Original Article

Prevalence and Associated Factors of Malnutrition among Children Under Five Years with Clefts Attending a Hospital in Rwanda

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Abstract

Background
Children with clefts face a high risk of malnutrition (undernutrition) with a range of serious life-threatening challenges. The objective of this study was to estimate the prevalence of malnutrition in children with clefts in Rwanda.

Methods
A retrospective cross-sectional study was conducted among children with clefts admitted at a Hospital in Rwanda between 2018 and 2022. Descriptive statistics were conducted, and WHO Z-scores were used to classify nutritional status (stunting, wasting, underweight, and overall malnutrition). Subsequently, chi-square and logistic regression analyses identified factors associated with malnutrition, with statistical significance set at $P < 0.05$.

Results
The prevalence of malnutrition was 54.2%. Children with combined clefts were 61.8% more malnourished. The odds of malnutrition were 1.69 times (AOR: 1.69; 95% CI: 1.14 to 2.48) more among males. Similarly, the prevalence of malnutrition was about three-fold more among children <12 months of age (AOR: 2.81; 95% CI: 1.61 to 4.87) and 2.20 times more among children of divorced parents AOR: 2.20; 95% CI: 1.26 to 3.83), and 2.50 times (AOR: 2.50; 95% CI: 1.31 to 4.78) more among children with combined clefts. Moreover, household income has a significant association with malnutrition (P=0.049). Similarly, children with cleft lips were 1.58 times (AOR: 1.58; 95% CI: 1.06 to 2.36) more likely to be malnourished than those with cleft palate.

Conclusion
The burden of malnutrition among children with clefts was high. Early identification and appropriate feeding management are crucial to ensuring no one is left behind in the fight against malnutrition.

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Keywords: Children, Cleft lip, cleft palate, malnutrition, Rwanda

Background

Cleft lip and cleft palate (clefts) are some of the most prevalent orofacial congenital anomalies worldwide.[1] The incidence of cleft palates varies based on socioeconomic status, geographic origin, and ethnic background (CDC, 2020). According to a report by the Institute for Health Metrics and Evaluation (IHME), globally, for every 1,000 live births, 1.41 babies are born with orofacial clefts, amounting to nearly 195,000 babies born with clefts annually. Another study indicated that the prevalence of orofacial clefts ranges from 0.57 to 1.57 per 1,000 live births. Currently, 4.62 million people are living with an unrepaired or inadequately repaired cleft, including babies who haven't received treatment, making them vulnerable to several potentially life-threatening conditions, such as malnutrition (under-nutrition). Studies suggest that children with clefts are generally lighter and smaller than those without clefts.[2]

A recent study by Maera reveals that clefts affect one in every 700 babies born in the U.S., making them the fourth most common birth defect nationwide.[3] Of the 600,000 children under 5 years living with clefts in 2020, one-third (200,000) resided in low- and middle-income countries (LMICs) and were underweight.[4] The highest incidence was reported in Asia, with the lowest in Africa. In Africa, the prevalence varies from 0.5 per 1,000 in Nigeria, 0.8 per 1,000 in Uganda, 0.2 per 1,000 in Ethiopia, to as high as 2 per 1,000 in Rift Valley, Kenya. The variation in the occurrence of orofacial clefts may be influenced by genetic and environmental risk factors.[5] Epidemiological studies indicate that children born to one parent with a cleft have a 3.2% and 6.8% higher probability of cleft lip and palate, respectively.

