7%)	5(7.1%)
Underweight	35(9.4%)	64(77.1%)

As in Table 4 most sick children who were undernourished were stunted and diarrhea was the leading sickness. Of the children who had diarrhea, 50% of them were undernourished. Most of the children who had malaria 66% and 71% who had pneumonia were undernourished. Less than half of the children who had injuries and measles were malnourished.

3.1.5. Maternal knowledge on nutritional needs of the sick child

Most of the mothers 77% had good basic knowledge on the nutritional needs of the sick child; they scored above average in the questionnaire ranking as in Table 5. However, further probing showed that the mothers had basic knowledge but lacked a comprehensive knowledge on the relationship between nutrition and infection. 83% of the mothers said that the nutritional needs of the sick child are different from that of a well child and that the sick child looses nutrients of which 325(99.1%) of the mothers knew exactly the nutrients lost and how to replace them. Slightly more than half of the mothers 53% said a sick child should eat energy foods more as shown in Figure 7.

Table 4: Under-nutrition by type of sickness

Indicator	Stunting N (%)	Wasting N (%)	Underweight N (%)
Diarrhea	48(38.7)	20(44.4)	30(85.7)
Malaria	46(37.1)	11(24.4)	4(11.4)
Injuries	8(6.4)	8(17.8)	0(0)
Measles	2(1.6)	3(6.7)	0(0)
Pneumonia	20(16.1)	3(6.7)	1(2.9)

Table 5: Maternal knowledge and nutritional counseling given to them

Indicator	N(%)
Maternal knowledge	
Low	83(21.6)
Moderate	301(77.4)
Nutritional Counseling	
Adequate	158(41.1)
Inadequate	226(58.9)

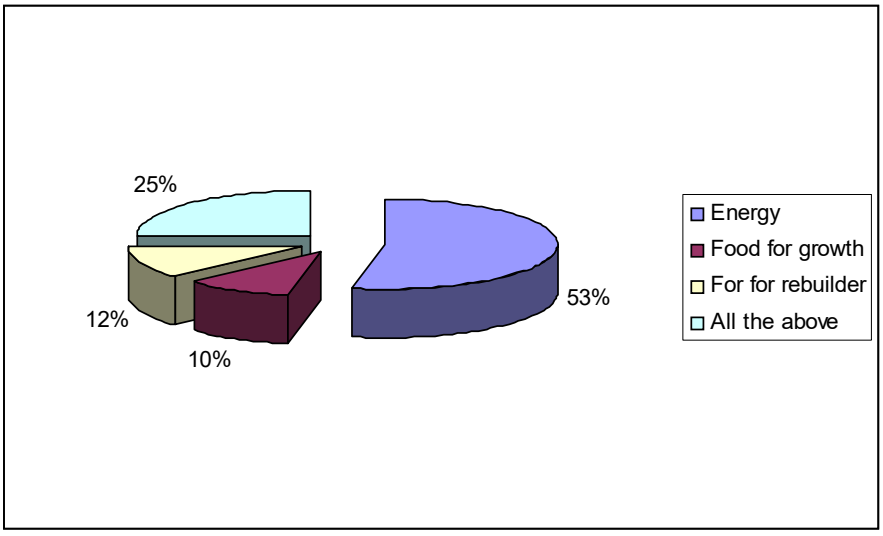

Figure 7: Maternal knowledge on food for the sick child

More than half of the mothers chose vitamins as food group that is needed to boost the child's immune system as shown in Figure 8.

