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Coexistence of Stunting and Wasting, and Associated Factors among Under-Five Children in Bahir Dar Town, North West Ethiopia: 2024

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Research Article

Keywords: Coexistence of wasting and Stunting, associated factors, under-five children, Bahir Dar city, Ethiopia

Posted Date: November 6th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11385264/v1

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Additional Declarations: No competing interests reported.

Abstract

Introduction:

The coexistence of wasting and stunting is defined as the simultaneous presence of both conditions in the same child. However, this phenomenon has not been well documented among children under five years of age. Therefore, this study was conducted to assess the coexistence of stunting and wasting, and associated factors in children under five in Bahir Dar town, North-western Ethiopia, from May to June 2024.

Methods

A community-based cross-sectional study was conducted among 385 children under five years of age selected systematically in Bahir Dar town. SPSS version 20.0 was used to analyze the data. Bivariate and multivariable logistic regression analyses were employed to identify factors associated with the coexistence of stunting and wasting at a p-value of < 0.05 and 95% confidence level.

Results

The prevalence of the coexistence of wasting and stunting (WaSt) was 5.4% (95% CI: 3.0–7.8). Counselling on complementary food (AOR = 6.7, 95% CI = 1.1–41.3, P = 0.045); sanitation practices (AOR = 0.004, 95% CI = 0.00-0.559, p = 0.029); family size (AOR = 5.6, 95%CI = 5.1–6.2, P = 0.035); mother's education level (AOR = 3.04, 95%CI = 1.1–8.7, P = 0.045); and birth order AOR = 0.12, 95%CI = 0.02–0.75, P = 0.049) were the identified associated factors for coexistence WaSt among under five children.

Conclusion

Prevalence of concurrent WaSt was below ten per cent. Counselling on complementary food, family size, mother education, sanitation and birth order were found to be significant determinants. Accordingly, nutrition education, family planning, parental empowerment and improved sanitation interventions are recommended.

INTRODUCTION

Malnutrition, particularly wasting and stunting, remains a major public health problem, affecting an estimated 42.8 million (6.6%) children with wasting and 150.2 million (23.2%) children with stunting worldwide among those under five years of age in 2024. The majority of children suffering from wasting and stunting live in Africa and Asia [1]. Stunting is defined as a height-for-age Z-score (HAZ) < − 2 SD and reflects chronic undernutrition, leading to long-term, often irreversible physical and cognitive impairments that may persist across the life course and extend to subsequent generations[1–4]. Wasting is defined as a weight-for-height Z-score (WHZ) < − 2 SD and/or bilateral pitting oedema and indicates acute undernutrition, which is associated with a substantially increased risk of long-term developmental delays and mortality of the child [2, 4]

In Ethiopia, stunting and wasting are widely used indicators of undernutrition among children under five[5]. Both conditions remain significant public health concerns, affecting approximately 39% and 11% of children, respectively. Marked regional disparities exist: stunting is most prevalent in Afar (42%), Oromia (41%), Amhara (40%), and SNNP (40%), while wasting is highest in Afar (26%), Somali (17%), Amhara (15%), Gambela (15%), and Dire Dawa (14%) [6].

Numerous studies from Ethiopia reported that children under five are vulnerable to malnutrition especially stunting and wasting due to multiple interrelated factors, Some of these factors including food insecurity, high family size, unequal household food distribution, limited access to clean water and sanitation, recurrent infections, lack of maternal access to a health facility, low maternal education, and inadequate childcare and feeding practices [6–11].

Children may experience multiple forms of undernutrition simultaneously, particularly the concurrent presence of wasting and stunting. The coexistence of wasting and stunting (WaSt) is defined as the simultaneous presence of both conditions in the same child within the same child [8, 12]. Wasting and stunting share common underlying factors and are closely linked, with each increasing the risk of developing the other; wasting may heighten the risk of stunting, while stunting can also predispose children to wasting. A recent systematic review underscores this close association, indicating that episodes of wasting substantially contribute to the development of stunting, whereas the effect of stunting on wasting is relatively weaker [13–15]. Most importantly, children who are both stunted and wasted have a significantly higher chance of dying than children who only have one of the conditions [12–16]. For instance, children with WaSt face a substantially higher risk of mortality, being up to 12 times more likely to die than children who are only stunted or wasted [13], and at greater risk than those who are severely wasted (WHZ < − 3) [12].

Only a limited number of primary studies have investigated the prevalence and associated factors of WaSt in Ethiopia, reporting prevalence estimates of 5.8% in Kerssa district and 4.7% in other settings. To the best of our knowledge, no study has specifically assessed the prevalence and determinants of the coexistence of stunting and wasting among under-five children in Bahir Dar town. Therefore, this study aimed to assess the coexistence of stunting and wasting and its associated factors among children under five in Bahir Dar town, northwest Ethiopia.

