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Original Research Article

Prevalence of Underweight and Its Determinant Factors among Children Aged 0-59 Months: A Case of Garissa Sub-county

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ABSTRACT

Background: Malnutrition remains a chronic public health problem among under-five children in the developing world and it highly contributes to child mortality in Kenya, yet information on specific determinants has not been vastly studied.
Objectives: The objective of this study was to assess the prevalence of underweight and its determinant factors among children below five years in Garissa sub county, Kenya.
Methods: A cross-sectional study was employed using mixed methods. A sample of 365 children under five years was selected using systematic sampling method. Pre-tested questionnaire and FGDs were used to collect data. Pearson's chi-square test and odds ratio with corresponding 95% confidence interval were used to establish the association between the dependent variable and independent variables. The level of statistical significance was set at P-value <0.05. Binary logistic regression analysis was performed to determine the independent factors associated with underweight.
Results: The findings of the study reveal that 31% of the children were found to be underweight. At multivariate analysis, factors that were independently associated with occurrence of underweight were: low birth weight (<2.5kgs) [AOR=3.16; 95%CI=1.90-5.27; P=<0.001];child's gender (female) [AOR=1.86; 95%CI=1.12-3.08; P=0.017]; recent illness [AOR=1.76; 95%CI=1.07- 2.91; P0.027] and households income [AOR=3.11; 95%CI=1.19-8.12; P=0.021].
Conclusion: The prevalence of underweight among the under five children was high, indicating that the nutrition situation in study area is very critical. Program planners, policy makers in the Ministry of Health and other stakeholders should strengthen collaboration and coordination of nutritional programs that aim to alleviate nutritional deficiencies by addressing the above significant factors.

Key words: children, determinant factors, prevalence, underweight.

INTRODUCTION

Malnutrition as a general term refers to a number of diseases, each with a specific cause related to one or more nutrients and each characterized by a cellular imbalance between the supply of nutrient and energy and the body's demand for them to ensure growth, maintenance and specific functions. [1] This may lead to either under nutrition or over-nutrition. Worldwide there are about 60 million children with moderate acute malnutrition and 13 million with severe acute malnutrition. [2] Malnutrition is consequently the most important risk factor

for the burden of disease in developing countries. [3] It is associated with increased morbidity and mortality from malaria, diarrheal diseases, measles and respiratory diseases among other diseases. There are long-term detrimental consequences of malnutrition which include impaired cognitive development, growth impairment, greater behavioral problems, deficient social skills and inability to fulfill ones potential. [4]

There is an abundant literature detailing the causes of child malnutrition, especially under-nutrition, and the means of reducing it. Poor availability of food both in terms of quality and quantity, poor dietary diversification and high rates of infection are the major determinants of under-nutrition in the majority of developing countries. [5] Recent research suggests that poor composition of the diet; inappropriate caregiver-feeding behaviors' play an important role in child nutrition and development. These include mixed feeding and early cessation of breastfeeding, the untimely introduction of complementary foods, and low psychosocial stimulation of children, poor food preparation and food hygiene practices, and inappropriate care for children during illness, among others. The quality and quantity of food available to a household are not the only factors explaining the determinants of malnutrition in infants and young children. Care and feeding practices of the caregiver are key factors that lead to undernourishment in young children. [6]

Globally, the practice of breastfeeding is declining. When exclusive breastfeeding is not practiced it can contribute to a high prevalence of malnutrition. [7] In South Africa the practice of exclusive breastfeeding is very low. The South African Demographic and Health Survey (SADHS) found that of all three month old babies, only 10% were exclusively breastfed and 48.3% were bottle fed. In addition, inadequate complementary feeding practices and poor infant feeding practices lead to low protein and energy intake. [8]

In the developing world, 129 million children under five years are underweight and 10% are severely underweight. According to 2008/09 Kenya Demographic Health Survey, rates of under nutrition in children below five years are high. Proportion of underweight among children below five years nation-wide was (20.3%) and proportions of underweight by region present Nairobi with the least at (10%) and North-eastern province with the highest (31.1%). [9]

