Household Food Insecurity and Its Association with Nutritional Status of Children 6–59 Months of Age in Kebridehar City

Ebrahim Hassen Aden, Saleha Abdusamed Mohammed

Department of Human Nutrition, Collage of Dryland Agriculture, Jigjiga University, 1020 - Jigjiga, Ethiopia

*Corresponding author: mahdihassen3@gmail.com

ABSTRACT: Malnutrition, characterized by an imbalance in the intake of calories, proteins, or other nutrients, includes undernutrition and overnutrition. This study aimed to assess the impact of household food insecurity on the nutritional status of children aged 6 to 59 months in Kebridehar town using a community-based cross-sectional approach. The city of Kebridehar was divided into 12 kebeles and the study targeted families with children in the specified age group. A proportional sample of 344 households was randomly selected from each kebele. Data were collected through surveys and analyzed to determine the prevalence of food insecurity and its effects on children's nutrition.
Results: The study revealed significant disparities in food security: 11.6% of households were food secure, while 88.4% were food insecure. Female-headed homes had a lower percentage of impoverished children and the mother's education had a vital influence. Low- and middle-income households had a larger risk of childhood loss than higher-income ones. Smaller families were 15.76 times more likely to suffer food insecurity and homes without health services were 3.27 times higher potential to be food insecure. Children from insecure food families have poorer health outcomes, being 4.95 times more likely to be underweight, 1.30 times more likely to be stunted, and 1.45 times more likely to be wasted.
Conclusion: The study highlights an important problem of food insecurity that affects the health of children. Factors such as the woman's family, the mother's education level, low income and family size are crucial. Urgent interventions are necessary to improve food security and nutritional outcomes, especially for families with low income, less education, and poor sanitation.

Keywords: household food insecurity, household food secure, underweight, stunting, wasting, children

INTRODUCTION

Food insecurity is when individuals do not always have a source of adequate, secure, and nourishing food to satisfy their nutritional needs for an active and healthy life (El Bilbeisi *et al*., 2022). It contributes to all forms of malnutrition, including insufficient, poor quality, and unsustainable food (Das, Hossain, and Nesa 2009; FAO, IFAD, UNICEF, WFP 2019) and remains a major challenge worldwide. Malnutrition is an imbalance in the intake of calories, proteins, or other nutrients and includes undernutrition and overnutrition. Nutritional problems such as stunting, weight loss, and underweight are usually associated with malnutrition. Causes of malnutrition include insufficient food intake, infections, restricted access to nourishment, poor care and feeding practices, inadequate health care, adverse surroundings, and lack of human, financial, bodily, and social assets (Dessie *et al*., 2019). While malnutrition is often the most pressing concern in developing countries, modernization and changes in dietary habits have led to acceleration in overnutrition. In the framework of the World Food

Program (WFP), malnutrition typically refers to undernutrition unless specified otherwise (Betebo *et al*., 2017).

Access to enough nutritious food is needed to achieve international child nutrition guidelines. According to the Global Nutrition Report 2018, only half (51%) of children aged 6 to 23 months globally receive the necessary number of meals each day, and only one in five (16%) receives a minimally appropriate diet (Derso *et al.*, 2021). As a result, the frequency of child malnutrition in developing nations, notably in Sub-Saharan Africa (SSA), continues worrying. SSA is the home of a third of children who are malnourished in the globe, 38.5% of which are short, 25% underweight, and 9% wasted (Berra *et al*., 2020).

During the Millennium Development Goal (MDG) period, in Ethiopia, there has been a significant reduction in the frequency of pregnancy and underweight among children under five. The 2015 deadline for the MDGs has been replaced with the targets for sustainable development

(SDGs), which continue to address similar concerns. The Ethiopian Demographic and Health Survey (EDHS) of 2016 indicated that 38% of children under the age of five were stunted, 10% were wasting and 24% were underweight (Kuse *et al.*, 2023).

Further research utilizing data from the 2019 Ethiopian Demographic and Health Mini Survey indicated that the overall weighted prevalence of stunting, wasting, and underweight among Ethiopian children aged 0-23 months was 27.21%, 7.80%, and 16.44% correspondingly (Sahiledengle *et al*; 2022). Another research that reviewed data from five Ethiopian Demographic and Health Surveys done between 2000 and 2019 indicated that 24% of Ethiopian children were undernourished (Atallel *et al.*, 2022).

Furthermore, a meta-analysis of 18 studies published between 1997 and 2015 found that the combined prevalence of stunting, underweight, and weight loss among Ethiopian children aged 0-5 years was 42.0%, 33.0%, and 33.0%, respectively % (Ahmed *et al.*, 2014).

Household food insecurity (HHFI) contributes significantly to child malnutrition, including undernutrition and overnutrition. The relationship between HHFI and childhood malnutrition has been established in different countries and is influenced by poor socioeconomic conditions and dietary practices (Ortiz-Marrón *et al.*, 2022). However, in Ethiopia, research on the association between food security and the nutritional status of children aged 6 to 59 months has been limited. This research intends to evaluate the association between household food insecurity and the nutritional health of children aged 6 to 59 months in the city of Kebridehar. Given the lack of research on this topic in the Ethiopian context, especially in the city of Kebridehar, this study aims to provide localized data on the prevalence of family food insecurity and its correlation with indicators of malnutrition, such as pregnancy, weight loss, and weight gain in children.

MATERIALS AND METHODS

Kebridehar is a town in the Eastern Somali Regional State. It is about 1011 and 393 kilometers southeast of Addis Ababa and Jigjiga, respectively. Geographically, it is located between the latitude and longitude intervals 6o1550-7 1610N and 43o3710-4403720E, respectively (Teshome *et al.*, 2022).

The average height of the city is 393 meters above sea level. The population of the city of Kebridehar was 136,142 people, according to the Central Statistics Agency of Ethiopia (CSA). Pastoralists make up the majority of the communities' population (36.99%), with urban dwellers accounting for 21.48% (Kebridehar City Environmental Protection Office) (Teshome *et al.*, 2022).

Study Design
A community-based cross-sectional research was done utilizing a quantitative technique in Kebridehar town administration.

