https://www.eejournals.org Open Access
EURASIAN EXPERIMENT JOURNAL OF BIOLOGICAL SCIENCES (EEJBS) ISSN:2992-4138
©EEJBS Publications Volume 4 Issue 1 2023

Prevalence of Undernutrition and its Associated Comorbidity amongst under Fives Admitted in the Paediatric Ward Nutritional Unit in Fort Portal Regional Referral Hospital

Mugenyi Deborah

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

ABSTRACT

Malnutrition is defined as the deficiencies, excesses or imbalances in a person's intake of nutrients. Malnutrition has caused adverse effects on the population including; diminished immunity making them susceptible to many infections which are detrimental to their lives and brain retardation affecting their studies and memory, low birth weight which is likely to cause death and those that survive are likely to succumb to growth retardation. Despite several interventions, malnutrition still persists. Thus, this study sought to find out the prevalence of undernutrition and its associated co-morbidities amongst under-fives admitted in the paediatric ward nutritional unit in Fort Portal Regional Referral Hospital (FRRH). This cross-sectional study was carried out in FRRH in October after receiving Approval. Mothers were interviewed their case files were also reviewed. The data was collected with the consideration of privacy and confidentiality which was implemented by omitting the names and no video or audio recording. Descriptive analysis was used to compare demographic factors of children and their mothers, odd ratios were used to analyse the associated co-morbidities. The information was then presented in tables, figures and charts. A total of 372 children were enrolled in the study, 34.9% were males and 65.1% female, 25 – 36 months was the largest age group with 40.05%, children with > 5 siblings were the most affected with 43.5%, children whose caregivers were 25- 29 years were most affected with 34.7%, children in rural areas were highest with 72.3%, children whose parents were married were highest with 83.3%. The prevalence of under nourished was 19.6% prevalence of children of peasants was highest at 79.8%, and most were brought in by their mothers at 87.9%. Under five acute diarrhoea and acute respiratory infection were co-morbidities that should be prevented. Therefore, hospitals should work in collaboration with health extension workers to prevent co-morbidities and strengthen screening and referral of malnutrition cases at the community level. Moreover, FPRRH and District Health Offices should facilitate experience sharing among health facilities.

Keywords: Malnutrition, Infections, Paediatric, Diarrhoea, Undernutrition, Mothers.

INTRODUCTION

According to World Health Organization (WHO), malnutrition is defined as the deficiencies, excesses or imbalances in a person's intake of nutrients. It is broadly divided into; under-nutrition and over-nutrition [1-3]. Undernutrition is insufficient intake of energy and nutrients to meet an individual's needs to maintain good health [4, 5]. Undernutrition is further divided into kwashiorkor and marasmus, which are the deficiencies of proteins and carbohydrates [6, 7]. The deficiency of vitamins and minerals with devastating consequences to especially children

under 5 years is a description of micro nutrition-related malnutrition [8-12]. Overnutrition is the overconsumption of nutrients and food to a point where health is adversely affected [13, 14]. It is estimated that 42 million children under 5 years are overweight globally [3]. However, malnutrition can also be classified into acute malnutrition and chronic malnutrition with acute malnutrition consisting of oedema, dermatoses, irritability, and chronic malnutrition containing stunted growth, wasting, and mental retardation [15, 16]. The prevalence of stunted children has slightly reduced over a period of 19 years from 32.4% (199.5 million) in 2000 to 21.3% (144 million) in 2019 while overweight children have increased from 4.9% (30.8 million) to 5.6% (38.3 million) over the same period of time. Those that were wasted in 2019 were 6.9% accounting for 47 million children [17]. In Uganda, 6% were wasted while 14% were underweight. By 2013 with 567,621 deaths, malnutrition accounted for 60% of the deaths among under-fives and it was the leading cause of premature death among the same age group in Mubende Regional Referral Hospital (MRRH) [18]. Many other effects have continued to be a result of malnutrition with some being life-threatening to the mentioned age group of children. Malnutrition has caused adverse effects to the population including; anemia, diminished immunity making them susceptible to many infections, mental retardation, low weight which is likely to cause death and those that survive are likely to succumb to growth retardation [19-23]. Malnutrition has also been found to be an underlying cause of childhood death with relation to infectious diseases in developing countries such as acute respiratory infections, diarrhoea and malaria [24]. To end food insecurity many donors and the international community have promoted initiatives in industrial agriculture in the majority of African countries with Uganda inclusive which increases the amount of food produced and diversity of food in turn reducing malnutrition [25]. Nutrition education as an intervention has greatly been used to combat malnutrition, especially in developing countries where literature is printed and availed to the community [26].

