IAA Journal of Scientific Research 10(2):115-124, 2023 ISSN: 2736-7319

Evaluation of Caregiver-Related Determinants on Malnutrition of Children Less Than Two Years in Kijumo, Bushenyi District

Kiti, Isaac Mukasa

Faculty of Clinical Medicine and Dentistry Kampala International University Western Campus.

ABSTRACT

Malnutrition, is a deficiency, excess or imbalance in a person's intake of energy and/or nutrients to ensure growth and maintain specific functions. It covers both over (Obesity) and undernutrition (wasting, stunting, underweight, and micronutrient deficiency). Child malnutrition was an important indicator for monitoring progress towards the achievement of Millennium development goals. A descriptive cross-sectional study was used for children in Kashenyi Parish and a total of 100 children were considered during the study. In this study, the prevalence of malnutrition among children aged two years and below in Kashenyi Parish-Bushenyi District was 20%. Age of a child, gender, birth order, mother's age, mother's occupation, parents' religion mother's education level, mother's marital status, breastfeeding, infections, and immunization were found to be statistically significantly associated with malnutrition in children under the age of two. The researchers recommended that there is a need for feeding education to mothers which would help to improve nutrition habits among needy infants mainly to control malnutrition. This should be done under good monitoring and evaluation.

Keywords: Malnutrition, Undernutrition, Children under the age of two years, breastfeeding, Immunization.

INTRODUCTION

Malnutrition, was a deficiency, excess or imbalance in a person's intake of energy and or nutrients to ensure growth and maintain specific functions [1]. It covers both over (Obesity) and undernutrition (wasting, stunting, underweight, and micronutrient deficiency) [2] Child malnutrition was an important indicator for monitoring progress towards the achievement of Millennium Development Goals (MDG). However, nutrition indicators for young children and their mothers have not improved much over the past years, with some indicators showing a worsening trend with 45% of children under 2 years old in Uganda being short for their age (stunted) in 1995. 10 years later, the prevalence of stunted under-5s (most especially those under two years of age) had fallen to only 39% [3]; thus, stunting is the most malnutrition condition with the highest prevalence (38.5 %) in Nakaseke and Nakasongola followed by wasting (16.5 %) and underweight (13.5 %) respectively [4]. It, therefore, remains a significant cause of mortality and is a development issue in the region. In Tanzania, studies have shown high levels of malnutrition among the under-five children [5]. Due to the many cause, Children become malnourished if they suffer from diseases that cause undernutrition or if they are unable to eat sufficient nutritious food [6]. World over, Malnutrition is one of the most important public health problems in developing countries especially in Sub-Saharan Africa [7]. According to [8]; it is estimated that there are 178 million children that are malnourished across the globe, and at any given moment, 20 million are suffering from the most severe form of malnutrition. Malnutrition contributes to between 3.5 and 5 million annual deaths among under-two children. Also, UNICEF estimates that there are nearly 195 million children suffering from malnutrition across the globe; and in developing countries, malnutrition is one of the most

important risk factors for high child mortality rates [9]. Malnutrition has devastating effects on human performance, health, and survival and was a leading cause of the global burden of diarrheal diseases among children [10]. Pregnant women and children are highly vulnerable to the consequences of malnutrition and children in sub-Saharan Africa are 15 times more likely to die before two years and one out of six children in developing countries shows signs of being underweight, this points out a total number of 100 million children in the developing world [9]. Research indicates that malnutrition has devastating effects on human performance, health, and survival and a recent global analysis demonstrated that child malnutrition is the leading cause of the global burden of disease [10, 11]. One out of six children in developing countries shows signs of being underweight, this points out a total number of 100 million children in the developing world [9]. Malnutrition covers two broad groups of conditions, that is, overnutrition (obesity) and undernutrition (wasting/stunting and undernutrition) [2, 12, 13]. These two causes often occur together and result from multiple underlying factors including inadequate access to food and health services [14, 15]. Other basic causes include poverty, illiteracy and social norms [16, 7]. However, the nature and magnitude of such factors vary from one place to another [17, 5].