Children with clefts face many challenges. [6] The lip and/or palate anatomy affects muscle coordination required for swallowing, limits the ability to create suction during breastfeeding and bottle feeding, and increases the time needed for feeding.[7, 8] This results in children with clefts facing a greater burden of poor nutrition and an increased risk of malnutrition. According to the institute for Health Metrics and Evaluation,[8] Children with clefts often experience challenges in feeding due to their oral structural anomalies.[9] These difficulties can impede proper nutrition and affect their overall growth. The risk of underweight among children with clefts are 2.15 times more as compared to their age group without clefts and are at higher risk of growth failure. Subsequently, more than 46,000 children with clefts died because of malnutrition. [8] Moreover, babies born with cleft face a range of issues including challenges in speaking, breathing, and hearing.[10] One of the most overlooked dangers to babies with clefts is the life-threatening impact of malnutrition.[8]

Another consequence is when individuals with unrepaired clefts, especially young children, do not consume enough food, they are at high risk of becoming underweight, a form of malnutrition associated with an increased risk of infections such as diarrhea, measles, and pneumonia.[11] Those who are malnourished also face higher risks during anesthesia and surgery and tend to heal more slowly. Prolonged or untreated malnutrition can lead to stunted growth, which has been linked to cognitive problems resulting in poor school performance, lower lifetime earnings, and earlier onset of health issues like diabetes, kidney disease, and obstructed labor in those who become pregnant as adults.[12]

A study by the Children's Hospital of Philadelphia (CHOP) found that lower socioeconomic status, including lower maternal educational attainment and lack of prenatal care, is associated with an increased risk of clefts. Additionally, children with cleft lip and palate from families with limited resources often experience delayed care and poorer treatment outcomes.[13] In some societies, such as in Nigeria, clefts are sometimes perceived as divine punishment for parental sins like witchcraft or prostitution, leading to these children being kept away from the public.[14]

Despite a good health delivery structure, Rwanda suffers from insufficient human resources for health like other developing countries. Varied access to specialized healthcare, such as nutritional counseling, speech therapy, and specialized feeding support, could influence the child's nutritional status, therefore limited access may lead to suboptimal nutritional management.[15] Moreover, socioeconomic status including family income, education, and access adequate nutrition and healthcare might hinder access to quality food, supplements, or medical interventions. Despite Rwanda's healthcare system having well-established and organized health delivery structures, including community health insurance and community-owned health facilities, a lack of sufficient personnel has left few hospitals able to provide cleft lip surgeries, which require specialized expertise. In Rwanda, between 300 and 500 children are born with clefts annually, and 1 in 10 may die before their first birthday, according to a non-governmental organization that visited Rwanda to perform surgeries on orofacial cleft patients.[16]

While malnutrition is a significant public health concern in Rwanda,[17] its specific prevalence and associated factors among this vulnerable pediatric population with clefts remain poorly identified. The lack of comprehensive research in this area hinders the development of targeted interventions and support systems to address the unique nutritional challenges faced by these children.

Methods

Study Design

A retrospective cross-sectional study was conducted among children under five years old with cleft lip and cleft palate (clefts) admitted to a Hospital in Kigali, Rwanda between January 2018 and July 2022.

Study Setting

This study took place at a Hospital in Rwanda,a public hospital located in the Kicukiro District of Kigali, the capital city. The study setting is a Hospital in Rwanda is a vital healthcare facility, offering specialized services in the treatment of cleft lips and palates among children in Rwanda. These children were fully managed and supported by Smile Train. Smile Train is a nonprofit organization and charity providing corrective surgery for children with cleft lips and palates. This organization provides free corrective cleft surgery in 87 countries including Rwanda, training local doctors, and providing hospital funding for the procedures. It is for this background that, in collaboration with Rwanda Military Hospital, Smile Train supports children in Rwanda with CP/L.

Its importance extends beyond a single district, serving patients from various regions across the country. The Hospital is renowned for providing high-quality healthcare services, particularly in orthopedic surgery, general surgery, neurosurgery, gynecology and obstetrics, internal medicine, pediatrics, and dermatology.

In collaboration with the nonprofit organization Smile Train, the hospital provides corrective surgery for children with cleft lips and palates. Smile Train offers free corrective cleft surgery in 87 countries, including Rwanda, and supports the training of local doctors and hospital funding for these procedures. This partnership ensures a comprehensive approach to the treatment and care of children with cleft lip and palate.

