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# PREVALENCE AND MATERNAL RELATED FACTORS ASSOCIATED WITH ACUTE MALNUTRITION AMONG CHILDREN UNDER FIVE IN TEREGO DISTRICT. A CROSS-SECTIONAL STUDY.

***Amon Otafire*, Bonny Aloka, Derick Modi, Julius Kayizzi***
***Faculty of Public Health, Lira University.***



## Abstract

### Background

Malnutrition is one of the major causes of mortality and morbidity among vulnerable populations including children below five years of age, determining the prevalence and the maternal-related factors associated with acute malnutrition is crucial in the Terego district, Therefore the study aimed to determine the prevalence and maternal-related related to acute malnutrition in Terego district, Uganda.

### Methodology

This study employed a cross-sectional design with quantitative data collection techniques, using a structured questionnaire. A multistage sampling technique by randomly generated numbers was used. The data was cleaned for univariate and bivariate analysis using SPSS version 26.

### Results

A total of 419 children were included in the study, more than half of the children were females (54.4%) aged 37-59 months (55.3%). Of the males, 32.6% experienced acute malnutrition, and 44.0% of females experienced acute malnutrition, p-value 0.064. Additionally, 22.5% (31) of mothers aged 20-29 had children with acute malnutrition.,95% CI: 1.062-5.425, a p-value of 0.012. Then 94.3% of children aged 0-12 months experienced acute malnutrition, and 48.7% of children aged 23-36 months experienced acute malnutrition, p-value of <0.001. 19.2% of children aged 37-59 months experienced acute malnutrition, p-value <0.001. According to Birth order**,** 23.8% (41) of children with birth order 1-2 experienced acute malnutrition, and 46.6% (48) of children with birth order 3-4 experienced acute malnutrition, p-value of <0.00. 51.4% (74) of children with birth order 5+ experienced acute malnutrition, a p-value of 0.458.

### Conclusion

The highest rates of acute malnutrition were observed in mothers less than 20 years of age at the time of the child's birth, compared to those between 21 and 39 years.

### Recommendation

Early and forced marriages should be stopped since they predispose to under-fives to malnutrition because the young mothers cannot afford to take care of their children.

***Keywords:*** *Terego district, maternal-related factors, prevalence of acute malnutrition, anthropometric measures.*
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***Corresponding Author:*** Amon Otafire*
***Email:*** **amonotafire3@gmail.com**
***Faculty of Public Health, Lira University.***

## Background of the study

Acute malnutrition is a nutritional deficiency resulting from either inadequate energy or protein intake (Dipasquale et al., 2020). Undernutrition puts children at greater risk of dying from common infections, increases the frequency and severity of such infections, and delays recovery (Kassaw et al., 2021). WHO defines acute malnutrition as a low weight-for-height. It often indicates recent and severe weight loss, although it can also persist for a long time. It usually occurs when a person has not had food of adequate quality and quantity (Gebremaryam et al., 2022). In the view of acute malnutrition WHO, World Bank estimates show that its prevalence has been declining since the year 2000, more than one in five 149.2 million children under 5 were stunted in 2020, and 45.4 million suffered from acute malnutrition (Govender et al., 2021a). Available evidence shows the world today is facing a prevalence of malnutrition with 155 million stunted and 52 million wasted children. Globally, it is estimated that 45% of deaths in children under 5 years of age are due to undernutrition (Adebisi et al., 2019a).

Malnutrition has been identified as one of the major challenges facing Africa, especially the sub-Saharan region (John-Joy Owolade et al., 2022a). The prevalence of undernutrition in the region was estimated to rise from 181 million in 2010 to about 222 million in 2016. In 2020, up to 264.2 million people living in sub-Saharan Africa were undernourished (John-Joy Owolade et al.,

2022b). That is about 24.1% of the population, the highest prevalence anywhere in the world some are poverty, overpopulation, unsuccessful small-scale agriculture, low educational status, climate change, corruption, wars and conflicts, and fluctuation of food prices (Koubi, 2019).

The prevalence of acute malnutrition, also known as wasting, among children aged 6 to 59 months in Uganda is 4%, and it rises to 10% in the West Nile sub-region (Adebisi et al., 2019b). Malnutrition is the most serious outcome of food insecurity in children under five years old. Acute malnutrition is associated with increased risks of illness, death, and disability, along with stunted cognitive and physical growth and a heightened susceptibility to infections (Govender et al., 2021). Ensuring the physical and mental development of children is a fundamental right, and achieving optimal health requires proper nutritional support (World Health Organization, 2018).