Globally, stunting among children under five years of age has fallen from 32.6% in 2000 to 22.2% in 2017 [18]. There has been a slight decrease in underweight women since 2000, from 11.6% to 9.7% in 2016 [18]. Yet, while there has been progress, It has been slow and patchy. Developing countries have the largest proportions of malnourished children with over one-third of the children in developing countries being malnourished [19]. In Uganda, nutrition indicators have not improved much over the past years and some indicators have even shown a worsening trend. Similarly, in 2016, the Uganda Demographic and Health Surveys (UDHS) report showed that 29% of children under two are considered to be short for their age or stunted, and 9% are severely stunted [3]. Despite the availability of favourable natural resource capacity & a variety of nutritional supplements in the country, malnutrition has remained an important health and welfare problem, especially among children under two years [20]. Therefore, this research study is aimed to determine the influence of caregiver-related determinants on malnutrition of children Less than two years in Kijumo, Bushenyi District.

METHODOLOGY

Study Design

A descriptive cross-sectional and analytical study design was used [21]. Anthropometric data was obtained using MUAC, measurement tapes and a Weighing scale while a questionnaire was used to collect quantitative data on caregiver-related determinants.

Area of Study

The study was conducted in Kijumo village in Bushenyi district. Kijumo village is located in the Kabaare parish of Kakanju Sub County in Igara County, Bushenyi district. Kijumo village has an estimated 700 people with about 150 households [22].

Study population

All children under two years in each household visited Kijumo village.

Inclusion criteria

Children under two years of age in each household whose parents/Guardians/caretakers consented to participate.

Exclusion criteria

Children above two years of age.

Children under two years of age in each household whose parents/Guardians/care takers did not consent to participate.

Sample size

This was determined using the [22] household statistics of 150 households in Kijumo village.

Sampling techniques

Participants were enrolled consecutively in each household visited based on the inclusion and exclusion criteria.

Data collection

Data was collected using a pretested questionnaire. Anthropometric measurements were obtained using a weighing scale for weight and tape measure for height/length and MUAC Tape for mid-upper arm circumference. Two assistants were trained and used to help in the administration and explanation of questionnaires to the respondent(s) in order to aid and ease the process of data collection.

Data collection instrument

A questionnaire was used for both quantitative and qualitative data collection. A self-administered questionnaire was used to conduct the study. As a main data collection tool, the questionnaires were both closed and open-ended questions. MUAC tapes (6), tape measure (6), and a Weighing scale was used to obtain the essential measurements.

Measurement of MUAC: This was measured as follows;

i. Mid Upper Arm Circumference was taken on the less active arm (commonly the left arm of the client). To locate the correct point for measurement, the elbow was flexed to 90^0 as well as the entire arm at about 60-900 from the trunk.
ii. The tip of the shoulder (acromion) and elbow (olecranon) on the left flexed was located.
iii. The mid-point between the tip of the shoulder and the elbow was determined.
iv. The MUAC tape was placed around the middle of the left upper arm (the arm hanging down the side of the body and relaxed).
v. Reading of the measurement from the window of the MUAC tape without tightening or loosening it was done.
vi. Recording the MUAC to the nearest 0.1 cm and the colour code (Green, Yellow, and Red) was done.

Data Analysis

Both qualitative [21] and quantitative data were collected. This was analyzed by the statistical package for social scientists (SPSS) version 20.0 to obtain frequencies and percentages and regression analysis for the p-values and risk estimates of the significance and association of the determinant to the prevailing distribution of malnutrition. Typing was done using appropriate computer packages such as Microsoft Office Word for the results that enabled formatting and drawing of charts and tables. The findings were presented as frequencies, percentages and cross-tabulation on graphs and charts. Percentages for the prevalence and additional p-values and odds ratios with their confidence interval were used for the maternal and child factors.

RESULTS

Prevalence of Malnutrition among Children under two years in Kijumo Village

The Prevalence of malnutrition among children under two years in Kijumo village was 20%. 13 children (13%) had Mid Upper Arm Circumference of 11.5 cm-12.5 cm, and 7% were Less than 11.5cm. 80% of the children had BMI from 18-25 while 20% of the children had a BMI of less than 18 (Table 1).

