Stunting among children under five years with disabilities in Bugesera District, Rwanda: prevalence and associated factors

Nkurunziza Emmanuel (Nkurunzizaemmy6@gmail.com)
University of Rwanda
Rutayisire Erigene
University of Rwanda
Nwanna Uchechukwu Kevin
University of Rwanda
Michael Habtu
University of Rwanda

Research Article

Keywords: Associated factors, Children with disabilities, Prevalence, Stunting

Posted Date: January 22nd, 2024

DOI: https://doi.org/10.21203/rs.3.rs-3853883/v1

Additional Declarations: No competing interests reported.

Abstract

Background

Global burden of disease report shows that 49.8 million children under the age of five worldwide suffer from disabilities together with other difficulties. The most prevalent of these problems is stunting, which negatively impacts children's physical health, growth, mental development, and resilience to disease. This heightened burden is attributed to inadequate food intake, exacerbating their nutritional status and worsening their overall well-being, particularly in developing countries like Rwanda. Thus, the primary objective of this study was to evaluate the prevalence of stunting and its associated factors among disabled children under the age of five in Bugesera district, Rwanda.

Method

This was a cross-sectional descriptive study. A multistage sampling technique was applied where the first eight sectors out of 15 were randomly selected then participants were selected using a simple random technique based on probability proportion to size (PPS) in each sector. Weight was obtained using a standard electronic balance scale while height was measured using a wooden height board and children less than 24 months lengths were obtained in recumbent position. Height for age was classified according to WHO z-score standards with the help of the zscore06 stata function. Independent factors including sociodemographic and socio-economic factors were obtained through an administered questionnaire. The description of independent variables was done using frequencies and percentages. The chi-square (χ^2) test was applied to determine the associated factors of stunting among children with disabilities. Multivariable logistic regression analysis was performed to test the strength of the association. The significance level was set at 5%.

Results

In total 265 children were recruited and the majority were aged between 25-59 months and more than half 59.66% were males. The prevalence of stunting among disabled children under the age of five was 44.91%. The factors positively associated with stunning after running multiple logistic regression were: age 25-59 months (aOR = 4.18 [95% CI: 1.71 - 10.23]), incomplete child immunization (aOR = 4.4 [95% CI: 1.16 - 16.69]), and rural residence (aOR = 3.08 [95% CI: 1.05 - 8.99]. However, the father’s education in primary school was a protective factor compared to those with no education ([aOR=0.52 [95% CI: 0.30-0.90]).

Conclusion

The prevalence of stunting among under-five children with disabilities is high and being in preschool age, incomplete child immunization, and living in rural are associated with high risk of stunting among these children. There is a need to address stunting among disabled children through a strong program on

parental education about nutritional guidance and support, as well as providing high-quality healthcare including child full immunization.

Introduction

The World Health Organisation through the International Classification of Functioning, Disability, and Health (ICF) defines a disability as an umbrella term that includes limitations on activities, participation restrictions, and impairments[1]. Globally, there are about 49.8 million children under five with disability [2], and they encounter numerous challenges, including nutritional difficulties, which are very common and can lead to inadequate nutrition. This seriously affects disabled children in terms of thriving, brain development, physical growth, and susceptibility to diseases[3]Studies show that the incidence of stunting among children with disabilities is more than two times greater than that among children without disabilities [4]. A systematic review of the prevalence of stunting, wasting, and underweight in low- and middle-income countries performed by E. Emerson *et al*. among children with disabilities revealed a high incidence of stunting (49%), which is higher than the prevalence according to WHO child growth standards[5].

In developed countries such as Swaziland, a study performed by *C. Holenweg-Gross et al*. on the prevalence of undernutrition among children with profound intellectual and multiple disabilities showed different findings of a low prevalence (8%) of stunting among the study participants [6]. However, among children with disabilities between the ages of two and five, a study conducted in Turkey found a high prevalence of stunting (41.3%) [7]. Feeding difficulty is one of the challenges children with disabilities encounter, and it was found to be associated with malnutrition, especially stunting [8].

Stunting and disability are positively correlated, according to research on nutrition status among children with special needs in lower-income nations like Ethiopia and Egypt.[9][10].Other Studies done on nutrition status among children with disabilities in Nepal, Bangladesh, and Egypt all indicated a high burden of stunting among children with disabilities[10]–[12].

