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FACTORS ASSOCIATED WITH SEVERE ACUTE MALNUTRITION AMONG CHILDREN AGED 6 MONTHS TO 59 MONTHS ATTENDING MOROTO REGIONAL REFERRAL HOSPITAL MOROTO MUNICIPALITY. A CROSS-SECTIONAL STUDY.

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Abstract

Background:

Objectives: Study established factors associated with SAM among children aged 6 months to 59 months attending Moroto Regional Referral Hospital. The specific objectives of the study were to assess demographic, socioeconomic, and clinical factors associated with SAM among children aged 6-59 months attending MRRH, Moroto municipality in the Karamoja sub-region.

Methodology:

The study used a descriptive cross-sectional design. A convenience sampling technique was used. A target population of 152 respondents was included in the study. Research-based questionnaires were used to collect data from the respondents. Data were analyzed using SPSS software.

Results:

The prevalence of SAM in children aged 6-59 months attending MRRH is 34.2%. The following factors were significantly associated with SAM: birth order 1-3rd 61.5%, birth interval <2 years 48.1%, rural setting 84.6%, no education background 92.3%, no occupation 82.7%, no stable family income 92.3%, family members >5 71.2%, unsafe source of water 76.9%, breastfeeding < 8 times 69.2%, early or delayed weaning 78.8%, previous infection 67.3%, diarrhea for >1 week 46.3%.

Conclusions:

The findings of this study indicated that birth order, birth interval residence, education level, occupation, family size, source of water, age of weaning, frequency of breastfeeding, previous infections, and diarrhea were major factors associated with SAM among children aged 6-59 months.

Recommendations:

Government through the Ministry of Health should resort to mass screening of children in the Karamoja region to combat the increasing prevalence of SAM in Karamoja. Health education on the importance of family planning should be passed on to them to correctly plan for good birth intervals and manageable family sizes. Emphasis on education for all should be put in place. Management of the underlying conditions, and health education on the importance of breastfeeding should be put in place to fight this epidemic.

Keywords: Severe Acute Malnutrition, Prevalence, Moroto Regional Referral Hospital, submitted: 2023-04-13 accepted: 2023-07-29

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1. BACKGROUND.

According to (Kebede F,2022) severe acute malnutrition is defined as either a weight-for-height < -3z score of the median WHO growth standard, a mid-upper-arm circumference (MUAC) < 115 mm, visible severe wasting, or the presence of nutritional edema. (IMAM, 2020)

Malnutrition results from the interaction between poor diet and diseases which leads to nutritional deficiencies observed among the under-five children. Socioeconomic, biological, and environmental factors are the underlying causes for the insufficient food intake or ingestion of food with proteins of low nutritional quality that leads to protein energy malnutrition (PEM) (WHO, UNICEF, World Bank, 2020).

Malnutrition remains one of the most common causes of morbidity and mortality in children throughout the world. It is responsible directly or indirectly for 60% of the 10.9 million deaths annually among under-five children and two-thirds of these deaths occur during the first year of life (Bizuneh, Fassikaw et Al, 2021).

SAM is a global public health problem that affects an estimated 45.4 million children under five of which 12.1 million children are Africans (Wamani H et Al,2022).

In Uganda, the Karamoja sub-region, one of the most food insecure locations in Eastern Africa has the highest level of child nutrition estimated at 26, 34, and 10% for underweight, stunting, and wasting respectively (Okidi L et al, 2022).

According to (Christine V. Kramer, 2015) disparity in prevalence and predictors of undernutrition in children under five among agricultural, pastoral, and agro-pastoral ecological zones of the Karamoja sub-region, Uganda; a cross-sectional study found the prevalence of underweight, stunting, and wasting ranged from 36 to 58% but varied with agroecology in terms of peak age ranging from 6 to 37 months (Okidi L et al, 2022).

Child characteristics, feeding practices, household economic factors, sanitation factors, and caregivers' characteristics that predict undernutrition among children under-fives were identified. (Okidi L et al, 2022)

As per the survey data collected during the lean season of 2021 (February to March 2021) from the nine districts in the Karamoja region, all nine districts have over 5% of their children affected by acute malnutrition.

According to IPC (integrated food security phase classification) acute malnutrition scale, one district (kaabong) has been in IPC AMN phase 4 (critical levels of acute malnutrition) with GAM prevalence of 18.6% and four districts (Amudat, Moroto, Kotido, and Napak) have been classified in the IPC AMN phase 3 (serious levels of acute malnutrition). Although the GAM (WHZ) prevalence of Napak puts it in IPC AMN phase 2, the final phase has been arrived at using the GAM based on MUAC (11.6) and after taking into consideration historical prevalence. The remaining four districts are classified in IPC AMN Phase 2 (alert levels acute malnutrition) and these are Abim, Karenga, Nabilatuk, and Nakapiripirit.