The United Nations General Assembly declared that to address all forms of malnutrition by 2025. The Sustainable Development Goal (SDG)-2 (end hunger, achieve food security and improve nutrition). SDG-3 (ensure healthy lives and promote well-being for all ages) also sets the relevant nutritional outcome targets by 2030 (Atukunda et al. 2021). Furthermore, there is limited published information about child-related factors associated with acute malnutrition among children under five years old in the Terego district. Therefore, this study aimed to determine the prevalence and maternal-related factors associated with acute malnutrition among children under five years old in Terego district, Uganda.

## Methodology

### Study design

This study was cross-sectional research that included the use of quantitative methods of data collection techniques and data analysis. The partakers provided answers to the questions by ticking in the suitable options provided in the questionnaire and other data collection tools.

### Study location

The study was carried out in the different health centers of Terego district one of the eleven districts in the west Nile region. This is because Terego hosts a large number of refugees from neighboring South Sudan, placing additional strain on already limited resources. Terego District is located in the West Nile region of northern Uganda and is a new district created out of the Arua district. It borders the districts of Yumbe to the north, Madi-Okollo to the east, Arua to the south, and Maracha to the west.

According to population projections of the Uganda Bureau of Statistics (UBOS), the non-refugee population of Terego District for 2020 was estimated at 233,300 people (UBOS, 2019).

### Study population

This research targeted all the children in the age group of 1 to 59 months and accessed those admitted at the pediatric ward of the health Centers in Terego district.

### Inclusion criteria

This study included all children in the age group of 1 to 59 months at the pediatric ward of health centers of Terego, the communities, and those who assented to the study.

### Exclusion criteria

This study excluded all the children who were 5 years and above admitted at the pediatric ward of health centers of Terego district and within the community and those who did not assent to the study.

### Sample size determination

The sample size was determined using Kish Leslie's (1965) sample size formula for finite population;

$$n = \frac{Z^2pq}{E^2}$$

**n**= required sample size.

**z**= the z value on the table value for 1 degree of freedom at the desired confidence level (1.96 for a 95% confidence level).

**q**= 1-p

**P**= the population proportion.

**e**= the error margin (0.05).

According to (UDHS 2016) data, acute malnutrition prevalence among children under 5 was 54%.

p=0.54, q=0.46, z=1.96, e=0.05

n=1.962*0.54*0.46/0.052=381

Non respondent rate= 0.1*381= 38

n=381+38=419

### Sampling Technique

The study used a multistage sampling technique by randomly generated numbers where children in the age group of 1 to 59 months were regarded for the study. The caretakers (mothers) provided answers to the questions during the study. The technique also provided each participant of the target population an equal and independent probability of being carefully chosen for the study. This confirmed that the selected sample is a good illustration of the population of the study.

### Data collection methods

Quantitative data collection methods like structured interviews through interviewer-administered were used to collect data from the participants who consented to the study by signing the forms of consent. This was supplemented by interactive periods with the partakers to make clear those elements of the questionnaire were not understood well.

### Data Collection tools

Structured interviews with closed-ended questions were used as the data collection tool. The questionnaire contained the parts namely part one (this consisted of the

child-related factors), part two (which consisted of maternal-related factors), and part three (anthropometry measurements.

## Data collection procedure

This started with an enrolment of research assistants which included students attached to the pediatric wards of different health centers, then data was collected by the researcher by the use of structured interviews which were directed by the researcher as the participants responded to the questionnaires. In the course of data gathering, there was supervision from the researcher which made sure complete data collection was achieved.

## Quality control

Before the efficiency, effectiveness, and quality of the study results, the subsequent measures under quality control were used. Proper preparation and orientation of the interviewers before the study, in circumstances where the participants found it problematic to understand the questions, the questions then were interpreted by the interviewer. The presence and conduct of the interviewer was professional.

## Data analysis and presentation

Once the data was collected, it was ready for analysis for frequency and percentages and presented using statistical approaches like tables, graphs, pie charts, and information then be précised in the form of percentages, pie charts, and tables to give descriptive statistics for easy comprehension by other scholars with the use of SPSS (Statistical Package for Social Sciences) software 2020 version for data analysis and presentation.