MATERIALS AND METHODS

The study was conducted in Garissa Sub County. Garissa Sub County is among the 6 sub counties that make up the larger Garissa County. It covers an area of about 7.45% of the total area of the country and has a population of 65,881. The sub county has 3 administrative wards namely Sankuri, Central and Korakora. It is about 215 miles (350 km) east of Nairobi. A cross-sectional study applying mixed methods approach was carried out. A sample of 365 participants determined using the single population proportion formula as used by Fisher et al, 1998.The study population were mothers/guardians with children aged (0-59 months) in the selected villages in Sankuri within Garissa sub county who gave written informed consent to be part of the study. Data was collected using a pre-tested structured questionnaire .Data was checked daily for completeness and was cleaned, edited, counter-checked for accuracy. Quantitative data from the questionnaires was double entered into a computer database designed using MS-Access application. Backup of the data was done and filled questionnaires was cross-checked then stored in a lockable cabinet accessible only

to authorized persons so as to ensure confidentiality and to avoid data loss.

Quantitative data was analyzed by using Statistical Package for Social Science [SPSS] Version 20.Descriptive analysis was computed whereby means, standard deviation, proportion/percentages and frequency were calculated for the demographic variables. Prevalence of malnutrition was estimated by computing percentage of malnutrition outcome among the entire sampled under five years children nutrition status outcome. Pearson's chi-square test and odds ratio with corresponding 95% confidence interval were computed to establish the association between the dependent variable (nutritional status) and independent variables. Multiple logistic regression analysis was used to adjust the confounding variables in the association between dependent and independent variables. The level of statistical significance was set at p-value < 0.05. For the anthropometric measurement analysis the WHO standards (2006) Z-score values for WAZ of children was considered.

Qualitative data was analyzed manually using a thematic manner. From the data collected, the key points were marked with a series of codes, which were extracted from the text. The codes were grouped into similar concepts in order to make them more workable for analysis. Approval to conduct this study was obtained from the Kenya Medical Research Institute (KEMRI) Scientific Steering Committee (SCC) and Ethical review committee (ERC). A written consent for interview was obtained from each child's parents/ guardian after explaining the purpose of the study. No names were recorded and the respondents were assured of their confidentiality. Participants were enrolled into the study only after voluntary informed written consent. Prior to the study, sensitization meetings were held with the respective village heads and the objectives explained. Codes were also assigned on all information about the participants and handled with utmost confidentiality making it difficult to relate the data to respondents and only be used for intended purposes. Participants might decide to withdraw from the study at any time, without facing any consequences.

RESULTS

Socio-demographic characteristics of the mothers/guardians: The mean age of the respondents was 26.5 years. The findings also show that about half of respondents (51.8%) were within the age group of 16-25 years while the age group of 36 years and above was only 11.0%.With respect to level of education, more than half of mothers/guardians (57.5%) never attended school while only 10.4% attended secondary school and above. Most of the respondents (88.5%) and (92.3%) were married and Muslim respectively. A majority (72.3%) of the mothers were housewives. The monthly income of the majority of the household (75.1%) was less than 5000 Kenyan shillings.

Socio-demographic characteristics of the children: The ages of the children ranged from 4 months to 54 months. The highest percentage was in the age category of 4 to 12 months (31.0%) and 13 to 24 (30.1%). The gender distribution among the children indicates that there were 53.7% females and 46.3% males. About half (49%) of the children had low birth weight (<2.5Kg).

The distribution of mean age, birth weight, current weight and height among the children who participated in the study was 24.28 months, 2.57kg, 9.37 kg and 85.2 cm respectively.

Child health practices by mothers/ guardians: Majority of the children (68.2%) were born at health facilities including hospitals and community health centers compared to 31.8% born at home. Most mothers (77.0%) attended antenatal care (ANC) during their pregnancy. Most of the

children (90.7%) and (86.8%) respectively were supplemented with vitamin A and dewormed in the previous 6 months. Majority (72.0%) of the children's immunization cards were up to date. With respect to source of water, there was almost equal distribution among those using river (29.6%), tap water (28.5%) and borehole (32.6%) while the remaining 9.3% were using a well as source of water.

Morbidity among the children and their perceived causes:

- **Morbidity among children:**

The mothers/guardians were asked about their children's recent ill health and nearly half of the children (49.9%) had been sick. Information from FGDs indicated that some of the participants took their sick children to health centres. While others said they seek spiritual healing. It was also reported that various types of herbs were used for treating diarrhoea. Some of the statements given by the participants of the FGDs were; *'when a child has diarrhoea, we give animal fat or herbs to clear the stomach*', *'traditional herbs are usually good to stop diarrhoea'*.

