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Factors Associated With Stunting Among Children Under Two Years Attending Immunization Program in Nyabihu District, Rwanda.

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Abstract

Chronic malnutrition remains a public health problem at global level where 149 million children are stunted. In Rwanda 33% children under-five years are stunted and Nyabihu District has 46% of under five Children stunted. The integration of nutritional services in immunization program was found as a foundation for improvement of nutrition status. The study investigated the factors associated with stunting of children attending immunization program. The study used a cross-sectional design with a quantitative approach. The target population was 767 children who were expected in immunization program on a monthly basis. A sample of 352 mothers who brought their children for immunization program were interviewed for this study. Convenience sampling was used to choose 4 heath centers among 16 health centers of Nyabihu District. Simple random sampling was utilized to choose mothers children pairs who attended immunization program in 4 selected health centers. Data was entered and analyzed by SPSS Version 16. Descriptive analysis was used to analyze stunting while logistic regression analysis for socio-demographic profile and feeding practices was used with a significant level of 0.05. Ethical clearance was obtained from MKU, District and from respondents. A pre-established questionnaire prepared in English was translated in Kinyarwanda and was used in one-to-one interview with selected participants. The big proportion of Children 94.6% had normal nutritional status/height for age and only 5.4% were stunted. Socio-economic and demographic factors that were associated with stunting includes age, gender, marital status, family size, education level, ubudehe categories, occupation, and monthly income. The bivariate analysis indicated the association between ubudehe category (P=0.049), occupation (P=0.004) of mothers and stunting. The logistic regression analysis revealed that children who were sometimes fed a balanced diet were more likely to be stunted compared to those who were always fed a balanced diet (AOR=3.70, 95% CI: [1.045-13.135], P=0.043). Children whose mothers sometimes seek care when they are sick were nine times more likely to be stunted compared to those whose mothers always seek care when they are sick (AOR=9.36, 95% CI: [2.032-43.165], P=0.004). Feeding practices were exclusive breastfeeding, frequency of feeding a child with a balanced diet per day, meal frequency, responsiveness, the time spent in feeding a child, frequency of breastfeeding a child per day, time spent in playing with a child. The bivariate analysis showed that time for breastfeeding a child (P<0.001), seeking care for a sick child (P<0.001), hand washing practices (P< 0.001), feeding a child with balanced diet (P=0.030), feeding a child with animal source food (P=0.023) were significantly associated with stunting. The results from logistic regression analysis revealed that children who were sometimes fed a balanced diet had been more likely to be stunted compared to the ones who were always fed a balanced diet (AOR=3.70, 95% CI: [1.045-13.135], P=0.043). Children whose mothers sometimes seek care when they are sick were nine times more likely to be stunted compared to the ones whose mothers always seek care when they are sick (AOR=9.36, 95% CI: [2.032-43.165], P=0.004). Children attending immunization program in Nyabihu District had good nutritional status. Stunting were associated with poverty, low maternal education level, poor hand washing practices of mothers and lack of animal source food. Nyabihu District should advocate for the poorest and unemployed mothers to access income generating activities and reinforce community cooking demonstrations.

Keywords: *Immunization program, Nutrition status, Nutritional services in immunization program Stuntin.,*

1 Introduction

Malnutrition continue to be a public health concern in Rwanda among children. According to DHS (2020), 33% of children were stunted (too short for their age) this shows chronic malnutrition and among them 12.9% are severely stunted. Wasting (too thin for height) which indicate acute malnutrition (1%). Eight per cent (8%) of Rwandan children are underweight (too thin for their age). This can be caused by improper feeding practices, low coverage of nutrition interventions because malnutrition is high in the period that children are supposed to be vaccinated and receive complementary feeding as well. Nyabihu district has immunization coverage of 97% with prevalence of stunting equal to 46% which is higher than the one of national level (33%) among them 12.9% were severely stunted. This situation called for investigation on factors related with stunting of children under two years attending immunization program (DHS, 2020). Hence, it is with such background that this research was conducted to identify the factors related with stunting among children under two years attending immunization program in Nyabihu District.

The research objectives were:
i.To assess nutritional status of the children under two years screened in immunization program.
ii.To find out socio-economic and demographic factors associated with stunting among under two years children who attended immunization program.
iii.To identify the feeding practices associated with stunting among children attending immunization program.

