Prevalence of Underweight and Associated Factors among Children Aged Six to Fifty-Nine Months in the Pastoral Community of Korahay Zone, Somali Regional State, Ethiopia 2016. Across-Sectional Study

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Abstract **Background:** Ethiopia is among the nations with highest under-five mortality rate in the world and at least 57% of children mortality attributed by malnutrition. The objective of this study was to assess the prevalence and associated factors of underweight among 6-59 months year's old children in the pastoral community of Korahay Zone, Ethiopia. **Methods:** A community-based cross-sectional study was used among 624 children paired with their mothers. Multi-stage sampling technique was used to select the study participants. Data was collected by using a structured questionnaire and anthropometric measurements. Odds ratios with 95% confidence intervals were used to assess the level of significance. **Results:** The study indicated that prevalence of underweight among children 6-59 months' years old was 48.7%. Children being male (AOR: 2.0; 95%CI 1.3, 3.0), not attending antenatal care by the mother (AOR: 6.2; 95%CI 1.4, 28.1), preceding birth interval of children less than 24 months (AOR: 2.1; 95%CI 1.3, 3.2) and breast milk feeding for children less than 12 months (AOR: 2.0; 95%CI 1.3, 3.1) were significant predictors of underweight. **Conclusions:** This study indicated that half of the children from 6-59 months' years old were underweight. Not attending antenatal care visits by the mother and children who feed breast milk for 12 months and less were more underweight than their counterparts. Maternal education on the advantages of breastfeeding, birth interval and antenatal care visit to improve the nutritional status of children.

Keywords Underweight, Socio-demographic, Healthcare, Environmental, Dietary, Children, Ethiopia

1. Introduction

Underweight is referred to as being low weight-for-age (WAZ), less than minus two standard deviations (SD) of the new World Health Organization (WHO) Growth Standard. It is an indicator of both acute and chronic malnutrition problems and a broader measure of malnutrition among children aged 6-59 months [2]. Globally, about 16% (115 million) of children under-five years were underweight. The highest levels of underweight prevalence are found in South Asia, where almost half (46%) of under-five children are underweight, followed by Sub-Saharan Africa with more than one-quarter (28%) of under-five children are underweight. It is the causes for 2.2 million deaths out of these one million in African countries and 800,000 in the South-East Asia Region [3–5].

Ethiopia is among the nations with the highest under-five mortality rate in the world and at least 57% of under-five children mortality attributed by malnutrition [6]. Studies done in different part of Ethiopia reported that high prevalence of underweight among under-five children [7–10]. Past studies also showed that child sex [7–9, 11], child age [12], mother educational status [12, 13], father educational status [7], household monthly income [6, 14], antenatal care visit by the mother [13, 15], household water source [16], duration of breastfeeding [17], birth order of the children [16] and child colostrum's feeding status [15] were factors associated with underweight.

Majorities of those studies conducted in Ethiopia focused on urban dwellers, agrarian and agro-pastoral communities. No previous study attempts to address the magnitude and associated factors of underweight among the pastoral community in which the most underserved area in terms of access to essential health services and characterized by high level of child malnutrition, food insecurity and vulnerable livelihoods. Therefore, the objective of this study was to assess the magnitude and factors associated with underweight and came up with the possible recommendations for program planners who engage in the

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improvement of maternal and child health care services.

2. Methods

Study design and setting:

A community-based cross-sectional study was carried out from May 1-20, 2016 in Korahay Zone, Somali regional state, East Ethiopia. Korahay zone is one of six administrative zones within Somali Regional State. This is 428 km from Jig-Jiga town. The zones have six Woredas in which most population are predominantly pastoralist. According to the 2007 census the zone has 167,031 population [18].

Study participants

The source population of this study included all 6–59 months years old children paired with their mothers who lived in the Zones. The study populations were all 6–59 months years old children paired with their mothers who lived in the selected Woredas.