A study conducted in East Africa, Uganda, to evaluate the nutrition status of children with disabilities, particularly those with cerebral palsy, found that 38% of the children were stunted [13]. Similar results were also observed in the Kenyan Turkana region in a study on childhood and disability, which showed that children with disabilities have a 54% prevalence of stunting[14].

The elevated occurrence of stunting in children with disabilities is linked to various sociodemographic factors such as being male, age above 24 months, incomplete or absent immunization history, and not having exclusive breastfeeding before six months of age. These factors are consistently identified in various literature sources as associated factors contributing to the heightened prevalence of stunting in children with disabilities under the age of five[10] [4] [15]. Lack of adequate nutrients in children results in serious health-related conditions including delayed growth, increased risks of diseases, and in the worst condition death this gets worse in children with disabilities[16] [15].

In Rwanda, malnutrition in the general population among children under the age of five is still a public health problem though good progress has been made in reducing the magnitude of stunting. Trends of stunting in children under the age of five from 2000 to 2020 declined like the following but not sufficient according to WHO criteria; 47.4 %(2000), 44% (2010),38% (2015), and 33.1% (2020) respectively [17]–[19].

Through the Rwanda National Council for Persons with a Disability (NCPD), which has developed other terminologies that have replaced the traditionally known ones that sounded discriminatory toward people with disabilities among other communities, Rwanda has adopted the terms "person with disabilities" and "children with disabilities" to properly address people with disabilities[20]. The National Child Development Agency (NCD) in Rwanda launched the "Tubarere mumiryango" (Let's Raise Them in Families) program in 2012. The program's goal was to provide homes, families, or small groups of disabled children living in residential institutions with necessities. Additionally, this has improved the schooling of kids with disabilities[21]. The Rwanda Demographic Household Survey 2019–20 indicates that at least 14% of household members who are five years of age or older have a disability[17].

Different interventions have been done in Rwanda to improve the lives of children with disabilities, however, less is known about their nutrition status especially stunting, in Rwanda Bugesera District. To our knowledge, there is no study in Rwanda looking at the prevalence of stunting and associated factors among children with disabilities. Consequently, understanding the prevalence of stunting and the related factors in this population is crucial for developing tailored nutrition programs for children with disabilities. Therefore, this study was set to determine the prevalence and associated factors of stunting among children with disabilities.

Methods

Study setting and study design

This was a descriptive community-based cross-sectional study that focused mainly on children aged 0 to 5 years between 2021 and 2022 in the Bugesera District. The administrative divisions of Rwanda include provinces, districts, sectors, cells, and villages. It is a country in eastern central Africa. Bugesera, which is populated with 523,999 inhabitants, is 15 kilometers away from Kigali, the country's capital, and due to its proximity to the capital city, the ongoing construction of the international airport, and the modernization of its agriculture, the economy in the area is experiencing rapid growth. The 2022 map of children with disabilities in Bugese ra shows that there are 3736 children between the ages of 0 and 18; however, our target population consisted of 1012 children from birth to age five[22].

Sample size calculation

The study targeted children less than five years old with limitations on activities, participation restrictions, and impairments. The sample size was obtained using the *Cochran (1977)* formula assuming the

prevalence of stunting among children with disabilities under the age of 5 to be (**p) 34%** about similar studies in the same context done in Kenya [14]with desired level precision of (**d)** 0.05, critical value of desired confidence level ((1.96) and 95% confidence from targeted children with disabilities in Bugesera of 1012.

$$n = \frac{z^2 pq}{d^2}$$

$$q=1-p$$

$$n = \frac{3.8416x0.34x(1-0.34)}{0.0025}$$

$$n = 345$$

A correction formula was used to calculate the actual sample size because the sample size was less than 10,000.

$$fn = \frac{345}{1 + (345-1)/1012}$$

$$fn = \mathbf{257}$$

$$fn = final\ sample\ size$$

N*: population size*

*10% was added as a predicted non-response, and the final sample size was 254+24=**282***

Sampling technique

A multistage sampling technique was applied to obtain 282 participants. From 15 sectors 8 sectors were randomly selected, and from each sector, probability proportion to size (PPS) sampling was used to determine the number of children. The study participants were obtained from each sector by simple random technique from the list of all children with disabilities under the age of five in that sector. MS Excel was used to generate random numbers to sample target populations differently.