2. Review of Literature

2.1 Review of Empirical Studies

Immunization and good nutrition in 1000 days, are essential for child growth especially mental, physical and psycho affective and support the children to reach their full potential in the future. Immunization coupled with nutrition services improve nutritional status. To determine nutritional status of children, the anthropometric measurement (height for age) is very useful in monitoring child growth and reflects earlier childhood nutritional status (MOH, 2014). In Indonesia children who regularly attend immunization visits are most likely to have good nutrition status (Paknawin, Jarvis, Husaini, Jahari, & Politt, 2000).

A study conducted by the World Bank in Peru showed that the government of Peru focused on two vaccines against pneumococcus and rotavirus and indicated that it brought high impact in reducing stunting by half means 28% to 13% from 2005 to 2016 respectively (Marini, Rokx, & Gallagher, 2017).The research conducted in Zambia, Madagascar, Tanzania and Zimbabwe by Doherty and Chopra M. found out that nutrition and health status of children has improved by integrating anthropometric measurement, complementary feeding, nutrition education, Vitamin supplementation in immunization program (Tanya, et al., 2010). A study conducted in Ethiopia found that a lot of children who had been vaccinated against measles were associated to low percentage of acute malnutrition in young children (Chiara, Tefera, & Debarati, 2016) ; in the same approach, in Kenya children who are regularly vaccinated were 27% less likely to be stunted (Constance & Nanette, 2012). Many studies related to impact of vaccines found out that children from the areas of elevated degree of immunization have a good nutritional status.

Immunization can also lead to lower rates of child malnutrition in high-risk populations. An analysis conducted in areas of Ethiopia with high proportions of refugees found that high measles vaccination coverage was linked to lower rates of acute malnutrition in children under five. Each percentage point increase in measles vaccination coverage was associated with a 0.65% decrease in the rate of acute malnutrition in these areas (Altare C, 2016). A research conducted in Papua New Guinea (PNG) aimed to determine the vaccination and nutritional status of children less than 5 years old in the remote and rural Karawari area of PNG. 85% of children had incomplete vaccination, children above the median age of 32 months (34%) were more likely to be fully vaccinated for their age, $\chi 2\ (1) = 23.294$, $p < 0.005$. In addition, and 25.5% below the -1 SD for height-for-age compared to WHO standards. A large proportion of children had poor nutrition status and lack protection from vaccine preventable diseases (Louis Samiak, 2017).

A study conducted on the impact of maternal education and work on the nutritional health of children under the age of three in India, was found that most (92.20%) of the mothers were housewives or were unemployed, though most extreme beneath nutrition (88.46%) was found in children whose mothers were untalented laborer by occupation, though children of housewives were found to be only 59.22% undernourished (Shaili Vyas, 2011). A study conducted in Ethiopia found that large family size was considered as critical factor associated with stunting (Getnet, Solomon, & Mekonnen, 2018).

Another study on the impact of socio-economic and nutritional attributes on child growth in kwale district of Kenya, Mothers occupation was found as a factor that influences child nutritional status, In the same study conducted by Adeladza, It is found that Children aged 20-23 months were the foremost susceptible to malnutrition in the research area, which demonstrates the helplessness of children amid the weaning move. Malnutrition increases quickly and gets to become common amid the weaning move (Adeladza, 2009). The education level of a mother play a great role in improvement of child health as it is highlighted in the study Effect of mother's education on child's nutritional status in the slums of Nairobi (Benta, James, & Elizabeth, 2012). Generally, mothers' education holds on as a solid indicator of children nutrition status in city ghetto settings, indeed after directing for other factors. Assuming that stunting could be a solid indicator of human assets, Focus on girl-child education may grant to breaking the destitution cycle in city destitute settings.

Cally Mathews (2006) says that wellbeing and slim down naturally connected with the wellbeing hole extending; there is an affiliation between those at the lower conclusion of the gap and higher risk of disease. Lower wage gather have been appeared to have insufficient dietary level in their diets. With affordability cited as the major reasons why low income groups experience inadequate nutrition, many studies places great importance of eating whole grains, low fat foods and a minimum of 5 fruits and vegetables a day, however despite public data many still take far less than the recommended sum per day; especially low income group. This put them to more risk of getting disease and losing their lives.A study conducted in India revealed that stunting was found to be highly correlated with economic status of the population, Children in poorest households have higher risk of stunting compared to those from highest quintiles (Barun Kanjilal, 2010).