Table 1: Prevalence of malnutrition among children under two years in Kijumo village

Variables	Frequency (n=100)	Percentage (%)
Nutrition status		
Malnourished	20	20.0
Normal	80	80.0
Mid Upper Arm Circumference		
Less than 11.5cm (severe wasting)	7	7.0
11.5cm-12.5cm (wasting)	13	13.0
More than 12.5cm (Normal)	80	80.0
Body Mass Index (kg/m^2)		
Less than 18.5 (underweight)	20	20.0
Greater than 18.5 (Normal)	80	80.0
Above 25	0	0.0

Socio-demographic characteristics of children under two years in Kijumo Village

The majority of 46 (46%) of the children were between 12 and 24 months of age, most 31(31%) were 6-12 months of age and 23(23%) were less than 6 months of age. The majority 62(62%) were females while most 38 (38%) were males. Most 43 (43%) of the children were first born and the caregivers reported that the majority 46 (46%) had a birth weight of 2.5kg while most 35(35%) were between 2.5-3.0kg. Most 62(62%) of the children had a birth interval of 2 years while most 33(33%) were after a 1-year interval (Table 2).

Table 2: Socio-demographic characteristics of children under two years in Kijumo

Variable	Frequency (n=100	Percentage (%)
Age of the child		
<6 months	23	23
6 months -12 months	31	31
12-24 months	46	46
Gender		
Male	38	38
Female	62	62
Birth order		
Firstborn	43	43
Second born	19	19
Third born	12	12
Fourth born	26	26
Birth weight		
<2.5 kg	46	46
2.5-3.0kg	35	35
>3.0kg	19	19
Birth interval		
After 2 years	62	62
After 1 year	33	33
After 6 months	4	4
Before 6months	1	1

Caregiver-Related Determinants of children under two years in Kijumo Village

Most 50 (50.0%) of the caregivers (mostly biological mothers) were within the age bracket 23-27 years and they were mostly 41(41%) peasants. The majority 94(94%), 71(71%) and 63(63%) of the mothers were Banyankole by tribe, had 1-2 children and were married respectively. Most 51(51%), 41(41%) and 40(40%) of the mothers had attained primary education, were Catholics and breastfed their children for at least 24 months (Table 3).

Table 3: Caregiver-Related Determinants of children under two years in Kijumo Village

Variable	Frequency (n=100)	Percentage (%)
Age		
<18 years	7	7.0
18-22 years	26	26.0
23-27 years	50	50.0
>27 years	17	17.0
Mother's occupation		
Student	11	11.0
Businesswoman	15	15.0
Peasant	41	41.0
Housewife	21	21.0
Civil servant	12	12.0
Parents' religion		
Catholic	41	41.0
Protestant	29	29.0
Muslim	11	11.0
SDA	15	15.0
Pentecostal	4	4.0
Education level		
Primary level	51	51.0
Secondary level	38	38.0
Post-secondary level	11	11.0
Marital status		
Single	31	31.0
Married	63	63.0
Widow	6	6.0
Tribe		
Banyankole	94	94.0
Bakiga	2	2.0
Batooro	2	2.0
Bakonjo	1	1.0
Baganda	1	1.0
Number of children		
1 – 2	71	71.0
3 -4	23	23.0
> 5	6	6.0
Duration of breastfeeding		
3months	4	4.0
>6 <12 months	26	26.0
>12<24 months	30	30.0
24months	40	40.0

Influence of Caregiver-Related Determinants on Malnutrition among children under two years in Kijumo Village

Results in Table 4 show that the mother's age, mother's occupation, parents' religion mother's education level and mother's marital status were statistically significant ($p<0.05$) in association with malnutrition in children under two years. Children whose mothers were below 18 years of age were 6.7 times [OR: 6.75, 95%CI (1.09-11.61)], peasants were 4 times [OR: 4.82, 95%CI (1.06-7.83)], Muslims were 4 times [OR: 4.33, 95%CI (2.23-8.12)], mothers whose primary education was the highest attainment were 7 times [OR: 7.07, 95%CI (1.30-11.07)] and mothers who are single

were about 7 times [OR: 6.98, 95%CI (2.05-9.22)], more likely to become malnourished compared to those whose mothers were in the age bracket 23-27 years, civil servant, Catholics, had secondary education and are married respectively (Table 4).