Data collection and measurement

For information on sociodemographic and socioeconomic factors, an interviewer-administered questionnaire was used and every interview took less than 30 minutes from each participant. *Kobo toolbox application was used* to collect data and later was downloaded in the form of Excel for cleaning and imported into STATA software for analysis. Sociodemographic factors**:** Sex, Age, child birth order, birth weight, Child vaccination history, place of residency, type of disability, and child deworming history: Age was categorized into two main groups' children aged less than 24 months and the second group was between 25 months and 59 months, Birthweight; children born with weight less than 2500 grams were classified as low birth weight and children who had birthweight above 2500 grams were classified as normal birth weight. Child vaccination history was also grouped into completely immunized and incompletely or not immunized in one category. Location as a place of residency children coming from a sector where the district office is located were classified as urban residency while those from other sectors were classified as rural residency. Socioeconomic factors: *Ubudehe category (socioeconomic status)***,** *parents education and occupation, Access to safe drinking water and Sanitation*: Ubudehe category was classified as 1st to 3rd category according to Rwanda local government classifications, Mother and father education was categorized into No formal education (those who haven't attended formal education), primary education, those who attended secondary school and higher were grouped into secondary and upper education category. Father and mother's occupations were categorized into Office jobs, blue-collar jobs, farm, and no job. Access to safe water was categorized into basic (those who obtain drinking water from improved tap water at their home or at least those who use less accessible community tap water), and unimproved was categorized for families who use dams, rivers, and lakes. Sanitation is classified as basic (flash toilet with treated disposal or improved pit latrine with slab), limited(improved pit latrine without slab), and unproved no toilet.

Weight was obtained using standard electronic balance scales with children's heavy clothes and shoes removed, height was measured using a wooden height board children less than 24 months length were obtained in recumbent position and those who couldn't support themselves were supported by their caretakers. To ensure the reliability of data, data collectors were trained on how to measure height and weight, repeated practices were done, measuring instruments were set at standards and multiple measures were taken to ensure accuracy. Classification of anthropometric measures was obtained according to WHO z-score standards. Height-for-age(HAZ) was calculated using the anthropometric calculator command in Stata software and findings were classified according to WHO Z-score, the research outcome variable stunting was obtained as a dichotomous variable where 1 was stunting HAZ<-2SD and 0 no stunting HAZ >2SD.

Statistical analysis

After obtaining the row data, completeness was cross-checked and the data were entered into STATA MP.v015 for analysis. Description of variables were obtained through percentages and frequencies for all

independent variables. Height for age was obtained by the zscore06 function in Stata. For bivariate analysis cross tabulation was done between dependent variables with independent variables and a chi-square (X^2) test was used to determine the associated factors of stunting among children with disabilities. To control confounding variables, multivariable logistic regression analysis was used among the variables that showed significant association during bivariate analysis. The degree of relationship was assessed using odds ratios (ORs) with 95% confidence intervals; a p-value of less than 0.05 was regarded as statistically significant.

Results

Sociodemographic characteristics of study participants

A total of 265 children under the age of five with disabilities participated in this research which is equivalent to a 94% response rate. Among 265 children with disabilities; male to female ratio was 1.2:1. The mean age was 43 months with a standard deviation of ±13.86 and (225) 86.42% were between 24 and 59 months. There were more children born after the fourth child among the participants 107(40.38%). Most of the children 238(89.51%) had normal birth weight. There was a big percentage of 251(94.72%) of children who completely got all required child immunizations of the majority 239(90.19%) of children were living in rural areas. Household sizes of members between five and seven were 94(35.47%) and families composed of more than seven members were 97(36.60%). Orthopaedic and multiple disabilities were the most common disabilities among the children who participated in the research 92(34.72 %) and 73(27.55 %) respectively. Children with a history of getting at least one tablet of albendazole every three months were 181(68.30%). (see **Table 1**).