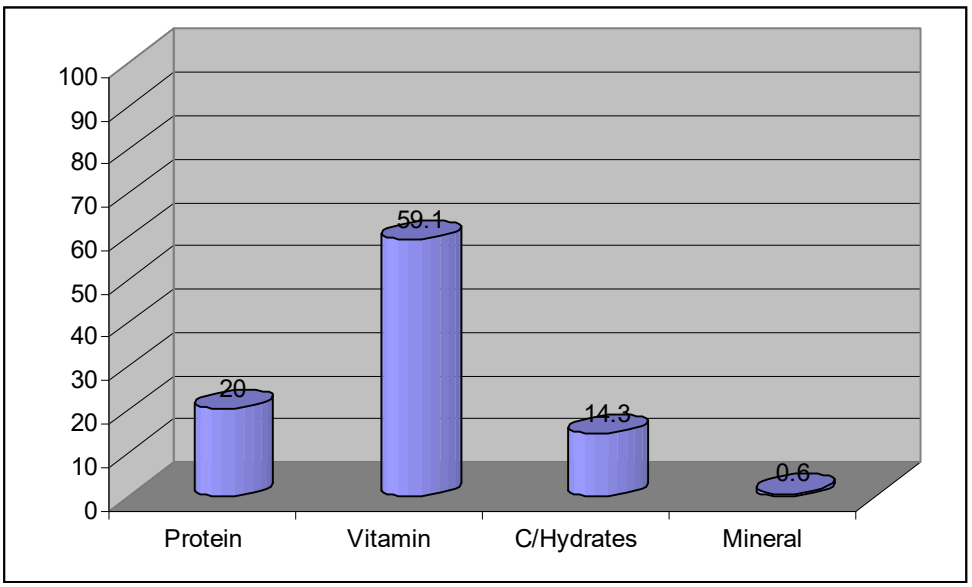

Figure 8: Maternal knowledge on foods that build immunity system

3.1.6. Nutritional counseling given to mothers

Time take during counseling sessions were used to test quality of counseling given, most health care providers (80%) were taking one minute or less and only 2% took more than two minutes, none of them took more than five minutes. More than half of the mothers 58.9% were given inadequate nutritional counseling since they scored below average in the questionnaire ranking as in Table 5. A 43% of the mothers were told the child may lose nutrients during illness and only 16% were engaged on a detailed conversation on nutrients lost as per the illness and types of food to give so as to replace the lost nutrients. For the mothers who said the sick child loses nutrients during illness, 166(91.2%) were advised on the kind of food to feed the child for replacement. Only 177(47%) of the mothers were told that the sick child needs vitamins in plenty. Half of the mothers thought the information given will help improve the status of the sick child. Most mothers (70%) needed to know more on nutrition of the sick child.

3.1.7. Bivariate analysis

There was no significant association between maternal knowledge and under nutrition ($\chi^2 = 0.18$, $df = 1$, $p = 0.672$).

4. Discussion

4.1. Prevalence of under nutrition

Findings from this study were compared to prevalence of under nutrition among children in general since there was no literature on studies done on prevalence of under nutrition among sick children specifically.

Findings from this study indicate that under nutrition is still high though most of the children were mildly undernourished. The prevalence agrees with current data on stunting, wasting and underweight. This was seen in a study carried out in Siaya District of western Kenya, the prevalence of underweight, stunting and wasting were determined: 30% were underweight, 47% were stunted, and 7% were wasted (Emily *et al.*, 2004). It also agrees with the Kenya overall rate of under nutrition among children under-five; stunting was 30% in 2003 and 35% in 2008-09, wasting was 6% in 2003 and 7% in 2008-09, and underweight was 20% in 2003 and 16% in 2008-09 (KDHS 2008-09). The countrywide data from 2005/06 showed that 33% of children under five in Kenya were stunted, six% are wasted and 20% are underweight (UNICEF Kenya/2009/d'Elbée). The rates are fluctuating though findings from this study are different from findings in Siaya but almost similar with the

nationwide findings. This could be due to difference in study populations in Siaya and Eldoret, some cases of under nutrition could be caused by the cyclic under nutrition phases in different populations which are passed on to generations. Other factors could be access and availability of recommended nutrients in right amounts, food in season, culture on food choice and different food grown in different parts of Kenya.

According to UNICEF 2009, the rate of stunted growth among children under-fives in Kenya was about 38% in 1990, in 2008, the rate was about 34%. According to UN common database, children under-fives who were underweight for age in Kenya were 22.3% in 1993 and 20.2% in 2003 (UNICEF, 2003). Between 2003-2008, 21% of under-fives were suffering from moderate and severe underweight (NCHS/WHO), 6% of under-fives were suffering from moderate and severe wasting (WHO) and 35% of under-fives were suffering from moderate and severe stunting (WHO) (UNICEF, 1999-2010). United Nations statistics division reports that children severely and moderately underweight for age in Kenya were 22.3% in 1993 and 19.9% in 2003 (UN, 2007). The trend of under nutrition shows that there has been a minimal change in the figures in Kenya. A reduction by 5% in a span of 15 years shows how slow under nutrition is in being faced out. Finding from this study concur with this since the figures are almost the same.

A study carried out in Egypt on children with diarrhea found out that stunting, wasting, and low weight-for-age were found in 19%, 3%, and 7%, of these children, respectively (Wierzba *et al.*, 2001). The percentages in this study and that of Kenya generally are slightly higher for wasting, stunting and underweight. A comparison of these finding and that of Egypt shows that Kenya is still among countries in Africa where under nutrition is not declining. Reasons could be due to the Kenyan economy, inflation of food prices and high rates of unemployment in Kenya.