Sample size and sampling procedure

Sample size was computed using a single population proportion formula with the following assumptions; 95% confidence level, 5% margin of error, reported prevalence of underweight among under five children in Shinile zone 24.5% [17], 10% non-response rate and design effect of two. The final required sample size was 624. Multi-stage sampling technique was used to select the study participants. First stage, three Woredas was selected from a total of six Woredas by lottery method. Second stage, three Kebeles was selected via lottery method from each selected Woredas. Then, the census was conducted in each selected Kebeles to know the eligible households. Final stage, households were selected by using systematic random sampling technique and took a child-mother pair from each selected household until the required sample size was fulfilled.

Measurements

The dependent variable for the study was underweight. The independent variables considered in the study were grouped in to three: Socio-demographic factors (child sex, child age, mother educational status, father educational status, occupation status of mother, father occupational status and household monthly income); healthcare and environmental factors (number of ANC visits by the mother, PNC visits of the mother, maternal age at pregnancy, diarrheal status of children, place of delivery, birth order of children, preceding birth interval of children, source of drinking water, availability of functional toilet facility); and dietary factors (time for initiation of breastfeeding, first milk feeding, duration of breastfeeding, complimentary food starting, cup feeding, spoon feeding). Anthropometric data were collected through measurements of age and weight. Child age was collected from the mother and confirmed by using the birth certificate or vaccination cards and also used a "local events calendar". Weight was measured by an electronic digital weight scale with light clothing and no shoes. Calibration was done before weighing every child by setting it to zero. In case of children aged below two years, the scale was allowed weighing of very young children through an automatic mother-child adjustment that was eliminated the mother's weight while she standing on the scale with her baby. WHO Anthro version 3.2.2 software was used to convert the anthropometric measures; Children whose weight-for-age Z-score is below minus two standard deviations (-2 SD) from the median of the WHO reference population are considered to be underweight [2].

Operational definition

Woreda: it is an administrative locality which contains more than twenty kebeles.

Kebele: it is an administrative locality which contains more than one hundred households.

Data processing and analysis

Data was cleaned for completeness and consistencies, coded and entered into Epi info version 3.5.3 and exported to SPSS version 20 for analysis. The results were organized, summarized and presented using appropriate descriptive measures such as text, tables, frequencies and percentage. Associations between the outcome and independent variables were assessed by using odds ratios with 95% confidence intervals. Bivariate logistic regression was used to screen variables that had a significant association with the outcome variable with p-value ≤ 0.2. These variables were entered into multivariable logistic regression to assess the independent predictors for underweight. Variables which were significant at the p-value less than 0.05 and adjusted odds ratios with 95% CIs were considered to be the associated factors of childhood underweight.

Data quality control measures

The data collection tool was first prepared in English and translated to the Somali language and back-translated to English check for consistency. The pre-test was done on 5% of the respondents prior to the actual data collection period. Training was given for both data collectors and the supervisor on the data collection tools and techniques of interviewing. Daily supervision was done by the supervisors and principal investigators.

3. Results

Socio-demographic characteristics: A total of 598 children between 6-59 months year old with their mothers were participated in the study that made the response rate of 95.8%. Out of the total respondents, 334 (55.9%) were females. The majority of participants 215 (36.0%) were between 12-23 months year old, followed by 24-35 months year old which accounted 34.8%. Five hundred ninety-one (98.8%) were Muslim followers in religion and 582 (97.3%) were Somali in ethnic group (Table 1).

Table 1. Socio-demographic characteristics of children and their mothers in pastoral community of Korahay Zone, Somali Regional State, Ethiopia 2016

Variable	Frequency	Percent
Sex of children		
Male	264	44.1
Female	334	55.9
A religion of the mother		
Muslim	591	98.8
Orthodox	7	1.2
Ethnicity		
Somali	582	97.3
Amhara	7	1.2
Oromo	9	1.5
Age of children (in a month)		
6-11	127	21.2
12-23	215	36.0
24-35	208	34.8
36-47	32	5.4
48-59	16	2.7
Maternal educational status		
Can read and write	268	44.8
Can't read and write	249	41.6
Primary (1-8)	26	4.3
Secondary (9-12)	19	3.2
Above secondary	36	6.0
Father's education		
Can read and write	342	57.2
Can't read and write	78	13.0
Primary (1-8)	24	4.0
Secondary (9-12)	35	5.9
Above secondary	119	19.9
Mother's occupation		
House Wife	388	64.8
Government employee	164	27.4
Self-employed	46	7.7
Father's occupation		
Pastoral	252	42.1
Government employee	179	29.9
Self-employed	167	27.9
Household monthly income in ETB		
Less than 1,500	289	48.3
1,500 and more	309	51.7

