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Magnitude and factors associated with wasting among children on antiretroviral therapy in the East Wollega zone, Western Ethiopia

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Abstract

Background Insufficient food intake and infectious diseases cause undernutrition. Undernutrition in children is a severe public health issue globally, especially in low-resource areas. Among the most vulnerable to these challenges, children affected by HIV/AIDS in Ethiopia are at risk of undernutrition, including wasting, which links to increased child morbidity and mortality. Despite the importance of the issues, there is a lack data from East Wollega Zone of Ethiopia. Therefore, the present study aims to assess the magnitude and determinants of wasting among children receiving antiretroviral therapy (ART) in the east Wollega zone of Ethiopia.

Methods From June to July 2022, a survey was carried out in the East Wollega Zone of Ethiopia to collect the data. The study sample comprised 380 children aged ≤ 15 years who were being treated with ART. A systematic questionnaire and anthropometric measurements were used to collect the data. Epi data 3.1 and SPSS version 26.0 was used for the input data, and data analysis respectively. The relationship between independent variables and wasting was identified using logistic regression analysis.

Results The study revealed that the magnitude of wasting (WFH <-2 Z-score) was 36.8% with a 95% CI (32.1, 41.8). Having a recent history of acute illness (AOR = 5.82, 95% CI: 2.86, 11.84), Low CD4 level (AOR = 3.68, 95% CI: 1.04, 1.64), treating water at home (AOR = 3.30, 95% CI: 1.8, 6.05), duration of follow-up (AOR = 1.97, 95% CI: 1.11, 3.47), food insecurity (AOR = 3.55, 95% CI: 2.03, 6.19), and latrine unavailability (AOR = 2.73, 95% CI: 1.39, 5.36) were statistically significant associations with undernutrition among children with ART.

Conclusions The magnitude of wasting is a significant problem among pediatric populations affected by HIV/AIDS in the eastern Wollega zone of Ethiopia. The factors associated with wasting include recent history of acute illness, low CD4 levels, non-treated water at home, duration of follow-up, food insecurity, and latrine unavailability. Public health facilities should implement measures to address these factors to improve the dietary status of children living with HIV/AIDS.

Keywords Magnitude, Risk factors, Undernutrition, Children under 15 years of age, East Wollega zone

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Introduction

Undernutrition arises from insufficient food intake and infectious diseases, presenting a significant risk to the health and well-being of children affected by HIV/AIDS in Ethiopia, leading to childhood morbidity and mortality. Undernutrition encompasses a range of conditions, including stunting, wasting, and being underweight.1 It is associated with impaired physical growth, mental development, intellectual ability, and compromised natural defenses against infections and diseases.2 It is estimated that undernutrition will cause 20 million incidents of disease and mortality among children.3 It has been observed that weight loss and undernutrition are prevalent among individuals living with HIV/AIDS, which can accelerate the progression of the disease, elevating rates of illness, and diminishing overall survival.4 The coexistence of HIV and undernutrition is widespread in less affluent countries.5 A study conducted in Africa showed that 42% of HIV-infected children have undernutrition.6.

In 2021, a significant number of children worldwide were diagnosed with HIV, with the majority, approximately 86%, residing in sub-Saharan Africa.7 Recent statistics show that among about 56,514 children under the age of 15 who were HIV positive at the end of 2018,8 approximately 2,994 individuals were newly infected with HIV. This region, despite its high prevalence of HIV, also faces severe challenges in terms of undernutrition among children. Statistics show that 21.2% of children below the age of five in the area are underweight, while 36.8% experience stunted growth and 6.8% suffer from wasting.9 Undernutrition remains a leading cause of mortality among children under the age of five years old,10 contributing to long-term consequences such as cognitive decline, chronic diseases and hindered development.11 This issue is critical for HIV-infected children, as it creates a vicious cycle of poor health and increased vulnerability to infections.12 HIV-related opportunistic diseases, including persistent diarrhea or oral and esophageal candida infections, further deteriorate the nutritional well-being of affected children.13 The sociocultural impact of HIV on families has a negative influence on the nutritional well-being of children. When productive individuals within a family are affected by HIV, household finances and agricultural production are reduced, resulting in food insecurity.14 Suboptimal feeding practices among HIV-infected women can affect the nutritional condition of their children.15.