## Ethical considerations

### Approval

A formal letter was issued by the Lira University faculty of public health to be presented to the in charge of health centers and the community leaders before I started data collection.

## Consent

A printed document containing the purpose of the study, the significance the associated risks, and the rights of the participants. They were requested to consent to the study after they had accredited that they understood and agreed to partake in the study. Consent was obtained by a written signatory or a thumbprint for those who could not write.

Assent Form: If the individual was willing to participate, they were asked to sign an assent form, which is a simplified version of the consent form. For those unable to write, other methods of indicating agreement, such as a verbal agreement recorded by the researcher, were used.

## Privacy protection

Interviewing of respondents was carried out in a private place which was safe from disturbances and inconveniences.

## Confidentiality

Data collection was done by the student and reserved in a place that was of controlled access. All relevant information obtained from participants was kept private using initials and not their full names and other personal data. Only the investigator was capable of gaining contact with the collected data.

## A thropometry analysis

Anthropometry is a method that uses body measurements of the human to draw assumptions about the nutritional status of persons and residents. This technique was used to assess the malnutrition status of under-five children (Bhattacharya et al., 2019). Child variables including weight, height/length, sex, and age were entered into SPSS (2020 version) Software to generate measurement indices of weight-for-age, height-for-age, and weight-for-height. The indices generated were then compared with standard reference values for WHO Child Growth Standards and CDC to obtain the Z-scores. This was done automatically by the software. Three indices were used including wasting, stunting, and underweight among children below five years of age.

Wasting refers to a low weight-for-height and is a measure of acute malnutrition; it's an indicator of short-term fluctuation in nutritional status. Children whose weight-for-height Z-scores were below minus 2 standard deviations were regarded as wasted. Stunting on the other hand refers to a low height-for-age which is a measure of chronic malnutrition. It's a good indicator of cumulative growth retardation. Children whose height-for-age Z-scores were below minus 2 standard deviations were regarded as stunted. Underweight on the other hand denotes a low weight-for-age and it's a measure of chronic and acute malnutrition. Similarly, all children whose weight-for-age Z-scores were less than minus 2 standard deviations were denoted as underweight.

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## Results

**Table showing the general prevalence of malnutrition among children under 5**

| Parameters | Frequency | Percentages (%) |
|---|---|---|
| **Malnutrition** | 163 | 38.9 |
| **Other conditions** | 256 | 61.1 |

**Table showing the percentages of stunted, wasted and underweight children under 5**

| Malnutrition index | Frequency | Percentages(n=419) |
|---|---|---|
| Stunting | 96 | 22.8 |
| Wasting | 43 | 10.2 |
| Underweight | 24 | 5.8 |

**Table showing the prevalence of malnutrition (stunting, wasting and underweight) based on maternal related factors**

| Parameters | stunted | (%) | Wasted | (%) | Under weight | (%) |
|---|---|---|---|---|---|---|
| **Age of mother at birth (years)** | | | | | | |
| <20 | 41 | 9.8 | 14 | 3.4 | 13 | 3.1 |
| 20 – 29 | 26 | 6.2 | 8 | 1.8 | 3 | 0.7 |
| 30 – 39 | 21 | 1.8 | 3 | 0.7 | 2 | 0.5 |
| 40+ | 8 | 5.0 | 18 | 4.3 | 6 | 1.5 |
| **Maternal education level** None | 51 | 12.0 | 26 | 6.4 | 12 | 2.9 |
| Primary | 18 | 4.3 | 8 | 1.8 | 4 | 1.0 |
| Secondary | 14 | 3.3 | 8 | 1.8 | 7 | 1.7 |
| Tertiary/university | 13 | 3.2 | 1 | 0.2 | 1 | 0.2 |
| **Marital status** | | | | | | |
| Married | 28 | 6.7 | 16 | 3.8 | 2 | 0.4 |
| Single | 23 | 5.4 | 16 | 3.7 | 8 | 1.9 |
| Separated | 23 | 5.4 | 6 | 1.4 | 6 | 1.4 |
| Widowed | 22 | 5.3 | 5 | 1.3 | 8 | 2.0 |