Source Population
All children from 6 to 59 months in the city of Kebridehar

Study Population
All mothers and caregivers of children aged 6 to 59 months were randomly selected in the city of Kebridehar.

Eligibility Criteria
Inclusion Criteria
The study included all women with children ages 6 to 59 months residing in Kebridehar who consented to participate.

Exclusion Criteria
All mothers with children aged 6 to 59 months who were mentally ill, severely sick, or incapable of responding were eliminated from the research. All moms who declined to provide informed permission for the interview were eliminated.

RESULTS

Socioeconomic and Demographic Characteristic of Parents in Kabridahar City
This table includes crucial socio-economic and demographic data for parents in Kebridehar city. It highlights significant characteristics such as the head of the home, the mother's age, the parent's education, work, family size, monthly income, and sources of money. In Kebridehar town, male-headed households constitute 55.2% of all households, while female-headed households constitute 44.8%. Most of the mothers (67.7%) are between 26 and 45 years old. The education levels of women vary, with a significant percentage (43.9%) having no formal education, followed by those with primary (25.0%) and secondary or preparatory education (24.4%). In contrast, fathers

Table 1. Socioeconomic and demographic characteristics of parents in Kabridahar city

VARIABLES	CATEGORIES	N	%
head of the household	Male	190	55.2
	Female	154	44.8
	Total	344	100.0
Mother age	>25	108	31.4
	26-45	233	67.7
	>51	3	0.9
	Total	344	100.0
Mother's Educational Level	no education	151	43.9
	Primary	86	25.0
	secondary and preparatory	84	24.4
	University	23	6.7
	Total	344	100.0
father educational level	no education	48	14.0
	Primary	66	19.2
	secondary and preparatory	80	23.3
	University	150	43.6
	Total	344	100.0
mother occupation	house wife	244	70.9
	Merchant	40	11.6
	private organization employee	11	3.2
	government employee	15	4.4
	daily worker	34	9.9
	Total	344	100.0
father occupation	daily worker	53	15.4
	Merchant	112	32.6
	private organization employee	99	28.8
	government employee	80	23.3
	Total	344	100.0
people live in household	1-2 people	121	35.2
	3-4people	109	31.7
	5-6 people	88	25.6
	7 or more people	26	7.6
	Total	344	100.0
monthly income	Low Income	50	14.5
	Medium Income	290	84.3
	High Income	4	1.2
	Total	344	100.0
source income	Employment	136	39.5
	Self-employment	130	37.8
	Remittances from family or friends	78	22.7
	Total	344	100.0

tend to have a higher level of education, with 43.6% having earned a university degree. Most of the mothers (70.9%) are housewives, while others work in various professions. Fathers have various occupations, with a notable proportion (32.6%) engaged in trade as merchants. The sizes of households in the city of Kebridehar vary, with a significant percentage (35.2%) consisting of 1-2 people. Almost all families (84.3%) have an average income, while fewer have a low or high income. The most common sources of income are work (39.5%) and self-employment (37.8%), although some families rely on remittances. (Table 1)

Household Food Insecurity in Kabridahar City, Ethiopia

In the Family Skip Meals domain, 22 people (6.4%) never skipped meals, while 203 people (59.0%) seldom skipped meals, 105 people (30.5%) occasionally skipped meals, and 14 people (4.1%) regularly missed meals. In the Family Run Out of Food category, 37 individuals (10.8%) never experienced food shortages, 119 (34.6%) seldom

Table 2. Household food insecurity in Kabridahar city

VARIABLES	CATEGORIES	N	%
Family Go Hungry	Never	32	9.3
	Rarely	165	48.0
	Sometimes	137	39.8
	Often	10	2.9
	Total	344	100.0
Family Skip Meals	Never	22	6.4
	Rarely	203	59.0
	Sometimes	105	30.5
	Often	14	4.1
	Total	344	100.0
Family Eat Less	Never	26	7.6
	Rarely	206	59.9
	Sometimes	101	29.4
	Often	11	3.2
	Total	344	100.0
Family Run Out of Food	Never	37	10.8
	Rarely	119	34.6
	Sometimes	161	46.8
	Often	27	7.8
	Total	344	100.0
Family Gone to Bed Hungry	0 times	28	8.1
	1-2 times	173	50.3
	3-4 times	108	31.4
	5-6 times	35	10.2
	Total	344	100.0
Family Borrow Food	Never	34	9.9
	Rarely	116	33.7
	Sometimes	155	45.1
	Often	39	11.3
	Total	344	100.0

faced such shortages, 161 (46.8%) occasionally ran out of food, and 27 (7.8%) frequently ran out of food. In the category of Family Borrowing Food, 34 people (9.9%) never had to borrow food, 116 (33.7%) seldom borrowed food, 155 (45.1%) occasionally needed to borrow food, and 39 (11.3%) regularly needed to borrow food (Table 2).

Assessment of Nutritional Status in Children Aged 6 to 59 Months in Kabridahar City
Looking at the frequency of children's meals, the data shows that a significant proportion of them, approximately 28.5% (98 out of 344), receive three meals a day. However, 14.0% (48 of 344) of children did not eat meals, while a smaller percentage, 2.3% (8

of 344), received more than three meals per day. However, 18.9% of children (65 of 344) do not receive animal products. The majority of children, 34.0% (117 of 344), eat fruits and vegetables three to four times per week. The high number of underweight children indicates a significant nutritional problem in this region (Table 3).