Undernutrition is a prevalent outcome observed in children affected by HIV infection, leading to a significant proportion of untreated children experiencing low weight-for-age rates in settings with partial resources, with figures reaching up to 50%.[10] Children facing critical nutritional deficiencies had a three-fold greater mortality risk than children not infected with HIV.11 For children with HIV, maintaining a healthy nutritional status is a severe problem. Insufficient diet intake, the impact of ART, and HIV infection are all factors that contribute to the problem.16 Assessing undernutrition in HIV-infected individuals, particularly children, can present challenges.17 Despite the existing literature on the association between HIV/AIDS and undernutrition, few studies have been undertaken in Ethiopia.18, 19 However, there are no reports on the specific area of this study' within the eastern Wollega zone of Ethiopia. Therefore, the study design aims to determine the magnitude and variables associated with wasting among children aged < 15 who receive ART in public health institutions.

Methods

Study area

The study encompassed the entirety of public healthcare establishments offering long-term HIV treatment (ART) in the East Wollega Zone. East Wollega is a zone within the Oromia regional state of Ethiopia, situated approximately 330 km west of the capital, Addis Ababa. Spanning an area of 12,579.77 square kilometers, it is home to an estimated population of 1,213,503 individuals, with 606,379 men and 607,124 women, as projected by the 2007/2008 national census. The people's economy is centered on subsistence farming and livestock keeping. The East Wollega Zone has five hospitals and 19 health centers that provide chronic HIV care (ART).

Study design

Cross-sectional research was conducted in the Wollega East Zone in western Ethiopia, to investigate the extent and factors associated with wasting among children receiving ART under the age of 15. The study population comprised all HIV-positive children under 15 years of age who were enrolled in HIV care and treatment centers within public health facilities in the East Wollega Zone. All children infected with HIV aged 15 years old and being followed at East Wollega Zone Hospital and the pediatric ART clinic of the health center were considered. Caregivers who were unwilling to provide information were the only exclusion criteria.

Sample size determination

The sample size of this study was computed using a method to estimate the proportion of a single population ($n = (Z\ \alpha\ /2)\ 2\ p\ (1\text{-}p)/d^2$), and the undernutrition prevalence of 41.8% from a prior study conducted in northwest Ethiopia 20 was considered. n = sample size, and z = the value corresponding to a level of 95% significance = 1.96. By substituting the values, a total sample size of 380 was computed. To account for potential non-responses, a 10% non-response rate was incorporated into the final sample size determination.

Sampling technique and procedure

The sample was distributed across the facilities based on the number of children receiving ART at each hospital and health center during the study period. The study included five hospitals and 19 health centers that offer pediatric ART. During the study period, all children aged ≤ 15 who received ART and met the inclusion criteria were qualified to participate. The final sample comprised 166 children from the five hospitals and 214 children from the 19 health centers. This proportional distribution helped ensure that the sample was representative of both hospital and health center settings, accurately reflecting the wider population of children receiving pediatric ART in the East Wollega Zone.

Data collection instrument and procedure

Study variables

Dependent variables undernutrition-wasting.

Independent variables

Socioeconomic and demographic variables of parents/caregivers: Sex, residence, head of household, family size, marital status, ethnicity, religion, income, parental status.

Child characteristics: Age, sex, and with whom the child lives.

Maternal Characteristics: Family size, caregiver education.

Medical and related problems in children: CD4 count level, eating problems, swallowing difficulties, morbidity status, tuberculosis (TB), diarrhea, acute respiratory infection (ARI), duration of follow-up, WHO clinical stage.

Operational definition

Undernutrition refers to the condition where children have weight-for-height z scores that fall below − 2 standard deviations (<-2 SD) of the median value derived from the WHO growth reference.21, 22.