Children with disabilities from families in the first, second, and third ubudehe categories were 43(16.23%), 135(50.14%), and 87(32.82%) respectively; more children with disabilities came from second ubudehe category families. The findings also show that 95.47% of children came from families that use community health insurance (CBHI) rather than other health insurance and no insurance. Primary school was the most optimal education level for fathers and mothers 127(51.70%) and 143(53.96%) respectively; there were very few who attended higher education. The research also found that farming was the most common occupation for both parents. Access to safe drinking water among the families with study participants where 209 (78.87%) of children come from households that at least have access to basic tap drinking water and the rest use unimproved water sources like dams, lakes and rivers while children from families with at least basic sanitation flash toilet or pit latrine with slab was 258 (97.36%) and the rest were unimproved pit latrine without slab or open defecation 7(2.62%). (see **Table 2**).

Table 1 Sociodemographic characteristics of the study participants (n= 265)

Characteristics	Number	Percentage(%)
Gender		
Female	119	44.91
Male	146	55.09
Age group(months)		
0 - 24	36	13.58
25-59	229	86.42
Childbirth order		
Firstborn	40	15.09
Second	54	20.38
Third	41	15.47
Fourth	23	8.68
After the fourth Child	107	40.38
Child Birth weight (Grams**)**		
Low birth weight	27	10.9
Normal birth weight	238	89.81
Vaccination History		
Completely immunized	251	94.72
Incomplete immunized	14	5.28
Place of residence		
Urban	26	9.81
Rural	239	90.19
Type of disability		
Autism	2	0.75
Hearing disability	7	2.64
seeing disabilities	43	14.96
Mental health problems	6	2.26
Hearing and seeing disabilities	2	0.76
Multiple disabilities	73	27.55

Orthopedic disabilities	92	34.72
Speech disorders	4	1.51
Cerebral Palsy	24	9.06
History of deworming (Every 3 months)		
Get Albendazole	181	68.3
Do not get Albendazole	84	31.7

Table 2. Socioeconomic characteristics of the study participants (n=256)

Characteristics	Number	Percentage (%)
Ubudehe category		
One	43	16.23
two	135	50.94
three	87	32.83
Health Insurance		
Community-based health insurance	253	95.47
Private health insurance	4	1.51
No health insurance	8	3.02
Mother's education		
No formal education	103	38.87
Primary education	143	53.96
Secondary and upper education	19	7.17
Father's education		
No formal education	99	37.36
Primary education	137	51.7
Secondary and upper education	29	10.94
Mother's occupation		
Office job	2	0.75
Blue collar job	9	3.40
Farmer	168	66.79
No job	79	29.06
Father's occupation		
Office job	7	2.62
Blue collar job	11	4.15
Farmer		63.4
No job	77	29.8
Source of drinking water		

Basic tap water	209	78.87
Unimproved	56	21.13
Sanitation		
Flash toilet/pit latrine with slab	258	97.36
Pit latrine without slab/no toilet	7	2.64

Prevalence of stunting in children under five years of age with disabilities in the Bugesera district

The prevalence of stunting (HAZ <-2 z score) among children with disabilities under the age of five in the Bugesera district was 44.91% (95% CI; 38–51).

Factors associated with stunting among children with disability

Factors associated with stunting among children with disabilities were obtained through bivariate analysis using the *Pearson chi-square test.* Among demographic characteristics child's age (p=0.001), immunization history (p = 0.001), and place of residence were significant, (p =0.005), mother's education (p = 0.045) mother's occupation (p = 0.045), and fathers' education (p = 0.027) (see **Table 3**).

Table 3. Factors associated with stunting among children with disability

	Stunting			
Characteristics	**Yes n(%)**	**No n(%)**	**X^2 Value**	**P value**
Gender			1.82	0.177
Male	71(59.66)	75(51.37)		
Female	48(40.34)	71(48.63)		
Age group(months)			10.91	**0.001**
0 - 24	7(5.88)	29(19.86)		
25-59	112(94.12)	117(80.14)		
Child order			4.37	0.357
First	15(12.61)	25(17.12)		
Second	29(24.37)	25(17.12)		
Third	17(14.20)	24(16.44)		
After the fourth Child	45(37.82)	62(42.47)		
Child Birth weight(Grams)			3.89	0.24
Low birth weight	15(12.61)	12(8.22)		
Normal birth weight	104(87.39)	134 (91.78)		
Child immunization history			6.77	**0.009**
Completely Immunized	108(90.76)	143(97.95)		
Incompletely Immunized	11(9.24)	11(9.24)		
Place of residence			3.7	**0.005**
Urban	7(5.88)	19(13.01)		
Rural	112(94.12)	127(86.99)		
Type of disability			7.03	0.855
Autism	2(1.68)	0(0.00)		
Hearing disability	4(3.36)	3(1.37)		
seeing disabilies	15(12.61)	22(15.07)		
Mental health problems	2(1.68)	4(2.74)		
Hearing and seeing disabilities	1(0.84)	1(0.84)		