- **Perceived causes of the child's sickness:**

Among the children who were recently sick, the main causes of the illness were respiratory infection (50.9%) followed by diarrhoea/vomiting (23.1%) as indicated in Figure 1.

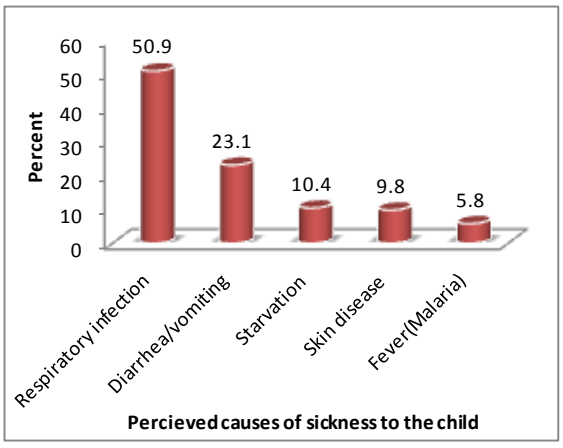

Figure 1: Perceived causes of sickness to the child

Culturally accepted complementary foods: Figure 2 presents the culturally accepted complementary foods. The highest percentage of the respondents (39.5%) indicated that milk and porridge were the culturally accepted complementary foods. It was also indicated in the FGDs that the kind of foods that are appropriate for children by the time they have stopped breast-feeding were '*mashed potatoes, diluted camel/goat milk, beans and tea'*.

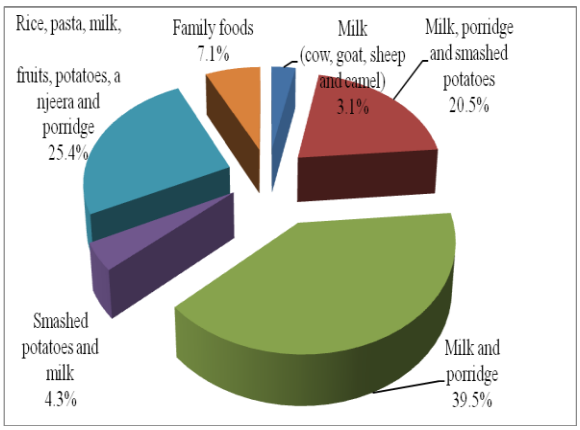

Figure 2: Culturally accepted complementary foods

Food intake – 24 hour inventory on Childs Food Consumption: The respondents were asked to indicate the types of foods they fed their children based on the previous 24 hours. More than half (52.9%) had eaten rice from the cereals and two third (65.8%) had consumed potatoes from the tubers and roots. The highest percentage from vegetables was cabbage (38.4%). Majority (65.2%) and (95.6%) did not eat meat and eggs respectively in the previous 24 hours. Potato was the main (65.8%) consumed food.

Similarly, participants from FGDs were asked to mention the body building foods, energy giving foods and foods that can protect children from getting sick. The food most frequently mentioned by participants were '*ugali, chapatti, rice and patatoes'* as the body building foods. *'Bananas, water melon, mangoes and papaw'* were indicated as foods that give energy. From the foods that can protect

children from getting sick easily respondents said '*meat and diluted milk of camel/cow/goat*. These implied that there was inadequate knowledge among the respondents on nutrition.

Awareness on causes of malnutrition and actions taken on malnourished children:

- **Awareness of mothers/guardians on causes of malnutrition:**

Majority of respondents (83.6%) indicated that the cause of malnutrition among children was inadequate food in the household as shown in Figure 3.