Kaabong district has the highest absolute number of severely malnourished children (2,263) whereasKotido has the highest number of moderately malnourished children (8623). Overall 1.9% of the children in the Karamoja region are severely malnourished and another 8.8% are moderately malnourished, based on the weight for height (WHZ) index. With MUAC, the numbers go up slightly with 3.8% severely malnourished and 9.9% moderately malnourished. All the 56,560 cases of children aged 6-9 months were acutely malnourished; SAM had 10,257: and MAM had 46,302 cases (IPC, 2022)

The prevalence of acute malnutrition among children in Karamoja is at a serious level (13.1%) with Moroto (21.9%) and Kaabong (19.6%) being most affected, that is children between 6- 59 months (UNICEF, Uganda Karamoja response, 2022)

It's upon this background that the researcher decides to establish the factors associated with SAM to inform policymakers to design targeted interventions to prevent this avoidable cause of morbidity and mortality among children below 5

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years.

1.1. General objectives.

To assess factors associated with severe acute malnutrition in children aged 6 months to 59 months attending Moroto Regional Referral Hospital, Moroto municipality.

1.2. Specific objectives.

- To assess demographic factors associated with severe acute malnutrition among children aged 6 months to 59 months attending Moroto Regional Referral Hospital Moroto municipality.
- To establish the socioeconomic factors associated with severe acute malnutrition among children aged 6 months to 59 months attending Moroto Regional Moroto municipality.
- To assess clinical factors associated with severe acute malnutrition among children aged 6 months to 59 months attending Moroto Regional Referral Hospital Moroto municipality.

2. METHODOLOGY.

2.1. Study design.

The study employed descriptive cross-sectional research which involved the use of both quantity and qualitative approaches to data collection and analysis. The participants gave responses to the questions that were being asked by the researcher and ticked in the appropriate options provided in the questionnaire.

2.2. Study area.

The study was conducted at the Moroto Regional Referral Hospital Karamoja region. The hospital was constructed in the 1940s and is located in Moroto municipality in the Karamoja sub-region of North Eastern Uganda and has a catchment area of 9 districts in the region which include Moroto, Kaabong, Nakapiripirit, Napak, Kotido, Karenga, Nabilatuk, Abim, Amudat.The study was conducted from December 2022 to January 2023, a period of two months.

Malnutrition is one of the leading causes of morbidity and mortality in children below five years in Moroto Regional Referral Hospital (MRRH). According to the reports from the facility one ya ear back by Simon Ondoga, a senior nutritionist in Moroto Regional Referral Hospital, reports at least it receives five children with severe acute malnutrition every day. This is an increase from three cases admitted during the early months of the year. For example, in January, February, and March, there were 60, 64, and 53 children admitted with acute malnutrition respectively. The figures are likely to rise to four in every 10 children representing 40% this month with more than 70 admissions projected.

2.3. Study population.

The study targeted all children aged 6 months to 59 months attending Moroto Regional Referral Hospital Karamoja region.

2.4. Sampling technique.

The researcher used the convenience sampling technique because it helped recruit the desired subjects in a short time.

2.5. Sampling procedure.

The researcher was in the hospital for two months. Each child that was admitted to the hospital, depending on the acceptance of the caretaker to participate in the study was recruited until the desired sample size was attained.

2.6. Inclusion criteria.

The study included all children aged 6 months to 59 months and those who consented to attend Moroto Regional Referral Hospital Karamoja region.

2.7. Exclusion criteria.

The study exclude all the children aged below 6 months and above 59 months attending Moroto Regional Referral Hospital Karamoja region and those in the intensive care unit.

2.8. Data collection method.

Data were collected using questionnaires consisting of both open and close-ended questions. Questions included demographic, socioeconomic factors, and clinical factors associated with severe acute malnutrition in children aged 6 months to 59 months attending Moroto Regional Referral Hospital Moroto municipality.

Anthropometric measurements such as MUAC, weight, and height were taken for each child using the standard techniques of WHO. For children less than 24 months, recumbent length was used instead of standing height. A weight measurement was taken for all children between 6 months to 59 months using the hanging scale and weighing scale that's Secca.

2.9. Data collections tools.

A research administered questionnaires containing both open and closed-ended questions, having demographic, socioeconomic, and clinical factors associated with severe acute malnutrition among children aged 6 months to 59 months attending Moroto Regional Referral Hospital Karamoja region was used. Anthropometrics measurements such as MUAC tapes, weighing scales, and stadiometers were used.

2.10. Data collection procedure.

The researcher first recruited research assistants qualified by their knowledge of the subject matter, competent in taking anthropometric measurements and local dialect whereby the researcher proceeded to train them on the logistics of the research.