Multiple disabilities	31(26.05)	42(28.77)		
Orthopedic disabilities	41(34.45)	51(34.93)		
Speech disorders	2(1.68)	2(1.37)		
Cerebral Palsy	11(9.24)	13(8.90)		
Autism	2(1.68)	0(0.00)		
History of deworming (Every 3 months)			0.04	0.848
Get Albendazole	82(68.91)	99(69.81)		
Do not get Albendazole	37(31.09)	47(32.9)		
Ubudehe category			0.51	0.773
One	21(17.65)	22(15.07)		
two	58(48.74)	77(52.74)		
three	40(33.61)	47(32.19)		
Health Insurance			3.52	0.171
Community based health insurance	116(97.48	137(93.84)		
Private health insurance	2(1.68)	2(1.37)		
No health insurance	1(0.84)	7(4.79)		
Mothers's education			6.19	**0.045**
No formal education	56(47.06)	47(32.19)		
Primary education	55(46.22)	88(60.25)		
secondary and upper education	8(6.72)	11(7.53)		
Mother's occupation			6.48	**0.045**
Office job	2(1.68)	0(0.00)		
Blue collar job	6(5.04)	3(2.05)		
farmer	72(60.50)	105(71.92)		
no job	39(32.77)	38(26.03)		
Fathers' education			7.21	**0.027**
No formal education	51(42.86)	48(32.88)		
Primary education	51(42.86)	86(58.90)		
Secondary and upper education	17(14.29)	12(8.22)		

Father's occupation			4.26	0.235
Office job	3(2.74)	4(2.74)		
Blue collar job	3(2.52)	8(5.48)		
farmer	78(65.55)	105(71.92)		
no job	35(29.41)	29(19.86)		
Source of drinking water			2.15	0.142
Basic tap water	89(74.79)	120(82.19)		
Unimproved	30(25.21)	26(17.81)		
Sanitation				
Flash toilet/pit latrine with slab	114(95.80	144(98.63)	2.04	0.153
Pit latrine without slab/no toilet	5(4.20)	2(1.37)		

Multivariable logistic regression analysis on factors associated with stunting

Children between the age category 24 to 59 months (preschooler) were 4 times more likely to be stunted than the children below the age of 24 months ([aOR=4.18 [95% CI: 1.71 - 10.23]). Children who have a history of being partially or not immunized were at a 4.4 times higher risk of being stunted compared to those who were fully immunized ([aOR=4.4 [95% CI: 1.16 - 16.69]). Children who are located in rural areas were positively associated with stunting ([aOR=3.02 [95% CI: 1.05 - 8.99]) compared to those in urban areas. Children whose fathers attended primary school were 0.52 times less likely to be stunted ([aOR=0.52 [95% CI: 0.30- 0.90]) compared to those whose fathers never attended school. (see **Table 4).**

Table 4. Multivariate logistic regression analysis of factors associated with stunting

Characteristics	AOR [95% CI]	P value
Age group(months)		
0 - 24 (infants)	1.00	
25-59 (Preschooler)	4.18[1.71 - 10.23]	0.002
Vaccination History		
Complete immunization	1.00	
Incomplete immunization	4.4[1.16 - 16.69]	0.029
Location		
Urban	1.00	
rural	3.08[1.05 - 8.99]	0.039
Mothers' education		
No formal education	1.00	
Primary education	0.51[0.24 - 1.06]	0.072
secondary and upper education	0.42[0.12 - 1.40]	0.055
Fathers' education		
No formal education	1.00	
Primary education	0.52[0.30- 0.90]	0.021
Secondary and upper education	1.26[0.53 - 2.91]	0.59

Discussion

This study aimed at determining the prevalence of stunting and associated factors among children with disabilities who are under the age of 5 years in Bugesera district in Rwanda. The prevalence of stunting among children with disabilities was 44.91%, which was higher than the 33.1% national prevalence of stunting in the same age group for all children [17]. This significantly shows that the prevalence of stunting is much higher among children with disabilities according to the WHO recommended significance cut-off, height-for-age of below -2 standard deviation(SD) of the WHO standards [23].