A Global report released by Water Aid in 2016, showed that 25% of stunted cases in children under two years' is caused by chronic diarrhea linked with inadequate Water Sanitation and Hygiene, A quarter of all cases of stunting are assessed to be straightforwardly caused by chronic diarrhea in the first two years of life (and 88% of cases of diarrhea are caused by insufficient WASH) (Jo, Dan, & Megan, 2016).Khan M (2011) conducted a research on Feeding practices and nutritional status of children under two years of age in Mymensingh, Bangladesh. The goal of the study was to evaluate breast feeding patterns, complementary feeding patterns, types of supplementary foods and nutritional status, as well as to see if there was any link between nutritional status and feeding practices. Out of 400 children, Complementary nourishing begun in time in 35.8%, early weaning in 44.5% children. Around 29% children were stunted among 11.25% were extremely stunted (Khan, et al., 2011).

Different studies revealed the elements that influence children's nutritional status. Research conducted in Ghana by Saaka in 2014, showed that there is a high significant association between maternal childcare knowledge and the child growth (height for age), the findings of this investigation are similar to those found by Muller in his research for developing countries where it was highlighted the relationship between mothers nutritional education and long-term wellbeing of children in terms of height for age (Saaka & Mahama, 2014). Rwanda nutrition situation Analysis conducted by World Bank in 2017, revealed that food diversity, meal frequency, frequent illnesses, hygiene, child care and feeding practices were associated with stunting in children under two years (World Bank, 2017).

Recent studies conducted found out the association of stunting and child related feeding practices. For children who are already undernourished, infectious diseases can worsen the nutritional status and reduce the child's ability to respond to nutritional interventions. For example, vitamin A during a measles outbreak or episode is critical, and measles vaccine is part of the systematic treatment provided to all acutely malnourished children admitted in treatment programs. Repeated bouts of diarrhea have been found to be associated with up to 43% of stunting cases (Richard L. Guerrant, 2012). A Cross-sectional study of secondary data analysis using the 2012 Ecuador National Health and Nutrition Study, aimed to analyze the prevalence of breastfeeding and complementary feeding practices and explore the association with stunting indicated that in 625 children aged 0-23 months, Twenty-six-point eight percent (26.8%) of the children were stunted. Stunting occurred mainly in children with rural residence, on poor households, and where there were four or more children. Most of the children had a timely initiation of breastfeeding (69.5% for 0-12 months and 75.5% for 13-23 months) and exclusive breastfeeding up to six months (78.2%). Among children between 6-12 months of age, 99.3% continued to be breastfed. In children from ages 6 to 12 months, 32.5% received food with adequate dietary diversity. Lower percentages of complementary feeding occurred in the poorest, adolescent mothers or those with less education. Children who did not receive the minimum frequency of meals for their age had higher odds of stunting (OR 3.28; 95% CI 1.3, 8.27). Children from age 19 to 23 months who consumed foods rich in iron showed lower probabilities of stunting (OR 0.04; 95% CI 0.00, 0.51) (Betzabé Tello 1 2, 2022).

2.2 Theoretical Framework

This research was led by theory of integration adopted by WHO as the fourth of its six guiding principles with emphasis on strong immunization program. The integration has been proposed as one of the strategies to improve coverage, efficiency of immunization program and other health and nutrition programs (WHO, 2018). Hence the factors associated with stunting in children under two years attending immunization program got to be examined so that the ones with high impacts should be prioritized. The above theories enabled the researcher to establish the conceptual framework as follows:

2.3 Conceptual Framework

The study comprises the independent and dependent variables described as follows:

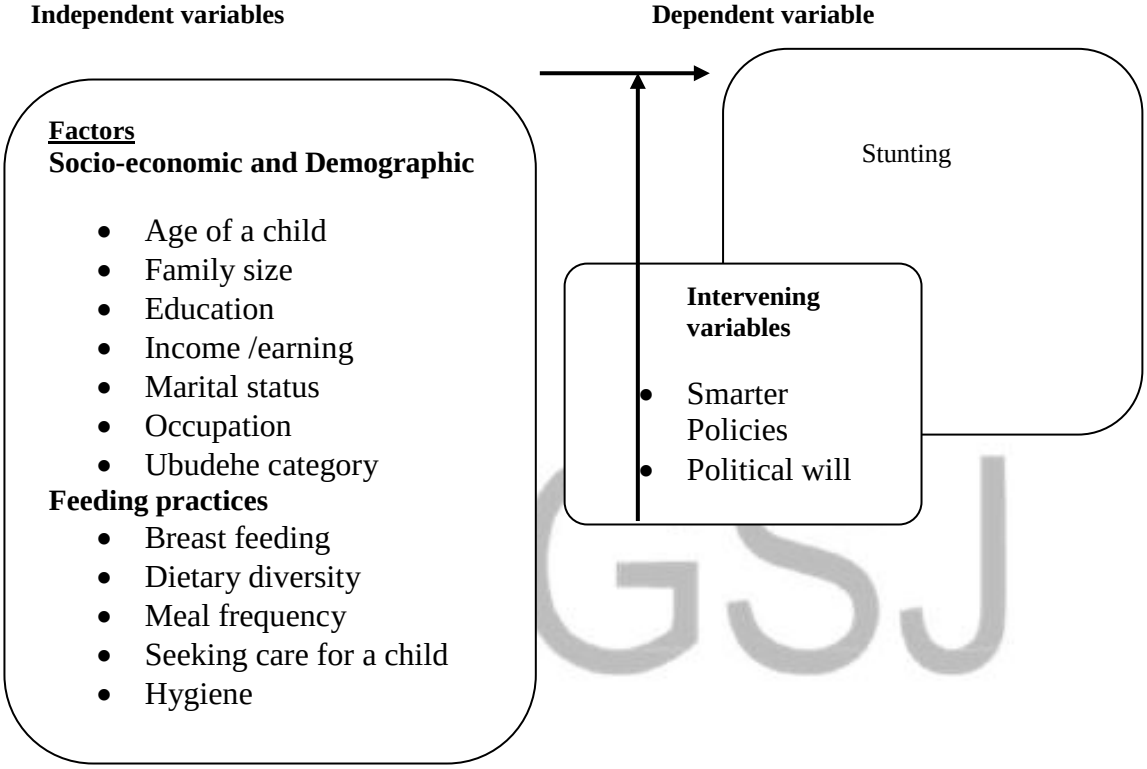


Figure 1: Conceptual Framework

This diagram has focused on three types of variables; independent, intervening variables and dependent variables. The independent variables are factors related to Socio Economic and Demographic (age of a child, family size, education, income, marital status, occupation and ubudehe category) and Feeding practices (breastfeeding, balanced diet, meal frequency, seeking care for a sick child and hygiene). Intervening variables (smarter policies and political will), then these variables contribute to the dependent variable which is Stunting among children under two years in Nyabihu District..

3. Materials and Methods

This study employed descriptive cross-sectional study design. This study design was fitting with this research because the collection of data was conducted at a point in time and data was not intended to show the causality of malnutrition but showed the nutritional status of children under two years in Nyabihu District.This study used a quantitative approach in the descriptive components of factors associated with stunting in immunization program. The target population comprises children under two years and their mothers attending immunization program in Nyabihu District. In accordance with Nyabihu District Health unit, a total of 767 children attended immunization program per month, this number served as the target population in this study.

Sample size using the Fisher's formula which is:

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

Where,

n = sample size

z = normal standard deviation at 95% confidence level = 1.96

p = the proportion in the target population estimated to have characteristics being measured as the prevalence of severe stunted in children under five years in Nyabihu = 46%

q = 1- p

d = statistical significance level = 0.05

Z= [(1.96). (1.96)]. (0.46). (0.54)/ (0.05) (0.05) =382

The number of respondents were 382 Mothers-Children pairs.

This paper used Simple random sampling was chosen for its advantage of giving every unit of the population an equal probability of being selected for the sample (Kothari & C.R., 2004). Mothers who had children of age from 0 to 2 years in immunization program were the respondents. Convenience sampling was utilized to choose the 4 health centers, representatives of 16 health centers in the whole district. Health centers were selected considering the location, stunting rates, and immunization coverage. A health center with higher immunization coverage and high prevalence of stunting was selected. The four selected health centers are Bigogwe, Kareba, Rwankeri and Kora. In this research a structured questionnaire was utilized to gather data from the mothers located in the study area. The questionnaire had the following parts: Section 1: Socio-economic and demographic characteristics of mother-child pair, Section 2: Nutrition status of the children under two years. Section 3: Maternal feeding practices. The height board (an instrument which are used to measure the standing height of children of two years and older and adults, or the recumbent length of infants less than two years of age) were used to measure the height of the children and Immunization cards were used to record the age (in months) of the children. After data collection, data was coded, entered in computer and analyzed through SPSS software for interpretation and discussion. Specifically, for objective one the researcher used descriptive statistics analysis with percentages and frequencies. For objective two and three, bivariate and multivariate analysis were used to examine socio-economic, demographic and feeding practices associated with stunting. Adjusted odd ratio with 95% Confidence interval was estimated at significant level of 0.05.