In Uganda, the rate of malnutrition among the stunted is 28.9% and 3.5% wasted as compared to 25% and 8.9% respectively in other countries [27]. The prevalence of acute malnutrition (wasting) in Uganda among children 6-59 months of age is 4% in the West Nile sub-region and 10% in refugee humanitarian settings [28]. In central Uganda in Mubende Regional Referral Hospital, a study done by Namusoke and Atuhaire in 2019 revealed that 35% of the children were undernourished [18]. Despite the government's efforts through its Uganda Nutrition Action Plan (2011-2016), the levels of malnutrition have remained high and coincided with failed targets according to the millennium goal developed in 2000 that showed that malnutrition was to end by 2020 [29]. Generally, this problem has greatly affected the population especially the children under five having growth retardation, diminished immunity, and mental retardation, and has progressed even to death. Economically, the countries managing children with malnutrition have used a lot of money to combat this problem. Socially, stigma has also been attached to this condition, especially to the families where these children come from. Specific to the sample population of research, there is stigma from the community, they are susceptible to other infections; long hospitalization which has affected their family finances, and the children's school attendance. Interventions have been done at all levels of the country through providing health education about proper nutrition before and during pregnancy to prevent underweight babies, breastfeeding within one hour of birth, exclusive breastfeeding until 6 months, the introduction of supplementary foods from 6 to 24 months, good hygiene at home, timely and proper immunization, and family planning. Furthermore, the government has gone ahead to provide food to some vulnerable people like those in refugee camps and provided the necessary health services like immunization, maternity, and antenatal free for everyone. Despite the above interventions, malnutrition still persists. Therefore, this research sought to out the factors that have contributed to malnutrition among under-fives in Fort Portal Regional Referral Hospital (FRRH).

METHODOLOGY

Study design

This was a cross-sectional study to determine the prevalence of undernutrition and its associated comorbidity amongst children under five in the paediatric ward of Fort Portal Regional Referral Hospital.

Area of Study

The study was carried out in the paediatric ward of Fort Portal Regional Referral Hospital. The hospital is located in fort portal city, Kabarole District, western Uganda. It serves; Bundibugyo, Kamwenge, Kasese, Ntoroko and Kyenjojo. It's approximately 295km by road west of Kampala. Fort portal hospital is a public hospital funded by MOH and general care in the hospital is free. It's one of the 15 internship hospitals where graduates from medical schools serve one year under the supervision of qualified specialists and consultants. The bed capacity in the paediatric ward is 40 beds. It's headed by one consultant paediatrician, three paediatricians plus medical officers and interns.

Study population

The study was carried out amongst the children admitted to the paediatric ward and Nutritional unit of Fort Portal regional referral hospital.

Sample size determination

The sample size was determined by use of the Keish and Leslie (1995) formula as below;

$$N = \frac{Z^2 pq}{D^2}$$

Where;

N = sample size required.

Z= 1.96 (the Z score value corresponding to 95% level of confidence on the standardized normal distribution curve).

p= using the prevalence of acute malnutrition in the Tooro sub-region is 41% according to Adebisi *et al.* [28].

q=1-p.

D=0.05 which is the acceptable tolerable error.

Therefore, substituting for **N;**

N = $\frac{1.96^2 \text{ X } 0.41 \text{ X } (1-0.41)}{0.05^2}$

N= *372* children. Therefore, 372 respondents were used in the study.