Table 4: Influence of Caregiver-Related Determinants on Malnutrition among children under two years in Kijumo Village

Independent variables	Malnourished (n=20)	Normal (n=80)	OR (95% CI)	P-Values
Age				
<18 years	3(15.0%)	4(5.0%)	**6.75(1.09-11.61)**	**0.040**
18-22 years	4(20.0%)	22(27.5%)	2.14(0.51-8.87)	0.293
23-27 years	10(50.0%)	40(50.0%)	ref	
<27 years	3(15.0%)	14(17.5%)	3.60(0.51-25.00)	0.195
Mother's occupation				
Student	2(10.0%)	9(11.25%)	1.60(0.49-23.36)	0.212
Businesswoman	4(20.0%)	11(13.75%)	1.40(0.260-11.15)	0.578
Peasant	9(45.0%)	32(40.0%)	**4.83(1.06-7.83)**	**0.042**
Housewife	2(20.0%)	19(23.75%)	1.32(0.24-15.26)	0.536
Civil servant	3(15.0%)	9(11.25%)	ref	
Parents' religion				
Catholic	4(20.0%)	37(46.25%)	ref	
Protestant	7(35.0%)	22(27.5%)	2.59(0.84-5.28)	0.081
Muslim	6(30.0%)	5(6.25%)	**4.33(2.23-8.12)**	**0.014**
SDA	2(10.0%)	13(16.25%)	0.72(0.07-7.49)	0.788
Pentecostal	1(5.0%)	3(3.75%)	3.11(0.32-52.69)	0.26
Education level				
Primary level	17(85.0%)	34(42.5%)	**7.07(1.30-11.07)**	**0.032**
Secondary level	2(10.0%)	36(45.0%)	**ref**	
Post-secondary level	1(5.0%)	10(12.5%)	3.11(0.132-38.26)	0.575
Marital status				
Single	12(60.0%)	19(23.75%)	**6.98(2.05-9.22)**	**0.000**
Married	6(30.0%)	57(71.25%)	ref	
Widow	2(10.0%)	4(5.0%)	3.31(0.38-48.11)	0.235

DISCUSSION

Prevalence of Malnutrition among Children under two years in Kijumo Village

In this study, the Prevalence of malnutrition among children under two years in Kijumo village was 20% of which 13% were wasted and 7% were severely wasted. Generally, 20% of the children under two years in this study were underweight. The findings of this study showed differences in the prevalence rates when compared to prevalence rates of underweight (23.1%) and wasting (9 %) reported in a rural community of Osun state, Nigeria [23] and underweight (47.6%) and wasted (30.9%) reported in Hidabu Abote district [24].

Influence of Caregiver-Related Determinants on Malnutrition among Children under two years in Kijumo Village

In the present study, children whose mothers were below 18 years of age were 6.7 times more likely to become malnourished compared to those whose mothers were greater than 27 years. These study findings agree with a study in Bangladesh which reported that children whose mothers were less than 18 years were more likely to be stunted, wasted and underweight compared to children whose mothers were 18 years and above. Similarly, this study aligns with a study in the Ugandan settings which identified some common risk factors for protein-energy malnutrition, that is, severely