4. Results Presentation

4.1. Demographic characteristics of respondents

Demographic characteristics of included respondents were considered in this study. Demographic variables are the main indicators to be studied before further analysis of the study findings. Age and sex of a child, Maternal Characteristics: Marital status, Number of Children in the family, Educational level, Ubudehe Category, Occupation and Monthly income were considered as major demographic characteristics of children attended in immunization program in Nyabihu District from March to April 2022. All respondents were from Nyabihu District.

Table 1 Demographic characteristics of children and mothers

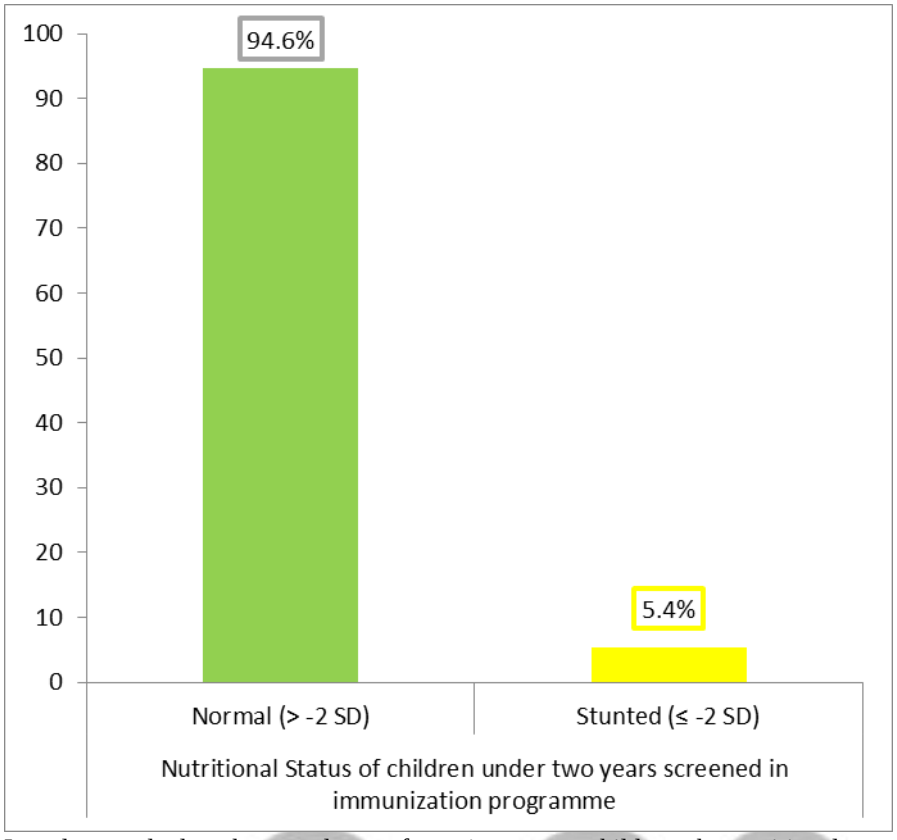
Variables	Frequency	Percentage
Child characteristics		
Age of child in months		
0-6	132	37.5
6-24	220	62.5
Mean±SD (8.94±5.87)		
Sex of a child		
Male	181	51.4
Female	171	48.6
Maternal characteristics		
Marital status		
Single mother	60	17.0
Married	292	83.0
Number of children in the family		
≤3	270	76.7
>3	82	23.3
Education level		
No formal education	44	12.5
Primary	196	55.7
TVET/Secondary and above	112	31.8
Ubudehe category		
One	55	15.6
Two and Three	297	84.4
Occupation		
Housewife	184	52.3
Monthly salary/Business	168	47.7
Monthly income (Rwf)		
None	73	20.8
30,000 and above	279	79.3