In Ethiopia, despite the substantial burden of stunting and wasting and the possibility that children may experience both conditions concurrently (WaSt), the relationship between these forms of undernutrition has not been adequately explored among children under five. Most existing studies in Ethiopia, including those conducted in Bahir Dar, have examined stunting and wasting separately and primarily reported their individual prevalence [5, 17, 18]. Only a limited number of primary studies have investigated the prevalence and associated factors of WaSt in Ethiopia, reporting prevalence estimates of 5.8% in Kerssa district, [19], and 4.7% in other settings 4.7% [15]. Given that Ethiopia’s substantial diversity in socio-economic conditions, dietary practices, urbanization, access to health services, and environmental contexts, the determinants of WaSt are likely to vary across localities. Consequently, findings from other regions cannot be directly generalized to Bahir Dar. Thus, generating local evidence on the prevalence and associated factors of coexistence of WaSt among under-five children in Bahir Dar is essential to inform context-specific interventions, improve targeting of nutrition programs, and support evidence-based policy and planning.

METHODS AND MATERIALS

Study area and period

The study was conducted in Bahir Dar town, north Gojjam, Amhara region, northwest Ethiopia. The city is the center of the Amhara region and is located approximately 564 kilometres northwest of Addis Ababa, the capital of Ethiopia. Bahir Dar is one of the leading tourist destinations in Ethiopia, with a variety of attractions in the nearby Lake Tana and Blue Nile River. The city is located at an elevation of approximately 1820 m above sea level, with geographic coordinates of 11 0 36' N and 37° 25' E[20]. This study was conducted from May to June, 2024.

Study design and population

Community based cross-sectional study design was used. The source populations were all under five children permanently living in Bahir Dar town. Whereas, the study population were selected under five children who residing from the selected kebeles of Bahir Dar town.

Selection criteria

All children under the age of five who had lived permanently in Bahir Dar town for at least six months were included in the study. Children with physical deformities, those whose mothers or caretakers were seriously ill and/or had difficulty communicating, and mothers who were unable to respond were excluded from the study.

Eligibility criteria: All children aged 6–59 months who had been permanent residents of Bahir Dar town for at least six months were eligible for inclusion in the study. Children with obvious physical deformities and those whose mothers or primary caregivers were seriously ill or had difficulty communicating were excluded.

Sample size determination: The required sample size was determined by using the single population proportion formula (n = (Zα/2)2 P (1-P)/ d2). Where: n = the number of under-five children; Z = Critical value at 95% confidence interval (1.96); P = proportion of coexistence of Wasting and Stunting (WaSt) (5.8%) [19]; d=Margin of error (3%); design effect of 1.5 and non-response rate of 10% were taken. Accordingly, the final sample size was 385 under five children.

Sampling procedure

A multistage sampling technique was used to select the study participants. In the first, six kebeles were selected from the 27 kebeles of Bahir Dar town randomly. In the second stage, children were selected systematically from the selected six kebeles. The calculated sample size 385 of under five were proportionally allocated to the selected kebeles. The health extension workers registration book was used to know the number and the households with children under five at each kebele. The k value was calculated by dividing the total sample size by the number of children living in the selected kebeles, which resulted in a value of 2. Accordingly, the first household with an under-five child was selected randomly, and then every second household (k = 2) was included in the sample. When a household had two or more children under five, one child was selected at random (Fig. 1).

Variables

Dependent variables were coexistence of stunting and wasting on a child. The independent variables include

- **Child characteristic**: sex of child, age of child, birth order index of child, child feeding practice and preceding illness in the past 2 weeks.
- **Maternal and household characteristics**: educational status and occupation of mother and father, marital status, head of household, age of mother, family size, religion of the family, mother's exposure to media/Information, wealth index, source of drinking water, type of toilet, sanitation practices and number of children less than five years.
- **Health services and counselling variables**: Antenatal care, postnatal care services, counselling on complementary feeding, cooking demonstration training and vitamin A supplementation.

Operational Definitions: Wasting: the weight-for-height z score < − 2 SD in relation to the reference population. Stunting: the height-for-age-z-score < − 2 SD in relation to the reference population[2, 21]. Coexistence of stunting and wasting: is a condition where both stunting and wasting exist in a child at the same time [19]. Caregiver: the most responsible person who provides child care when the mother is out of the home for work[22]. Exposure to media:

Mothers who listened to the radio, or watched television at least once a week was recorded as satisfactory media exposure, and otherwise unsatisfactory[23] .

Data collection tools and procedures

All data collection tools were translated into Amharic and back-translated to English to ensure consistency of the data. A pretested, structured Amharic version questionnaire was used to collect the required data from mothers. The questionnaire was adapted from the Ethiopian Demographic and Health Survey (EDHS), reviewing different literature and other published journal articles, considering the local situation of the study subjects[5, 22, 24, 25]. The data were collected by interviewing the mothers/caretakers; face to face interviewer-administered questionnaire to collect the associated factor data. While anthropometric measurements were taken by weighing and measuring the height/length of the children. Three BSc nurse graduates were recruited and assigned as data collectors with the critical follow-up and day-to-day checking by two professionals as supervisors and the investigator.