malnourished infants mostly from young mothers, had low weight at birth with less access to breastfeeding was essential for the infants' protein intake. This study, therefore, suggests that younger mothers tend to have less knowledge of child nutrition due to inexperience. The current study found that children of peasants were more likely to become malnourished compared to children of civil servants. These findings concur with a study in Uganda which revealed that children from mothers who were labourers or farmers and housewives had a greater prevalence of stunting, underweight and wasting than children from mothers who worked in offices [25]. These findings can be attributed to the fact that such mothers are financially challenged thus they fail to provide proper and rich complementary feeds including protein foods to their children. Also, such mothers rarely have time to take care of their children because of the labour and farming demand as such, they leave their children at home with other siblings who may neglect to feed them following the right frequency and this sometimes worsens the problem of malnutrition while mothers who are civil servants can employ nannies whom they take to work to stay close in designated areas as the work and care for their children. In this study, children whose mothers attained a primary level of education were more likely to become malnourished compared to children whose mothers attained a secondary level of education. This study agreed with previous studies by [26, 27, 31, 32, 33, 34, 35] which found that mother's education was associated with good nutrition practices and particularly under-two children nutrition and median levels of malnutrition across all countries ranging from 36 per cent for children whose mothers had some primary education to 16 per cent for children of mothers with secondary or higher education respectively [26, 27]. This could be attributed to the fact that most women with low education spend more time in gardens and feed their children less nutritious foods. Education also determines her income and this helps mothers to access proper nutrition for the child as well as health services. Children whose mothers were single and widowed were more likely to become malnourished compared to children whose mothers were married. This study's finding was similar to a study in Ethiopia which found that the risk of under-two-child malnutrition is higher among unmarried rural and divorced/separated women compared to married ones [28]. This can be attributed to the fact that unmarried mothers face financial difficulties thus limiting their capacity to provide nutritious food to their children. However, this present study differs from a study in Zambia which revealed that mothers who are married were more likely to have undernourished children unlike those that were unmarried perhaps because of the cost of maintaining families hence sometimes these families fail to produce nutritious supplements to the under-two children [29, 30, 31, 32, 33, 34, 35].

CONCLUSION

In this study, the proportion of malnutrition among children under two years in Kijumo village was 20%. Mother's age, mother's occupation, education level and marital status were statistically associated with malnutrition in children under two years.

Recommendations

There is a need for feeding education to mothers which would help to improve nutrition habits among needy infants mainly to control malnutrition. This should be done under good monitoring and evaluation. Healthy eating is essential for children, mental growth, and lifelong health and well-being. When children are not receiving proper nutrition, they are unable to grow well hence becoming stunted. It is therefore recommended mothers and caregivers are adequately encouraged to feed their children well. The researcher recommends that more research on malnutrition and associated factors in adults be conducted as most studies are on malnutrition among children.