4.2. Common childhood illnesses

Results from this study indicate almost half of the sick children were undernourished and diarrhea was the leading sickness, followed by malaria. Though malaria was the leading disease, three quarters of children with pneumonia were undernourished, similarly more than half of the children who had malaria and half who had diarrhea were undernourished. Under nutrition was therefore most common among children with pneumonia and this confirms what is already known that nutrition has serious adverse effects on pneumonia and vice versa. This also confirms the vicious cycle between under nutrition and infection. Since previous literature indicate that anthropometric measurements are not routinely done and was also confirmed by the researchers in this study, it is evident that under nutrition among the sick children is missed out. Yet it should be diagnosed with what the sick child is suffering from then they are all treated on time.

This has also been seen in Ghana where it was noted that the clinical setting offered the best opportunity for assessment of under nutrition in children under five. However, anthropometric measurements were not routinely done in most of the clinics. These children thus miss the opportunity for nutritional assessment and detection of under nutrition (Antwi, 2008).

Findings from this study can also be compared to the countrywide data from the Kenya health policy framework 1994-2010 which indicate that malaria was the leading cause of morbidity in Kenya at 24% in 2007 and 31% in 2008, followed by respiratory infections at 12% in 2007 and 9% in 2008, diarrhea comes next at 10% in 2007 and 8% in 2004. It can also be compared to the KDHS findings; children under-five who had fever was 24%, 8% had symptoms of ARI, and 17% had diarrhea (KDHS 2008-09). The findings from this study rates diarrhea as the leading sickness while the other surveys rate malaria, reasons could be due diversity in place of residence and populations. Malaria is also high in malaria endemic areas and Eldoret is not part of them, diarrhea is also high during bumper harvest or during rainy seasons.

4.3. Maternal knowledge on the nutritional needs of the sick child

Most of the mothers scored above average on the nutritional needs of the sick child general knowledge ranking, three quarters had moderate knowledge. However, further probing showed that the mothers had basic knowledge but lacked a comprehensive knowledge on the relationship between nutrition and infection. According to most mothers, a sick child should eat energy foods more, only a few said that a sick child needs to eat more foods to rebuild worn out tissues.

These finding are comparable to findings from a study carried out in India on maternal Knowledge on sick child care revealed that at pre testing level 65% mothers of experimental group had moderate level of knowledge followed by 35% having low knowledge regarding childcare activities. After giving intervention in group and individually and also through visual packages, videocassette, slides and folders. A change was noticed at the time of post testing, when knowledge inventory was again administered. Majority of mothers' i.e., 71.66% had moderate level of knowledge while only 23.33% had low level of knowledge and 5% mothers were also found having high level of knowledge. Whereas in control group almost all the mothers were found in the same category when post tested, as they were at pre testing time. None of them was found in high category of knowledge (Santosh and Anju, 2009).

Hemmeter and Kaiser (1994) examined the effects of training for parents to use enhanced nutritional supplements with their preschool children aged 25-49 months with developmental delays. A multiple baseline design across three intervention strategies was used. Results show that the parents learned to use the strategies in clinic and generalized them to the home. Evidence of positive effects on child's development was observed. A comparison of findings from this study and findings from the study in India shows that most mothers had moderate knowledge but none/only a few in India had high level knowledge. However, the study by Kaiser revealed that training parents had a positive impact on child's development. Factors related to unreduced levels on under nutrition despite the moderate knowledge could be maternal level of education, lack of exposure to nutritional knowledge or poor attitude towards child care.

4.4. Nutritional counseling given to mothers at the health facility

More than half of the mothers were given inadequate nutritional counseling, the mothers scored below average in the questionnaire ranking. Out of the interviewed mothers who had been given nutritional advice, half of them were given further advice on specific food to give the child. The mothers further reported that they were not praised or commended and did not have further discussions concerning the same. However, almost all the mothers felt inadequate to handle nutritional problems of their sick child and needed more advice on the same. The attitude of the health care givers improved towards the end of the study and mothers were being given a more elaborate advice. Despite the members of staff having a nutritional background most undernourished children went unnoticed.

Similarly, in a study carried out on Brazilian children to assess nutritional counseling given to the sick child, children whose mothers were counseled reported an increase in growth. Maternal satisfaction with the counseling provided was high at 65.0%. As reported by mothers, doctors who were more likely to praise the mother when she reported an appropriate feeding behavior were 28.9%. 64.4% of the mothers recalled receiving some type of nutritional advice. Doctors were tested on nutritional counseling for children < 2 y of age basing the questions on the IMCI guidelines. On average, the mean number of correct answers by doctors was 68%. However, doctors behaved differently after the second follow up on nutritional counseling in terms of use of good communication skills (asking and listening, positively reinforcing mothers and checking their proper understanding of the counseling delivered) (Santos *et al.*, 2001).