Stunted children it defines those with a height-for-age (HAZ) index below − 2 SD of the median of the standard curve based on the WHO growth reference of 2007.21, 22.

Severe stunting it defines severe stunting as a height-for-age (HAZ) index below − 3 SD of the median of the standard curve based on the WHO growth reference of 2007.21, 22.

Dietary diversity It was assessed by a questionnaire where study participants were asked which of 16 food groups, they consumed in the past 24 h. A dietary diversity score was calculated based on the seven food groups.23.

Food Security Food security was determined based on responses to the nine occurrence and frequency-of-occurrence questions from the Household Food Insecurity Access Scale (HFIAS). Each question asked about food access issues over the past four weeks. For each question, the respondent was first asked whether the condition occurred at all (yes or no). If the answer was "yes," the frequency of occurrence was assessed, with responses categorized as rarely (once or twice), sometimes (three to ten times), or often (more than ten times). Food security was assessed by asking respondents if they answered "no" to all nine affirmative food access scale questions over at least four weeks indicating no difficulty in accessing sufficient food during the reference period.24.

Food insecurity Individuals were classified as food insecure if they answered "yes" to all nine affirmative food access scale questions over at least four weeks. Food insecurity can be categorized as mild, moderate, and severe according to the food insecurity classification method.24.

Mild food insecurity Mild food insecurity was determined when all respondents selected "rarely" (1) as their response to frequency questions, with values ranging from 1 to 9 inclusive.24.

Moderate food insecurity Moderate food insecurity was determined when all respondents selected "sometimes" (2) in their response to frequency questions about food insecurity, with values ranging from 10 to 18 inclusive.24.

Severe food insecurity When all respondents consistently reported a high frequency (3) for questions related to the frequency of occurrence, resulting in a cumulative value of 27 (3 multiplied by 9, representing the number of frequency questions).24.

For our study, CD4 counts were retrieved from patient records, measured as part of routine clinical care for children on antiretroviral therapy (ART). The categorization of CD4 counts into thresholds based on WHO guidelines [25]: ≥500 cells/mm^3: Normal or minimal immune suppression. 200–499 cells/mm^3: Moderate immune suppression. <200 cells/mm^3: Severe immune suppression.

Data collection procedure

Five local ART staff supervised the data collection procedure, guided by protocols outlined in the WHO Child Growth Standards and UNICEF's guidance on nutrition data collection and reporting. 26 For data collection, face-to-face interviews were administered by 21 BSc nurses using a questionnaire initially created in the English language and subsequently converted into the indigenous language, Afan Oromo, through translation. To measure weight, a Seca digital scale was used, providing

measurements to the nearest 0.1 kg, while height was measured to the nearest 0.1 centimeters and length to the nearest millimeter.

Data quality control

To ensure the integrity of the data, it implemented rigorous measures throughout the data collection process. Training sessions were conducted to equip data collectors and supervisors with the skills for interviewing and taking accurate anthropometric measurements. Close supervision and frequent checks were performed by supervisors to maintain the completeness and consistency of the gathered information. Before commencing data collection each day, the functionality of the digital weight scales was meticulously examined by using known weights (1 kg weight used for calibration), and data collectors ensured that the scale read zero. A pre-test was conducted on a sample of 10% in Wollega referral hospitals, which were not included in the final study, to validate the data collection instruments.

Data processing and analysis

Epi data 3.1 was used for data input, whereas SPSS version 26.0 was used to analyze the data. The collected weight and height/length measurements were then converted into a height-for-age Z score (HAZ) and a BMI-for-age Z score (BAZ) based on the WHO growth standards. For children under five years old, the WHO Anthro tool was used, whereas the WHO Anthro Plus tool was employed for children above five years old. A Z score of less than 2 (-2) shows stunting or wasting in children. Besides weight and height/length, the middle- and upper-arm circumference is measured for children aged < 5.

Descriptive statistics were employed to provide a comprehensive summary of the data.