Study population

All children under five years with cleft palate and cleft lips who admitted to the Hospital were the primary target population of this study. Information of all children with clefts admitted to the Hospital in Kigali, Rwanda between January 2018 – July 2022 was included in the present analysis. Children with complete information were included in the study. Children with clefts, either discharged immediately with advice, referred for further management or dead-on arrival, were excluded.

A total of 536 children under five years with clefts were admitted between January 2018 and July 2022.

Sample size and sampling

The 498 children's files were reviewed and included in the present analysis, with a response rate of 93% in which this study directly involved the exact population relevant to the research objective, for a comprehensive investigation into the factors associated with malnutrition in children under five years with clefts. The study employed purposive sampling strategy. The population of this study has a unique characteristic that are crucial to the research objectives. Children with clefts have unique medical conditions or circumstances that are not commonly found in the general population, and for this regard the appropriate sampling method was purposive sampling which allowed for the deliberate selection of participants from the specific demographic of interest. By studying this specific group, research can gain a deeper understanding of the unique challenges and contributing factors of malnutrition among children under five years with clefts.

Data collection

All medical records of children under five years with clefts that were treated under the support of Smile Train from a Hospital in Rwanda were included. All variables assumed to have association with nutritional status of children with clefts were retrieved manually using a structured checklist. Information related to children and their parents' demographic and socio-economic factors were included. The study employed a checklist which covered variables under this study these included the gender of child, Age of the child, parents place of residents, educational level, marital status, employment status, awareness about clefts campaigning, age of care taker, type of clefts (Cleft lip/ Cleft palate/ combined), Other anomalies or medical conditions a child born, types of diet (little and rarely, single diet), and family Size.

All files from the archival office of the hospital were accessed manually through a guided permit from the concerned persons in charge of data and statistical records at the study setting.

Data Analysis

Extracted data were processed for missing values, manually coded and labeled in an Excel sheet, and then imported into SPSS software version 26 for statistical analysis. Descriptive analysis was conducted using frequencies and percentages for categorical variables, and means and standard deviations for quantitative data.

The nutritional status of children with clefts was classified based on the WHO Z-scores calculator. Children with a height-for-age Z-score below -2 standard deviations (SD) were identified as stunted, those with a weight-for-height Z-score below -2 SD were classified as wasted, and children with a weight-for-age below -2 SD were categorized as underweight. In this study, stunted, wasted, and underweight children were classified as malnourished. Chi-square and logistic regression analyses were conducted to identify factors associated with malnutrition. All variables with a P-value ≤ 0.05 in the bivariate analysis were considered for multivariable analysis. A P-value less than 0.05 was declared as statistically significant, and unadjusted and adjusted odds ratios with corresponding 95% confidence intervals (CI) were reported.

Ethical considerations

Ethical clearance was obtained from the Mount Kenya University Institutional Review Committee in Kigali, Rwanda (MKU04/ PGS&R/1142/2023). Following approval, the researcher presented the authorization letter to Smile Train and notified the hospital management to gain access to existing records of patients treated for cleft lip and cleft palate between January 2018 and July 2022. The personal information of participants and their caregivers was treated with strict confidentiality.

Results

Sociodemographic characteristics of the study participants

A total of 498 participants with clefts were included in the study. About two-third (60.8%) of children with cleft lips and cleft palate in this study were males and the remainder female. One-fourth (25%) of the study participants were aged less than a year. More than eight-tenth (83.7%) of children with clefts attending the referral hospital were from rural place of residence. The majority (59.2%) of respondents were not going to school and 39% were attending in Nursery I.

Farming was the main occupation practiced by the majority of the parents (52.4%). About half (45%) of mothers and fathers did not attend schooling and majority 40% and 42.2% are from the low- and middle-income category . More than two-third (69.3%) of the parents with cleft child had attending campaign related to clefts and nutrition (Table 1).