Target population; children admitted in the paediatric ward of Fort Portal regional referral hospital.

Sampling procedure

The sampling was done after a session of explanation to the respondents on the study and its importance. This was done in English, Luganda, and Runyakitara languages for the majority to understand.

Inclusive criteria

All children aged under five were considered in the study

All the children admitted to the nutritional unit of the paediatric ward were considered in the study.

Exclusive criteria

Those whose mothers did not consent to the study.

Children aged five years and above.

Data collection method

The data was collected with the consideration of privacy and confidentiality which was implemented by omitting the names and no video or audio recording. The researcher was helped by a research assistant to collect the data and who also helped with translation since the majority of the place know the language. The informed consent was read to the caretakers after explaining the reason for the collection of data. Those who were allowed were given the consent forms to fill and data was collected. The answering was done with a one-on-one interaction by ticking or writing opinions by the respondent to make sure the questionnaire is correctly filled. The questionnaire was checked if fully and correctly filled and then kept in a separate box from the consent box.

Data collection tool

The research data was collected with a questionnaire that had both closed and open-ended questions. This was personally developed to suit my research.

Data processing and analysis

The questionnaires, after data collection, were recounted to make sure they were the exact number and were kept in a box with a lock only accessible to the researcher only. Descriptive analysis was used to compare the demographic factors of children and their mothers, odd ratios were used to analyse the significance of comorbidities. The information was then presented in tables, figures and charts.

RESULTS

Sociodemographic Characteristics of Study Population

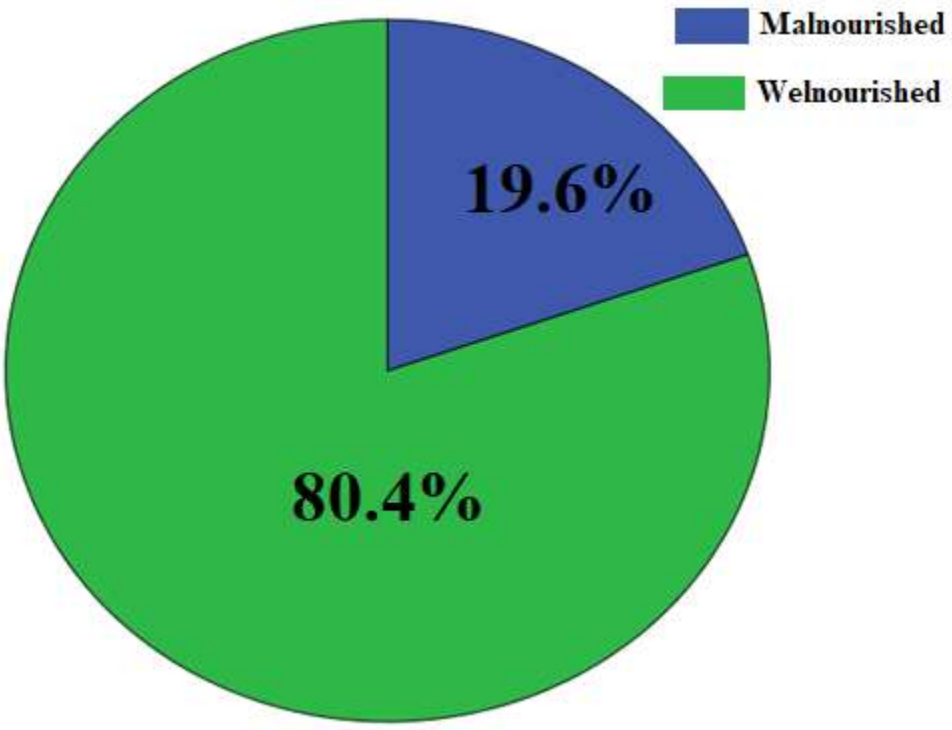
Table 1: sociodemographic characteristics of respondents