The weight and height of children were measured using the standard anthropometric measurement protocol. Height-for-age, weight-for-height Z-scores are calculated using the 2006 WHO child growth standards recommended for international settings. Weight was measured using a weighing scale without coats, shoes, and any additional clothing and recorded to the nearest 0.1 kg; while height was taken by using studio meter with no shoes; for 6–23 months of age length taken by using the lying scales; and for 24–59 months of age height to the nearest 0.1 cm is record, for this step-on scale was used and the scales prepare by placing on level ground; height and weight of the child was measured two times to increase the data quality if there is difference the measurement tripled to get the accuracy value[26]. Age was record from the card, and ask the mother or caregiver.

Data quality assurance

The quality of data was assured by proper design and pre-tested of the questionnaires; the pretest was conducted at Abay Ras kebele, which is not selected for data collection. Three-day training was given for both data collectors and supervisors by the principal investigators. Every day after data collection, questionnaires were reviewed and checked for completeness by the supervisors and principal investigator and the necessary feedback was given to data collectors in the next morning. The weight scale was calibrated to zero reading before and after weighing every child. The height and weight of the child were measured twice, and the average was taken.

Data Analysis

The data were coded, entered and cleaned into EPI Info version 3.5.1 and exported to SPSS version 20.0 software packages for analysis. Descriptive statistics, including frequencies and means, were used to summarise the results and are presented in tables and figures. Height-for-age z-scores (HAZ) and weight-for-height were calculated using WHO AnthroPlus version 1.0.1.

Multicollinearity among the independent variables was evaluated using the variance inflation factor (VIF). Only variables without multicollinearity were included in the logistic regression analysis, and those with a p-value < 0.05 in the bivariable analysis were entered into the multivariable model. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated to assess the strength of the associations, with statistical significance set at $p < 0.05$. The Hosmer–Lemeshow goodness-of-fit test was performed, and a p-value greater than 0.05 indicated that the logistic regression model adequately fit the data.

RESULT

Child-related characteristics

A total of 352 under-five children and their mothers took part in this study, resulting in a response rate of 99.4%. Slightly over half of the study children were male (51%). Of the children, 28% initiated complementary foods prior to six months of age. About 15% children had good dietary diversity. Among the study participants, one-third (35.2%) were the firstborn child. Almost one-fourth (23.6%) of kids had diarrhea within the previous two weeks (Table 1).

Table 1
Child related characteristics of the study participates in Bahir Dar town, North west Ethiopia, May to June, 2024 (N = 352)

Variables	Characteristics	Frequency (n = 352)	percent
Child Sex	Female	173	49.1
	Male	179	50.9
Child age in months	6–11	44	12.5
	12–23	92	26.1
	24–35	96	27.3
	36–47	67	19.0
	48–59	53	15.0
Breast feeding within an hour of delivery	No	58	16.5
	Yes	294	83.5
Birth order of the child	First	124	35.2
	2–4	214	60.8
	≥ 5	14	4.0
Had diarrhea in last two weeks	No	269	76.4
	Yes	83	23.6
Had common cold/Acute fiver illness in last two weeks	No	274	77.8
	Yes	78	22.2
Age to initiate complementary food	< 6 months	99	28.1
	≥ 6 months	253	71.9
Frequency of feedingper 24 hours	2 times	27	7.7
	2 to 3	115	32.7
	≥ 4 times	210	59.7
Dietary diversity score (N = 339)	< 5 group of foods	291	85
	≥ 5 group of foods	48	15

Parenteral and household characteristic

More than 70% of mothers were between the ages of 20 and 34 years. Eighty-seven percent of the respondents were married, and of the total (46.9%) were house wife. Nearly all participants (94.6%) reported drinking from clean water sources, and the majority (77.3%) were found to have good sanitation practices. More than three fourth (77%) of the study population have been using improved toilet. Fifty-seven percent of the children came from wealthy families (Table 2).

Table 2
Parenteral and household characteristics of respondents at Bahir Dar town, North west Ethiopia, May to June,2024 (N = 352)

Variables	Characteristics	Frequency	percent
Mother's age	20–34 years old	259	73.6
	≥ 35 years old	93	26.4
Media access of mother	No	228	64.8
	Yes	124	35.2
Marital status of mother	Married/ have husband	308	87.5
	Unmarried/ no husband	31	8.8
Mother education level	Diploma & above	139	39.5
	Secondary/High Sc	134	38.1
	No formal education	53	15.1
	Primary	26	7.4
Mother occupation	House wife	165	46.9
	Gov't employee	91	25.9
	Merchant	55	15.6
	Daily laborer	41	11.6
Father's education level	Diploma & above	163	46.3
	Secondary/High Sc	92	26.1
	No formal education	32	9.1
	Primary	23	6.5
Father's occupation	Gov't employee	120	34.1
	Small scale trading	90	25.6
	Farmer	52	14.8
	Daily laborer	49	13.9
Monthly income of the household	Rich	201	57.1
	Middle	117	33.2
	Poor	34	9.7
Number of family members	≤ 4	220	62.5
	≥ 5	132	37.5
Number of under five children	Only one	290	82.4
	Two and above	62	17.6
Head of household	Husband	270	76.7