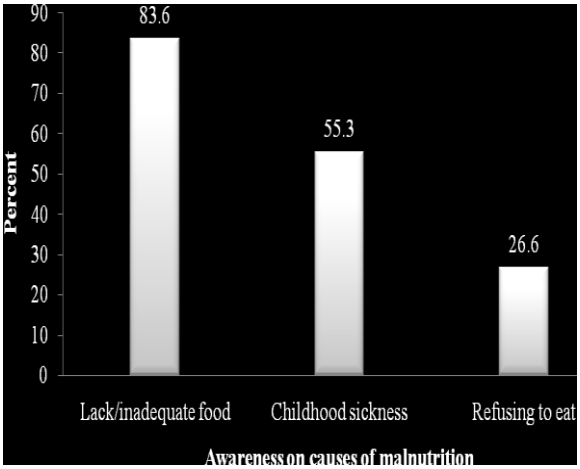

Figure 3: Awareness on causes of malnutrition

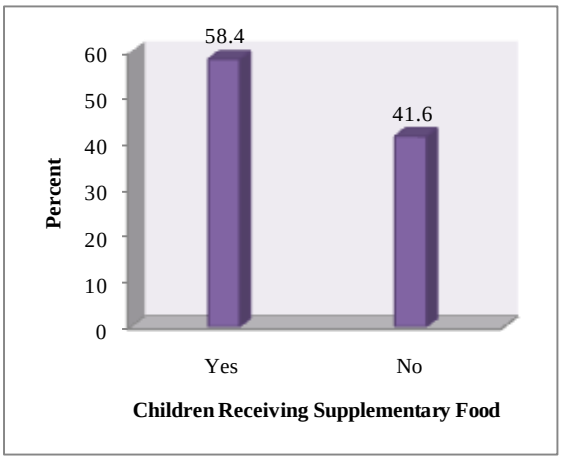

Figure 4: Proportion of children receiving supplementary feeding

Actions taken if the child becomes malnourished: Mothers/guardians were asked on what action they would take if the child becomes malnourished and majority (76.3%) responded they would take the child to the health facility, 13% indicated that they would give fruits and foods frequently while the remaining 10.7% reported to seek for spiritual healing.

Proportion of children receiving supplementary feeding: Figure 4 shows the distributions of children who have received supplementary foods. The figure depicts that more than half (58.4%) of the children had received supplementary foods.

Socio-cultural beliefs on infant/child feeding: The socio-cultural factors related to infant/child feeding practices are summarized in Table 1.

Table 1: Socio-cultural beliefs on infant/child feeding

Variables	Frequency (n=365)	Percentage (%)
Breastfeeding initiation after delivery		
One day and above	162	44.4
Immediately after birth	203	55.6
Breastfeeding		
No	19	94.8
Yes	346	5.2
Age of the child to introduce complementary foods		
0-2 months	159	43.6
3-4 months	68	18.6
6 months	138	37.8
Duration of breastfeeding		
On-going	86	24.9
6-12 months	80	22.6
18 -24 months	54	15.5
> 24 months	134	37.0
Missing	11	
Whether boys or girls have different foods		
Yes	2	0.6
No	360	99.4
Missing	3	
Foods the child is culturally entitled to eat on certain occasions		
Yes	11	3.0
No	354	97.0
Food taboos (Yellow milk liver, eggs, fish, sukuma and leafy vegetables)		
Yes	9	2.5
No	356	97.5
Preparation of child's food separately from the rest of the family		
No	219	60.0
Yes	146	40.0
Source of food for the child		
Cooking in the house	319	87.4
Buying of ready-made food	28	7.7
Relatives	18	4.9
Perceived cost of preparing food for the child		
Expensive	164	44.9
Affordable	201	55.1

Prevalence of malnutrition among children: Malnutrition was determined by using Z-score for weight for age (under-weight), that is below minus two and minus three standard deviations (-2SD and -3SD)

according to WHO (2006) standards. The result of the study indicated that 31% were underweight.

Association between socio-demographic characteristics and underweight: Bivariate analysis of association between prevalence of underweight and socio-demographic attributes is summarized in Table 3.The proportion of underweight was significantly more among children aged 37-54 months (38.6%) than children aged 12 months and below (23.0%), [OR=2.13; 95%CI=1.06-4.29; P=0.035].Child birth weight was significantly associated with underweight. Children with birth weight less than 2.5Kgs had significantly high prevalence of underweight (41.9%) than children with birth weight of 2.5Kgs and above (21.8%), [OR=2.59; 95%CI=1.62-4.12; P=<0.001]. Mothers/guardians who never attended school had significantly increased proportion of underweight children (37.1%) compared to those who had attended secondary school and above (18.4%), [OR=2.62; 95%CI=1.10-6.23; P=0.030].Children whose mothers worked as casuals had significantly higher prevalence of underweight (45.5%) when compared to children whose mothers were house wives (28.8%), [OR=2.06; 95%CI=1.08-3.95; P=0.029].Households whose income was less than 5000 Ksh per month had significantly more proportion of underweight (34.7%) than households with income of 15000-20,000 Ksh (14.9%), ([OR=3.03; 95%CI=1.31-7.03; P=0.010].