Child Demographics	Frequency (N)	Percentage (%)
Age (Months)		
< 12 Months	28	7.5
12 – 24 Months	70	18.8
25 – 36 Months	149	40.05
>36 Months	125	33.6
SEX		
Male	130	34.9
Female	242	65.1
Number of Siblings		
< 2	69	18.5
2– 4	141	37.9
5 and above	162	43.5
Caregiver Demographics	**Frequency (N)**	**Percentage (%)**
Age (Years)		
15 – 19	27	7.3
20 – 24	90	24.2
25 – 29	129	34.7
30 – 34	85	22.8
35 and above	41	11.0
Residence		
Rural	269	72.3
Urban	103	27.7
Marital Status		
Single	32	8.6
Married	310	83.3
Divorced / Separated	26	6.99
Widowed	4	1.1
Occupation		
Peasant	297	79.8
Hairdresser	19	5.1
Shopkeeper	7	1.9
Tailor	14	3.8
Vendor	35	9.4
Relationship to Child		
Mother	327	87.9
Sister	7	1.9
Aunt	23	6.2
Grandmother	15	4.0

As Table 1 above shows, most (40.05%) of the under-fives admitted at FPPRH during the study period were between 25 – 36 months old, female (65.1%), with between 2 to 4 siblings in a household, and were under the care of their married (83.3%), peasant (79.8%), mothers (87.9%), aged between 25 and 29 years, and who lived in a rural area (34.7%).

Prevalence of Acute Malnutrition Among Under-Fives

FPRRH. Figure 1: Prevalence of acute malnutrition among Under-fives admitted in the pediatric ward of FPRRH.