The Prevalence Of Nutritional Status And Household Food Insecurity Among Children Aged 6 to 59 Months in Kabridahar City
The table displays the nutritional condition of Kebridehar City children aged 6-59 months, with an emphasis on the prevalence of household food insecurity. According to the findings of the research, in

Table 3. Assessment of nutritional status in children aged 6 to 59 months in Kabridahar city

Variables	Categories	N	%
Sex of Child	Female	118	34.3
	Male	226	65.7
	Total	344	100.0
Children Live in Household	1-2 Children	95	27.6
	3-4 Children	95	27.6
	5 Children	77	22.4
	More Than 5 Children	77	22.4
	Total	344	100.0
Child Frequency Meal	0 Times	48	14.0
	1 Time	118	34.3
	2 Time	72	20.9
	3 Time	98	28.5
	More Than 3 Time	8	2.3
	Total	344	100.0
Child Frequency Animal Product	0 times	65	18.9
	1-2 times	115	33.4
	3-4 times	80	23.3
	5-6 times	84	24.4
	Total	344	100.0
Frequency of Fruits or Vegetables	0 times	42	12.2
	1-2 times	100	29.1
	3-4 times	117	34.0
	5-6 times	51	14.8
	Every Day	34	9.9
	Total	344	100.0
Health Problems	Diarrhea	142	41.3
	Fever	86	25.0
	Cough	105	30.5
	Difficulty Breathing	10	2.9
	None of The Above	1	0.3
	Total	344	100.0
Vaccinations	Yes	240	69.8
	No	27	7.8
	Not Sure	77	22.4
	Total	344	100.0
Underweight	Normal	35	10.2
	Underweight	309	89.8
	Total	344	100.0
Stunting	Normal	112	32.6
	Stunted	232	67.4
	Total	344	100.0
Wasting	Normal	12	3.5
	Wasted	332	96.5
	Total	344	100.0

the context of food security, 11.6% of families were food secure, while 88.4% were food insecure (Table 4).

Exploring the Association between Household Food Insecurity and Nutritional Status in Children Aged 6 to 59 Months in Kabridahar City

The table presents the findings of a logistic regression study to examine the connection between household food insecurity (HHFI) and the nutritional status of children aged 6–59 months in Kebridehar city. The nutritional status of children was measured based on weight, pregnancy, and wasting. Children from food-insecure homes have a considerably higher risk of being underweight and stunted than children who grew up in food-insecure families. Malnourished children were 4.95 times more likely to be undernourished (AOR = 4.95; 95% CI = 0.66; 37.2) and 1.30 times more likely to be stunted (AOR = 1.30; 95% CI = 0). 63, 2.73) compared to children with access to food compared to children with access to food (AOR: 1.45;

Table 4. The prevalence of household food insecurity nutritional status of children aged 6-59 months and in Kebridehar city

VARIABLES	CATEGORIES	N	%
Household Food security status	food secure	40	11.6
	food insecure	304	88.4

Table 5. Exploring the association between household food insecurity and nutritional status in children aged 6 to 59 months in Kabridahar city.

Nutritional status of child	HHFI	No N (%)	Yes N (%)	COR (CI)	P value	AOR(CI)
Underweight	food secure	1(2.5%)	39(97.5%)	1		1
	food insecure	34(11.2%)	270(88.8%)	4.91(0.65, 36.90)**	0.001	4.95(0.66-37.2)**
Stunted	food secure	11(27.5%)	29(72.5%)	1		1
	food insecure	101(33.2%)	203(66.8%)	1.31(0.630, 2.733)**	0.001	1.30(0.63-2.73)**
Wasting	food secure	1(2.5%)	39(97.5%)	1		1
	food insecure	11(3.6%)	293(96.4%)	1.46(.184, 11.652)**	0.001	1.45(0.18-11.57)**

95% CI: 0.18–11.57). Of note, the greater chance of being underweight was statistically significant even after accounting for relevant covariates, suggesting a substantial link between eating disorders and weight in childhood. When these nutritional characteristics are evaluated about the condition of food security, children living in food-insecure homes are more likely to be underweight, stunted, and wasted. These findings underscore the importance of addressing food insecurity as a key factor impacting child nutrition in the study region and suggest greater research and focused interventions to address these discrepancies (Table 5).

Factors Influencing Nutritional Status in Children Aged 6 to 59 Months, Based on Underweight (Weight for Age) Measurements in Kabridahar City

The table presents the results of a logistic regression analysis aimed at identifying the factors associated with the nutritional status of children aged 6 to 59 months in the city of Kebridahar, as measured by weight underweight (body weight relative to the weight for age). The following variables were considered in the analysis: the head of the family, the level of education of the mother and father, the profession of the father, and the gender of the child. The categories of each variable were valid and submitted. Depending on the gender of the head of the household, children in male households were about a third more likely to be underweight than children in male-headed households (AOR = 0.35; 95% CI: 0.16-0.76). According to the educational level of the father, the risk of having low birth weight children was the same for uneducated men for uneducated fathers (AOR = 0.45; 95% CI: 0.09 - 2.0).34). Similarly, men with primary education were as likely to have underweight children as fathers with no education (AOR = 0.35; 95% CI 0.07 to 1.71). Similarly, the probability of having an underweight child is as high among fathers with secondary or preparatory education as among fathers with a low level of education (AOR = 0.47; 95% CI: 0.10-2, 16). Regarding the employment of fathers, journalists are about three times more likely to have children under civil servants, although this difference is not statistically significant (AOR = 2).79; 95% CI: 0.95-8.23). However, salespeople are five times more likely to have children than public sector workers, and this difference is statistically significant (AOR = 5.42; 95% CI: 1.39-21/07). In contrast, employees of commercial organizations are not more likely to have children under those of the public sector (AOR = 2.59; 95% CI: 0.68-9.0).74. Regarding gender, boys are more likely to be underweight than boys (AOR = 2.86; 95% CI: 1.38 to 5.93) (Table 6).

Table 6. Factors Influencing Nutritional Status in Children Aged 6 to 59 Months, Based on Underweight (Weight for Age) Measurements in Kabridahar City