A total of 352 children under two years and mother's pairs attended immunization program in Nyabihu District from March to April 2022 under two years. Among the children 220 (62.5%) were aged between 6-24 months, few number of studied children 132(37.5%) were aged between 0 to 6 months. More than a half 181(51.4%) of children were males and less than a half 171(48.6%) were females. Considering maternal characteristics, marital status majority of mothers 292(83%) were married and few of them were single 60(17%). Referring to the number of children in the family, a big number of families 270(76.7%) had more than three children and few of them 82(23.3%) had three or less than three children. Based on the level of education, 196(55.7%) completed primary school, 112(31.8%) attended secondary school, TVET and above, 44(12.5%) had no education level. Under Ubudehe category, the majority of the respondents 297(84.4%) are in ubudehe two and three and few of them 55(15.6%) were in ubudehe category one. Regarding the occupation of the mothers, 184(52.3%) were housewives and 168(47.7%) had monthly salary or were in business. Lastly, earning monthly income was considered as key indicators where 279(79.3%) earn more than 30,000 Rwandan Francs and 73(20.8%) had no monthly income

4.2. Nutritional status of children under two years screened in immunization program

The first objective of this research was to assess nutritional status of under two years children attended immunization program in March and April 2022.

Figure 1. Child Nutritional Status



In order to calculate the prevalence of stunting among children, the nutritional status of children under two years who attended immunization program in Nyabihu District from March to April 2022 was determined. Majority of children 94.6% had normal nutritional status/height for age and few of them 5.4% were stunted. Therefore, the predominance of stunting among children under two years attending immunization program in Nyabihu District was 5.4%.

4.3. Socio-demographic and economic factors associated with stunting among under two children screened in immunization program

Table 2. Bivariate analysis of Socio- demographic and economic factors associated with Stunting

	Nutritional status		Chi-square	P-value
Variables	Normal n (%)	Stunted n (%)		
Age of child in months			0.300	0.584
0-6	126(95.5)	6(4.5)		
6-24	207(94.1)	13(5.9)		
Sex of a child			2.324	0.127
Male	168(92.8)	13(7.2)		
Female	165(96.5)	6(3.5)		
Marital status			0.228	0.633
Single mother	56(93.3)	4(6.7)		
Married	277(94.9)	15(5.1)		
Number of children in the family			0.103	0.749
≤3	256(94.8)	14(5.2)		
>3	77(93.9)	5(6.1)		
Education level			1.107	0.575
No formal education	41(93.2)	3(6.8)		
Primary	184(93.9)	12(6.1)		
TVET/ Secondary and above	108(96.4)	4(3.6)		
Ubudehe category			3.878	**0.049**
One	49(89.1)	6(10.9)		
Two and three	284(95.6)	13(4.4)		
Occupation			8.211	**0.004**

Farmer/Housewife	168(91.3)	16(8.7)		
Monthly salary job/Business	165(98.2)	3(1.8)		
Monthly income (Rwf)			3.168	0.075
None	66(90.4)	7(9.6)		
Below 30,000	267(95.7)	12(4.3)		

As presented in Table 2, the findings from bivariate analysis show that ubudehe category (P=0.049) and occupation (P=0.004) of mothers were significantly associated with stunting. Despite, the statistical significance, the results from this research showed that the majority of stunted children were aged 6 months and above (5.9%). According to gender, male (7.2%) were more stunted than female. Stunting was more prevalent among children born from single mothers (6.7%), children born from a family with more than 3 children (6.1%). When compared to children born to educated mothers, the prevalence of stunting was higher in children born to mothers with no formal education (6.8%), and children born to mothers with only primary education (6.1%). The data suggest that children born into impoverished families have a greater rate of stunting (9.6%) than those born into homes with a monthly income of at least 30,000 Rwf

4.4. Feeding practices associated with stunting among under two years children screened in immunization program

The third objective of the study was to identify the feeding practices associated with stunting among children attending immunization program.

Table 3. Bivariate analysis of Child feeding practices associated with Stunting

	Nutritional status		Chi-square	P-value
	Normal n (%)	Stunted n (%)		
Exclusively breastfeed			0.603	0.437
Yes	128(93.4)	9(6.6)		
No	205(95.3)	10(4.7)		
Feed a child a balanced diet			4.717	**0.030**
Always	93(98.9)	1(1.1)		
Sometimes	240(93.0)	18(7.0)		
Feeding time			3.334	0.189
5 and more	87(94.6)	5(5.4)		
3 times and less	246(94.6)	14(5.4)		
Facing a child while feeding			3.276	0.070
Always	140(97.2)	4(2.8)		
Sometimes	193(92.8)	15(7.2)		
Time for feeding			0.167	0.683
Less than 20 Minutes	249(94.3)	15(5.7)		
20 minutes and more	84(95.5)	4(4.5)		
Times for breastfeeding			28.400	**<0.001**
Less than 8 times	59(81.9)	13(18.1)		
8-12 times and more	274(97.9)	6(2.1)		
Time spending while playing with a child			2.306	0.129
Less than 15 minutes	225(93.4)	16(6.6)		
15 minutes and more	108(97.3)	3(2.7)		
Feed a child animal food			5.164	**0.023**
Always	72(100.0)	0(0.0)		
Sometimes	261(93.2)	19(6.8)		
Seeking care for a sick child			36.839	**< 0.001**
Always	269(98.5)	4(1.5)		
Sometimes	64(81.0)	15(19.0)		
Hand washing practices			25.662	**<0.001**
Always	249(98.4)	4(1.6)		
Sometimes	84(84.8)	15(15.2)		