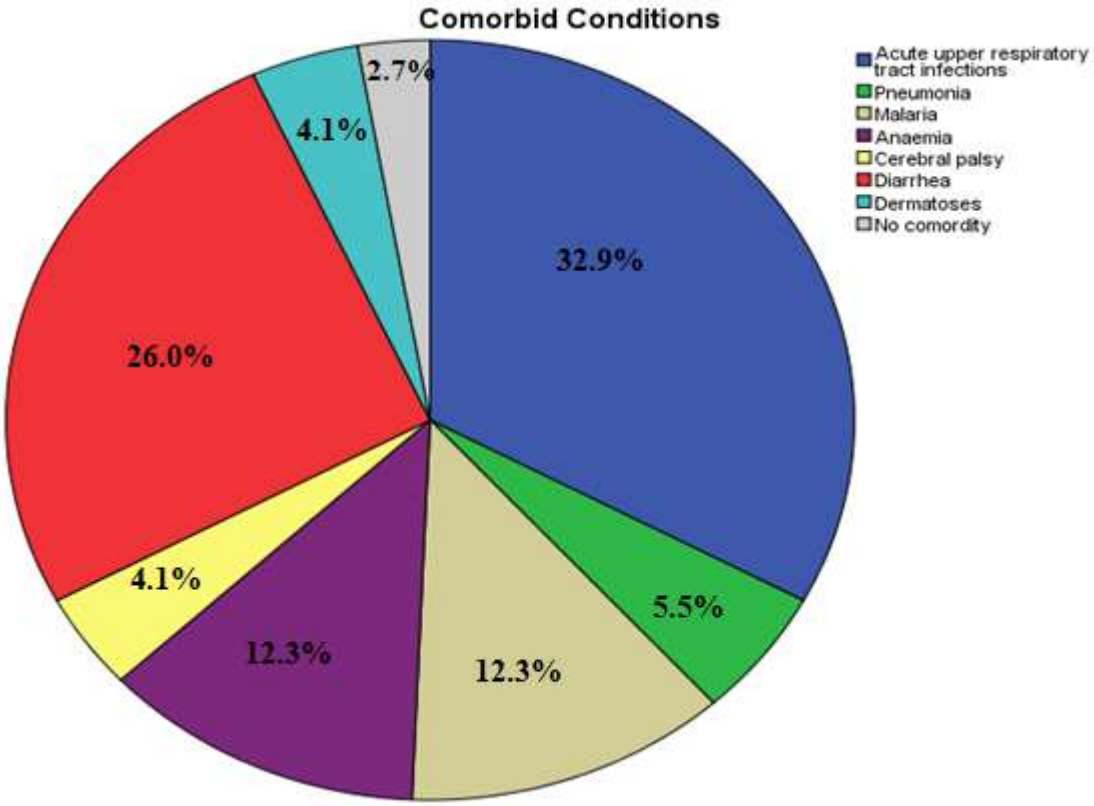


As shown in Figure 2, the prevalence of acute malnutrition among under-fives was 19.6% (73) with well-nourished under-fives having 80.4% (299) over the study period of 2 months.

Common Comorbid Conditions in Under-Five Acute Malnutrition.

71 (97.26%) out of all the 73 acute malnutrition cases had a co-morbid condition too. Figure 3 below shows the various co-morbid conditions reported among the acutely malnourished under-fives studied.

Figure 2: Incidence & Types of Comorbid Conditions in Acutely Malnourished Under-fives



From Figure 2, upper respiratory tract infections were the most common co-morbidity contributing 32.9% in acutely malnourished under-fives followed by diarrhoea (26%), then followed by malaria (12.3%) and anaemia (12.3%). Others were pneumonia (5.5%), Dermatoses (4.1%) and cerebral palsy (4.1%)

DISCUSSIONS

Prevalence of Acute Malnutrition in Under-fives admitted in paediatric ward in FPRRH.

The prevalence of under nutrition among the under-fives was 19.6%. Males contributed 10.2% while females made 9.4%. It was higher among children aged 2 – 4 years (35.29%) and least in those below 12 months (14.71%). This value is slightly higher than the Indian prevalence of 16% [30] which could be attributable to a larger study population size in the populous India. The value, however, emphasizes the fact that malnutrition is high in low- and middle- income countries (LMICs) of Africa as seen in studies conducted in Central African Republic (CAR) [31], Bangladesh [32], and Enugu, Nigeria [33]. Most importantly, it was way lower than the 5% reported by Mawa & Lawoko [34], for Uganda implying a regional prevalence variation with some regions in Uganda having high prevalence and others having low prevalence that would average to that lower value of 5%.

Comorbidities in Acutely Malnourished Under-fives

Comorbid conditions such as anaemia, worm infestations, malaria, and HIV/AIDS among others have been shown to cause, result or complicate undernutrition [35-38]. This consequently worsens the prognosis as compared to if malnutrition or the other comorbidities were occurring independently of each other. The prevalence of comorbid conditions in acutely malnourished under-fives was 97.26% with the three most common ones being upper respiratory tract infection, acute watery diarrhoea, anaemia and malaria. Others were cerebral palsy, pneumonia and Dermatoses. These findings agree with previous reports by Rodríguez *et al.* [39] and the fact that comorbidities are high among malnourished children. This also agrees with Saurabh and Ranjan's [40] report that diarrhoea and respiratory tract infections are the most common comorbid conditions in malnutrition. Also, the findings are a reiteration of those by Reddy *et al.* [41] in Andhra Pradesh India.

CONCLUSION

The prevalence of acute malnutrition among under-fives attending Fort-Portal Regional Referral Hospital was high at 19.6%. Upper respiratory tract infections and acute watery diarrhoea were the highest co-morbid conditions seen in acute malnutrition among under-fives.

RECOMMENDATIONS

Since acute diarrhea and acute respiratory infection were the highest co morbidities, they should be assessed in every under nourished child. In this study the prevalence of under nutrition was high therefore there is need for FPRRH and District Health Offices should facilitate experience sharing among health facilities, joint effort by the government, non-governmental organizations are necessary to overcome the malnutrition problem among children. Better coverage of nutrition-specific (e.g., promotion of breastfeeding, maternal supplementation with balanced energy and protein, multiple micronutrient supplementation) and nutrition-sensitive interventions (e.g., improving socioeconomic status and control over resources, discouraging early marriage, improving access to water and sanitation facilities) may play a vital role in reducing the burden of malnutrition.