Variables	Characteristics	Frequency	percent
	Mother	82	23.3
Type latrine	Improved	271	77.0
	Unimproved	81	23.0
Sanitation	Good	272	77.3
	Poor	80	27.7
Drinking water source	Piped, clean water	333	94.6
	Non piped sources	19	5.4
Religion of the house hold	Orthodox	318	90.3
	Muslim	28	8.0

Health services and counselling variables

Below one-fifth of children (18.5%) have completed their vaccinations, while the majority (72.7%) have received vitamin A supplementation. More than 90% mothers had ANC follow-up. Almost all mothers (99.7%) gave birth at a health facility. The majority of mothers (94.9%), did not participate in the complementary food cooking demonstration (Table 3).

Table 3
Health services and counseling variables of the study participants at Bahir Dar town, *North west Ethiopia, May to June,2024 (N = 352)*

Variables	Characteristics	Frequency	percent
Vaccination status of the child	All	282	80.1
	Some	65	18.5
	None	5	1.4
Vitamin A supplementation	No	96	27.3
	Yes	256	72.7
Place of delivery	Health facility	351	99.7
	Home	1	0.3
ANC follow up	No	2	0.6
	Yes	350	99.4
PNC follow up	No	24	6.8
	Yes	328	93.2
Had you (mother) counseled on complementary food?	No	101	28.7
	Yes	251	71.3
Do you (mother) participate on food cooking training	No	334	94.9
	Yes	18	5.1

Prevalence of wasting, stunting, and co-existence of wasting and stunting (WaSt)

Among children under five years, wasting prevalence was 7.4% (95% CI: 4.5–10.2) and stunting prevalence was 35.2% (95% CI: 30.1–39.8). The prevalence of co-existing wasting and stunting (WaSt) was 5.4% (95% CI: 3.0–7.8) (Fig. 2).

Factors associated with the prevalence of coexistence of WaSt

In the bivariable analysis, history of illness, sanitation practices, dietary diversity score, counselling on complementary feeding, access to media, birth order, ANC follow-up, family size, monthly income, household headship, maternal occupation, and maternal education were associated with WaSt. Variables with a p-value < 0.20 in the bivariable analysis were subsequently entered into the multivariable logistic regression model. In the multivariate analysis model reported that counselled mothers about complimentary food, family size, sanitation practice, mothers' educational level and child birth order have significant associations with WaSt.

Children from mothers who had not received counselling on complementary food had 7 times higher odds of developing WaSt (AOR = 6.7, 95% CI = 1.1–41.3, P = 0.045) compared to counselled mothers. A household with a family member of more than eight was 6 times more likely to have a child with coexistence wasting and stunting

(AOR = 5.6, 95%CI = 5.1–6.2, P = 0.035). Good sanitation practice was positively associated with low WaSt (AOR = 0.004, 95% CI = 0.001–0.559, p = 0.029). Children of mother completed primary school were three times more likely to face WaSt than children of an uneducated mother (AOR = 3.04, 95% CI = 1.1–8.7, P = 0.045). Being the first child in birth order had a 88% higher odds of WaSt compared with children of birth order five or greater (AOR = 0.12, 95%CI = 0.02–0.75, P = 0.049) (Table 4).

Table 4
Bivariate and multivariate regression analyses for variables associated with WaSt in under- five children at Bahir Dar, 2024 (n = 352)

Variable	Category	Coexistence		COR, 95%CI	p-value	AOR,95% CI	p-value
		No	Yes				
Age of child	06–11	39(88.6%)	5(11.6%)	1			
	12–23	85(92.4%)	7(7.6%)	0.64 (0.19–2.15)	0.47		
	24–35	90(93.4%)	6(6.3%)	0.52 (0.15–1.81)	0.30		
	36–47	66(98.5%)	1(1.5%)	0.12 (0.01–1.05)	0.06		
	48–59	52(100%)	0(0%)				
Breast feeding within an hour	No	57(98.3%)	1(1.7%)	1			
	Yes	276(93.9%)	18(6.1%)	3.72 (0.49–28.41)	0.21		
Immunization	None	4(80.0%)	1(20.0%0	1			
	Some	272(96.5%)	10(3.5%)	0.15 (0.02–1.44)	0.10		
	All	57(87.7%)	8(12.3%)	0.56 (0.06–5.67)	0.62		
History of illness	No	264(96.4%)	10(3.6%)	1			
	Yes	69(88.5%)	9(11.5%)	3.44 (1.35–8.80)	0.01		
Sanitation	Poor	72(90%)	8(10%)	1			
	Good	201(96%)	11(4%)	0.38(0.15–0.98)	0.045	0.004(0.001–0.56	0.029*
Dietary diversity score (N = 339)	< 5 group of food	276 (94.8%)	15 (5.15%)	1			
	> 5 group of food	44 (91.67)	4 (8.33%)	9.42(2.24–39.71)	0.002		
Counseled on complementary food	No	91(90.1%0	10(9.9%)	1			
	Yes	242(96.4%)	9(3.6%)	0.34 (0.13–0.86)	0.02	6.7 (1.1–41.3)	0.045*
Frequency of feeding per day	< 2	24(88.9%	3(11.1%)	1			