REFERENCES

1. WorldHealthOrganization. (2016). Wor ld health statistics 2016: monitoring health for the SDGs, sustainable development goals. World Health Organization. https://apps.who.int/iris/handle/10665/206498
2. World Health Organization (WHO) (2017) World Health Statistics 2017: Monitoring Health for the SDGs, Sustainable Development Goals. WHO, Geneva.
3. UBOS, Uganda Demographic and Health Survey 2011, Uganda Bureau of Statistics, Kampala, Uganda, 2012
4. Habaasa, G. (2015). An investigation on factors associated with malnutrition among underfive children in Nakaseke and Nakasongola districts, Uganda. *BMC Pediatr* 15, 134. https://doi.org/10.1186/s12887-015-0448-y
5. United Republic of Tanzania, URT (2010). The National Strategy for Growth and Reduction of Poverty (NSGRP). Programme Document, Dar es Salaam: Vice President's Office.
6. World Health Organization. (2006). The world health report: 2006: working together for health. World Health Organization. https://apps.who.int/iris/handle/10665/43432
7. Gulati, R., Nohria, N. and Wohlgezogen, F. (2010) Roaring out of Recession. Harvard Business Review, 88, 62-69.
8. World Health Organization. (2013). World health statistics 2013. World Health Organization. https://apps.who.int/iris/handle/10665/81965
9. World Health Organization. (2014). World health statistics 2014. World Health Organization. https://apps.who.int/iris/handle/10665/112738
10. Black, R. E., Allen, L. H., Bhutta, Z. A., Caulfield, L. E., De Onis, M., Ezzati, M., et al. (2008). Maternal and Child Undernutrition: Global and Regional Exposures and Health Consequences. The Lancet, 371, 243-260. https://doi.org/10.1016/S0140-6736(07)61690-0
11. Odwee, A., Kasozi, K. I., Acup, C. A., Kyamanywa, P., Ssebuufu, R., Obura, R. and Bamaiyi, P. H. (2020). Malnutrition amongst HIV adult patients in selected hospitals of Bushenyi district in southwestern Uganda. *African health sciences*, *20*(1), 122-131.
12. Mada, S. B., Bawa, K. D., Saliu, M. A., Garba, A., Abarshi, M. M., Muhammad, A. and Garba, I. (2020). Evidence of Malnutrition and its Associated Factors among Under-five Children in Danko-Wasagu Kebbi State, North-western Nigeria. *Nigerian Journal of Basic and Applied Sciences*, *28*(1), 56-65.
13. Eze, E. D., Barasa, A., Adams, M. D., Rabiu, K. M., Ayikobua, E. T., Ezekiel, I. and Okpanachi, A. O. (2018). Assessing factors contributing to the prevalence of protein–energy malnutrition among children under five years of age attending Kigoma District Hospital, Tanzania. *Journal of Food and Nutrition Sciences*, *6*(5), 123-128.
14. World Health Organization. (2010). The world health report: health systems financing: the path to universal coverage. World Health Organization. https://apps.who.int/iris/handle/10665/44371
15. Akanbiemu, F. A., Fatiregun, A. A. and Adejugbagbe, A. M. (2016). Nutritional status of under-fives in rural and urban communities in southwest, Nigeria. World Academic Journal of Community Health and Epidemiology, 2(4):64–73.
16. Fotso, J. C., Ezeh, A. C., Madise, N. J. *et al.* (2007). Progress towards the child mortality millennium development goal in urban sub-Saharan Africa: the dynamics of population growth, immunization, and access to clean water. *BMC Public Health* 7, 218. https://doi.org/10.1186/1471-2458-7-218
17. Fernandez, F. et al. (2002) Expression and characterization of a human cDNA

that complements the temperature-sensitive defect in dolichol kinase activity in the yeast sec59-1 mutant: the enzymatic phosphorylation of dolichol and diacylglycerol are catalyzed by separate CTP-mediated kinase activities in Saccharomyces cerevisiae. Glycobiology 12(9):555-62