REFERENCES

1. Eze, E. D., Barasa, A., Adams, M. D., Rabiu, K. M., Ayikobua, E. T., Ezekiel, I., ... & Okpanachi, A. O. 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*, 2018; 6(5): 123-128.
2. Mada, S. B., Bawa, K. D., Saliu, M. A., Garba, A., Abarshi, M. M., Muhammad, A., and Garba, I. 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*, 2020; 28(1): 56-65.
3. WHO. Malnutrition. Geneva: WHO, 2020.
4. Trehan I, Goldbach HS, LaGrone LN, Meuli GJ, Wang RJ, Maleta KM, Manary MJ. Antibiotics as part of the management of severe acute malnutrition. Malawi Med J. 2016;28(3):123-130.
5. Kumbakulu, P. K., Ndeezi, G., Egesa, W. I., Nakalema, G., Odoch, S., Kambele, R. L., ... & Nduwimana, M. Prevalence, feeding practices, and factors associated with undernutrition among HIV-exposed uninfected children aged 6 to 18 months in Bushenyi district, western Uganda: A cross-sectional study. Research Square, 2022; 1-22.
6. Odwee, A., Kasozi, K. I., Acup, C. A., Kyamanywa, P., Ssebuufu, R., Obura, R., ... & Bamaiyi, P. H. Malnutrition amongst HIV adult patients in selected hospitals of Bushenyi district in southwestern Uganda. *African health sciences*, 2020; 20(1): 122-131.
7. Obeagu, E. I., Nimo, O. M., Bunu, U. M., Ugwu, O. P.C. and Alum, E.U. Anaemia in children under five years: African perspectives. *Int. J. Curr. Res. Biol. Med.*, 2023; (1): 1-7.
8. Offor C. E., Ugwu O. P. C. and Alum E. U**.** Determination of Ascorbic Acid Contents of Fruits and Vegetables. *International Journal of Pharmacy and Medical Sciences*. 2015; **5(1):** 01-03.
9. Aja P. M., Uzuegbu U. E., Opajobi A. O., Udeh S.M.C., Alum E. U., Ominyi M.C., Aloke C. and Ekpono E. U. Amino acid profile, Vitamin and Reducing sugar compositions of Ethanol Fruit-extract of *Phoenix dactylifera* L (Date Fruit) sold in Abakaliki, Ebonyi State, Nigeria. *International Journal of Biology, Pharmacy and Allied Sciences*. 2017; **6***(2): 349-362.*
10. Alum E. U., Ibiam U. A., Aja P. M., Orji O. U., Ezeani N. N. and Ugwu O. P.C. Comparative Analysis of Chemical Composition of *Buchholzia coriacea* Ethanol Leaf-Extract, Aqueous and Ethylacetate Fractions. *Indo American Journal of Pharmaceutical Sciences (IAJPS)*. 2018*;* **5**(7): 6358- 6369.
11. Aja P.M., Ugwu O. P. C., Ekpono E. U., Mbam M. L., Alum E. U. and Ibere J. B. Proximate and Mineral Compositions of *Phoenix dactylifera* (Fruit Sold in Hausa Quarter Abakaliki, Ebonyi State, Nigeria. *IDOSR Journal of Scientific Research*. 2017; **2(1):** 53-65.
12. Alum, E. U., Oyika, M. T., Ugwu, O. P. C., Aja, P. M., Obeagu, E. I., Egwu, C. O. and Okon, M. B. Comparative analysis of mineral constituents of ethanol leaf and seed extracts of *Datura stramonium*. *IDOSR JOURNAL OF APPLIED SCIENCES*, 2023; **8**(1):143-151.
13. Afiukwa, C. A., Ogah, O., Ugwu, O. P. C., Oguguo, J. O., Ali, F. U., & Ossai, E. C. Nutritional and antinutritional characterization of two wild yam species from Abakaliki, Southeast Nigeria. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, 2013; 4(2): 840-848.
14. Uraku A. J., Igwenyi I. O., Alum E. and Orji O. U. Assessment of nutritional value of *Culcasia scandens* P. Beauv leaves *Advances in Biomedicine and Pharmacy*. 2016; ***3*** (2): 115-119.