	2 to 3	108(93.9%	7(6.1%)	0.52 (0.13–2.15)	0.37		
	≥ 4	201(95.7%)	9(4.3%)	0.36 (0.09–1.42)	0.14		
Access to media	No	211(92.5%)	17(7.5%)	1			
	Yes	122(98.4%)	2(1.6%)	0.20 (0.05–0.90)	0.04		
ANC follow up	No	1(100.0%)	0(0.0%)	1			
	Yes	1(50.0%)	1(50.0)	0.05 (0.01–0.91)	0.04		
Number of family member	1–4	206(93.6%)	14(6.4%)	1			
	5–8	124(96.9%)	4(3.1%)	0.48 (0.15–1.47)	0.20		
	> 8	3(75.0)	1(25.0%)	4.90 (0.48–50.26)	0.18	5.6 (5.1–6.2)	0.035*
Monthly income	Poor	29(85.3%)	5(14.7%)	1			
	Middle	112(95.7%)	5(4.3%)	0.26 (0.07–0.96)			
	Rich	192(95.5%)	9(4.5%)	0.27 (0.09–0.87)			
Mother's education level	No formal education	51(96.2%)	2(3.8%)	1			
	Primary	20(76.9%0	6(23.1%)	7.65 (1.42–41.12)	0.02	3.04 (1.1–8.7)	0.045*
	Secondary/ High Sc	126(94%)	8(6%)	1.62 (0.33–7.89)	0.55		
	Deploma & above	136(97.8%)	3(2.2%)	0.56 (0.09–3.46)	0.54		
Birth order	first	51(96.2%)	2(3.8%)	1			
	2–4	20(76.9%)	6(23.1%)	0.35 (0.13–0.92)	0.03	0.11 (0.02–0.77)	0.051*
	≥ 5	136(97.8%)	8(6%)	0.79 (0.09–6.62)	0.83	0.12 (0.02–0.75)	0.049*

Mother occupation	Daily laborer	38(93.9%)	3(7.3%)	1			
	House wife	155(93.9)	10(6.1%)	0.82 (0.21–3.12)	0.77		
	Merchant	51(92.7%)	4(7.3%)	0.99 (0.21–4.70)	0.99		
	Gov't employee	89(97.8	2(2.2%)	0.29 (0.05–1.77)	0.18		
Father education level	No formal education	27(84.4%)	5(15.6%)	1			
	Primary	22(95.7%)	1(4.3%)	0.25 (0.03–2.26)	0.22		
	Secondary/High Sc	88(95.7%)	4(4.3%)	0.25 (0.06–0.98)	0.05	0.3 (0-1.2)	0.057
	Deploma & above	157(96.3%)	6(3.7%)	0.21 (0.06–0.72)	0.01	0.1 (0–1.0)	0.050
Father's occupation	Daily laborer	43(87.8%)	6(12.2%)	1			
	Farmer	10(90.9%)	1(9.1%)	7.17 (0.39–130.3)	0.183		
	Merchant	104(95.4%)	5(4.6%)	0.25 (0.06–1.04)	0.05		
	Gov't employee	127(95.5%)	6(4.5%)	0.31 (0.09–1.07)	0.07		
	Others	49(98%)	1(2%)	0.15 (0.02–1.26)	0.08		
Head of the household	Wife	80(97.6%)	2(2.4%)	1			
	Husband	253(93.7%)	17(6.3%)	2.69 (0.61–11.89)	0.19		

DISCUSSION

The coexistence of wasting and stunting (WaSt) is associated with particularly severe outcomes. Children affected by both conditions have a substantially higher risk of mortality compared with those experiencing either wasting or stunting alone. They are also more likely to suffer pronounced cognitive and developmental impairments, increased vulnerability to infections, and slower, less complete recovery, even when appropriate treatment is provided [12, 13]. The present study assessed the coexistence of wasting and stunting among under-five-year-old children living in Bahir Dar, Amhara region, north-west Ethiopia.