Table 1. Demographic Profile of the Respondents

Variables		Number (N)	Percent (%)
Gender of the Child	Male	303	60.8
	Female	195	39.2
Age of child	< 12 Months	125	25.1
	1 Year	86	17.3
	2 Years	86	17.3
	3 Years	81	16.3
	4 Years	120	24.1
Child Education	No schooling	295	59.2
	Nursery 1	194	39.0
	Nursery 2	9	1.8
Malnourished	Yes	270	54.2
	No	228	45.8
Type of Cleft	Cleft palate	54	10.8
	Cleft lip	232	46.6
	Both	212	42.6
Place of residence	Rural	417	83.7
	Urban	81	16.3
Parents Marital status	Married	243	48.8
	Single	174	34.9
	Divorced	81	16.3
Parents Education	No Education	225	45.2
	Primary	136	27.3
	Secondary	78	15.7
	Tertiary	59	11.8
Parents occupation	No occupation	261	52.4
	Have occupation	237	47.6
Household income	Low income	199	40.0
	Middle income	213	42.8
	High income	86	17.3
Awareness campaign	No	153	30.7
	Yes	345	69.3
Care-taker ages_categories	<25 Years	61	12.2
	20-25 Years	33	6.6
	26-30 Years	98	19.7
	>30 Years	306	61.4

Prevalence of Malnutrition among Children under 5 Years with Clefts attending a Hospital in Kigali, Rwanda

Table 2 highlights that the prevalence of malnutrition among children under 5 years with clefts attending a Hospital in Kigali, Rwanda, is 54.2%. The findings indicate that the prevalence of malnutrition is higher among males (58.1%) compared to females (48.2%). Regarding age, the data revealed a higher prevalence of malnutrition among children aged 0 to 11 months, at 68%, while for those aged 1 to 4 years, the prevalence ranged from 42% to 55%.A significant difference in the prevalence of malnutrition was observed between children with combined clefts (cleft lip and cleft palate) at 61.8% and those with cleft lip at 51.9%. This difference was statistically significant (P=0.004). However, no significant difference in nutritional status was found based on place of residence for children under 5 years (P=0.340).

The prevalence of malnutrition was significantly higher among children of single (58.0%) or divorced (66.7%) parents compared to the married or cohabited parents (47.3%) (P=0.005). According to the household income category, the prevalence of malnutrition among children under five was significantly higher among children from middle household income (61.5%) (P=0.004). the proportion of malnutrition among parents who attended a campaign was comparable with those of children from parents who have never attended campaigns.

Table 2. Malnutrition among under 5 years children with clefts attending a Hospital in Kigali, Rwanda

Variables		Total	Malnourished		X^2-value	P-value
		Yes	No			
Gender	Male	303(60.8)	176(58.1)	127(41.9)	4.67	**0.031**
	Female	195(39.2)	94(48.2)	101(51.8)		
Age of Child	< 12 Months	125(25.1)	85(68.0)	40(32.0)	17.39	**0.002**
	1 Year	86(17.3)	46(53.7)	40(46.5)		
	2 Years	86(17.3)	47(54.7)	39(45.3)		
	3 Years	81(16.3)	42(51.9)	39(48.1)		
	4 Years	120(24.1)	50(41.7)	70(58.3)		
Type of Cleft	Cleft lip	232(46.6)	118(50.9)	114(49.1)	11.07	**0.004**
	Cleft palate	54(10.8)	21(38.9)	33(61.1)		
	Both	212(42.6)	131(61.8)	81(38.2)		
Place of residence	Rural	417(83.7)	230(55.2)	187(44.8)	0.91	0.340
	Urban	81(16.3)	40(49.4)	41(50.6)		
Parents marital status	Married	243(48.8)	115(47.3)	128(52.7)	10.74	**0.005**
	Single	174(34.9)	101(58.0)	73(42.0)		
	Divorced	81(16.3)	54(66.7)	27(33.3)		
Parents education	No Education	225(45.2)	123(54.7)	102(45.3)	2.06	0.560
	Primary	136(27.3)	77(56.6)	59(43.4)		
	Secondary	78(15.7)	43(55.1)	35(44.9)		
	Tertiary	59(11.8)	27(45.8)	32(54.2)		
Parents occupation	No occupation	261(52.4)	133(51.0)	128(49.0)	2.35	0.126
	Have occupation	237(47.6)	137(57.8)	100(42.2)		
Household income	Low income	199(40.0)	90(45.2)	109(54.8)	11.30	**0.004**
	Middle income	213(42.8)	131(61.5)	82(38.5)		
	High income	86(17.3)	49(57.0)	37(43.0)		
Awareness campaign	No	153(30.7)	82(53.6)	71(46.4)	0.03	0.853
	Yes	345(69.3)	188(54.5)	157(45.5)		
Caretaker age categories	<25 Years	61(12.2)	29(47.5)	32(52.5)	3.86	0.277
	20-25 Years	33(6.6)	15(45.5)	18(54.5)		
	26-30 Years	98(19.7)	50(51.0)	48(49.0)		
	>30 Years	306(61.4)	176(65.5)	130(42.5)		