Data was collected by the researcher through the use of structured questionnaires which were administered by the researcher and the researcher read questions for participants, ticked and answered them according to the participant's response.

The researcher sought informed consent from the respondents and assured them of high confidentiality.

2.11. Study Variables.

2.11.1. Dependent variable.

Severe acute malnutrition among children aged 6 months to 59 months attending Moroto Regional Referral Hospital in Moroto municipality.

2.11.2. Independent Variable.

Factors associated with severe acute malnutrition among children aged 6 months to 59 months attending Moroto Regional Referral Hospital.

2.12. Quality control.

For efficient, effective, and quality research results, the following measurements under quality control were employed.

Appropriate training and orientation of the interviewers before surveying.

In cases where the participants found difficulty understanding the questions, the interviewer interpreted and explained them to the respondents. The researcher also checked the study tool for complete filling to increase the efficiency of the study.

The researcher also stored data safely and securely to avoid distortion of study findings.

2.13. Piloting of the study.

The questionnaire was first approved by the supervisor and then the research committee together with the proposal. The questionnaire was pre-tested on 5 mothers with children aged 6 months to 59 months attending Moroto Regional Referral Hospital Karamoja region to uncover problems that might compromise the data on a large scale to check out for ambiguous questions, errors, and corrections were made.

2.14. Data analysis and presentation.

Data was sorted, cleared, and directly put into IBM SPSS software version 27.

Categorical variables were analyzed using frequencies, percentages and presented in figures and tables.

2.15. Ethical considerations.

An introductory letter was obtained from Medicare Health Professionals College and was presented to the hospital director's office through the human resources of Moroto Regional Referral Hospital.

A well-written consent was sought from the administration of Moroto Regional Referral Hospital seeking to conduct a study in the pediatric ward of Moroto Regional Referral Hospital.

The consent form was presented to the head of the pediatric and nutrition ward of Moroto Regional Referral Hospital who was guiding the researcher on information about the nutritional statuses of children aged 6 months to 59 months attending Moroto Regional Referral Hospital Karamoja region.

Informed consent from the respondents was sought and was assured of the high level of confidentiality which was observed and maintained maximally by the researcher, and this was through the use of special codes to conceal their identity.

Table 1: Demographic factors associated with SAM (n=152)

Variable	Frequency of SAM n (%)	
	yes(n=52)	No(n=100)
Age in months		
6-12	9(17.3%)	38(38.0%)
13-24	22(42.3%)	21(21.0%)
25-36	10(19.2%)	14(14.0%)
37-59	11(21.2%)	27(27.0%)
Sex		
Male	23(44.2%)	53(53.0%)
Female	29(55.8%)	47(47.0%)
Birth weight		
<2.5kg	8(15.4%)	14(14.0%)
2.5kg	17(32.7%)	32(32.0%)
>2.5kg	27(51.9%)	54(54.0%)
Birth order		
1-3	32(61.5%)	40(40.0%)
4-6	11(21.2%)	51(51.0%)
7+	9(17.35%)	9(9.0%)
Birth interval		
<2years	25(28.8%)	20(20.0%)
2years	15(48.1%)	39(39.0%)
>2years	12(23.1%)	41(41.0%)
Care givers age		
<20years	3(5.8%)	6(6.0%)
20-30years	37(71.2%)	77(77.0%)
>30years	12(23.1%)	17(17.0%)
Marital status		
Married	44(84.6%)	84(84.0%)
Separated	6(11.5%)	4(4.0%)
Never live together	2(3.8%)	12(12.0%)

Source: primary 2023

3. STUDY RESULTS.

3.1. Prevalence of SAM in children aged 6 months to 59 months attending MRRH.

152 children were screened for SAM, and 52 children were severely malnourished.

Figure 1 shows that the prevalence of SAM children aged 6-59 months attending Moroto Regional Referral Hospital is 34.2%.

3.2. Demographic factors associated with SAM among children aged 6-59 months attending MRRH.

Results presented in Table 1 show that the majority in the age group 13-24 months, 22(42.3%), Children with birth weight above 2.5kg 27(51.9%), 1-3rd birth order 32(61.5%), birth interval of less than 2 years 25(48.1%), Children raised by mothers in the age bracket 20-30 years 37(71.2%). Married mothers 44(84.6%) were severely malnourished.