Table 2: Association between socio-demographic characteristics and underweight

Socio-demographic attributes	Underweight status		OR	(95%CI)		χ2 value	* P value
	Underweight, n(%)	Normal, n(%)		Lower	Upper		
Age of children in months							
<12 months	26(23.0%)	87(77.0%)	1.00				
13-24 months	32(29.1%)	78(70.9%)	1.37	0.75	2.50	1.07	0.301
25-36 months	34(38.6%)	54(61.4%)	2.11	1.14	3.89	5.67	0.017
37-54 months	34(38.6%)	54(61.4%)	**2.13**	1.06	4.29	4.47	**0.035**
Gender of the child							
Female	69(35.2%)	127(64.8%)	1.54	0.98	2.43	3.569a	0.059
Male	44(26.0%)	125(74.0%)					
Birth weight of child in kilograms							
≤2.5	72(41.9%)	100(58.1%)	**2.59**	1.62	4.12	16.34	**<0.001**
>2.5	39(21.8%)	140(78.2%)	1.00				
Age of mother/guardian in years							
16-25	59(31.2%)	130(68.8%)	1.20	0.56	2.56	0.22	0.643
26-35	43(31.6%)	93(68.4%)	1.22	0.56	2.67	0.25	0.620
36 and above	11(27.5%)	29(72.5%)	1.00				
Mother/guardian level of education							
No school	78(37.1%)	132(62.9%)	**2.62**	1.10	6.23	4.73	**0.030**
Primary school	28(23.9%)	89(76.1%)	1.39	0.55	3.51	0.50	0.482
Secondary school & above	7(18.4%)	31(81.6%)	1.00				
Marital status of the mother/guardian							
Married	100(31.0%)	223(69.0%)	0.77	0.29	2.01	0.29	0.592
Divorced/separated	6(26.1%)	17(73.9%)	0.61	0.16	2.26	0.56	0.455
Single	7(36.8%)	12(63.2%)	1.00				
Religion of the mother/guardian							
Christian	7(25.0%)	21(75.0%)	0.73	0.30	1.76	0.50	0.478
Muslim	106(31.5%)	231(68.5%)	1.00				
Mother's Occupation							
Casual worker	20(45.5%)	24(54.5%)	**2.06**	1.08	3.95	4.75	**0.029**
Self employed	17(29.8%)	40(70.2%)	1.05	0.56	1.97	0.02	0.876
House wife	76(28.8%)	188(71.2%)	1.00				
Father's occupation							
Employed	48(30.4%)	110(69.6%)	1.15	0.57	2.33	0.16	0.691
Pastoralist	17(31.5%)	37(68.5%)	1.21	0.52	2.82	0.21	0.651
Farmer	34(33.3%)	68(66.7%)	1.32	0.63	2.77	0.55	0.460
Unemployed	14(27.5%)	37(72.5%)	1.00				
Monthly income of the house							
<5000 Ksh	95(34.7%)	179(65.3%)	**3.03**	1.31	7.03	6.69	**0.010**
10000-15000 Ksh	11(25.0%)	33(75.0%)	1.91	0.66	5.46	1.44	0.231
15000-20000 Ksh	7(14.9%)	40(85.1%)	1.00				