18. World Health Organisation (WHO) (2018) Joint Child Malnutrition Estimates—Levels and Trends: UNICEF-WHO the World Bank Group. https://www.who.int/nutgrowthdb/2018-jme-brochure.pdf?ua=1
19. Smith, L. C. and Haddad, L. J. (2000). Explaining child malnutrition in developing countries: a cross-country analysis, Research reports 111, International Food Policy Research Institute (IFPRI).
20. Kikafunda, J. K., Walker, A. F., Collett, D. and Tumwine, J. K. (1998). Risk factors for early childhood malnutrition in Uganda. *Pediatrics*, *102*(4), E45. https://doi.org/10.1542/peds.102.4.e45
21. Ugwu, C. N. and Eze, V. H. U. (2023). Qualitative Research. *IDOSR of Computer and Applied Science*, *8*(1), 20–35.
22. UBOS (2017) Uganda Bureau of Statistics 2017 Statistical Abstract. Kampala, Uganda.
23. Babatunde, R. O., Olagunju, F. I., Fakayode, S. B. and Sola-Ojo, F. E. (2011). Prevalence and determinants of Malnutrition among under-five Children of Farming Households in Kwara State, Nigeria. Journal of Agricultural Science.3(3):173- 181.
24. Kebede, B., Gebeyehu, A. and Andargie, G. (2013). Use of previous maternal health services has a limited role in reattendance for skilled institutional delivery: cross-sectional survey in Northwest Ethiopia. Int J Womens Health, 5:79-85. doi: 10.2147/IJWH.S40335. Epub 2013 Feb 21. PMID: 23459063; PMCID: PMC3583437.
25. Olwedo, M. A., Mworozi, E., Bachou, H. and Orach, C. G. (2008). Factors associated with malnutrition among children in internally displaced person's camps, northern Uganda. *African health sciences*, *8*(4), 244–252.
26. Masinde, D., Mazure, R. and Sseguya, H. (2009). Harnessing community capitals for livelihood enhancement: experiences from a livelihood program in rural Uganda. Community Development, 40(2)
27. Nazni, W. A., Hoffmann, A. A., NoorAfizah, A., Cheong, Y. L., Mancini, M. V., Golding, N., Kamarul, G. M. R., Arif, M. A. K., Thohir, H., NurSyamimi, H., ZatilAqmar, M. Z., NurRuqqayah, M., NorSyazwani, A., Faiz, A., Irfan, F. M. N., Rubaaini, S., Nuradila, N., Nizam, N. M. N., Irwan, S. M., Endersby-Harshman, N. M., White, V. L., Ant, T. H., Herd, C. S., Hasnor, A. H., Abubakar, R., Hapsah, D. M., Khadijah, K., Kamilan, D., Lee, S. C., Paid, Y. M., Fadzilah, K., Topek, O., Gill, B. S., Lee, H. L. and Sinkins, S. P. (2019). Establishment of Wolbachia Strain wAlbB in Malaysian Populations of Aedes aegypti for Dengue Control. Curr Biol., 29(24):4241-4248.e5. doi: 10.1016/j.cub.2019.11.007. Epub 2019 Nov 21. PMID: 31761702; PMCID: PMC6926472.
28. Ngure, F. M., Reid, B. M., Humphrey, J. H., Mbuya, M. N., Pelto, G. and Stoltzfus, R. J. (2014). Water, sanitation, and hygiene (WASH), environmental enteropathy, nutrition, and early child development: making the links. *Annals of the New York Academy of Sciences*, *1308*, 118–128. https://doi.org/10.1111/nyas.12330
29. Irena, A. H., Mwambazi, M. and Mulenga, V. (2011). Diarrhea is a major killer of children with severe acute malnutrition admitted to inpatient set-up in Lusaka, Zambia. Nutr J., 11;10:110. doi: 10.1186/1475-2891-10-110. PMID: 21989455; PMCID: PMC3214843.
30. Yusuf S. Enechi, O.C., Ugwu, Kenneth K., Ugwu Okechukwu P.C. and Omeh (2013) EVALUATION OF THE ANTINUTRIENT LEVELS OF CEIBA PENTANDRA LEAVES. IJRRPAS, 3(3): 394-400.

31. OU Orji, UA Ibiam, PM Aja, P Ugwu, AJ Uraku, C Aloke, OD Obasi, BU Nwali (2016). Evaluation of the phytochemical and nutritional profiles of Cnidoscolus aconitifolius leaf collected in Abakaliki South East Nigeria. World Journal of Medical Sciences,13(3): 213-217.
32. BU Nwali, GI Egesimba, PCO Ugwu, ME Ogbanshi (2015).Assessment of the nutritional value of wild and farmed Clarias gariepinus. Int. J. Curr. Microbiol. App. Sci,4(1): 179-182.
33. CE Offor, PC Ugwu Okechukwu, U Alum Esther (2015). Determination of ascorbic acid contents of fruits and vegetables. Int. J. Pharm. Med. Sci,5: 1-3.
34. E. C. Afiukwa, C. A., Ogah, O., Ugwu, O. P. C., Oguguo, J. O., Ali, F. U., & Ossai (2013). Nutritional and Antinutritional characterization of two wild Yam species from Abakaliki, Southeast Nigeria. Research Journal of Pharmaceutical, Biological and Chemical Sciences, RJPBCS,4(2): 840-848.
35. FC Asogwa, PC Ugwu Okechukwu, U Alum Esther, O Egwu Chinedu, Edwin Nzubechukwu (2015). Hygienic and sanitary assessment of street food vendors in selected towns of Enugu North District of Nigeria. American-Eurasian Journal of Scientific Research 10(1) 22-26.

Kiti, Isaac Mukasa (2023). Evaluation of Caregiver-Related Determinants on Malnutrition of Children Less Than Two Years in Kijumo, Bushenyi District. IAA Journal of Scientific Research 10(2):115-124.