Variables	Categories	WAZ Normal N (%)	Underweight N (%)	COR (CI 95%)	AOR (CI 95%)
head of the household	Male	11(5.8%)	179(94.2%)	1	1
	Female	24(15.6%)	130(84.4%)	0.33(0.16-0 .70)**	0.35(0.16-0.76)**
Educational level of mother	no education	18(11.9%)	133(88.1%)	1.158 (0.49-2.71)**	1.19(0.49, 2.93)**
	Primary	9(10.5%)	77(89.5%)	1.489(0.59-3.73)**	1.41(0.54-3.68)**
	secondary and preparatory	7(8.3%)	77(91.7%)	2.98(0.38-23.45)**	3.01(0.36,25.27)**
	University	1(4.3%)	22(95.7%)	1	1
Educational level of father	no education	2(4.2%)	46(95.8%)	0.44(0.08-2.25)**	0.45(0.09-2.34)**
	Primary	6(9.1%)	60(90.9%)	0.27(0.06-1.29)	0.35(0.07-1.71)
	secondary and preparatory	11(13.8%)	69(86.3%)	0.36(0.08-1.64)	0.47(0.10-2.16)**
	University	16(10.7%)	134(89.3%)	1	1
occupation of father	daily worker	8(15.1%)	45(84.9%)	1.81(0.67-4.89)**	2.79(0.95-8.23)**
	Merchant	10(8.9%)	102(91.1%)	3.34(1.04-10.79)**	5.4(1.39,21.07)**
	private organization employee	5(5.1%)	94(94.9%)	1.01(0.38, 2.66)**	2.59(0.68,-9.74)
	government employee	12(15.0%)	68(85.0%)	1	1
Sex of child	Female	20(16.9%)	98(83.1%)	1	1
	Male	15(6.6%)	211(93.4%)	0.35(0.17, 0.71)**	2.86(1.38, 5.93)

** >0.05p   WAZ (weight for age; underweight)

Factors Influencing Nutritional Status in Children Aged 6 to 59 Months, Based on Stunting (Height for Age) Measurements in Kabridahar City

Regarding the level of education of the mother, it is significant that women without education have a higher risk of giving birth to a child than mothers with a high education [AOR]: 1, 15, 95% CI: 0,59 -2, 19). Regarding the educational level of fathers, it should be noted that fathers without formal education show similar patterns of reduced risk to fathers with higher education (AOR: 0.88, 95% CI: 0.37-2.09). Regarding monthly income, children from low-income families had a slightly higher risk of stunting than children from high-income families (AOR: 1.26, 95% CI: 0.63 -2.51). Regarding the sex of the child, the risk of pregnancy was higher in girls than in boys (AOR: 1.51, 95% CI: 0.93-2.0).43). Regarding the consumption of fruits and vegetables, it is important to note that children who consumed zero fruits and vegetables per day had a significantly higher risk of stunting than children who included them in their daily diet (AOR: 0.68, 95% CI: 0.30 -1.55) (Table 7).

Table 7. Factors influencing nutritional status in children aged 6 to 59 months, based on stunting (height for age) measurements in Kabridahar city

		HAZ			
		Normal	**Stunted**		
Variables	**Categories**	**N (%)**	**N (%)**	**COR(95.0%CI)**	**AOR(95.0%CI)**
Educational level of mother	no education	48(31.8%)	103(68.2%)	1.20(0.67-2.16)**	1.15(0.59-2.19)**
	Primary	24(27.9%)	62(72.1%)	0.76(0.43-1.32)	0.80(0.45-1.42)
	secondary and preparatory	32(38.1%)	52(61.9%)	0.87(0.35-2.20)**	1.03(0.38-2.78)**
	University	8(34.8%)	15(65.2%)	1	1
Educational level of father	no education	14(29.2%)	34(70.8%)	1.02(0.45-2.31)**	0.88(0.37-2.09)**
	Primary	19(28.8%)	47(71.2%)	0.77(0.35-1.66)	0.77(0.35-1.72)
	secondary and preparatory	28(35.0%)	52(65.0%)	0.79(0.39-1.62)	0.81(0.38-1.74)
	University	51(34.0%)	99(66.0%)	1	1
Monthly income	Low income	17(34.0%)	33(66.0%)	1.15(0.61-2.19)**	1.26(0.63- 2.51)**
	medium income	76(30.9%)	170(69.1%)	0.79(0.35-1.79)	0.89(0.37- 2.19)
	high income	19(39.6%)	29(60.4%)	1	1
Sex of child	Female	45(38.1%)	73(61.9%)	1	1
	Male	67(29.6%)	159(70.4%)	1.46(0.92-2.34)**	1.51(0.93-2.43)**
Consumption of fruits or vegetables	0 times	11(26.2%)	31(73%)	2.26(0.85-5.84)**	0.68(0.30-1.55)
	1-2 times	34(34.0%)	66(66.0%)	1.53(0.69-3.38)**	0.75(0.33-1.69)
	3-4 times	36(30.8%)	81(69.2%)	1.78(0.81-3.89)**	0.77(0.31-1.95)
	5-6 times	16(31.4%)	35(68.6%)	1.73(0.70-4.2))**	0.47(0.17-1.26)
	Every day	15(44.1%)	19(55.9%)	1	1

** >0.05p   HAZ (height for age; stunting)

Factors Influencing Nutritional Status in Children Aged 6 to 59 Months, Based on Wasting (Weight for Height) Measurements in Kabridahar City

In terms of gender, men had a 1.95 times higher risk of wasting compared to women, with an adjusted odds ratio (AOR) of 1.953 (95% CI: 0.59–6.49). When considering monthly income, children from low-income families were 1.38 times more likely to experience wasting (AOR = 1.38; 95% CI: 0.26–7.37), while children from middle-income families were 2.58 times more likely to be wasted (AOR = 2.58; 95% CI: 0.20–32.97), both of which were statistically significant when compared to children from higher-income families. Regarding access to healthcare services, children without access were 55% less likely to suffer from wasting, as reflected by an AOR of 0.55 (95% CI: 0.08–3.73), a statistically significant difference as well (see Table 8).