Similar research results have been found in Nepal, where a comparative study of the nutrition status of children with disabilities revealed a higher prevalence of 45%. This finding was primarily attributed to the type of disability, the severity of the disability, the parental economic status, and the child's ability to feed themselves. [24]. The similarity reflects the same characteristics and context of this study's participants who had multiple disabilities and came from low socioeconomic status families. A correlating study done in Zambia to assess the burden of malnutrition among children with disabilities challenges and

opportunities found similar findings of high prevalence of stunting 46%[25]. The similarity in findings both Zambia and Rwanda share common socioeconomic characteristics, poverty, and unequal distribution of resources within the household, access to sufficient healthy food is frequently a subject of concern for families with a disabled member in both contexts [26].

However, there is a similar study that found less prevalence compared to the research findings done in Kenya Turkana by Hannah *Kupaer et Al*. to associate malnutrition and disability among children where they found out that the prevalence of stunting is higher in children without disabilities compared to the control group of children with disabilities by 34% and 23% respectively. The reason behind fewer findings is that in Kenya some children were selected from a rehabilitation center making them exposed to more improved healthcare and diet than in the study population whereas study participants were cared for by their families[27]. A higher prevalence of stunting among disabled children was reported in research done in Bangladesh where the prevalence was 1.7 times more than this research findings and this can be attributed to a high percentage of illiteracy of the children's mothers[28].

The main factors contributing to stunting among children with disabilities were the child's age, immunization history, and residence. Older children between 25 months and 59 months were 4 times more at risk of being stunted than children under 24 months of age and similar findings were reported by other researchers from Saudi Arabia, Bangladesh, and Kenya [29][30][27]. Children with disabilities who are above the age of 2 years are prone to stunting due to many general reasons but this is normally where a child starts supporting him or herself like feeding and playing with others which have a big contribution to the child's body metabolism, this is also the time where most parents wean the child off the breastfeeding which have been playing a big role in term of providing nutrients to the child[31].

The study findings show that children who have not received or are partially immunized are four times more prone to stunting than those who are fully vaccinated. Research in Nigeria looking at the association of child vaccine uptakes and undernutrition showed that vaccination adherence was consistently associated with a lower risk of stunting similar findings were also reported by Thai researchers where children who were incompletely immunized were 1.47 higher to be stunted than those fully immunized[32], [33]. Child immunization provides immunity to the body to fight different ranges of infections; the lack of child vaccines can indirectly contribute to stunting through its impact on the overall health and immunity of the child. Infections can lead to decreased appetite, nutrient malabsorption, and increased nutrient requirements for recovery from repeated infections which may result in chronic gut inflammation, leading to poor nutrient absorption and utilization, which can ultimately lead to stunted growth[34]

The study's conclusions also indicate that children with disabilities who live in rural areas are more likely to experience stunting; similar results were seen in studies conducted in Mozambique and Nigeria[35] [36], scale Agricultural activities carry more than 80 percent of all household income generating activities in Bugesera district of Rwanda which experience extended drought that is associated with inconsistent and insufficient rainfall hence leading to food insecurity in the region[37].

However, other studies show no significant difference in the magnitude of stunting among children living in rural areas to those living in urban areas [38].

Although gender was not statistically significant, the prevalence was higher among males 59.66% (CI 95%; 40.28 - 57.03) children with disabilities females 40.34 %(95%CI; 31.44 - 49.71). Male children are more likely to grow stunted than girls in Rwanda and Sub-Saharan Africa, which may be attributed to biological differences between male and female boys more often having higher metabolic rates and energy expenditure than girls. They might require more calories to maintain their growth rate, and if their nutritional intake is inadequate, they could be more susceptible to stunting[39], [40] education was significantly associated with a lower prevalence of stunting among children with disabilities. The higher education status of the parents was associated with a reduced trend in the prevalence of stunting of their children. Other research also is in connection with the research findings where both educated parents correlate with less prevalence of stunting[12][41]. Low level of education and lack of nutritional education of caregivers of disabled children may worsen the severity of health challenges they face due to lack of proper information and guidance on providing adequate nutrition to meet their child's specific needs. Children from educated parents are less likely to be stunted due to a variety of factors related to knowledge, awareness, socioeconomic status, and healthcare access. Educated parents often have a better understanding of the importance of proper nutrition for child growth and development. They are more likely to be aware of the nutritional needs of their children and make informed choices regarding their diet, hence parental education can influence a child's likelihood of stunting[42].