15. Asomugha, I. C., Uwaegbute, A. C., & Obeagu, E. I. Food insecurity and nutritional status of mothers in Abia and Imo states, Nigeria. *Int. J. Adv. Res. Biol. Sci*, 2017; *4*(10): 62-77.
16. Gandu, Z., Omotunde, P., Okafor, C. J., Rashid, H. K., & Obeagu, E. I. A Comparison of Haematological Parameters of Obese Individual and Non-Obese at Omisanjana Area of Ado Ekiti, Ekiti State, Nigeria. *Journal of Pharmaceutical Research International*, 2022; 32-36.
17. UNICEF. Malnutrition, 2020.
18. Namusoke M, Atuhaire S. Factors Contributing To Malnutrition among Under-Fives: A Survey of Mubende Regional Referral Hospital, Uganda. J Health Sci Stud., 2019; 1(2): 201.
19. Orji, O. U., Ibiam, U. A., Aja, P. M., Ezeani, N., Alum**,** E. U. and Edwin, N. Haematological Profile of *Clarias gariepinus* (Burchell 1822) Juveniles Exposed to Aqueous Extract of *Psychotria microphylla* Leaves IOSR-JESTFT, 2015; **9 (9):** 79-85**.**
20. Aja, P. M., Uzuegbu, U. E., Opajobi, A. O., Udeh, S. M.C., Alum, E. U., Abara, P. N., Nwite, F. and Ibere, J. B. Comparative Effect of Ethanol Leaf-Extracts of *Ficus capensis* And *Moringa oleifera* on some haematological indices in normal Albino Rats. *Indo American Journal of Pharmaceutical Sciences*, 2017;**4 (2):** 471-476.
21. Ekpono, E. U., Aja, P. M., Ibiam, U. A., Alum, U. E and Ekpono, U. E. Ethanol Root-extract of *Sphenocentrum jollyanum* Restored Altered Haematological Markers in *Plasmodium berghei*-infected Mice. *Earthline Journal of Chemical Sciences*, 2019; **2** (2):189-203.
22. Obeagu, E. I., Bot, Y. S., Obeagu, G. U., Alum, E. U. and Ugwu, O. P. C. Anaemia and risk factors in lactating mothers: a concern in Africa. *International Journal of Innovative and Applied Research*, 2023;**11**(2): 15-17.
23. Obeagu, E. I., Ali, M. M., Alum, E. U., Obeagu, G. U., Ugwu, O. P. C. and Bunu, U. M. An Update of Aneamia in Adults with Heart Failure. *INOSR Experimental Sciences*, 2023; **11**(2):1-16.
24. Obeagu, E. I., Neema, B. G., Getrude Obeagu, G. U., Alum. E. U. and Ugwu, O. P. C. A Review of Incidence and Clinical Outcomes of Neonate with False Tooth Extraction. IAA Journal of Scientific Research. 2023; 10(1):25-27.
25. Gian Marco Grindatto, J. M. Ending Malnutrition. Paris: Global health advocates, 2018.
26. Zahid Khan A, Rafique G, Qureshi H, Halai Badruddin S. A nutrition education intervention to combat undernutrition: experience from a developing country. ISRN Nutr. 2013; 2013:210287.
27. WHO. Uganda nutrition profile. Global nutrition report, 2019.
28. Adebisi YA, Ibrahim K, Lucero-Prisno DE 3rd, Ekpenyong A, Micheal AI, Chinemelum IG, Sina-Odunsi AB. Prevalence and Socio-economic Impacts of Malnutrition Among Children in Uganda. Nutr Metab Insights. 2019;12: 1178638819887398.
29. UNSCN. Ending Malnutrition by 2020 An agenda for change in the Millennium, 2000.
30. WHO/Unicef/World Bank Group, Levels and trends in child malnutrition, Published by Unicef/WHO/World Bank, 2018.
31. Vonaesch P, Tondeur L, Breurec S, Bata P, Nguyen LBL, Frank T, Farra A, Rafaï C, Giles-Vernick T, Gody JC, Gouandjika-Vasilache I, Sansonetti P, Vray M. Factors associated with stunting in healthy children aged 5 years and less living in Bangui (RCA). PLoS One. 2017;12(8): e0182363.
32. Sarma H, Khan JR, Asaduzzaman M, Uddin F, Tarannum S, Hasan MM, Rahman AS, Ahmed T. Factors Influencing the Prevalence of Stunting Among Children Aged Below Five Years in Bangladesh. Food Nutr Bull. 2017;38(3):291-301.
33. Anoshirike, C. O., Ejeogo, C. P., Nwosu, O. I. C., Maduforo, A. N. & Nnoka, K. O. Infant Feeding Practices Among Mothers and Their Infants Attending Maternal And Child Health In Enugu, Nigeria. Journal of Biology, Agriculture and Healthcare. 2014; 4:1.
34. Mawa, R., & Lawoko, S. Malnutrition Among Children Under Five Years in Uganda. *American Journal of Health Research*, 2018; *6*, 56.
35. Egwu, C. O., Aloke, C., Chukwu, J., Agwu, A., Alum, E., Tsamesidis, I, Aja, P. M., Offor, C. E. and Obasi, N. A. A world free of malaria: It is time for Africa to actively champion and take leadership of elimination and eradication strategies. *Afri Health Sci.* 2022;22(4). 627-640.
36. Egwu, C.O., Aloke, C., Chukwu, J., Nwankwo, J.C., Irem, C., Nwagu, K.E., Nwite, F., Agwu, A.O., Alum, E., Offor, C.E. and Obasi, N.A. Assessment of the Antimalarial Treatment Failure in Ebonyi State, Southeast Nigeria. *J. Xenobiot.* 2023, 13, 16–26.