The factors associated with undernutrition were determined using both bi- and multi-variate logistic analysis. Only variables that exhibited statistical significance at a level of $P < 0.25$ during the bivariate analysis were included in the multivariate regression model. Following that, multivariate logistic regression analyses were executed to adjust for relevant confounders. The outcomes were presented as odds ratios accompanied by a corresponding 95% CI, while the level was established at a threshold of 0.05 along with a 95% CI.

Results

Socio-demographic characteristics

The sociodemographic profiles of caregivers and HIV/AIDS-positive children under ART follow-up at the public health facility in the East Wollega Zone were examined in this study. The study included 380 participants, ensuring a 100% response rate. Among the participants, the age range of the children varied from 2 to 15 years, with an average age of 12.04 ± 2.61 years. Most of the respondents were urban residents, accounting for 253 (66.6%). In addition, over 50% of the children identified as female, comprising 222 (58.4%). Regarding the heads of household, about two-thirds, 253 (66.6%), were male. Two-thirds, 254 (66.8%), of the parents of the children were alive. Further, most of the participants were orthodox, 193 (50.8%) in religion, and Oromo, 260 (68.4%) in ethnicity (Table 1).

Nutritional and health-related characteristics

The magnitude of undernutrition, as indicated by the indicators of wasting and stunting, was assessed in the study population. Among the participants, 36.8% were classified as wasted (i.e., had low weight-for-height), while 30.3% were stunted (i.e., had low height-for-age). These findings suggest a significant burden of undernutrition in the study population. Of the 380 children, 170 (44.7%) received counseling regarding diet; one-third, 136 (35.8%), received treated water for drinking; and 270 (71.1%) of the children had a high dietary diversity. These findings suggest that a majority of households are consuming a relatively varied diet, which is crucial for optimal nutrition. This study revealed that 246 (64.7%) children were in households with food insecurity. Almost two-thirds of them, 239 (62.9%), get a food frequency of less than three per day. The majority, 334 (87.9%) of the parents of the child, had a toilet, but only 60.3% had a hand washing facility near the bathroom (Table 2).

Clinical characteristics related to children with HIV/AIDS

More than half of the children, 222 (58.4%), had CD4 levels of 500 or higher. Of the 380 children, about 122 (32.1%) had a history of opportunistic infections. Approximately 16.6% of the children had eating problems two weeks before the survey, while 78 (20.5%) had recent history of acute illness and 62 (16.3%) had diarrheal disease. Two-thirds of them, 245 (64.5%), have been in ART follow-up for over five years. The majority, 338 (88.9%), of the children had high adherence to the ART medication (Table 3).

Factors associated with wasting

In bivariate logistic regression, variables with a p-value less than 0.25 were the head of household, the size of the family, the current status of the parents, eating problems, recent history of acute illness, nutritional counseling, CD4 level, water treatment at home, history of opportunistic infection, duration of follow-up, adherence to drugs, dietary diversity, food insecurity, food frequency, and latrine availability. In multivariate logistic regression (Table 4), variables such as having a recent history of acute illness (AOR = 5.82, 95% CI: 2.86, 11.84), low CD4

Table 1 Socio-demographic characteristics of caregivers and HIV/AIDS children on ART follow-up in East zone public healthcare facility centers, 2022

Variable	Response categories	Frequency (*n*)	Percentage (%)
Sex	Male	158	41.6
	Female	222	58.4
Residence	Urban	253	66.6
	Rural	127	33.4
Head of Household	Male	253	66.6
	Female	127	33.4
Family size	≥ 4	125	32.9
	< 4	255	67.1
Educational status of the caregiver	Formal education	345	90.8
	No formal education	18	4.7
	Unable to read and write	17	4.5
Marital status of the caregiver	Married	277	72.9
	Widowed	34	8.9
	Divorce	43	11.3
	Single	26	6.8
Ethnicity	Oromo	260	68.4
	Amara	111	29.2
	Tigre	8	2.1
Religion	Waqafata	11	2.9
	Orthodox	193	50.8
	Protestant	30	7.9
	Muslim	144	37.9
	other	2	0.5
Monthly income	≥ 1000 ETB	34	67
	< 1000 ETB	106	173
Parental current status	Both alive	254	66.8
	Mother died	53	13.9
	Father Died	21	5.5
	Both died	52	13.7
Birth order	1st born	148	38.9
	2nd born	157	41.3
	3rd born	68	17.9
	≥ 4th born	7	1.8