Strengths and Limitations of the Study

The results of the study were the first to provide baseline data that can be used as a basis for future research and intervention strategies among children with disabilities in Rwanda. It also offers a current and thorough snapshot of the prevalence of stunting and associated factors among disabled children in Bugesera District. This was a community cross-sectional study design, limiting the ability to infer causation or determine the directionality of the relationship between stunting and its associated factors.

Conclusion And Recommendations

This study aimed to assess the prevalence of stunting and associated sociodemographic and socioeconomic factors among disabled children aged less than five years from the Bugesera district in Rwanda. The findings showed that the prevalence of stunting among the study participants was 44.91%, whereas the current prevalence of stunting among the general population was 33.1%. Orthopedic-related disabilities and multiple disabilities were the most common disabilities experienced by the children. The main significant factors associated with stunting were child age, child immunization history, parental education level, and child residence. The children aged between 25 months and 59 months had a greater incidence of stunting than the children aged younger than 24 months. A fully immunized child was a protective factor against stunting. Stunting in the general population of Rwanda among children under the age of five is still a public health problem; however, with children living with disabilities, the situation

is worse. Addressing this public burden requires intervention programs that involve parents, local communities, and policymakers. Future studies to address the limitations of this research should involve collaboration with experts in disability studies to ensure optimal and specialized approaches for these study populations. Future researchers should apply a case-control and longitudinal or cohort to identify the cause-effect relationship.

List Of Abbreviations

ADHD: Attention deficit hyperactivity disorder

aOR: adjusted odds ratio

BMI: Body mass index

CFSVA: Comprehensive Food Security and Vulnerability and Nutrition Analysis Survey

CI: Critical interval

DHS: Demographic Health Survey

FANTA: Food and Nutrition Technical Assistant

HAZ: Height for Age

LMICs: Low- and middle-income countries

MOH: Ministry of Health

MUAC: Middle upper arm circumference

NCPD: National Council of Persons with Disability

SDG: Sustainable Development Goal

UNCRPD: United Nations Convention on the Rights of Persons with Disabilities

UNICEF: United Nations International Children’s Emergency Fund

WAZ: Weight for Age

WHO: World Health Organization

WHZ: Weight for height

LMICs: Low- and Middle-income countries

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the University of Rwanda Institutional Review Board (IRB) with Ref: CMHS/IRB/280/2023, and a full protocol and ethical approval letter were provided to all necessary authorities that had direct influence on the research. Before the data were collected, a written consent form was signed by the child caretaker.

Consent for publication

Not applicable

Availability of data and material

The datasets used and/or analyzed during the current study are provided by the corresponding author upon reasonable request.

Conflict of interest

The authors declare no competing interests.

Funding

This research was conducted without any external funding.

Author contributions

Emmanuel Nkurunziza, University of Rwanda College of Medicine and Health Sciences, School of Public Health, Department of Community Health.

Erigene Rutayisire, University of Rwanda College of Medicine and Health Sciences, School of Public Health, Department of Community Health.

Nwanna Uchechukwu Kevin, University of Rwanda College of Medicine and Health Sciences, School of Public Health, Department of Community Health.

Michael Habtu, University of Rwanda College of Medicine and Health Sciences, School of Public Health, Department of Community Health.

Contributions

Conceptualization: EN, Data collection, analysis, and report writing. ER&MH: original draft supervision. NUK reviewed the manuscript. All the authors have read and approved the final manuscript.

Corresponding author

Correspondence to Emmanuel Nkurunziza MD, MPH

Acknowledgment

I am incredibly appreciative of my supervisors for their unwavering patience and constructive criticism, which helped me advance my research abilities. Furthermore, this activity would not have been feasible without the amazing assistance of Bugesera district community health officers and staff.

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