Factors Associated with Malnutrition among Children under 5 Years with Clefts attending a Hospital in Kigali, Rwanda

Both univariate and multivariate logistic regression analyses were conducted to evaluate the strength of association of factors linked to malnutrition among children under 5 years with clefts attending a Hospital in Rwanda (Table 3).

Gender was significantly associated with malnutrition in children under 5 years with clefts. The odds of malnutrition were 1.49 times higher (COR: 1.49; 95% CI: 1.04 to 2.14) and 1.69 times higher (AOR: 1.69; 95% CI: 1.14 to 2.48) among males compared to females before and after adjustment, respectively.

Table 3. Factors associated with malnutrition among children under five years with clefts attending a Hospital in Rwanda

Independent variables		Bivariate analysis	P-value	Multivariate analysis	
	COR (95%CI)		AOR (95%CI)		P-value
Child Gender					
	Female	Ref [1.0]		Ref [1.0]	
	Male	1.49(1.04-2.14)	**0.031**	1.68(1.14-2.48)	**0.009**
Age of Child					
	< 12 Months	2.97(1.76-5.02)	**<0.001**	2.81(1.62-4.87)	**<0.001**
	1 Year	1.85(1.05-3.26)	**0.034**	1.91(1.05-3.45)	**0.033**
	2 Years	1.76(1.00-3-11)	**0.050**	1.87(1.03-3.39)	**0.039**
	3 Years	1.97(1.11-3.51)	**0.021**	1.87(1.02-3.41)	**0.042**
	4 Years	Ref [1.0]		Ref [1.0]	
Parents Marital					
	Married	Ref [1.0]		Ref [1.0]	
	Single	1.45(0.83-2.51)	0.190	1.57(0.88-2.80)	0.127
	Divorced	2.23(1.32-3.77)	**0.003**	2.20(1.26-3.83)	**0.006**
Household income					
	low income	Ref [1.0]		Ref [1.0]	
	middle income	1.61(1.04-2.67)	**0.049**	1.56(0.91-2.66)	0.104
	High income	0.83(0.5-1.38)	0.470	0.81(0.46-1.38)	0.437
Type of Cleft					
	Cleft palate	Ref [1.0]		Ref [1.0]	
	Cleft lips	1.56(1.07-2.28)	**0.021**	1.58(1.06-2.36)	**0.025**
	Both	2.54(1.38-4.69)	**0.003**	2.50(1.31-4.78)	**0.005**

Statistically significant at p<0.05, COR/AOR: Crude/Adjusted Odd Ratio, CI: Confidence Interval

The age of children with clefts also showed a significant association with malnutrition. Children under 12 months were approximately three times more likely to be malnourished compared to children four years old (COR: 2.97; 95% CI: 1.76 to 5.02) and (AOR: 2.81; 95% CI: 1.61 to 4.87). Similarly, children aged one to three years were about twice as likely to be malnourished compared to those aged four years, and all differences were statistically significant (p<0.05). Regarding the marital status of parents, the odds of malnutrition were more than double among children with clefts of divorced parents compared to children with married or cohabiting parents, and the difference was statistically significant before and after adjustment (COR: 2.23; 95% CI: 1.32 to 3.77) and (AOR: 2.20; 95% CI: 1.26 to 3.83), respectively.