Factors Contributing to Household Food Insecurity in Kebridehar City

The table below lists the factors that contribute to household food insecurity in Kebridehar town. Variables include current employment, clean water,

Table 8. Factors influencing nutritional status in children aged 6 to 59 months, based on wasting (weight for height) measurements in Kabridahar city

| Variables | Categories | WHZ | | COR(95%CI) | AOR(95%CI) |
		Normal	Wasted		
sex of child	Female	6(5.1%)	112(94.9%)	1	1
	Male	6(2.7%)	220(97.3%)	1.96(0.62-6.23)	1.953(0.59-6.49)**
Monthly income	Low income	2(4.0%)	48(96.0%)	1.09(0.23-5.24)**	1.38(0.26-7.37)**
	medium income	9(3.7%)	237(96.3%)	1.96(0.17-22.33)**	2.58(.20-32.97)**
	high income	1(2.1%)	47(97.9%)	1	1
clean drinking water	Yes	2(2.3%)	84(97.7%)	1	1
	No	10(3.9%)	248(96.1%)	0.59(.127-2.749)**	0.93(0.15-5.82)**
sanitation facilities	Yes	2(2.1%)	95(97.9%)	1	1
	No	10(4.0%)	237(96.0%)	0.49(0.11-2.32)**	0.55(.080-3.73)**
Vaccinations	Yes	8(3.3%)	232(96.7%)	1	1
	No	1(3.7%)	26(96.3)	1.18(0.30-4.55)**	0.73(0.08-6.64)**
	Not sure	3(3.9%)	74(96.1%)	1.05(0.11-10.59)**	0.79(0.193-0.42)**

** >0.05p   WHZ (weight for height; wasting)

sanitation, and monthly income. Food security and food insecurity are two categories of household food insecurity status. In the context of family size, families with 1 to 2 people have a 15.76 times higher risk of food insecurity than food security families (AOR = 15.76); CI = 0.69-36.34). In terms of access to water, families who do not have access to sanitation were 3.27 times more likely to experience food insecurity than households with access (AOR = 3).27; CI = 1.24-8.65). Low-income households were 0.78 times less likely to be food insecure than high-income households, as indicated by an AOR of 0.78 (CI = 0.26-2.36) (Table 9).

DISCUSSION

Assessing the Prevalence of Household Food Insecurity in Kabridahar City

The results of the study, in the context of food security, show that 11.6% of families were food secure, while 88.4% were food insecure. The current study was contradicted by a study conducted by the United States Department of Agriculture (USDA) which found that 88.4% of households in the United States were food

insecure while 11.6% were food insecure (Coleman-Jensen *et al*., 2024).This difference may be due to socioeconomic factors such as family income On the other hand, a previous study carried out in Oromia found that 69% of families were classified as food insecure (had insufficient access to adequate food), with a mean score (SD) of family food access of 7.9 (7.7) (Berra *et al*., 2020).

Exploring the Relationship Between Household Food Insecurity and Nutritional Status in Children Aged 6 to 59 Months in Kabridahar City

The study assessed the nutritional status of children, focusing on weight, pregnancy, and frailty. Children living in food-insecure households have a significantly higher risk of being underweight and stunted than those living in food-secure households. In particular, food-insecure children were almost five times more likely to be underweight (AOR = 4.95; 95% CI = 0.66, 37.2) and about 1.3 times more likely to be stunted (AOR = 1.30; 95% CI = 0.63, 2.73) ca. their food safe counterparts. These results are consistent with a previous study in Southern Ethiopia, which also observed that children living in food-insecure families have a significantly higher probability of being undernourished (AOR = 3.82;

Table 9. Factors contributing to household food insecurity in kebridehar city

		Household food insecurity status			
		Food secure	Food insecure		
Variables	**Categories**	**N (%)**	**N (%)**	**COR(95.0%CI)**	**AOR(95.0%CI)**
currently employed	None	1(50.0%)	1(50.0%)	1	1
	1-2 members	17(13.9%)	105(86.1%)	6.176(0.37-10.49)**	15.76(0.69-36.34)**
	3-4 members	12(10.9%	98(89.1%)	8.17(0.48-14.21)**	11.92(0.53-27.57)**
	More than 4 members	10(9.1%)	100(90.9%)	10.00(0.58-17.36)**	10.70(0.48-24.37)**
clean drinking water	Yes	22(25.6%)	64(74.4%)	1	1
	No	18(7.0%)	240(93.0%)	4.58(2.32-9.06)**	3.270(1.24-8.65)**
Sanitation facilities	Yes	22(22.7%)	75(77.3%)	1	1
	No	18(7.3%)	229(92.7%)	3.73(1.90-7.33)	2.378(0.90-6.26)**
Monthly income	Low income	5(10.0%)	45(90.0%)	1.13(0.41-3.15)	0.78(0.26-2.36)**
	Medium income	22(8.9%)	224(91.1%)	0.29(0.97-0.92)	0.23(0.07-0.77)
	high income	13(27.1%)	35(72.9%)	1	1

CI = 1.78, 8.19) and suffer from delayed growth. AOR = 6.7; CI = 3.71, 12.1) compared to those living in families in a food security situation (Betebo *et al*., 2017).

Furthermore, children from food-insecure families were 1.45 times more likely to be wasted, although the confidence interval was wide (AOR: 1.45; 95% CI: 0.18-11.57). This result reflects the results of a previous study by Leung *et al*. in 2020, which also reported a 1.45 times higher probability of experiencing loss among children from food-insecure families. These findings highlight the psychological distress faced by children living in food-insecure families and their coping strategies. Another study by Althumiri *et al*. in 2021 also reported that food waste tends to be more prevalent in households with mild and moderate food insecurity.

Factors Influencing Nutritional Status in Children Aged 6 to 59 Months, Based on Underweight (Weight for Age) Measurements
Regarding the gender of the head of the family, children in families headed by a woman are about a third less likely to be underweight than those in families headed by a woman (AOR = 0.35; 95% CI: 0.16–0.76). Similarly, a

study in northern Ethiopia found higher proportions of stunted and underweight preschool children in female-headed households than in male-headed ones (Haidar *et al*., 2009). Based on fathers' employment, day laborers are about three times more likely to have children than of civil servants (AOR = 2.79; 95% CI: 0.95-8.23). A study conducted in the Chitwan district of Nepal confirmed this result and found that children whose fathers were workers had a higher risk of being undertreated than children whose fathers worked in the health sector (Sidgel *et al*., 2020). Similarly, a study conducted in the Gondar region of southern Ethiopia among 314 school-aged children found that the father's occupation had a significant impact on the incidence of underweight. Children whose fathers were civil servants had a higher risk of being subjected to children whose fathers were civil servants (Yisak *et al*., 2021). The situation in the rural province of Zambezia in Mozambique reflects these findings. Children whose father was a civil servant have a higher risk of being subjected to children whose father was a civil servant. In addition, the study identified several family and individual factors associated with malnutrition,

suggesting the need for comprehensive interventions to reduce malnutrition among children under five (Palinkas *et al*., 2016).