The prevalence of WaSt identified in this study was 5.4%. This estimate is comparable to findings from Ethiopia, including reports from the Kersa district (5.8%) [19] and the Ethiopian Demographic and Health Survey (EDHS) (4.7%) [15]. Similar prevalence levels have also been reported in studies conducted outside Ethiopia, such as in Kenya (5%) [27], Uganda (4.96%)[28], the Philippines (4.6%)[29] and India (5.2%)[30]. However the WaSt prevalence identified in the present study is higher than estimates from several other settings, including Ghana (1.4–3.2%)[14], pooled DHS and multi-indicator cluster survey estimates from 84 countries (3%) [31], Indonesia (2.4%)[32], Guinea-Bissau (2.4%) [33], Southeast Asia (1.65%)[16], and China (0.26%)[34]. These variations may be attributed to differences in socioeconomic, sociodemographic, and socioecological contexts across study populations. For example, countries such as China and Indonesia generally have higher socioeconomic conditions compared with the setting of the present study, which may contribute to the lower observed prevalence.

In contrast, the prevalence of WaSt in this study was lower than that reported in South Asia (6%) [35], Senegal (6.2%) [12] and Somalia (9%[36]. This difference may be explained by variations in dietary practices, food security statuses, and socioeconomic conditions across settings. In addition, contextual factors such as prolonged conflict and political instability, particularly in Somalia, may exacerbate both chronic and acute undernutrition, leading to a higher burden of WaSt. Differences in study setting (urban versus rural), population characteristics, and access to health and nutrition services may also contribute to the observed variation.

The results of our study showed that counselling about complementary food for mothers reduces the chance of concurrent WaSt occurrence in children under five years old children. This finding is consistent with previous studies conducted in Ethiopia [37, 38], which reported that maternal counselling on child feeding practices has a significant positive effect on improving child nutritional status. World Health Organization (WHO) and UNICEF recommend counselling mothers on appropriate complementary feeding practices, particularly with regard to the timely introduction of complementary foods, adequate dietary diversity, and sufficient food quantity, alongside continued breastfeeding. These practices have been shown to promote healthy child growth and reduce the risk of malnutrition, stunting, and wasting. Adherence to these recommendations helps prevent inappropriate feeding practices and reduces the concurrent occurrence of undernutrition [39–41].

The occurrence of coexist of WaSt significantly increases as the number of family members increases. Children from households having more than eight members had 5.6 times higher chance to be stunted and wasted than a household with less than five members. Seral studies have reported similar findings[42, 43], as well as evidence from settings outside Ethiopia, such as the Philippines[29]. This because large families are known to require many members to share limited household resources, such as food, money, healthcare, attention, and time. Each child may receive less care and nutrition as a result, both in terms of quality and quantity. For this reason, risk of concurrent stunting and wasting increased[44].

We hypothesized that maternal education would be associated with lower rates of concurrent WaSt; however, contrary to this hypothesis, the present study found that children of mothers with primary school education were three times more likely to experience concurrent WaSt compared with children of uneducated mothers. This finding contradicts previous studies from Ethiopia showing that maternal education significantly reduces child stunting[45, 46] as well as evidence from studies conducted in Bangladesh[8], Philippines [29], and India[30]. While maternal education is known to improve child nutrition through better caregiving practices, increased household income, and enhanced maternal decision-making. The contradictory result observed in this study may reflect contextual factors. In particular, primary-level education in this setting may be insufficient to translate into improved nutritional knowledge or caregiving practices, and mothers with primary education may face time constraints due to informal or labor-intensive work.

Being the first child in birth order had a higher odd of WaSt compared with children of birth order five or greater. Unlike this finding, evidence suggests that higher birth order 3rd child or later more strongly associated with higher odds of stunting and wasting, largely due to increased competition for household resources and food insecurity in larger families [15, 41, 47]. While later-born children may experience greater cumulative nutritional risk, the higher vulnerability observed among first-born children in this study may be attributed to limited maternal experience, younger maternal age, and suboptimal caregiving practices among first-time mothers, which may outweigh the benefits of reduced resource competition.

The study found that good sanitation practices were associated with a lower likelihood of WaSt, which aligns with results from previous studies [36, 48–50]. It is well established that good sanitation is associated with a lower risk of malnutrition, including concurrent wasting and stunting. This relationship is likely driven by reduced exposure to infections and improved nutrient utilization among children. Improved sanitation limits fecal–oral transmission of pathogens, thereby reducing diarrheal diseases, a major contributor to acute weight loss and growth faltering. In addition, it decreases the risk of environmental enteric dysfunction by reducing chronic intestinal inflammation, which enhances nutrient absorption and supports linear growth[51, 52].

CONCLUSION AND RECOMMENDATION

The prevalence of concurrent WaSt was low; however, it remains a serious public health concern in the study area due to its severe consequences. The study identified maternal counseling on complementary feeding, family size, maternal education, sanitation, and birth order as key determinants of concurrent WaSt. Thus, strengthening targeted interventions focused on maternal counseling on complementary feeding, family planning, female education, and improved sanitation is recommended to reduce the risk of concurrent WaSt, particularly among first-born children.