*Significant p value bolded, OR= Odds Ratio, CI= Confidence Interval

Table 3: Relationship between underweight and child health practices

Child health practices	Underweight status		OR	(95% CI)		χ2 value	* P value
	Underweight, n(%)	Normal, n(%)		Lower	Upper		
Child place of birth							
Home	32(27.6%)	84(72.4%)	0.79	0.49	1.28	0.91	0.341
Health facility	81(32.5%)	168(67.5%)	1.00				
Whether a mother attended ANC							
No	33(39.3%)	51(60.9%)	1.63	0.98	2.70	3.54	0.060
Yes	80(28.5%)	201(71.5%)	1.00				
Whether the child's immunization card is up to date (verified)							
No	24(24.7%)	73(75.3%)	0.63	0.37	1.08	2.86	0.091
Yes	85(34.1%)	164(65.9%)	1.00				
Whether the child was sick recently							
Yes	68(37.4%)	114(62.6%)	1.83	1.17	2.87	6.96	**0.008**
No	45(24.6%)	138(75.4%)	1.00				
Vitamin A supplementation							
No	10(29.4%)	24(70.6%)	0.92	0.43	2.00	0.04	0.838
Yes	103(31.1%)	228(68.9%)	1.00				
Deworming of the child in the previous 6 months							
No	12(25.0%)	36(75.0%)	0.71	0.36	1.43	0.92	0.338
Yes	101(31.9%)	216(68.1%)	1.00				
Age difference between the two youngest children in months							
8-12 months	35(38.5%)	56(61.5%)	1.25	0.48	3.23	0.21	0.645
13-18 months	21(24.7%)	64(75.3%)	0.66	0.25	1.75	0.71	0.400
19-24 months	24(32.9%)	49(67.1%)	0.98	0.37	2.61	0.00	0.967
36 months and above	8(33.3%)	16(66.7%)	1.00				
Source of water used to prepare food for the child							
River	38(35.2%)	70(64.8%)	1.72	0.94	3.12	3.12	0.077
Well	9(26.5%)	25(73.5%)	1.14	0.47	2.76	0.08	0.775
Borehole	41(34.5%)	78(65.5%)	1.66	0.92	2.99	2.87	0.091
Tap water	25(24.0%)	79(76.0%)	1.00				
Storage of the child's food							
Sufuria	65(30.4%)	149(69.6%)	1.53	0.79	2.96	1.57	0.210
Pan	24(36.9%)	41(63.1%)	2.05	0.94	4.46	3.26	0.071
Bowl	10(43.5%)	13(56.5%)	2.69	0.98	7.44	3.65	0.056
Hot pot and flask	14(22.2%)	49(77.8%)	1.00				

*Significant p value bolded, OR= Odds Ratio, CI= Confidence Interval

Table 4: Relationship between socio-cultural factors and underweight

Socio-cultural beliefs	Underweight status		OR	(95% CI)		χ2 value	* P value
	Underweight, n (%)	Normal, n (%)		Lower	Upper		
Breastfeeding initiation after delivery							
≥ one day	62(38.3%)	100(61.7%)	1.85	1.18	2.89	7.29	**0.007**
Immediately after birth	51(25.1%)	152(74.9%)	1.00				
Breastfeeding							
No	5(26.3%)	14(73.7%)	0.79	0.28	2.24	0.20	0.653
Yes	108(31.2%)	238(68.8%)	1.00				
Age of the child at weaning							
0-2 months	59(37.1%)	100(62.9%)	1.55	0.95	2.54	3.06	0.080
3-4 months	16(23.5%)	52(76.5%)	0.81	0.41	1.59	0.38	0.539
6 months	38(27.5%)	100(72.5%)	1.00				
Foods the child is culturally entitled to eat on certain occasions							
Yes	6(54.5%)	5(45.5%)	2.77	0.83	9.27	2.95	0.086
No	107(30.2%)	247(69.8%)	1.00				
Culturally not allowed foods for children							
Yes	4(44.4%)	5(55.6%)	1.81	0.48	6.88	0.79	0.376
No	109(30.6%)	247(69.4%)	1.00				
Preparation of child's food separately from the rest of the family							
No	71(32.4%)	148(67.6%)	1.19	0.75	1.88	0.55	0.460
Yes	42(28.8%)	104(71.2%)	1.00				
Source of food for the child							
Cooking in the house	100(31.3%)	219(68.7%)	3.65	0.82	16.19	2.91	0.088
Buying of ready-made	11(39.3%)	17(60.7%)	5.18	0.99	27.06	3.80	0.051
Relatives	2(11.1%)	16(88.9%)	1.00				
Perceived cost of preparing food for the child							
Expensive	58(35.4%)	106(64.6%)	1.45	0.93	2.27	2.71	0.100
Affordable	55(27.4%)	146(72.6%)	1.00				

*Significant p value bolded, OR= Odds Ratio, CI= Confidence Interval

Table 5: Multivariate analysis of factors associated with underweight among children aged 0-59 months