3.3. Socioeconomic factors associated with SAM among children aged 6-59 months attending MRRH.

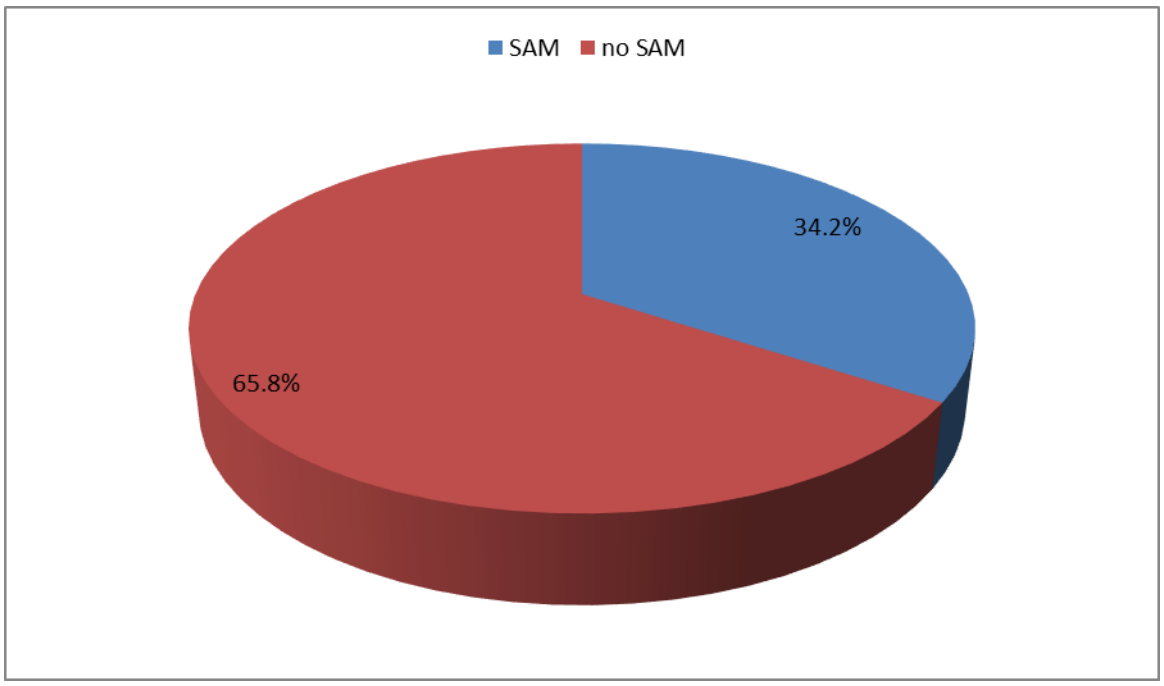

Figure 1: **Prevalence of SAM in children aged 6-59 months attending MRRH (n=152)**

Table 2: Socioeconomic factors associated with SAM (n=152)

Variable	Frequency of SAM n (%)	
	Yes(n=52)	No(n=100)
Type of residence		
Town	6(11.5%)	34(34.0%)
Slum	2(3.8%)	9(9.0%)
Village	44(84.6%)	57(57.0%)
Level of education		
Tertiary	0(0.0%)	7(7.0%)
Secondary	1(1.9%)	20(20.0%)
Primary	3(5.8%)	29(29.0%)
None	48(92.3%)	44(44.0%)
Occupation		
Civil servant	0(0.0%)	3(3.0%)
Business	0(0.0%)	10(10.0%)
Peasant	9(17.3%)	39(39.0%)
None	43(82.7%)	48(48.0%)
Estimated monthly income		
<100000	4(7.7%)	45(45.0%)
100000-500000	0(0.0%)	10(10.0%)
>500000	0(0.0%)	3(3.0%)
No stable income	48(92.3%)	42(42.0%)
Times in a day does care taker and child eat		
Once a day	30(57.7%)	21(21.0%)
twice	13(25.0%)	48(48.0%)
Thrice	9(17.3%)	14(14.0%)
Others	0(0.0%)	17(17.0%)
Number of family members		
<5 members	15(28.8%)	62(62.0%)
>5 members	37(71.2%)	38(38.0%)
Source of water		
Safe	12(23.1%)	29(29.0%)
Unsafe	40(76.9%)	71(71.0%)

Source: primary 2023

From the results presented in table 2, the majority of the children from rural setting 44(84.6%), caretakers who didn't attain any formal education 48(92.3%), caretakers who had no occupation 43(82.7%), Caretakers who had no stable income 48(92.3%), have meal once a day 30(57.7%), family members more than 5 members 37(71.2%), unsafe source of water 40(76.9%) were severely malnourished.