In terms of maternal education, the risk of having a delayed child was higher among mothers with no schooling than among mothers with secondary education (AOR = 1.15, 95% CI: 0.59–2, 19) (Azizah *et al*., 2022). In Nairobi, stunting was also significantly associated with maternal education, with the risk of stunting 29% higher among mothers with no or little secondary education than among mothers with at least some tertiary education (Abuya *et al* ., 2012). Another study conducted in Indonesia also found a significant association between maternal education and child pregnancy (Rahayuwati *et al*., 2023), as did a study in the province of North Sumatra (Handayani *et al*., 2017). Monthly income played a role, with children from low-income families having a slightly higher risk of stunting (AOR: 1.26, 95% CI: 0.63-2.51). This result is consistent with a study in Ethiopia, which showed that low-income families had a higher probability of stunting in their children (Ahmad *et al*., 2020). In addition, an Indonesian study found that 60% of stunted children come from low-income families (Rahma *et al*., 2022). A study from India also highlighted the importance of family wealth in predicting stunting (Kishore *et al*., 2022).

Regarding the child's gender, boys had a higher risk of delayed growth than girls (AOR: 1.51, 95% CI: 0.93-2.43). This observation was confirmed by several studies, including one conducted in Ethiopia (Samuel *et al*., 2022) and a larger study showing that pregnancy was more common among boys in some contexts (Thurstans *et al*., 2024). Regarding gender and spending, men were 1.953 times more likely to be wasted than women (AOR: 1.953, 95% CI: 0.59-6.49), under the results from Ethiopia (Samuel *et al*., 2022 and Thurstans *et al*., 2024) and previous research showing that boys were more likely to suffer loss in different age groups. In addition, monthly income was associated with wasting, with children from families with low income 1.38 times more likely to be wasted (AOR = 1.38; 95% CI: 0.26-7, 37), and those of families with an average income was 2.58 times. more likely (AOR = 2.58; 95% CI: 0.20 32.97), compared to children from high-income families. This trend was consistent with a study conducted in Pakistan (Siddiqa *et al*., 2023). and research in 35 low- and middle-income countries (Li *et al*., 2020). In addition, a study in Pakistan found that children whose mothers did not receive an education were more likely to suffer loss (Khan *et al*., 2019).

Factors Contributing To Household Food Insecurity
In terms of family size, one- and two-person families were 15.76 times more likely to be food insecure than food-secure families (AOR = 15.76; IC = 0.69-36.34). A cross-sectional study conducted in rural Malaysia also identified significant risk factors for household food insecurity, including household size, total monthly income, per capita income, and food expenditure (Ihab *et al*., 2013). Regarding access to sanitation, households without access to sanitation were 3.27 times more likely to experience food insecurity than families with access to it (AOR = 3.27; CI = 1.24-8).65). A related study on household food insecurity and limited food availability, which included factors such as consumption of less than 50 liters of water per person per day and untreated drinking water, has found a negative impact on composite mental health outcomes (MCS). < 0.05), with water consumption a modifier of the relationship between family food insecurity (Vuong *et al*., 2022). A study conducted in Bangladesh also found that poor hygiene is associated with child morbidity (Islam *et al*., 2022). Both studies highlight the negative impact of inadequate access to water, sanitation, and hygiene (WASH) on food security and health. Low-income households were 0.78 times less likely to achieve food security than high-income households, as indicated by an AOR of 0.78 (CI = 0.26–2.36). A study conducted in the United States found that food insecurity is associated with a higher risk of nonalcoholic fatty liver disease in low-income adults (Golovaty *et al*., 2020). This study particularly highlighted the significant link between low income and food insecurity.

Strengths
The study had no missing data, ensuring that the analysis was based on a complete dataset. The target sample size was achieved within the planned timeframe, indicating efficient study execution. The homogeneity of study participants reduced variability and potential confounding factors related to population diversity.

Limitations
The study did not use randomization or control groups. There was no blinding, so participants and/or researchers were aware of the group assignments. Additionally, the study was conducted at a single center with a limited sample size.

CONCLUSION

The results of the study highlight a worrying situation regarding food security, where a significant majority of families are food insecure. However, maternal education plays an important role, since children of uneducated mothers are at greater risk of stunting. Income level also plays a role: low-income families are more likely to have frail children than high-income families. The study also highlights the negative consequences of food insecurity on health. Children from food-insecure families are at a significantly higher risk of being underweight, delayed, and wasting than children from food-insecure families. These findings highlight the urgent need for interventions and measures to improve food security, especially in low-income, less-educated households with limited access to health facilities, to mitigate the negative impact on health and child welfare.

ACKNOWLEDGEMENT

REFERENCES

A. Ahmad, S. Madanijah, C. M. Dwiriani, and R. Kolopaking, "Effect of nutrition education and multi-nutrient biscuit interventions on nutritional and iron status: A cluster randomized control trial on undernourished children aged 6–23 months in Aceh, Indonesia," *J. Nutr. Sci. Vitaminol. (Tokyo).*, vol. 66, pp. S380–S390, 2020, doi: 10.3177/jnsv.66.S380.

A. M. Azizah, I. Nurmala, and S. R. Devy, "The Effect of Mother's Educational Level and Stunting Incidence on Toddler: A Meta-analysis Meta Analisis: Pengaruh Tingkat Pendidikan Ibu terhadap Kejadian Stunting pada Anak Balita," *Amerta Nutr.*, vol. 6, no. 4, pp. 369–375, 2022, doi: 10.20473/amnt.v6i4.2022.369-375.

A. Of, T. H. E. Nutritional, S. Of, T. Hospital, and A. Province, "World Journal of Pharmaceutical Research," vol. 10, no. 5, pp. 47–59, 2021, doi: 10.20959/wjpr20215-

A. W. FAO, IFAD, UNICEF, WFP, FAO, IFAD, UNICEF, WFP and WHO. *(2019). The state and food security and nutrition in the world 2019. Safeguarding against economic slowdowns and downturns. Rome: FAO.* 2019.