Predictor	AOR	95%CI		*P value
		Lower	Upper	
Underweight				
Birth weight in kilograms				
<2.5	3.16	1.90	5.27	<0.001
>2.5	1.00			
Whether the child was recently sick				
Yes	1.76	1.07	2.91	0.027
No	1.00			
Gender of the child				
Female	1.86	1.12	3.08	0.017
Male	1.00			
Monthly income of the household				
<5000 Ksh	3.11	1.19	8.12	0.021
10000-15000 Ksh	1.68	0.52	5.39	0.384
15000-20000 Ksh	1.00			

*Significant p value bolded, AOR= Adjusted odds Ratio, CI= Confidence Interval

Relationship between underweight and child health practices: The relationship of the child health practices by mothers/guardians and underweight among children who participated in the study is presented in Table 6. Children who had been recently sick showed a significant increase in prevalence of underweight (37.4%), when compared to those children who had not experienced any recent illness (24.6%), [OR=1.83; 95%CI=1.17-2.87; P=0.008].However, there was no significant association (P<0.05) observed between underweight of the child and the other child health practices.

Relationship between socio-cultural factors and underweight: The relationship between socio-cultural factors and occurrence of underweight among children aged 0-59 months presented in Table 9. There was a significantly higher proportion of underweight (38.3%) among children who initiated breastfeeding within 1 to 5 days after delivery compared to those who started immediately after delivery (25.1%), [OR=1.85; 95%CI=1.18-2.89; P=0.007].

Multivariate analysis of factors associated with underweight among children aged 0-59 months: Logistic regression analysis was conducted to assess factors independently associated with underweight among children aged 0-59 months. All factors (15 variables) found to have P value less than 0.15 with occurrence of underweight at bivariate analysis were considered together in a multivariate analysis. After running all these factors using binary logistic regression for each indicator of underweight by specifying *'backward conditional progressive stepwise'* with removal at P<0.05, four factors were retained in the final analysis (reduced model) as presented in Table 11.

Children with low birth weight (<2.5kgs) were 3.16 fold more likely to be underweight than children with birth weight of 2.5kgs and above [AOR=3.16; 95%CI=1.90- 5.27; P=<0.001].

Female children were significantly about 2 fold more likely to be underweight than male children [AOR=1.86; 95%CI=1.12-3.08; P=0.017].

Underweight was 1.76 times more among children who were recently sick when compared to those who had not experienced recent illness [AOR=1.76; 95%CI=1.07- 2.91; P0.027].

Households whose income per month was less than 5000 Ksh were 3.11 times more likely to have children with underweight than households with income of 15000-20,000 Ksh [AOR=3.11; 95%CI=1.19-8.12; P=0.021]

DISCUSSION

Prevalence of underweight among children aged 0-59 years: The prevalence of underweight in the present study was reported as 31%. This indicates high levels

of malnutrition as judged against World Health Organization criteria. This high prevalence could be due to the fact that majority of the households in the study belonged to low socioeconomic status and a direct relationship between low socio economic status and under nutrition is well known.

Low weight for age (underweight) is a measure of both acute and chronic under-nutrition. The underweight level reported in this study area is higher than Eastern province (19.8%) and the national level (16%), [9] but comparable to Kwale District in the Coast of Kenya at 34% [10] and in Western Kenya (30%). [11] It was also similar to other studies conducted in developing countries for instance in Ethiopia; in Hidabu Abote district 30.9% [12] and in Gumbrit 28.5% [13] and in Dhankuta district in Nepal located in South Asia 27%. However, it was high compared to the study conducted in West Gojam of Ethiopia which was 49.2 %. [14]

Factors associated with malnutrition among children aged 0-59 years: The result of the present study indicated that birth weight below 2,500g was an important risk factor for underweight. This finding concurs with a study conducted in Vietnam which indicated that LBW babies had 5, 6 and 8 times higher risk of being stunted, underweight and wasted respectively. [15] It is also in line with previous studies from Ludhiana reporting the prevalence of malnourished was observed being significantly higher (p=0.024) in LBW children [16] and in Bangladesh. [17] This could be due to the fact that children born with a low birth weight might from the time of their birth lack certain nutrients that are essential for their future normal growth and development. But it could also suggest that children born with low birth weight might take a longer period of time to reach the normal weight for their age.