level (AOR = 3.68 (95% CI: 1.04, 1.64), treating water at home (AOR = 3.30, 95% CI: 1.8, 6.05), duration of follow-up less than 5 years (AOR = 1.97, 95% CI: 1.11, 3.49), food insecurity (AOR = 3.55, 95% CI: 2.03, 6.19), and latrine unavailability (AOR = 2.73, 95% CI: 1.39, 5.36) were statistically significant predictors of wasting among children in follow-up with ART. These positive associations with wasting generally arise because the factors that have been identified are associated with heightened susceptibility to inadequate nutrition, either directly (e.g., difficulties in chewing or swallowing, acute illnesses, lack of access to food and clean water) or indirectly (e.g., socioeconomic limitations, weakened immune system -low CD4 count). Every one of these elements contributes to a cycle that affects a person's capacity to maintain proper nutrition, either directly or indirectly, raising the risk of wasting. Furthermore, in the east Wollega zone of Ethiopia, these factors often work together to raise the risk of wasting in children on antiretroviral treatment (ART).

Discussion

This cross-sectional investigation aimed to explore the extent of wasting among children living with HIV/AIDS who receive regular care at the public health facility in the East Wollega Zone, where ART is provided. The study revealed that 36.8% (95% CI: 32.1–41.8) of the children experienced wasting, as shown by a weight-for-height (WFH) Z-score below − 2. This finding aligns with a previous study conducted in referral hospitals in the Amhara region, which reported a prevalence of 30.3% [27]. However, the current result is comparatively lower than studies carried out among children living with HIV attending HIV care in Northwest Ethiopia and South India, where higher rates of wasting were observed.28, 29 These variations in prevalence could be attributed to the

Table 2 Nutritional and health-related characteristics of HIV/AIDS children receiving follow-up care at a public health facility in the East Wollega zone of West Ethiopia

Variable	Categories	Frequency (*n*)	Percentage (%)
Wasting	Yes	140	36.8
	No	240	63.2
Stunting	Yes	115	30.3
	No	265	69.7
Received dietary counseling	yes	170	44.7
	No	210	55.3
Presence of therapeutic food	Yes	118	31.1
	No	262	68.9
Water treatment at home	yes	136	35.8
	No	244	64.2
Level of dietary diversity	Poor	110	28.9
	Good	270	71.1
Level of food security	Food secure	134	35.3
	Food insecure	246	64.7
Food frequency	3 and above	239	62.9
	less than 3	141	37.1
Latrine availability	No	46	12.1
	Yes	334	87.9
Hand washing after the toilet	No	151	39.7
	Yes	229	60.3

Table 3 Clinical-related characteristics of HIV/AIDS children on ART follow-up at an East Wollega zone public health facility providing services in West Ethiopia

Variables	Response categories	Frequency (*n*)	Percentage (%)
Current CD4 Levels	≥ 500	222	58.4
	200–499	85	22.4
	< 200	73	19.2
History of Opportunistic Infection	No	258	67.9
	Yes	122	32.1
Difficulties in chewing or swallowing	yes	63	16.6
	No	317	83.4
Having a recent history of acute illness	Yes	78	20.5
	No	302	79.5
Recent history of acute illness	Diarrheal disease	62	16.3
	Pneumonia	5	1.3
	other AFI	11	2.9
Duration of follow-up	≤ 5 years	135	35.5
	> 5 years	245	64.5
WHO Clinical staging	Stage I	337	88.7
	Stage II	37	9.7
	Stage III	4	1.1
	Stage IV	2	0.5
Adherence to a drug	Good	338	88.9
	Poor	42	11.1

socioeconomic and socio-demographic characteristics of the study participants. The difference might be attributed to the study period, which was conducted following the World Health Organization's recommendation for prior use of ART. However, the earlier studies were carried out before the latest WHO test and treatment guidelines, which specify that HIV-infected children begin ART later, changing the comorbidity of undernutrition.