**Table showing the number and percentage of malnourished children based on maternal related factors**

| VARIABLES | CATEGORIES | ACUTE MALNUTRITION (N/%) | | COR | p-values |
|---|---|---|---|---|---|
| | | YES | NO | | |
| **Age of the mother at birth** | <20 | 44.4(72) | 55.6(90) | 1 | 1 |
| | 20-29 | 22.5(31) | 77.5(107) | 2.4001(1.062-5.425) | **0.012** |
| | 30-39 | 25.0(9) | 75.0(270 | 0.502(0.293-0.861) | 0.072 |
| | 40+ | 61.4(51) | 38.6(32) | 2.761(1.605-4.579) | **0.035** |
| **Maternal education** | None | 92.9(91) | 7.1(7) | 1 | 1 |
| | Primary | 35.8(31) | 64.2(162) | 2.019(1.024-3.981) | **0.043** |
| | Secondary | 27.9(24) | 72.1(43) | 0.692(0.327-1.466) | 0.337 |
| | Tertiary | 16.1(17) | 83.9(44) | 0.030(0.011-0.077) | 0.067 |
| **Marital status** | Married | 15.8(39) | 84.2(208) | 1 | 1 |
| | Single | 87.0(47) | 13.0(7) | 70.667(24.184-206.493) | **<0.001** |
| | Separated | 39.3(24) | 60.7(37) | 1.973(0.543-7.167) | 0.302 |
| | Widowed | 93.0(53) | 7.0(4) | 20.427(6.541-63.790) | **<0.001** |
| **Maternal occupation** | Peasant | 61.7(98) | 38.3(158) | 1 | 1 |
| | Business | 43.9(25) | 56.1(32) | 1.133(0.646-1.986) | 0.663 |

| | | | | |
|---|---|---|---|---|
| Civil servant | 32.6(14) | 67.4(29) | 0.899(0.436-1.857) | 0.774 |
| Others | 41.3(26) | 58.7(37) | 1.456(0.647-3.277) | 0.365 |

## Maternal-related factors bivariate analysis

### Maternal age at birth

<20 years: 44.4% (72 out of 162) of mothers under 20 had children with acute malnutrition. This group is the reference category (COR=1). 20-29 years: 22.5% (31 out of 138) of mothers aged 20-29 had children with acute malnutrition. The odds ratio is 2.4001 (95% CI: 1.062-5.425) with a p-value of 0.012. This indicates that children of mothers aged 20-29 are 2.4 times more likely to experience acute malnutrition compared to children of mothers under 20, and this association is statistically significant. 30-39 years: 25.0% (9 out of 36) of mothers aged 30-39 had children with acute malnutrition. The odds ratio is 0.502 (95% CI: 0.293-0.861) with a p-value of 0.072. This suggests that children of mothers aged 30-39 are 49.8% less likely to experience acute malnutrition compared to children of mothers under 20, though this finding is not statistically significant at the 0.05 level. 40+ years: 61.4% (51 out of 83) of mothers aged 40 and above had children with acute malnutrition. The odds ratio is 2.761 (95% CI: 1.605-4.579) with a p-value of 0.035, indicating that children of mothers aged 40+ are 2.76 times more likely to experience acute malnutrition compared to children of mothers under 20, and this association is statistically significant.

### Maternal Education

None: 92.9% (91 out of 98) of mothers with no education had children with acute malnutrition. This group is the reference category (COR=1). Primary: 35.8% (31 out of 193) of mothers with primary education had children with acute malnutrition. The odds ratio is 2.019 (95% CI: 1.024-3.981) with a p-value of 0.043. This indicates that children of mothers with primary education are 2.019 times more likely to experience acute malnutrition compared to children of mothers with no education, and this association is statistically significant. Secondary: 27.9% (24 out of 86) of mothers with secondary education had children with acute malnutrition. The odds ratio is 0.692 (95% CI: 0.327-1.466) with a p-value of 0.337. This suggests no significant association between secondary education and acute malnutrition compared to no education. Tertiary: 16.1% (17 out of 61) of mothers with tertiary education had children with acute malnutrition. The odds ratio is 0.030 (95% CI: 0.011-0.077) with a p-value of 0.067. This indicates that children of mothers with tertiary education are 97% less likely to experience acute malnutrition compared to children of mothers with no education, though this finding is not statistically significant at the 0.05 level.