The analysis showed that female children were about 2 times more likely to be underweight than male counterparts. This conforms to the findings of other researches in India [18-20] However, it contradicts to a number of other studies conducted in Dollo Ado District, Somali Region, Ethiopia, [21] in Chandigarh India, [22] in Kwara State, Nigeria, [23] in Eastern Uganda [24] and in Botswana [25] that found out male children are more likely to have under-nutrition than females. These differences could be closely linked with culture or traditional norms and gender issues which might be a reflection of preferential treatment among the opposite sex and provision of better quality food and health facilities which might need further investigation.

Children who were recently sick were significantly more among underweight children. This finding corroborated by a study in Chandigarh India where there was a statistically significant relationship between acute ailments (diarrhoea, ARI) and malnutrition ($p < 0.001$). [22] Under-nutrition and childhood morbidity have a synergistic relationship. The interrelationship of the two is in such a way that illness can suppress appetite precipitating under-nutrition of a child while, on the other hand, nutritional deficiencies increase the susceptibility of the child to infectious diseases. [26] Infection can suppress appetite and directly affect nutrient metabolism, leading to poor nutrient utilization.

Family/household income was a significant predictor of underweight in this study. Household socio-economic status is more often associated with child nutrition, [27,28] therefore, the observed interaction between socio-economic status and nutritional outcomes was anticipated. The prevalence of underweight was increased when the monthly income is lower than 15,000 Ksh in this study. Households whose income was less than 5000 Ksh per month

had 3.11 times more likely to have children with underweight than households with income of 15000-20,000 Ksh. Also, households with income between 10,000 to 15,000 Ksh per month had 3.5 times more likely to have children with underweight than households with income of 15000-20,000 Ksh. Similarly, poor family income has been found as a risk factor for under-nutrition in other studies done in Nigeria, [29, 30] Zimbabwe, [31,32] Bangladesh [33] and Ethiopia. [21,34]This similarity might be due to the fact that high socio-economic households can get enough food for children to feed and households with low economic status are not able to afford the nutritious foods for their child.

Even though breastfeeding initiation after one to five days of delivery was significantly associated underweight at the bivariate analysis, it was not significant after adjustment was made for other variables at multivariate analysis. However, from the FGDs almost all participants indicated that breast milk was not initiated immediately after delivery because they believe the mother should fully recover and this takes 2-3 days. This difference could be the reliability of the response from the individual participants. Furthermore, people tend to withhold giving colostrum to the child when it's the most nutritious and appropriate diet for the newly born child as the participants from the FGDs reported it is too thick and strong for the child. As per the recommendation of UNICEF (2010), breast feeding should be initiated within half an hour of birth instead of waiting several hours as is often customary. However, instead they tend to give the child the various other feeds like the plain water and camel/goat milk which are delirious to the health of the child. These feeds predispose the child to the various external infectious agents and child falls prey to the diseases at early stages of the life. [35] In most societies, Colostrum is recognized to differ from breast milk because of its colour and its creamy consistency, but its enormous value to the baby is not universally acknowledged. A study in Turkey also showed a common belief that Colostrum the "yellow, dirty milk", caused discomfort and jaundice for newborns, therefore removal of colostrum was considered as a tradition. [36] This misbelieve on colostrum was also seen in the present study.

Based on the 24 hour inventory on food consumption it was indicated that rice and mashed potatoes were the main food consumed by the children. Cereals and roots/tubers were the major foods consumed, while consumption of other food groups especially meat, eggs and milk remained very low. Cereal based foods may be energy dense; they lack other essential nutrients, such as proteins and micronutrients, required for optimal growth in infants and children. A cross-sectional study in Tanzania reported increased prevalence of under-nutrition among children fed energy-dense. This study further supports the observation of high under-nutrition prevalence and its association with poor diet quality as revealed by quantitative descriptive data on the 24 hour inventory on food consumption and qualitative data of the present study.

Weaning is crucial for the child developmental progress. From the FGDs, the results on weaning showed that many women applied bitter substances on the breast nipple for the child to avoid breast milk and in order to accustom the child not to breastfeed the mother travels to another distant area leaving the child. This implies that women in the community didn't know the appropriate weaning process and practices for their children and might also be a contributing factor for the high prevalence of malnutrition among children in the community.

CONCLUSION

The prevalence underweight in this study was found to be 31.0%. Multivariable logistic regression shows that underweight in the study area was associated with a few factors. The Ministry of Health and other stakeholders should design and implement measures to address these factors.

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