3.4. Clinical factors associated with SAM among children aged 6-59months attending MRRH.

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Table 3: Clinical factors associated with SAM **(n=152)**

Variable	Frequency of SAM n(%)	
	Yes(n=52)	No(n=100)
Age of weaning the child		
6 months	11(21.2%)	64(64.0%)
>6 months or <6 months	41(78.8%)	36(36.0%)
Attend antenatal care services		
yes	30(57.7%)	97(97.0%)
no	21(42.3%)	3(3.0%)
Immunization status of a child		
Completed immunization	17(32.7%)	42(42.0%)
Ongoing immunization	20(38.5%)	49(49.0%)
Skipped immunization	5(9.6%)	5(5.0%)
Never immunized	10(19.2%)	4(4.0%)
Does the children repeatedly fall sick(or any chronic infection like TB)		
yes	35(67.3%)	4(4.0%)
no	17(32.7%)	96(96.0%)
Does the caretaker regularly wash hands during food preparation or breastfeeding		
yes		
no	19(36.5%)	94(94.0%)
	33(63.5%)	6(6.0%)
How times in a day does the caretaker breastfeeds or breastfed during breastfeeding period.		
<8 times	36(69.2%)	14(14.0%)
8 times	9(17.3%)	19(19.0%)
>8 times	7(13.5%)	67(67.0%)
Time of initiation of breast feeding		
Within first hour of birth	18(34.6%)	57(57.0%)
After first hour of birth	34(65.4%)	43(43.0%)

Source: primary 2023

Results presented in Table 3, show that the majority of the children weaned before or after 6 months 41(78.8%), mothers who never frequently washed their hands 33(63.5%), and 1.65 times more than the controls, mothers who did not attend antenatal care services 21(42.3%) were 2 times more than their counterpart 10(2.9%), never immunized 10(19.2%) were 3 times more than the cases 4(4.0%), Children who repeatedly fall sick or with chronic infections like TB 35(67.3%), and it's 2 times more than that of their counterpart 15(4.3%), mothers who breastfed their children less 8 times in a day 36(69.2%), Children initiated on breastfeeding after 1 hour of birth 34(65.4%) were severely malnourished.

3.5. Diarrhea.

Table 4: Duration of diarrhea in respondents

Variable	SAM frequency n(%)	
	Yes(n=41)	No(n=70)
How long has the child been having diarrhea		
<1 week		
1 week	9(22.0%)	49(70.0%)
>1 week	13(31.7%)	19(27.1%)
	19(46.3%)	2(2.9%)

Source: primary 2023

Majority with diarrhea more than 1 week 19(46.3%) had severely malnourished children.(Table 4)

4. DISCUSSION.

4.1. Prevalence of SAM among children aged 6-59 months.

The results from my study showed the prevalence of severe acute malnutrition at 34.2%. The prevalence is higher than the global prevalence of SAM which is 7.3% but rates vary vastly between different areas. Low to middle-income countries carry the highest burden with rates of 14.6% reported in South Asia and 5% in South Africa. (WHO, UNICEF, and World Bank, 2020). The prevalence reported in South Asia was much lower than (14.6%) the prevalence of my study which is 34.2%. The prevalence of SAM in South Africa is 6.84 times lower than that of my study. This lies in the fact South Africa is a developed country with an extensive and established health sector gives it an advantage as compared to moroto Uganda found in the Karamoja region with a poor health sector and poor health-seeking behavior of people. Despite this, the data indicate that the prevalence is high, and substantial public effort is required to reduce it. The ultimate aim is for all children to be free of malnutrition in all its forms.

The prevalence of the study is 11.8 times higher than that found by Ssekajja V et al, 2022 who found out the prevalence of SAM among children below five years is 2.9%. The difference in the prevalence is the matter of fact that the Kigezi sub-region where Kabale is found is a food-rich region with favorable climatic conditions as compared to the Karamoja sub-region where Moroto

is found has poor climatic conditions, semi-arid, and one of the leading food insecure region in Uganda.

4.2. Demographic factors associated with SAM among children aged 6-59 months in MRRH.

The females 55.8% were more severely malnourished than the males 44.2%. This could be assigned to the fact that girls are at risk of health disparities compared to boys in the same age group, and more care and attention are provided to boys by their caregivers. To end this, disparities should be de campaigned, and equal attention to both male and female children. These findings are in line with the results got by Nosiphiwo et al, 2022 in the retrospective review of hospital files conducted at a regional hospital in South Africa, a total of 1296 children were included in the study, 93 with SAM, 52(56%) females, and 41(44%) males were severely malnourished.

Children in the age group 13- 24 months had the most severely malnourished children 42.3%. This lies in the fact that children under 2 years of age appear to be a particularly high-risk group. They may benefit from closer routine follow-up and growth monitoring. This finding is in line with the results found by Odei O et al, 2021 in cross-sectional survey datasets in all seven districts of the Karamoja region found that the age group between 12-23 months was significantly associated with wasting. This implies children below 2 years can benefit from growth monitoring.