### Marital Status

Married: 15.8% (39 out of 247) of married mothers had children with acute malnutrition. This group is the reference category (COR=1). Single: 87.0% (47 out of 54) of single mothers had children with acute malnutrition. The odds ratio is 70.667 (95% CI: 24.184-206.493) with a p-value of <0.001, indicating that children of single mothers are 70.667 times more likely to experience acute malnutrition compared to children of married mothers, and this association is highly significant Separated: 39.3% (24 out of 61) of separated mothers had children with acute malnutrition. The odds ratio is 1.973 (95% CI: 0.543-7.167) with a p-value of 0.302, suggesting no significant association between being separated and acute malnutrition compared to being married. Widowed: 93.0% (53 out of 57) of widowed mothers had children with acute malnutrition. The odds ratio is 20.427 (95% CI: 6.541-63.790) with a p-value of <0.001, indicating that children of widowed mothers are 20.427 times more likely to experience acute malnutrition compared to children of married mothers, and this association is highly significant.

### Maternal Occupation

Peasant: 61.7% (98 out of 256) of peasant mothers had children with acute malnutrition. This group is the reference category (COR=1). Business: 43.9% (25 out of 57) of mothers in business had children with acute malnutrition. The odds ratio is 1.133 (95% CI: 0.646-1.986) with a p-value of 0.663, indicating no significant association between being in business and acute malnutrition compared to being a peasant. Civil Servant: 32.6% (14 out of 43) of civil servant mothers had children with acute malnutrition. The odds ratio is 0.899 (95% CI: 0.436-1.857) with a p-value of 0.774, suggesting no significant association between being a civil servant and acute malnutrition compared to being a peasant. Others: 41.3% (26 out of 63) of mothers in other occupations had children with acute malnutrition. The odds ratio is 1.456 (95% CI: 0.647-3.277) with a p-value of 0.365, indicating no significant association between other occupations and acute malnutrition compared to being a peasant.

## Discussion

### Prevalence of malnutrition in under-fives

The results from this study showed malnutrition prevalence at 38.9%, with stunted children being the highest at 22.8%, wasting at 10.2%, and underweight at 5.8%. The results are higher than the national prevalence rates which reported that nationally, Uganda has been grappling with high rates of stunting, wasting, and underweight among children. According to the Uganda Demographic and Health Survey (UDHS) 2016, about 29% of children under five are stunted, 4% are wasted, and 11% are underweight. The prevalence in Terego District surpasses these national averages, highlighting a particularly severe situation in this region. The impact of random sampling might have been the reason for the

decrease in the prevalence of malnutrition as compared to the national report by UDHS.

The higher levels of malnutrition from the results also stem from the fact that West Nile, including Terego District, experiences significant food insecurity. The region's agricultural productivity is often hampered by erratic rainfall patterns, poor soil quality, and limited access to modern farming techniques (Kamugisha et al., 2024). Terego hosts a large number of refugees from neighboring South Sudan, placing additional strain on already limited resources. The refugee population often faces extreme poverty and food insecurity, exacerbating the malnutrition crisis in host communities (Kang et al., 2023).

Also; the high rates of malnutrition from the study are because malnutrition is. Stunting rates are highest in the Toro sub-region (41%), Karamoja and West Nile sub-regions have the highest percentages of children who are wasted (each at 10%), and the highest rates of underweight children are observed in the Karamoja sub-region. This forms the basis of the discrepancy in the results.

## Maternal related factors

The highest rates of malnutrition were observed in mothers less than 20 years of age at the time of birth of the child (44.4%) and those above 40 years of age (61.4%) lowest in the mothers who were between 30-39 years at the time of birth (22.5%) and those between 20-29 years of age at birth (22.5%).

This is in correspondence with(Nankinga et al., 2019)which suggested that children whose mothers were below 20 years at the time of birth were 1.22 times more likely to be stunted, wasted, and underweight compared to children whose mothers were 20 years and above. The maternal age of 40+ is associated with a higher likelihood of giving birth to low birth-weight children (Wang et al., 2020).

The results on maternal education level showed a high percentage of malnutrition in children whose mothers had no education. (92.9%) and the lowest in children whose mothers had tertiary or university education (16.1%) mothers who had secondary education (27.9%) and 35.8% of mothers who had secondary education. The level of education of the mother has an impact on child care as many of the mothers may lack the basic skills and knowledge to look after their children by offering nutritious nutrition.