In this study, factors significantly associated with wasting were recent history of acute illness two weeks before the survey, the current level of CD4, home water treatment, duration of follow-up, food security, and latrine availability. The findings of this study revealed that

Table 4 Multivariable logistic regression analysis for factors associated with wasting among HIV-positive children who are on ART follow-up at the East Wollega zone public health facility, Western Ethiopia, 2022

Variable	Category	Wasting		COR (95% CI)	AOR (95% CI)
		Yes	No		
Head of household	Male	83	170	1	
	Female	57	70	1.67 (1.08, 2.58)	1.33 (0.72,2.48)
Family size	≥4 Family	57	68	1.67 (1.08, 2.58)	1.38 (0.77,2.46)
	<4 Family	83	172	1	
Parental current status	Both alive	84	170	1	
	Mother died	22	31	1.44 (0.78, 2.63)	1.13 (0.49, 2.62)
	Father Died	9	12	1.52 (0.62, 3.74)	0.92 (0.30,2.86)
	Both died	25	27	1.87 (1.03, 3.43)	0.83 (0.35,1.98)
Difficulties in chewing or swallowing	Yes	35	28	2.52 (1.46, 4.37	1.96 (0.97,3.94)
	No	105	212	1	
Having a recent history of acute illness	Yes	57	21	7.16 (4.09, 12.54)	5.82 (2.86,11.84) *
	No	83	219	1	
Dietary counseling	yes	52	118	1	
	No	88	122	1.64 (1.07, 2.51)	1.41 (0.78,2.52)
Current CD4 level	≥500	71	151	1	
	200–499	30	55	1.16 (0.69–1.96)	1.02 (0.66, 1.31) *
	<200	39	34	2.44 (1.42–4.18)	3.68 (1.04, 1.64) *
Water treatment	yes	32	104	1	
	No	108	136	2.58 (1.61, 4.13)	3.30 (1.8, 6.05) *
History of opportunistic infection	No	82	176	1	
	Yes	58	64	1.95 (1.25, 3.03)	1.59 (0.90, 2.807)
Duration of follow-up	5 years	59	76	1.57 (1.02, 2.42)	1.97 (1.11, 3.47) *
	>5 years	81	164	1	
Adherence to the drug	good	116	222	1	
	Poor	24	18	2.55 (1.33, 4.89)	1.58 (0.69, 3.63)
Dietary diversity	Poor	50	60	1.67 (1.06, 2.62)	1.14 (0.63, 2.06)
	Good	90	180	1	
Food security	Insecure	63	183	3.92 (2.51, 6.13)	3.55 (2.03,6.19) *
	Secure	77	57	1	
Food frequency category	less than 3	64	77	1.78 (1.16, 2.74)	1.60 (0.92, 2.76)
	3 and above	76	163	1	
Latrine availability	No	15	31	2.89 (1.71, 4.87)	2.73 (1.39, 5.36) *
	Yes	125	209	1	

children who experienced an acute illness within two weeks before data collection had a significantly higher risk of developing wasting, approximately 5.82 times greater than those who did not have such an illness. This finding aligns with research conducted in northwest Ethiopia, which suggests that children who had diarrhea two weeks before the survey were three times more likely to be malnourished.30, 31 The explanation for undernutrition in HIV-infected children receiving ART may be attributed to factors such as fluid and electrolyte loss, decreased appetite, and reduced food absorption in the intestine due to high intestinal motility during episodes of diarrhea.32, 33 Children with CD4 levels less than 500 were almost twice as likely to have wasting compared to those with CD4 levels greater than 500. This observation can be attributed to the fact that children with lower CD4 counts may be more susceptible to advanced disease stages, rendering them susceptible to co-existing opportunistic infections.33 Further, as HIV infection progresses and additional opportunistic infections arise, the child's energy requirements escalate. Subsequently, the management of opportunistic infections, along with regular administration of first-line ART, can exacerbate adverse effects such as diminished appetite, compromised nutritional status, and weakened disease resistance among patients.33.