Birth interval of less than 2 years had the most severely malnourished children 48.1%. This is because the birth interval of fewer than 2 years leaves the child with inadequate support and also increases the bigger number of children under 5 years in a family which is a burden when it comes to care and providing equal needs, therefore, shifting care to the newborn, and as a matter of factor children below two years are at higher risk of SAM. This finding is in line with the findings by Dahal K et al, 2021 of the community-based matched case-control study conducted in the Satar community of Jhapa Nepal where a total of 664 children between the age group of 6 months to 56 months were screened for SAM were a birth interval of fewer than 2 years was found to be a determinant of SAM. Educative measures on the importance of child spacing of more than 2 years could be of value to combat wasting in the under-fives.

The birth order between 1-3rd had the most severely malnourished children 61.5%. The explanation for this might be due to cultural practices in the study area which give more emphasis to relatively young ones which may result in less time for feeding the older ones. These findings were in line with the findings by Ketha F et al, 2018 in the case-control study design conducted at Lubango pediatrics hospital Angola for the risk factors associated with SAM in children aged 6 months to 59 months was one of the predictors was family order in which it evenly distributed across birth order with the majority being in the second order (23.9%) and the least being in those in the birth order greater than four (14.7%).

The birth weight of more than 2.5kg 51.9% had the highest of the severely malnourished children. These results are contrary to those found by Sam MD et al, 2020 in the community-based case-control study from Vellore, Southern India in which SAM was more significantly associated with a birth weight of less than 2.499kg. This could be a result that most of the children in Karamoja being exposed to harsh conditions of low socioeconomic status like limited access to food and less attention paid to them since Toronto is found in the Karamoja sub-region which is one of the leading food insecure regions in Uganda.

The majority of the mothers with severely malnourished 84.6% were married. This could lie in the fact that most of the married population in Karamoja is unemployed and therefore unable to support their families. Most families in Karamoja are run by mothers in terms of looking for what to eat. Interventions like men's involvement in the daily activities of families should be put in place to combat this avoidable problem. These results are contrary to a matched case-control study conducted in Mao, Chad by Dodos J et al, 2018 about the individual and household factors associated with SAM in under-fives, multivariate analy-

sis on the household-level risk factors showed that the odds of SAM were significantly higher among children whose caretakers were not married.

For most mothers of age group 20-30 years, 71.2% had severely malnourished children. This could be assigned to the fact that this is the most active stage for mothers to start taking responsibilities like taking care of the family, looking for what to do to earn a living, and therefore giving little time to children at home. Also, this is the age of psychological stress brought in as a result of trying to meet the needs of life. Interventions needed to be done to have men involved in issues concerning family care since most of the men in Karamoja leave that to women alone. This finding is contrary to the study by Pravana NK et al, 2017 in a community-based-control study conducted in 12 randomly selected village development committees of Bara district of Nepal on determinants of SAM among aged 6-59months, the prevalence of SAM was 4.14%, mothers aged at birth <20 or >35 years was significantly associated with SAM. The study suggests the importance of men's involvement in the daily running activities of the family.

4.3. Socioeconomic factors associated with SAM among children aged 6 months to 59 months in MRRH.

The caretakers whose residence was the village had the highest number of severely malnourished children 84.6%. Rural children tend to suffer more than their counterparts because of poverty, poor maternal education and nutrition, lack of prenatal and neonatal care, poor health-promoting activities, inadequate complementary feeding, and limited resources to ensure a balanced diet since most families are usually large. These findings agree with those findings by Pravati J et al, 2019 in the hospital-based prospective observation study done in tertiary care in Odisha India, about SAM in children aged 6 months to 59 months revealed most of the children were from low socioeconomic status and rural areas.

Most mothers who never attended school 92.3%. This is because the largest population was uneducated and therefore have limited knowledge of nutritional aspects than the educated ones This may be due to the better quality of child care of relatively educated mothers than mothers who cannot read and write, also education gives a diversity of knowledge of various nutritious food and this can only be exhibited by educated mothers. These findings are in agreement with those findings of Diakite K et al, 2021 in the cross-sectional study carried out in the pediatrics department of Gabriel Youre university hospital in Bamako, where 348 children aged 6 months to 59 months were screened for SAM, the bivariate analysis showed that children with an out of school mother have 2.4 fold risk of being malnourished. This implies that education plays an important role in creating awareness of factors associated with SAM.

Most of the caretakers had no occupation with none taking the highest prevalence 82.7%. This could lie in the fact that the largest populace of Karamoja is in a village setting and with no formal education background thereby giving them limited access to job opportunities. These findings are in line with those by Diakite K et al, 2021 of a cross-sectional study carried out in the pediatrics department of Gabriel Youre university hospital in Bamako where 348 children aged 6 months to 59 months were screened for SAM and bivariate analysis showed that children from households with no stable income mostly non-salaried father had twice the risk of children from households with stable income. This implies that education plays an important role in terms of the job market and creation.