The above results correlate with studies done by Faustini et al. (2022) which suggested that the higher the education level of the mother, the lower the rate of malnutrition. The study suggested that educated mothers are better aware of the nutrition requirements of their children by providing improved health care (Teweldemedhin et al., 2021). The results also corresponded with those from (UDHS; 2016 and 2023).

The results obtained on marital status indicate a similar pattern of malnutrition (15.8%) in each of married, single (87.0%) and widowed (93.0%) mothers and (39.3%) in separated. The results show almost a constant pattern of malnutrition contrary to findings in Ethiopia, which found out that under-five malnutrition, is higher among unmarried rural and separated women compared to married ones.

On the other hand, however, the higher rate of malnutrition correlates with a study in Tanzania which revealed that mothers who are married were more likely to have undernourished children unlike those who were unmarried perhaps because of the cost of maintaining families hence sometimes these families fail to produce nutritious supplements to the under-five children. The results on maternal occupation showed a positive correlation with other previous studies whereby 65.2% were peasant farmers. It is common for non-working mothers to fail to provide complementary feeds including protein foods since most of them cannot afford them (Mrema et al., 2021).

The results on maternal education occupation showed a high percentage of malnutrition in children whose mothers were peasants (61.7%) and the lowest in children whose mothers were civil servants (32.7%), mothers who had businesses (43.7%) and 41.3% of mothers who fell in the others category.

Another study in Ethiopia also reported a greater prevalence of stunting, underweight, and wasting in mothers who were laborers or farmers than those working in offices or were housewives (Mohammed & Hussein, 2022). This is because they leave their children at home with other siblings who neglect to feed them following the right frequency hence worsening the problem of malnutrition (Schoonees et al., 2019). The above findings are true for peasant farmers attending the health facilities of Terego district who spend most of their time in the gardens leaving the under-five children at home under the care of other siblings or housemaids who in most times too young or illiterate on proper nutrition.

## Conclusion

The prevalence of malnutrition in under-fives in Terego District is significantly higher than the national averages reported by the Uganda Demographic and Health Survey (UDHS) 2016. Specifically, stunting (22.8%), wasting (10.2%), and underweight (5.8%) exceed national rates of 29% for stunting, 4% for wasting, and 11% for underweight. The severe malnutrition in Terego is attributed to food insecurity exacerbated by environmental challenges and the strain of hosting a large refugee population. This highlights the urgent need for targeted nutritional interventions and improved food security measures in the region.

## Recommendations

Healthcare providers should educate the public on the disadvantages of early pregnancies that predispose to under-five malnutrition since young mothers are also growing at the time of pregnancy and birth of the child.

The health care providers should educate the public on other practices that reduce malnutrition like exclusive breastfeeding, and should be advised on how and when

to introduce supplementary feeds during the growth cycle of the children.
Educational Programs: Raising awareness about nutrition and health through community education programs and integrating nutrition education into school curricula.

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## List of Abbreviations.
**AIDS:** Acquired Immunodeficiency Syndrome
**AMREF:** African Medical and Research Foundation
**ANC**: Antenatal Care
**BMI:** Body Mass Index
**BSPL:** Bachelor of Science in Public Health
**MCH**: Maternal and Child Health
**MOH**: Ministry of Health
**MUAC**: Mid-Upper Arm Circumference
**OPD**: Outpatient Department
**UBOS:** Uganda Bureau of Statistics
**UDHS:** Uganda Demographic and Health Survey
**UNAP:** Uganda National Action Plan
**UNICEF:** United Nations International Children's Emergency Fund
**USAID**: United States Agency for International Development
**WFP:** World Food Program
**WHO**: World Health Organization

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## Conflict of interest
The author declares no conflict of interest.

## Author Biography
Amon Otafire is a student pursuing a Bachelor of Science in Public Health at Lira University, faculty of public health.
Bonny Aloka is a senior lecturer at Lira University, faculty of public health.
Derick Modi is a student pursuing a Bachelor of Science in Public Health at Lira University, Faculty of Public Health.
Julius Kayizzi is a student pursuing a Bachelor of Science in Public Health at Lira University, faculty of public health.

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