37. Alum, E. U., Uti, D. E., Agah, V. M., Orji, O. U., Ezeani, N. N., Ugwu, O. P., Bawa, I., Omang, W. A. and Itodo, M. O. Physico-chemical and Bacteriological Analysis of Water used for Drinking and other Domestic Purposes in Amaozara Ozizza, Afikpo North, Ebonyi State, Nigeria. *Nigerian Journal of Biochemistry and Molecular Biology*,2023; 38(1):1-8.
38. Obeagu, E.I., Alum, E.U. and Obeagu, G.U. Factors Associated with Prevalence of HIV Among Youths: A Review of Africa Perspective. *Madonna University Journal of Medicine and Health Sciences*, 2023; **3**(1): 13-18.
39. Rodríguez L, Cervantes E, Ortiz R. Malnutrition and gastrointestinal and respiratory infections in children: a public health problem. Int J Environ Res Public Health. 2011;8(4): 1174-205.
40. Saurabh, K. and Ranjan, S. Fasciolopsiasis in Children: Clinical, Sociodemographic Profile and Outcome. Indian Journal of Medical Microbiology, 2017; 35(4):551-554,
41. Reddy VB, Kusuma YS, Pandav CS, Goswami AK, Krishnan A. Prevalence of malnutrition, diarrhea, and acute respiratory infections among under-five children of Sugali tribe of Chittoor district, Andhra Pradesh, India. J Nat Sci Biol Med. 2016;7(2):155-60.

Mugenyi Deborah (2023).Prevalence of Undernutrition and its Associated Comorbidity amongst under Fives Admitted in the Paediatric Ward Nutritional Unit in Fort Portal Regional Referral Hospital. *EURASIAN EXPERIMENT JOURNAL OF BIOLOGICAL SCIENCES*, 4(1): 13-21.