Strength ad limitation of the study

One of the main strengths of this study is its focus on the coexistence of wasting and stunting (WaSt), an often-neglected form of child undernutrition that is associated with high mortality and substantial public health importance. Regarding the limitation, the cross-sectional design limits causal inference. Some estimates had wide confidence intervals due to a small number of WaSt cases, and the study may be affected by recall and reporting bias.

Declarations

Ethical consideration

Ethical clearance was obtained from the Ethical Review Board of Bahir Dar University, College of Medicine and Health Sciences (protocol number 957/2024). A formal letter of permission was secured from the Amhara Public Health Institute and submitted to the respective zone health departments, sub-city offices, and selected kebele administrations. This study was conducted in accordance with the ethical principles for medical research involving human subjects outlined in the Declaration of Helsinki. After explaining the purpose and objectives of the study, informed consent was obtained from all adult participants/guardians, along with child assent where appropriate. Participation was entirely voluntary, and participants were assured of the confidentiality and anonymity of their data.

Consent for publication:

Not applicable because the manuscript does not include details, images, or videos relating to individual participants.

Competing interests:

The authors declare that they have no competing interest.

Funding:

Financial support for data collection was provided by Bahir Dar University. No specific funding was received for any other aspect of this study, and the university had no role in study design, data collection, analysis, manuscript preparation, or the decision to publish.

Author Contribution

Authors' contributions: - OS, TT&GE: contributed to research proposal writing, data collection and supervision. GE, AT, TT &HH: contributed data analysis and article writing. AT, TT&OS: contributed data interpretation. All authors read and approved the final manuscript.

Acknowledgement

Acknowledgements: We would like to express our gratitude to all participants who took part in this study. We also acknowledge Bahir Dar University for providing financial support for data collection.

Data Availability

Availability of data and materials: - The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request. If further is required, you can communicate me though my email: oumer0918@gamil.com/seoumer@yhoo.com.