Healthcare and environmental characteristics: From the total mothers participated in the study 224 (37.5%) had no any ANC visits and 376 (62.9%) in PNC visits. The age of the mother at pregnancy was ranged from 16 years to 45 years with the mean age of 26.61 (SD± 5.2) years. About 357 (59.7%) of the mothers delivered their child at home, followed by a public health facility (38.3%) and private

health facility (2.0%). Out of the total children participated in the study, 115 (19.2%) had an experience of diarrhoea for the preceding two weeks. About 254 (42.5%) of the households had an unsafe water source for drinking and 192 (32.1%) had no functional toilet facility (Table 2).

Table 2. Healthcare and environmental characteristics of children in the pastoral community of Korahay Zone, Somali Regional State, Ethiopia 2016

Variable	Frequency	Per cent
No. of ANC visits by mother		
None	224	37.5
1	120	20.1
2-3	244	40.8
4 and more	10	1.7
PNC visits by mother		
Yes	222	37.1
No	376	62.9
Mother's age at pregnancy		
Less than 20 years	216	36.1
20 to 35 years	332	55.5
More than 35 years	50	8.4
Mother's place of delivery		
Public facility	229	38.3
Private facility	12	2.0
At home	357	59.7
Birth order of child		
1	190	31.8
2-3	310	51.8
4 and above	98	16.4
Preceding birth interval		
Less than 24 months	351	58.7
More than 24 months	247	41.3
Took any form of vaccination		
Yes	389	65.1
No	209	34.9
Children have experience of diarrhea		
Yes	115	19.2
No	483	80.8
Sources of drinking water		
Safe water	344	57.5
Unsafe water	254	42.5
Toilet facility availability		
Yes	406	67.9
No	192	32.1

Dietary characteristics: Out of the total children participated in the study 354 (59.2%) feed first milk and 350 (58.5%) feed breast milk for less than 12 months. More than half of the children participated in the study (50.2%) start complementary food before six months. About 311(52.2%) of the mother used the bottle to feed their child (Table 3).

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Table 3. Dietary characteristics of children in a pastoral community of Korahay Zone, Somali Regional State, Ethiopia 2016

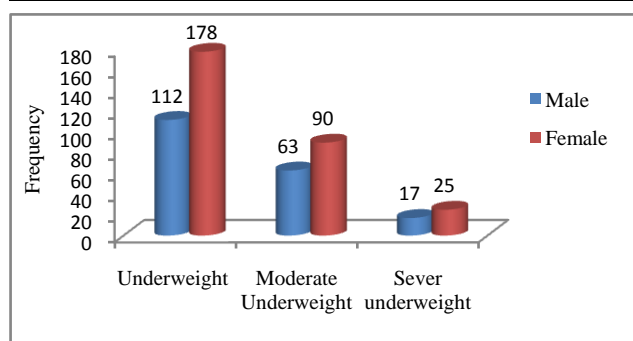| Variable	Frequency	Per cent
Time for initiation of BF		
Within 1 hour	248	41.5
Within 24 hours	350	58.5
A child fed first milk		
Yes	354	59.2
No	244	40.8
Duration of breastfeeding		
Less than 12 months	350	58.5
More than 12 months	248	41.5
Complimentary food started		
At 6 month	144	24.1
Before 6 month	300	50.2
After 6 month	154	25.5
Cup for feeding		
Yes	486	81.3
No	112	18.7
Spoon for feeding		
Yes	23	3.8
No	575	96.2
Hand for feeding		
Yes	95	15.9
No	503	84.1
Bottle for feeding		
Yes	311	52.0
No	287	48.0