The study also highlighted that the prevalence of malnutrition among cleft children was significantly associated with household income. Compared to children from low-income households, the odds of malnutrition were 1.61 times higher (COR: 1.61; 95% CI: 1.04 to 2.67) among children from middle-income households (P=0.049). However, this association was not significant after adjustment. Furthermore, the degree of malnutrition varied significantly with the type of clefts. Children with combined clefts were 2.54 times (COR: 2.54; 95% CI: 1.38 to 4.69) and 2.50 times (AOR: 2.50; 95% CI: 1.31 to 4.78) more likely to be malnourished compared to children with cleft palate, with significant differences before and after adjustment.

Similarly, children with cleft lips were 1.56 times (COR: 1.56; 95% CI: 1.07 to 2.68) and 1.58 times (AOR: 1.58; 95% CI: 1.06 to 2.36) more likely to be malnourished compared to those with cleft palate, with all differences being significant (P=0.05) (Table 3).

Discussion

The study's findings indicated that out of 498 children under 5 years with clefts attending a Hospital in Rwanda through Smile Train-sponsored facilities in low- and middle-income countries (LMICs), more than half-270 children (54.2%)-were malnourished. This finding highlights that the malnutrition among children with clefs in the study setting needs special attention. This prevalence of malnutrition was somewhat lower compared to a study conducted in Uganda by Tungotyo Martin and colleagues, which reported a rate of 68%.[12] The differences in geographical locations might explain the discrepancies observed, even though a similar methodology of nutritional assessment tools was used.
The prevalence of malnutrition in the current study was higher compared to a previous study conducted by Delage and colleagues in 2022, which reported a rate of 28.6%.[18] This could be possibly due to small sample size as compared to the global database analysis report.

In some studies, the standard deviation (Z score) method suggested by the WHO in 2022 was not utilized to define malnutrition. Another study conducted in Brazil by Montagnoli.[19] highlighted that the preferred method of assessment of malnutrition for children with clefts the 10th percentile cut-offs were used to document malnutrition. However, our study, similar to the study by Tungotyo Martin et al. conducted in neighboring Uganda, utilized standard deviations to assess malnutrition.[12] The variations in assessment methods may have contributed to the discrepancies in the statistics.

The prevalence of malnutrition in the current study was significantly higher among children in their first year of life compared to those aged four years. This finding aligns with evidence from a systematic review by Nyakotey, DA, et al.[20]

Studies from both African and non-African countries have demonstrated variations in the distribution of malnutrition[21]and cleft lip with or without palate.[12] Contrary to existing information[22]the current study revealed significant gender differences in the distribution of clefts, which aligns with findings by Samuel A. et al. in Ethiopia.[14] Additionally, a study by Butali in Nigeria[23] reported a male preponderance in orofacial clefts, which contrasts with the present findings in Rwanda. This imbalance requires further investigation, as few studies evaluating the issue have focused on gender differences. In Ethiopia[24] there was a reported female preponderance over males in all three types of clefts. Another study in Ghana[25] found that females are more affected by cleft lip, while males are more affected by cleft palate or combined clefts. Studies from Zambia and Uganda [26,27] showed a male preponderance of cleft lip and palate. Unlike the existing literature, the present findings in Rwanda showed no differences between gender and the type of clefts (cleft lip, cleft palate, or combined cleft lip and palate).