The results from bivariate analysis revealed that time for breastfeeding a child (P<0.001), seeking care for a sick child (P<0.001), hand washing practices (P<0.001), feeding a child with balanced diet (P=0.030), feeding a child with animal source food (P=0.023) were significantly associated with stunting among children under two

years. Prevalence of stunting was higher (15.2%) among children whose mothers had poor hand hygiene practices. Stunting was more prevalent (6.8%) among children who were not fed with animal source food.
Besides that, stunting rate was 4.7% in children who were not exclusively breastfed, 5.4% in children who were fed less than three times and 7.2% in children who are sometimes facing by their mothers while being fed. In addition to these children who are fed less than 20 minutes were stunted (5.7%) and children whose parents spend less than 15 minutes playing with them were stunted (6.6%).

Table 4: Logistic regression analysis: Factors associated with Stunting among children under two years

	AOR	95%CI	P-value
Ubudehe category			
One	1.34	0.420-4.292	0.620
Two/Three	Ref.		
Occupation			
Farmer/Housewife	2.93	0.763-11.280	0.117
Monthly salary job/Business	Ref.		
Feed a child a balanced diet			
Always	Ref.		
Sometimes	3.70	1.045-13.135	**0.043**
Times for breastfeeding			
Less than 8 times	1.62	0.352-7.486	0.535
8-12 times and more	Ref.		
Seeking care for a sick child			
Always	Ref.		
Sometimes	9.36	2.032-43.165	**0.004**
Hand washing practices			
Always	Ref.		
Sometimes	1.82	0.364-9.169	0.463

The results from logistic regression analysis revealed that children who were sometimes fed with balanced diet were more likely to be of short stature for their age than those who were always fed with balanced diet (AOR=3.70, 95% CI: [1.045-13.135], P=0.043). Children whose mothers sometimes seek care when they sick were nine times more likely to have low height for their age than the ones whose mothers always seek care when they are sick (AOR=9.36, 95% CI: [2.032-43.165], P=0.004). Children born from family classified in ubudehe category one had 34% higher risk of stunting compared to children born from families in other ubudehe categories, but no statistical significance observed. Children who born from housewife mother are 3 times to be stunted compared to those born from mothers with monthly salary or in business. In the same way, Children who were breastfed less than 8 times had 62% risk of stunting compared to those who were breastfed between 8 and 12 times. Based on handwashing, Children whose mothers didn't wash their hand had 82% risk of being stunted compared to those who wash their hand after toilet, cleaning a child and before breastfeeding or eating.

5. Discussion of Findings

A cross-sectional study was conducted in Nyabihu District to investigate the factors related with stunting/height for age among children under two years attending immunization program in Nyabihu DistrictA total of number of 352 children –mother's pairs participated in this study. In 352 children screened for nutritional status, 5.4% were stunted. These results indicated that children who regularly attend immunization program are at low risk of being stunted. These results were not far from those of the study conducted in Ethiopia revealed that a big number of children who were vaccinated of measles were associated to low rate of acute malnutrition in children under the age of five (Chiara, Tefera, & Debarati, 2016). Similarly, a study conducted in Kenya, reported children who are regularly vaccinated were 27% less likely to be stunted (Constance & Nanette, 2012). This consistence may due to the fact that the growth of children with more contact in immunization program is regularly monitored and interventions are designed to address the problem of malnutrition in real time. In accordance with our results, A research conducted in Papua New Guinea (PNG) aimed to determine the vaccination and nutritional status of children less than 5 years old in the remote and rural Karawari area of PNG. 85% of children had incomplete vaccination, children above the median age of 32 months (34%) were more likely to be fully vaccinated for their age, $\chi 2$ (1) = 23.294, P < 0.005. In addition, and 25.5% below the -1 SD for height-for-age compared to WHO standards. A large proportion of children had poor nutrition status and lack protection from vaccine preventable diseases (Louis Samiak, 2017).
Regarding social demographic and economic factors, ubudehe category (P=0.049) and occupation (P=0.004) of mothers were significantly associated with stunting. The findings of this study were similar to the one piloted in India where it was found that most (92.20%) of the mothers were housewives or were unemployed, though