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Figures

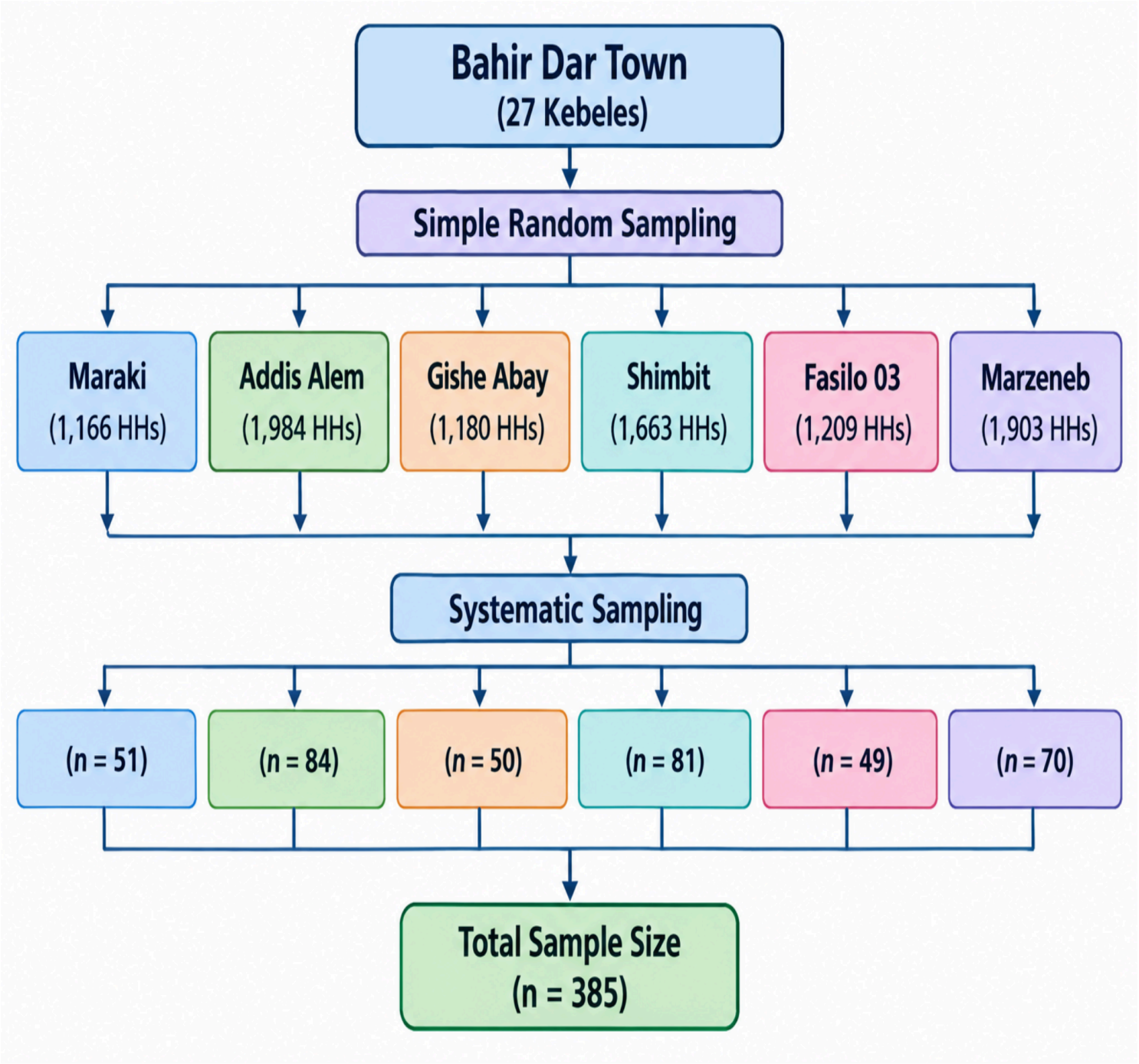


Figure 1

Schematic presentation of sampling procedure among under five children in Bahir Dar town, 2024.

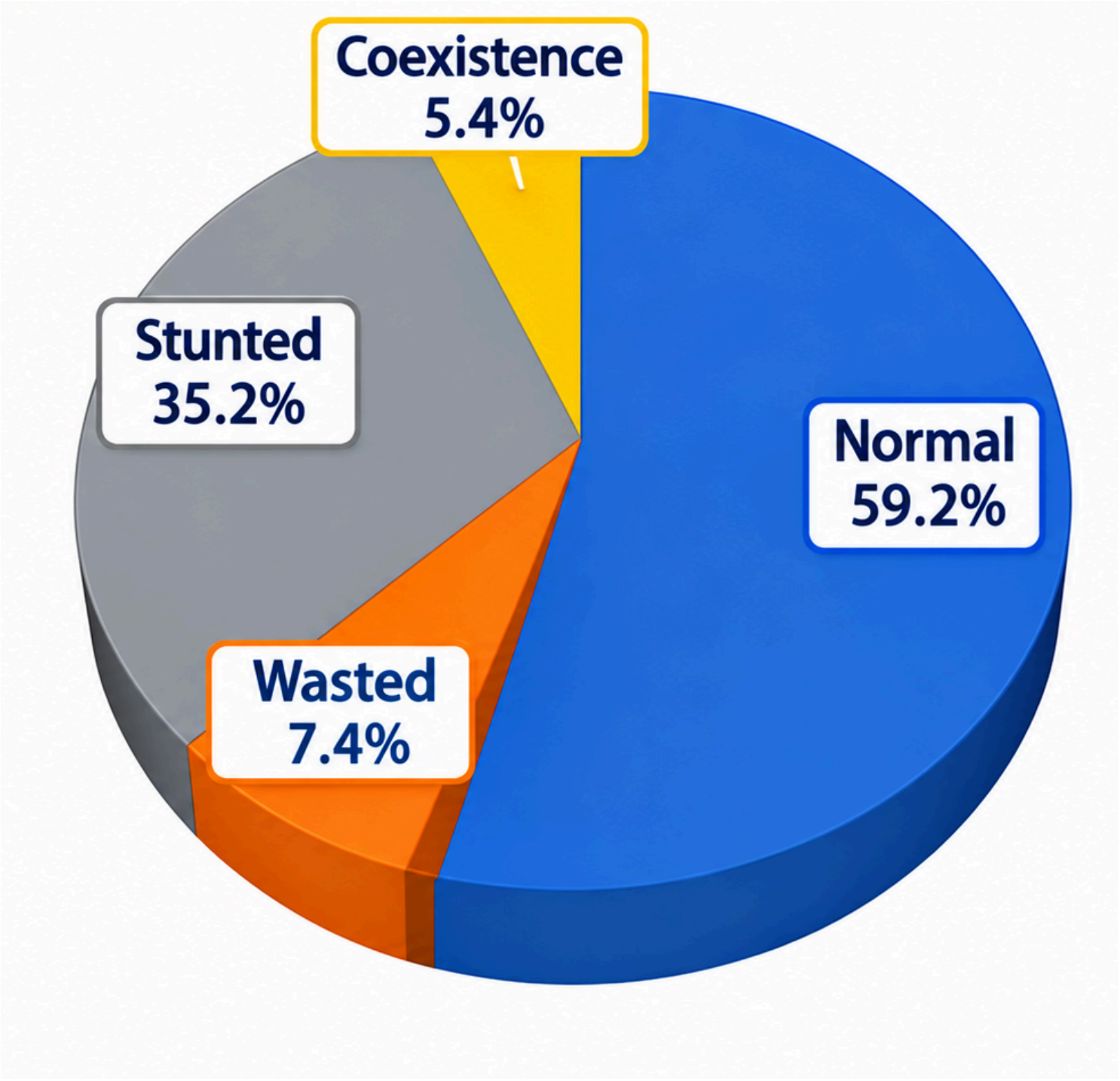


Figure 2

Prevalence of wasting, stunting, concurrent wasting and stunting among under five in Bahir Dar town, May to June,2024 (N=352)