Abdulahi, A., Shab-Bidar, S., Rezaei, S., & Djafarian, K. (2017). Nutritional Status of Under Five Children in Ethiopia: A Systematic Review and Meta-Analysis. *Ethiopian journal of health sciences*, 27(2), 175–188. https://doi.org/10.4314/ejhs.v27i2.10

Ali, D., Saha, K. K., Nguyen, P. H., Diressie, M. T., Ruel, M. T., Menon, P., & Rawat, R. (2013). Household food insecurity is associated with higher child undernutrition in Bangladesh, Ethiopia, and Vietnam, but the effect is not mediated by child dietary diversity. *The Journal of nutrition*, 143(12), 2015–2021. https://doi.org/10.3945/jn.113.175182

Althumiri, N. A., Basyouni, M. H., Duhaim, A. F., AlMousa, N., AlJuwaysim, M. F., & BinDhim, N. F. (2021). Understanding Food Waste, Food Insecurity, and the Gap between the Two: A Nationwide Cross-Sectional Study in Saudi Arabia. *Foods (Basel, Switzerland)*, 10(3), 681. https://doi.org/10.3390/foods10030681

Atalell, K. A., Alemu, T. G., & Wubneh, C. A. (2022). Mapping underweight in children using data from the five Ethiopia Demographic and Health Survey data conducted between 2000 and 2019: A geospatial analysis using the Bayesian framework. *Frontiers in nutrition*, 9,

B. A. Abuya, J. Ciera, and E. Kimani-Murage, "Effect of mother's education on child's nutritional status in the slums of Nairobi," *BMC Pediatr.*, vol. 12, no. 1998, 2012, doi: 10.1186/1471-2431-12-80.

Berra W. G. (2020). Household Food Insecurity Predicts Childhood Undernutrition: A Cross-Sectional Study in West Oromia (Ethiopia). *Journal of environmental and public health*, 2020, 5871980. https://doi.org/10.1155/2020/5871980K. A. Kuse and D. D. Debeko, (2023). Spatial distribution and determinants of stunting, wasting and underweight in children under-five in Ethiopia. *BMC Public Health*, vol. 23, no. 1, pp. 1–17. doi: 10.1186/s12889-023-15488-z.

Betebo, B., Ejajo, T., Alemseged, F., & Massa, D. (2017). Household Food Insecurity and Its Association with Nutritional Status of Children 6-59 Months of Age in East Badawacho District, South Ethiopia. *Journal of environmental and public health*, 2017, 6373595. https://doi.org/10.1155/2017/6373595

Coleman-Jensen, A., Rabbitt, M. P., Gregory, C. A., Singh, A., & Economic Research Service. (2022). *Household food security in the United States in 2021* (No. 309). Economic Research Service. https://www.ers.usda.gov/webdocs/publications/104656/err-309.pdf?v=2807.8

Das, S., Hossain, M. Z., & Nesa, M. K. (2009). Levels and trends in child malnutrition in Bangladesh. *Asia-Pacific Population Journal*, 24(2), 51-78. https://doi.org/10.18356/6ef1e09a-en

Derso, A., Bizuneh, H., Keleb, A., Ademas, A., & Adane, M. (2021). Food insecurity status and determinants among Urban Productive Safety Net Program beneficiary households in Addis Ababa, Ethiopia. *PLoS ONE*, *16*(9), e0256634. https://doi.org/10.1371/journal.pone.0256634

Dessie, Z. B., Fentie, M., Abebe, Z., Ayele, T. A., & Muchie, K. F. (2019). Maternal characteristics and nutritional status among 6-59 months of children in Ethiopia: further analysis of demographic and health survey. *BMC pediatrics*, *19*(1), 83. https://doi.org/10.1186/s12887-019-1459-x

El Bilbeisi, A. H., Al-Jawaldeh, A., Albelbeisi, A., Abuzerr, S., Elmadfa, I., & Nasreddine, L. (2022). Association of Household Food Insecurity With Dietary Intakes and Nutrition-Related Knowledge, Attitudes, and Practices Among School-Aged Children in Gaza Strip, Palestine. *Frontiers in nutrition*, *9*, 890850. https://doi.org/10.3389/fnut.2022.890850

F. Handayani, A. Siagian, and E. Y. Aritonang, "Mother's Education as A Determinant of Stunting among Children of Age 24 to 59 Months in North Sumatera Province of Indonesia," *IOSR J. Humanit. Soc. Sci.*, vol. 22, no. 06, pp. 58–64, 2017, doi: 10.9790/0837-2206095864.

Golovaty, I., Tien, P. C., Price, J. C., Sheira, L., Seligman, H., & Weiser, S. D. (2020). Food Insecurity May Be an Independent Risk Factor Associated with Nonalcoholic Fatty Liver Disease among Low-Income Adults in the United States. *The Journal of nutrition*, *150*(1), 91–98. https://doi.org/10.1093/jn/nxz212

H. Yisak, M. Tadege, B. Ambaw, and A. Ewunetei, "Prevalence and Determinants of Stunting, Wasting, and Underweight Among School-Age Children Aged 6–12 Years in South Gondar Zone, Ethiopia," *Pediatr. Heal. Med. Ther.*, vol. Volume 12, pp. 23–33, 2021, doi: 10.2147/phmt.s287815.

Haidar, Jemal & Wambui, Kogi-Makau. (2009). Gender Differences In The Household-Headship And Nutritional Status Of Pre-School Children. East African medical journal. 86. 69-73. 10.4314/eamj.v86i2.46936.

I. M. Rahma and M. Mutalazimah, "Correlation between Family Income and Stunting among Toddlers in Indonesia: A Critical Review," *Proc. Int. Conf. Heal. Well-Being (ICHWB 2021)*, vol. 49, no. Ichwb 2021, pp. 78–86, 2022, doi: 10.2991/ahsr.k.220403.011.