In this research, the duration of the follow-up period was found to have a strong correlation with wasting, with children who have been on ART treatment for less than five years nearly twice as likely to be undernourished as their counterparts. This discovery is consistent with previous research undertaken in Tanzania and Northwest Ethiopia, which also presents similar patterns.34, 35 This association can be attributed to the improved immune

function that accompanies longer ART treatment, which reduces diarrhea and vomiting and reduces the risk of opportunistic infections. Therefore, patients may experience enhanced appetite, increase dietary intake, and improve nutritional status.

In addition, the study found a significant link between undernutrition and household food security levels. Children residing in households facing food insecurity were 3.55 times more prone to wasting compared to those living in households with sufficient food availability. This finding is supported by analogous studies conducted in Ethiopia and Uganda, which reported comparable results.36, 37.

Limitations and strength of the study

Limitations of the study:

- Cross-Sectional Design: Because the study is cross-sectional, it is unable to prove causation.
- Recall Bias: Self-reported information may cause inaccurate recollections of previous actions and occurrences.
- Limited Generalizability: It's possible that the results won't hold true for people or areas with distinct circumstances.
- Unmeasured Confounders: Other variables that may have an impact on the outcomes but were not taken into consideration include socioeconomic status.

Conclusion and recommendations

Our study revealed a significant magnitude of wasting among children affected by HIV/AIDS.

Several factors were identified as strong contributors to wasting among children on ART, including the recent occurrence of acute illness within two weeks before the survey, low CD4 levels, the absence of water treatment practice at home, the short duration of follow-up, food insecurity, and a lack of access to sanitation facilities such as latrines. These findings highlight the associations between various factors and the nutritional status of children receiving ART, emphasizing the need for further research to explore causal relationships.

Recommendations:

1. Target Vulnerable Groups: Give special attention to helping big families and households led by women by providing family planning, healthcare access, and financial aid.
2. Healthcare and Nutritional Support: To avoid undernutrition, offer early assessment and treatment for acute illnesses, difficulties in chewing or swallowing, and those with low CD4 levels.
3. WASH Improvements: To reduce the risk of waterborne illnesses and enhance nutritional results, provide access to clean water and sanitary facilities.
4. Food Security Initiatives: To enhance food security and nutrition in homes who are at risk, put in place dietary counseling and food assistance programs.
5. Improved surveillance: To detect and treat undernutrition early, increase long-term surveillance and follow-up.
6. Public Health Education: Educate the public more about proper diet, personal cleanliness, and how to spot wasting early.

Researchers

More qualitative research is required in the study region to investigate food security among parents or caregivers of children at the ART follow-up.

Abbreviations

AIDS Acquired Immune Deficiency Syndrome
ARI Acute Respiratory Infection
ART Antiretroviral Therapy
HIV Human Immunodeficiency Virus
OR Odds Ratio
UNICEF United Nations Children's Fund
WHO World Health Organization
WAZWeight for Age
WHZ Weight for Height

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Author contributions

TS designed the study, participated in the data collection, performed analysis and interpretation of data and drafted the paper and revised the manuscript. AA assisted with the design, approved the proposal, and revised drafts of the paper and prepared and revised the manuscript. All authors read and approved the final manuscript.

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Data availability

The datasets used and/or analyzed are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Approval for the study was obtained from the Ethics Review Board of the Institute of Health Sciences at Wollega University (Ref. No: WUIHS/172/22), and official permission letters were obtained from the respective administrative authorities of the selected healthcare facilities. Informed consent on the participant's behalf was obtained from the mothers or caregivers after explaining the purpose of the study and procedures, and all information collected on each individual was confidential. Participants were informed about privacy and the right not to participate in studies without consequences. It linked children who are diagnosed with wasting to the pediatric outpatient department.

Consent for publication
Not applicable; because our manuscript does not contain data from any individual person in form of any individual details, image or videos.

Competing interests
The authors declare no competing interests.

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