greatest beneath nutrition (88.46%) was found in children whose mothers were untalented laborer by occupation, though children of housewives were found to be as it were 59.22% undernourished (Shaili Vyas, 2011). The same findings from DHS 2020 showed that 11% of children in lowest wealth quintile were stunted (DHS, 2020). In accordance with our findings, a secondary data analysis of RDHS Conducted in 2018 found that childhood stunting was negatively associated with high household income OR=0.38, P<001 (Etienne, et al., 2018).

In sub-Saharan Africa, a study conducted on determinants of stunting in young Children, mother's occupation and household income were among the determinants associated to stunting (Susan , Guy, Grace, & Bart, 2014).In addition to this , many studies in developing countries found results like those from our study. A study conducted in India revealed that stunting was found to be highly correlated with economic status of the population, Children in poorest households have higher risk of stunting compared to those from highest quintiles (Barun Kanjilal, 2010). These findings showed that the more the mothers are jobless or poorest, they are not able to access nutritious foods and health services which can expose their children to all forms of malnutrition.

In terms of feeding practices, children who were sometimes fed a balanced diet were 3.7 times more likely than those who were always fed a balanced diet to have short stature for their age (AOR=3.70, 95% CI: [1.045-13.135], P=0.043). This association between children who are sometimes fed with a balanced diet and stunting is justified by the lack of required amount of nutrients for a child which led the child faltering growth. Children whose mothers sometimes seek care when they are sick were nine times more likely to have short stature for their age than children whose mothers always seek care when they are sick (AOR=9.36, 95% CI: [2.032-43.165], P=0.004). In line with our study, the study conducted by World Bank in Ecuador where it was found out that inadequate food intake in children was associated with stunting in children (World Bank, Nutrition Failure in Ecuador, 2007). In contrast with our study findings, a study conducted in Indonesia found out that there was no affiliation between nourishing practices and nutrition status (height for age) P>0.05, where each variable of feeding practices (breastfeeding duration, snacking and frequency of meal time and balanced diet) was not associated with nutritional status (height for age) P>0.05 (Ika, Susetyowati, Reza, & Farah, 2019).

In the same way, a study conducted by Betzabé in Ecuador found that Children who did not receive the minimum frequency of meals for their age had higher odds of stunting (OR 3.28; 95% CI 1.3, 8.27). Children from age 19 to 23 months who consumed foods rich in iron showed lower probabilities of stunting (OR 0.04; 95% CI 0.00, 0.51) (Betzabé Tello 1 2, 2022). The findings in this study revealed a strong relationship between feeding practice and seeking care for a sick child with child growth, this means that more children are sometimes fed with nutritious food and don't seek care when they are sick, may be exposed to poor growth/stunting. In contrast, a study conducted in 2019 by the World Bank in Rwanda found that having adequate food alone was not associated with a stunting (Demas, et al., 2019). This discrepancy from the above study and our study may be due to the sample size that has been used or other intervening factors.

6 Conclusions and Recommendations

In conclusion, Children attending immunization program in Nyabihu District had good nutritional status with a lower prevalence of stunting. Stunting were associated with poverty, poor feeding practices (not seeking care for a sick child, lack of balanced diet, low frequency of breast feeding , lack of animal source food and poor hand washing practices)

Recommendations

The implication of this study is that the high prevalence was found in children more than 6 months and found that frequency for breastfeeding a child, seeking care for a sick child, hand washing practices, feeding a child with balanced diet feeding a child with animal source food, poverty and unemployment were associated with stunting, therefore we propose the following recommendations

To reinforce integration nutrition services especially Maternal Infant Young Child Nutrition and growth monitoring in routine immunization program because children who had more contacts in immunization have lower risk of being stunted.

To advocate for the poorest and unemployed mothers to access income generating activities and social protection as children from poorest and unemployed mothers have high risk of being stunted. The employment and income will allow them to access nutritious food and health services and other needs for better growth of their children. To improve the caring, feeding styles and practices with emphasis on a balanced diet comprising animal source foods and hygiene practices. To early seek care when their children are sick as the results revealed that not seeking care when a child is sick was associated with stunting.

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