Ihabi, A. N., Rohana, A. J., Wan Manan, W. M., Wan Suriati, W. N., Zalilah, M. S., & Rusli, A. M. (2013). Nutritional outcomes related to household food insecurity among mothers in rural Malaysia. *Journal of health, population, and nutrition*, *31*(4), 480–489. https://doi.org/10.3329/jhpn.v31i4.20031

Islam, M. A., Rahman, M., Uddin, M. F., Tariqujjaman, M., Karmakar, G., Rahman, M. A., Kelly, M., Gray, D., Ahmed, T., & Sarma, H. (2022). Household food insecurity and unimproved toilet facilities associate with child morbidity: evidence from a cross-sectional study in Bangladesh. *BMC Public Health*, *22*(1), Article 1075. https://doi.org/10.1186/s12889-022-13469-2

Khan, S., Zaheer, S., & Safdar, N. F. (2019). Determinants of stunting, underweight and wasting among children < 5 years of age: evidence from 2012-2013 Pakistan demographic and health survey. *BMC public health*, *19*(1), 358. https://doi.org/10.1186/s12889-019-6688-2

Kishore, S., Thomas, T., Sachdev, H., Kurpad, A. V., & Webb, P. (2022). Modeling the potential impacts of improved monthly income on child stunting in India: a subnational geospatial perspective. *BMJ open*, *12*(4), e055098. https://doi.org/10.1136/bmjopen-2021-055098

L. Palinkas, S. Horwitz, and C. Green, "乳鼠心肌提取 HHS Public Access," *Physiol. Behav.*, vol. 176, no. 1, pp. 139–148, 2016.

L. Rahayuwati *et al.*, "Exploring the relationship between maternal education, parenting practice, and stunting among children under five: Findings from a cross-sectional study in Indonesia," *F1000Research*, vol. 12, p. 722, 2023, doi: 10.12688/f1000research.133916.1.

Leung, C. W., Stewart, A. L., Portela-Parra, E. T., Adler, N. E., Laraia, B. A., & Epel, E. S. (2020). Understanding the Psychological Distress of Food Insecurity: A Qualitative Study of Children's Experiences and Related Coping Strategies. *Journal of the Academy of Nutrition and Dietetics*, *120*(3), 395–403. https://doi.org/10.1016/j.jand.2019.10.012

Li, Z., Kim, R., Vollmer, S., & Subramanian, S. V. (2020). Factors Associated With Child Stunting, Wasting, and Underweight in 35 Low- and Middle-Income Countries. *JAMA network open*, *3*(4), e203386. https://doi.org/10.1001/jamanetworkopen.2020.3386

Mulu, E., & Mengistie, B. (2017). Household food insecurity and its association with nutritional status of under five children in Sekela District, Western Ethiopia: a comparative cross-sectional study. *BMC nutrition*, *3*, 35. https://doi.org/10.1186/s40795-017-0149-z

Myatt, M., Khara, T., Schoenbuchner, S., Pietzsch, S., Dolan, C., Lelijveld, N., & Briend, A. (2018). Children who

are both wasted and stunted are also underweight and have a high risk of death: a descriptive epidemiology of multiple anthropometric deficits using data from 51 countries. *Archives of public health = Archives belges de sante publique*, *76*, 28. https://doi.org/10.1186/s13690-018-0277-1

Ortiz-Marrón, H., Ortiz-Pinto, M. A., Urtasun Lanza, M., Cabañas Pujadas, G., Valero Del Pino, V., Belmonte Cortés, S., Gómez Gascón, T., & Ordobás Gavín, M. (2022). Household food insecurity and its association with overweight and obesity in children aged 2 to 14 years. *BMC public health*, *22*(1), 1930. https://doi.org/10.1186/s12889-022-14308-0

S. Thurstans *et al.*, "Understanding Sex Differences in Childhood Undernutrition: A Narrative Review," *Nutrients*, vol. 14, no. 5, pp. 1–15, 2022, doi: 10.3390/nu14050948.

Sahiledengle, B., Mwanri, L., Petrucka, P., Kumie, A., Beressa, G., Atlaw, D., Tekalegn, Y., Zenbaba, D., Desta, F., Teferu, Z., Wordofa, D., Seyoum, K., Gomora, D., Negash, G., & Agho, K. E. (2022). Determinants of undernutrition among young children in Ethiopia. *Scientific reports*, *12*(1), 20945. https://doi.org/10.1038/s41598-022-25160-y

Samuel, A., Osendarp, S. J. M., Feskens, E. J. M., Lelisa, A., Adish, A., Kebede, A., & Brouwer, I. D. (2022). Gender differences in nutritional status and determinants among infants (6-11 m): a cross-sectional study in two regions in Ethiopia. *BMC public health*, *22*(1), 401. https://doi.org/10.1186/s12889-022-12772-2

Shuvo, S. D., Hossain, M. S., Riazuddin, M., Mazumdar, S., & Roy, D. (2022). Factors influencing low-income households' food insecurity in Bangladesh during the COVID-19 lockdown. *PloS one*, *17*(5), e0267488. https://doi.org/10.1371/journal.pone.0267488

Siddiqa, M., Shah, G. H., Mayo-Gamble, T. L., & Zubair, A. (2023). Determinants of Child Stunting, Wasting, and Underweight: Evidence from 2017 to 2018 Pakistan Demographic and Health Survey. *Journal of nutrition and metabolism*, *2023*, 2845133. https://doi.org/10.1155/2023/2845133

Sigdel, A., Sapkota, H., Thapa, S., Bista, A., & Rana, A. (2020). Maternal risk factors for underweight among children under-five in a resource limited setting: A community based case control study. *PloS one*, *15*(5), e0233060. https://doi.org/10.1371/journal.pone.0233060

Teshome, Z. T., Ayele, Z. T., & Abib, M. I. (2022). Assessment of solid waste management practices in Kebridehar city Somali regional state, Ethiopia. *Heliyon*, *8*(9), e10451.

https://doi.org/10.1016/j.heliyon.2022.e10451

The State of Food Security and Nutrition in the World 2019. (2019). In FAO eBooks. https://doi.org/10.4060/ca5162en

Vuong, T. N., Dang, C. V., Toze, S., Jagals, P., Gallegos, D., & Gatton, M. L. (2022). Household water and food insecurity negatively impacts self-reported physical and mental health in the Vietnamese Mekong Delta. *PloS one*, *17*(5), e0267344.