The present study also revealed variations in malnutrition and specific types of orofacial clefts. Children with combined clefts were more malnourished than those with a single cleft, either cleft lip or cleft palate. This finding is consistent with a previous study by Nyakotey DA, et al.[20] However, contrary to a study among Syrian refugee children with cleft lip and/or cleft palate, a significant association on malnutrition was detected among children with cleft lip and cleft.[22]

Empirical evidence indicates that children with clefts face financial issues, lack of awareness of treatment availability, and long distances from health facilities due to rural residency, leading to challenges in accessing healthcare services due to transportation barriers.[25]

Consistent with existing literature, a significant variation in malnutrition was identified among cleft children with varied demographic background characteristics. The prevalence of malnutrition among children with clefts was 1.56 times higher (AOR: 1.56; 95% CI: 0.91 to 2.66) among children from middle-income families and 19% lower (AOR: 0.81; 95% CI: 0.46 to 1.38) among children from high-income families compared to children from low-income families, although the difference was not significant.

Likewise, the study highlighted that the lack of provision of nutritional information was associated with malnutrition among children with clefts. Providing nutritional information has been shown to improve outcomes. A study by Tungotyo and colleagues[12] among infants with clefts at a hospital in Uganda revealed that the caretakers were predominantly mothers (98%), with 61% being over 30 years old. Similarly, our study found that 69.3% of women received post-delivery nutritional information, although the difference was not significant (P<0.853) compared to those who did not receive nutritional information. In developing countries, children with clefts from rural areas are considered more vulnerable to malnutrition due to limited economic resources, inadequate education access, and poor availability of health facilities, as supported by other studies.[28,29] Despite existing evidence, the difference in the prevalence of malnutrition by place of residence was not significant in the present study (55.2% from rural vs. 49.4% from urban areas).

Strengths and limitations

This study utilized data from a hospital record between January 2018 – July 2022 in Rwanda. This study generates very useful information from a setting where there is limited information, which could be crucial for bringing attention and intervention to this malnutrition vulnerable groups of a community. The methodology employed on data collection tools, data management strategies, and data analysis techniques, generating the findings will also help to compare with similar settings in other countries The study had some limitations. Factors related to feeding challenges, food availability, caregivers' knowledge, and socio-economic factors were not assessed because this information was not available in the Hospital records. Since this study was based on cross-sectional data, determining possible causal associations with some factors is limited, constraining our understanding of the experiences that contribute to malnutrition. Finally, our review was limited to documented cases and may underrepresent nutritional status of children under-five who were born and died out of territory and during the first hospitalization, in which malnourished children are at a higher risk of dying

Conclusion and Recommendation

This comprehensive study on malnutrition among children under 5 years with clefts attending a Hospital in Rwanda reveals a noteworthy overall prevalence of 54.2%, emphasizing the vulnerability during the first year of life, particularly in the age group of 0 to 11 months. Gender disparities were evident, with males having a higher prevalence than females. This implies a need for further investigation and appropriate intervention, as very few studies have focused on gender differences. The variation in malnutrition prevalence across age groups suggests diverse nutritional needs and the evolving impact of cleft conditions on growth and development. Notable disparities in the nutritional status of children with combined clefts versus those with a single cleft (either cleft lip or palate) indicate the influence of the type of cleft condition on nutritional status. Additionally, malnutrition prevalence was imbalanced based on demographic characteristics, including income, place of residence, and previous receipt of nutritional information. These findings underscore the multifaceted nature of malnutrition in this population,

emphasizing the importance of targeted interventions based on demographic and socio-economic factors.

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Authors' contributions
LR and OR conceptualized the study methodology and conducted a literature review, data collection. AKA did formal analysis, and writing (original draft). LR, OR, and AKA edited the manuscript. LR and AKA approved the final manuscript. AKA is responsible for the overall content as guarantor.

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Availability of data and materials
Relevant data are included in this manuscript. Additional data can be obtained from the corresponding author upon reasonable request.

Competing interests
None declared.

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