Figure 1. Underweight with sex between 6-59 months year old in the pastoral community of Korahay Zone, Ethiopia, 2016
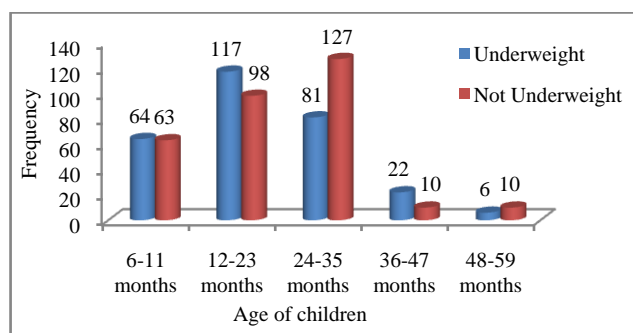

Figure 2. Underweight with age categories 6-59 months year old in the pastoral community of Korahay Zone, Ethiopia, 2016

Magnitudes of underweight among 6-59 months children

In the study, 290 (48.5%), 153 (25.6%), 137 (22.9%) children aged between 6-59 months year old were underweight, moderately underweight and severely underweight respectively (Fig. 1).

Underweight was more prevalent (19.6%) age between 12-23 months year old, followed by (13.55%) age between24-35 months year old (Fig. 2).

Factors associated with underweight:

In the bivariate analysis, child sex, child age, mother occupation, household monthly income, number of ANC visits by the mother, postnatal visits, place of delivery, birth interval of children, toilet availability, time for initiation of breastfeeding, duration of breastfeeding and bottle feeding were found to be significantly associated with childhood underweight. The result from multivariate logistic regression analysis revealed that being male children (AOR: 2.0; 95%CI 1.3, 3.0), children at age category between 12-23 months year old (AOR: 2.0; 95%CI 1.2,3.6), children from government employee mother (AOR: 1.6; 95%CI 1.1, 2.6), children from low household monthly income (AOR: 1.7; 95%CI 1.2, 2.5), children from mother who didn't visit ANC (AOR: 6.2; 95%CI 1.4, 28.1), children with birth interval of less than 24 months (AOR: 2.1; 95%CI 1.3, 3.2) and children who feed breast for less than 12 months (AOR: 1.98; 95%CI 1.30, 3.04) were the predictors of underweight. But postnatal visits by the mother (AOR: 1.3; 95%CI 0.8, 2.1), place of delivery (AOR: 1.1; 95%CI 0.7, 1.8), toilet availability (AOR: 1.6; 95%CI 0.9, 2.6) and bottle feeding (AOR: 1.2; 95%CI 0.8, 1.9) didn't show significant association with underweight (Table 4).

4. Discussion

The prevalence of underweight in the study area was high 48.5% according to the WHO classification standard. This was congruent with previous study reports in different parts of Ethiopia like Dola Ado (47.7%) [8] and west Gojam (49.2%) [13]. However, the findings of this study were higher than the report in south India (22.7%) [19], Iran (9.66%) [20], Rwanda (11.0%) [21], Kenya 18.1% [22] and in the different part of Ethiopia [1, 10]. This might be due to the fact that mothers in food insecure and inaccessible health service areas were at a high risk of getting underweight babies. On the other hand, the prevalence of underweight was lower than the reports in Mangalore (63.16%) [23], Pakistan (54.3%) [24] and India (52.9%) [25]. This might be the difference in the study population.

The result of this study showed that underweight was more prevalent on male children (AOR: 2.0; 95% CI 1.3, 3.0) than female children. This was consistent with the reports in South Africa [26], Rwanda [21] and in the different part of Ethiopia [7, 8, 11]. In contrast, a study conducted in India [25], Nepal [27] and Ethiopia [10]

showed that females were more underweight than males. These discrepancies in finding could be attributed to differences in cultures or traditional norms and gender issues on preferential treatment among opposite sex, parents' educational status and nutritional factors among communities.

Children age 12-23 months were about 1.95 times more likely to be affected by underweight than children age 6-11months (AOR: 2.0;95% CI 1.1, 3.6). It was consistent with previous study done in Mangalore [23] and Ethiopia [1, 6]. Children at this age category start walking on their own and they try to eat what they got in the field, thus increasing their exposure to infections and susceptibility to illness. This tendency, coupled with inappropriate or inadequate feeding practices may contribute to faltering nutritional status.