Findings from this study show that maternal satisfaction was slightly low compared to the study in Brazil. Reasons could be because the doctors in Brazil praised the mothers which could have influenced their response. However the figures are more or less the same since the Brazilian doctors gave more advice at the second follow up and this study realized also that health care givers had improved towards the end of the study.

Similarly, in a study carried out in Pelotas on whether the trained physicians made use of the clinical consultation to give mothers nutrition advice and whether they gave more advice. In the majority of their consultations, the physicians in the intervention group gave some nutrition advice. Only 9(24.4%) consultations of the trained physicians did not include advice; thus 28 of the 37 observed consultations (75.6%) included 1 or more nutrition messages. The trained physicians gave 81 messages in contrast to the 20 messages given by physicians in the control group. If any message was given, physicians in the intervention group gave more messages than did the practitioners in the control group ($P < 0.02$). At the upper extreme was a consultation in which the mother received 8 advice messages. Trained physicians gave significantly more messages about specific foods and food preparation and practices, but there was no difference in breast-feeding messages. Of the 81 messages, 90% were remembered by the mothers in the intervention group compared with 30% in the

control group. For two categories of messages, specific foods and food practices/food preparation, mothers who were seen by the trained physicians recalled more advice than did mothers in the control group. Striking differences existed between the two groups in recall of messages on specific foods and on food practice/preparation, with 95% of messages on specific foods and 90% of messages on food practice or food preparation advice remembered by the intervention group. In contrast 27% of messages on specific foods and 20% of messages on food practices/food preparation were recalled by mothers in the control group (Gretel *et al.*, 2004).

Finding from the study in Pelotas clearly indicates that doctors who had been trained gave comprehensive advice and mothers recalled their information while doctors who had not been trained gave less advice and mothers did not recall their information. The case is the same in findings of this study since the officers only had basic training from college; they gave mothers basic advice and did not engage mothers in detailed nutritional counseling. This could be the reason why most mothers still felt inadequate to handle nutritional problems of their children.

In Tanzania and Uganda, sick children attending a first-level health facility were initially checked for danger signs and for the main symptoms of diarrhea, malaria, pneumonia, measles, and other severe infections. Then all children were assessed for malnutrition and anemia, and vaccination status was verified. Children under two years of age, as well as older children presenting low weight for age, received nutrition counseling. (Cesar *et al.*, 2006).

In this study the nutritional counseling given by the medical staff and maternal satisfaction on advice given are relatively lower than in other studies outside Kenya. This could be due to the intensity of nutritional training given to the staff, and failure by the staff to notice under nutrition among the children. The staff could also be prioritizing on treating the child first then nutritional counseling being forgotten. However, the chi-square test of association indicated that there was a significant association between nutritional counseling and under nutrition. The logistic regression model showed that those with inadequate counseling were almost two times more likely to have a child who is undernourished. Inadequate counseling increases the chance for under nutrition.

5. Conclusion and recommendations

- Many sick children were undernourished and under nutrition was high among children with respiratory infections.
- Wasting was more prevalent among the sick children.
- Anthropometric measurements are not routinely done in most sick child clinics.
- Nutritional needs of the sick child were different, mothers did not have a comprehensive knowledge on the relationship between infection and nutrition, and how to handle underweight, stunting and wasting.
- Less than half of the mothers were adequately counseled yet most nutritional problems went unnoticed by the medical staff. Improper diagnosis was done on under nutrition by the medical staff.

5.1. The eldoret municipality should

- Carry out a thorough nutritional assessment on every sick child to avoid missing out on under nutrition. This can be done by employing a nutritionist/dietician at every facility and have them assess every sick child and recommend diet regimes accordingly.
- Educate mothers at the health facility to care for the sick child and give proper diet. This will help reduce on wasting, stunting and under nutrition.
- Organize for yearly refresher courses to all health care givers on nutrition education. This will equip them on skills of diagnosing all cases of under nutrition then advice mothers accordingly or refer them to a nutritionist.

Ethical approval and consent to participate

The study was approved by the Moi Teaching and Referral Hospital (MTRH) Institutional Research and

Ethics Committee (IREC). The study objectives were explained to the women and their informed consent obtained prior to commencement of the study.

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