Most of the caretakers had no stable income 92.3%. This is because the largest population is not educated and has no occupation therefore have no fixed income, and sometimes don't get it at all. The finding is in line with those found by Diakite A et al, 2021 in a cross-sectional study carried out in the pediatrics department of Gabriel Youre university hospital in Bamako which showed that children from households with no stable income (non-salaried fathers) twice the risk than children from a household with stable income. The results suggest that the stability of income in a household lowers the risk of SAM.

Those who eat once a day had the highest number 30(57.7%). This lies in the fact that Karamoja is a food insecure region where moroto is found therefore limited food access, leading to inadequacy. Adequate nutrition is important for child growth, health, and development. Children's nutritional status reflects their overall health. When children have access to sufficient food, are not exposed to repeated diseases, and are well cared for, they reach their growth potential and are considered nourished. These findings are in line with those found by Nabil QM et al, 2021) in a study done in Friendship teaching hospital, Aden Province Yemen to assess the nutritional status of children aged 6 months to 59 months, which revealed that children who received less than 3 meals per day were likely to suffer from wasting than those who received more than 3 meals per day. These findings suggest that food security and good access to food at any time of need play an important role in fighting malnutrition.

The majority with more than five family members had severely malnourished children 71.2%. This is because bigger family member gives a higher ratio as compared to the food supply and these demands for more food, and to make it worse karamoja is a food insecure region therefore family members end up receiving small or even not at all. This gives under fives little nutrients for daily body needs like growth and bodybuilding and therefore ends up malnourished severely. This finding is in line with those in a cross-sectional study conducted by Ghimire U et al, 2020 who found that 5.8% were severely malnourished, and multivariate analysis showed that SAM was significantly associated with family size in which a family size of more than 5 members.

The majority use unsafe water for drinking 76.9%. This is because Karamoja is semi-arid and most of the time experiences water crises and also has no adequate purification technologies like clarification and no knowledge of local knowledge of water purification like boiling, and limited boreholes for water sources except they only get water from man-made dams, swamps. The establishment of boreholes in every village and teaching them about local methods of making water clean for drinking could be of great intervention. This is in line with the cross-study in Kersa Ethiopia by Roba AA et al, 2021 which showed that households that did not treat water at the point of use were at higher odds 570(52.2%) than those who treated it at the point of use. The findings suggest the importance of making water safe for home use like drinking.

4.4. Clinical factors associated with SAM among children aged 6-59 months in MRRH.

Those mothers who breastfed their children less than 8 times had the highest number of severely malnourished children 69.2%. The low frequency of breastfeeding might be that most of the families in Karamoja are below the poverty line, which compels mothers to move to long-distance towns in search of what to eat. Therefore, the time spent at home by the mother affects breastfeeding frequency and babies do not get breastfed whenever they desire to. Also, the lack of adequate nutrition in mothers limits sufficient milk production to feed their children per requirements. These findings are in agreement with those found by Dahal K et al, 2021) in the community-based matched case control in the Satar community of Jhapa Nepal where a total of 664 children aged 6 months to 59 months were screened for SAM frequency of feeding less than 8 times a day was found to be determinant of SAM.

The children who were exclusively breastfed for 6 months had the least number 21.2%. This is because optimal breastfeeding is important for preventing malnutrition among infants and young children by providing the best source of energy and vitamins and protecting children from childhood diseases that can adversely affect their nutritional status. The findings are in agreement with those found by Pravati J et al, 2019) in the hospital-based prospective observational study done in tertiary care in Odisha India, about SAM in children aged 6 months to 59 months where only 12.6% of the participants were exclusively breastfed. This study suggests the importance of exclusive breastfeeding for 6 months because it protects children from childhood diseases

that can affect nutritional status.

Unimmunized were 19.2% 3 times more than those with no SAM but never immunized. This could be a result of the poor health-seeking behavior of parents in Karamoja. Unimmunized children are prone to infections. These results are in line with those registered in the hospital-based prospective observational study done by Pravati Jet al, 2019) in tertiary care of Odisha India, about severe acute malnutrition in children aged 6 months to 59 months, 63.7% of the study population were unimmunized. This suggests the importance of creating awareness about immunization which fights against infections like tuberculosis which are prevalent in some areas.

Children with diarrhea were more severely malnourished 80.8%, and those who had diarrhea for more than 1 week were severely malnourished 46.3%. This can be due to excessive loss of fluids and electrolytes, loss of appetite, and lack of absorption of food in the intestines due to high motility of the intestines during diarrhea episodes. The results are in agreement with the cross-sectional study conducted by Yeshaneh A et al, 2022 in Wolkite town of the Gurage Zone, Southern Ethiopia to assess the prevalence of acute malnutrition and associated factors among children aged 6 months to 59 months showed the prevalence of 14.7%, presence of diarrheal diseases in the past two weeks 1.68% was significant. Prompt management of diarrhea and other diarrheal diseases within one week of infection could be a great implication.