The current study revealed that household monthly income was a strong predictor of underweight. It was consistent with the study conducted in India [28] and Ethiopia [6, 14].This is not surprising as the household

which has low monthly income can't access different kinds of nutritious food and amounts of food available for consumption.

In the study area mothers who did not visit ANC were 6.21 times more likely to have the underweight child than those who had four and above ANC visits. Other studies conducted in Ethiopia, showed that mothers who did not attend ANC visit were more likely to have the underweight child than their counterpart [13, 15].

This study has been addressed only certain issues related to the underweight status of under-five children and determining covariates because of some limitation: Since the study employ cross-sectional study it is difficult to establish a cause-effect relationship. Important variables like Body Mass Index (BMI) of mother and size of children during birth were not assessed these might have an impact on the result of the study. Qualitative data were not included to explore some associated factors and triangulate the finding of the quantitative data through qualitative data.

Table 4. Factors associated with underweight among children aged between six to fifty-nine months in the pastoral community of Korahay Zone, Somali Regional State, Ethiopia 2016

Variables	Underweight		COR (95% CI)	AOR (95%CI)
	Yes	No		
Sex of child				
Male	112	152	1.6 (1.2, 2.1)	2.0 (1.3, 3.0)**
Female	178	156	1.0	1.0
Children's age in month				
6-11	64	63	1.0	1.0
12-23	117	98	0.9 (0.6, 1.3)	2.0 (1.1,3.6)*
24-35	81	127	1.6 (1.1, 2.5)	1.6 (0.9, 2.9)
36-47	22	10	0.5 (0.2, 1.1)	0.4 (0.2, 1.2)
48-59	6	10	1.7 (0.6, 5.0)	4.0 (0.9, 15.6)
Mother's occupation				
House wife	200	188	1.0	1.0
Government employee	66	98	1.6 (1.1, 2.3)	1.6 (1.1, 2.6)*
Self-employed	24	22	1.0 (0.5, 1.8)	0.7 (0.3, 1.6)
Household monthly income in ETB				
Less than 1,500	125	164	1.5 (1.1, 2.1)	1.7 (1.1, 2.5)*
1,500 and more	165	144	1.0	1.0
No. of ANC visits of mother				
None	35	189	5.4 (1.5, 19.6)	6.2 (1.4, 28.1)*
1	69	51	0.7 (0.2, 2.7)	0.7 (0.2, 3.3)
2-3	181	63	0.4 (0.1, 1.2)	0.3 (0.1, 1.4)
4 and more	5	5	1.0	1.0
Preceding birth interval				
Less than 24 months	146	205	2.0 (1.4, 2.7)	2.1 (1.3, 3.2)*
More than 24 months	144	103	1.0	1.0
Duration of breastfeeding				
Less than 12 months	130	181	1.8 (1.3, 2.4)	2.0 (1.3, 3.0)**
More than 12 months	160	127	1.0	1.0

• *Significant at P<0.05 ** Significant at P ≤ 0.001*

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5. Conclusions

Prevalence of underweight among children age 6-59 months in the study area was found to be high. Sex of children (being male), the age of children (between of 12-23 months years old), government employee mothers, low household monthly income, preceding birth interval within 24 months, breastfeeding less than 12 months and mother not attend antenatal care follows up were predictors of childhood underweight. Educating mothers on the advantage of breastfeeding, birth interval and antenatal care visits can promote the nutritional status of children.

List of Abbreviations

ANC - Antenatal Care, AOR– Adjusted Odd Ratio, PNC - Postnatal Care, SD - Standard Deviation, SPSS - Statistical Package for Social Science, WAZ-Weight-for-Age Z-score, WHO - World Health Organization.

Declarations

Ethical approval and consent to participate

This study was carried out after getting ethical clearance letter from Jig-Jiga University research ethics review committee. Data collection was carried out after receiving an ethical clearance letter from the regional health bureau and administration office. Informed consent was obtained from each study subject after an explanation of why they take part in research. They were also informed participation is volunteer based. Confidentiality has been ensured from all the data collectors, supervisors and investigators side using code numbers than names and keeping questionnaires locked.

ACKNOWLEDGEMENTS

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