The majority breastfed after 1 hour of birth 65.4% were severely malnourished. This could be due to early initiation of breastfeeding resulting in increased production of milk but late initiation is associated with decreased newborn-mother bonding and then inadequate maternal breast milk secretion. This finding is in line with those found by Wie G.T et al, 2020) in an unmatched case-control study conducted about determinants of acute malnutrition among 6-59 months visiting public health facilities in Gamblia Town, southwest Ethiopia showed that among the 114 cases, of children who were not initiated on breastfeeding within one hour 74(73.3%) than those who were initiated within one hour 27(26.7%). The results suggest the importance of early initiation of breastfeeding within one hour of birth which helps to create newborn-mother bonding and adequate maternal breast milk secretion.

Mothers who breastfed their children less than 8 times had the highest number of severely malnourished children 69.2%). The low frequency of breastfeeding might be that most of the families in Karamoja are below the poverty line, which compels mothers to move to long-distance towns in search of what to eat. Therefore, the time spent at the home of the mother affects breastfeeding frequency and babies do not get breastfed whenever they desire for. Also, the lack of adequate nutrition in mothers limits sufficient milk production to feed their children per requirements. These findings are in agreement with those found by Dahal K et al, 2021) in the community-based matched case control in the Satar community of Jhapa Nepal where a total of 664 children aged 6 months to 59 months were screened for SAM frequency of feeding less than 8 times a day was found to be determinant of SAM.

Most children had the infection before 67.3% this could be attributed to diarrheal diseases like cholera which tend to cause malabsorption syndromes, and also some chronic conditions like tuberculosis which is more prevalent in moroto and lowers a child's immunity. This is in line with the study by Habtamu E et al, 2022 In a facility-based unmatched case-control study conducted in Wonago Woreda public health facilities, Ethiopia on determinants of wasting among children aged 6-59 months, one of the determinants was found to be children have been morbidity history of the child in last 2 weeks. Early diagnosis, contact tracing, and early treatment could be of importance to combat this issue.

5. CONCLUSIONS.

The prevalence of severe acute malnutrition in children aged 6 months to 59 months attending Moroto Regional Referral Hospital was high at 34.2%. This demands urgent interventional measures.

Birth interval and birth order were very important in deciding the nutritional interventions needed to prevent severe acute malnutrition among children aged 6-59 months attending MRRH.

Residence, educational background, occupation, income stability, number of meals in a day, family members, and source of water are the most significant factors associated with SAM among aged 6-59 months.

Early or delayed weaning, mothers who don't frequently wash hands, those with previous illnesses, breastfeeding less than 8 times a day, delayed initiation on breastfeeding 1 hour after birth, and diarrhea of more than 1 week were associated with SAM in children aged 6-59 months.

6. STUDY LIIMITATIONS.

The largest population is illiterate who do not know how to read and write, the researcher found it hectic to read and explain to them about the questions.

7. RECOMMENDATIONS.

The government through the Ministry of Health should resort to mass screening of children in the Karamoja Region, and also provision and teach mothers how to use MUAC tapes for better monitoring of the child's nutrition status to combat the prevalence of SAM in Karamoja.

Embrace family planning, this can be passed to them through health education in health facilities to correctly plan the birth intervals of their children and be in control of the family size so that a manageable family size is run by most of the families.

The government of Uganda through the Ministry of Education and Sports should put in campaigns emphasizing education for all to ensure good jobs in the future and awareness of factors associated with SAM.

Treating underlying conditions like diarrheal diseases, contact tracing of cases like those of tuberculosis, SAM. Health education on the importance of breastfeeding should be put in place.

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9. ABBREVIATIONS AND ACRONYMS.

GAM: Global Acute Malnutrition
IPC: Integrated food security phase classification
MAM: Moderate Acute Malnutrition
MUAC: Mid-Upper Arm Circumference
NCDs: Non-Communicable Diseases
OTC: Outpatient Therapeutic Care
SAM: Severe Acute Malnutrition
UBOS: Uganda Bureau of Statistics
UDHS: Uganda Demographic and Health Survey
UN: United Nations
UNICEF: United Nations International Children's Fund
WFP: World Food Program
WHO: World Health Organization
WHZ: Weight for Height Z-Score
MRRH: Moroto Regional Referral Hospital
SPSS: Statistical Package for Social Scientists
ICF: Inner City Funds International
IBM: International Business Machine Corporation

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