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Prevalence of Severe Acute Malnutrition and Associated Factors Among Children Under Five Years in Umkaddada Locality, North Darfur, Sudan (2018)

Ibrahim Abdallah Khatir Shaib[1, *], Mohmed Musa Ali[2], Widad Elsheikh Mustafa[3]

[1]Al Fasheir Paediatrics Hospital, Al Fasheir, Sudan
[2]Economic and Food Security, Al Fasheir, Sudan
[3]Faculty of Medicine, University of Bahari, Khartoum, Sudan

Abstract

Severe Acute Malnutrition among under five is a major health problem in the developing countries, which contributes to nearly half of under five deaths, and it is wide spread in Asia; around 17 million were severely wasted which represent half of the world wasting followed by Africa which is second home to severe acute malnutrition approximately 28% of all world severe acute malnutrition (SAM). The main objective of the study was to determine the prevalence of severe acute malnutrition and risk factors associated with; in children less than five years of age in Um-kaddada locality during the period (September to October 2018). The study was across-sectional, observational and descriptive health centers and units based. A total of 522 under five children recruited in the study 195 (36.9%) were found severely malnourished. The most common risk factors associated with severe acute malnutrition was large family size (p-value=.003), child age between 12-17moths (p-value=.000), being female child (p-value=.027), child birth interval between 12-17months (p-value=.002), illness experienced by child 2 weeks prior (p-value=.034), mainly was diarrheal illness (p-value=.014), unvaccinated child (p-value =.044) and prolonged breast feeding up to 2 years of age (p-value=.002) and there were no association between severe acute malnutrition and the age, level of education, employment, antenatal care of the mother, initiation of breast feeding within first hour, exclusive breast feeding in first 6 months and introduction of food at age of 6 months of the infant life. Conclusion; the prevalence of severe acute malnutrition among under five was above extremely threshold (>15%). The major determinants of severe acute malnutrition among children below five in the area; were large family size, child age, being female child, birth interval, diarrheal illness, being not vaccinated and prolonged breast feeding. Recommendation; the government and it is partners have to co-ordinate for urgent intervention to save the life of children in; (Therapeutic Feeding Centre setting, Out Patient Department feeding program and Supplementary Feeding Program), Efforts are needed to increase the coverage rate of Expanded Program on Immunization (EPI) for at least 90% and Furthers studies with more details in this field are highly recommended.

Keywords

Prevalence, Severe Acute Malnutrition, Risk Factors, Under Five, Wasting

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* Corresponding author
E-mail address: shaibibrahim@yahoo.com (I. A. K. Shaib)

1. Introduction/Background

1.1. Introduction

Malnutrition is the most common nutritional disorder in developing countries and it remains, the most common cause of morbidity and mortality and is refer to deficiency or excess or imbalance in personal intake of energy or nutrient. The term composed of two broad groups of which condition are underweight which includes; stunting, (low height for age), wasting (low weight for height and underweight (low weight for age) and micronutrient deficiency or insufficiency intake of important vitamins and minerals, other overweight, obesity and it is related non communicable diseases such as heart diseases, stroke, diabetes and cancer.

There are 151 million stunted, 99 million underweight and 51 million wasted worldwide (UNICEF/WHO/World Bank Group Joint Child Malnutrition Estimates 2018) and malnutrition rates remains alarming, stunting is declining too slowly while wasting still impact the lives of far too many young children, Asia and Africa bear the greatest share of all forms of malnutrition. In Latin America 1 million and Ocean 0.1 million are malnourished.

Sudan is one of the Sub-Saharan developing countries, rank as one of worst in the world, where severe acute malnutrition rate is very high, and remains one of the urgent public health concern, over 1 in three children under -5 years are too short for their age (stunted) and more than 1 in 6 are too thin for their height (wasted). According to the federal ministry of health (FMOH, 2009), about 2.2 million children suffering wasting annually, out of which over 573000 suffering from severe acute malnutrition, eleven out of eighteen states have malnutrition prevalence above emergency threshold as per WHO standard, some states have much higher rate such as NORTH DARFUR where global acute malnutrition (GAM) prevalence is at 27%, this particularly, significant in East Sudan where chronic malnutrition is high (stunting), (WHO, 2017). So North Darfur has the poorest nutritional level of all five Darfur States.

Research conducted at Khartoum State, Sudan to identify the prevalence of malnutrition among children under 5 years; the results revealed risk factors were socioeconomic factors, poor nutrition and mother knowledge of feeding practices led to increase of malnutrition; Taha Musa and et al, (2014).

Study conducted in River Nile state, Sudan by Ahmed Abdalrahim Suleiman et al (2018) to assess the prevalence and determinants of malnutrition among under five, Across-sectional survey, among 1,447 surveyed children, the prevalence of stunting, underweight, and wasting were; 42.5%, 32.7% and 21% respectively, the stunting was highly among 48-60months of age group (82.5%) boys had poorer indicator of underweight in comparing to girls. Geographically stunting was more prevalence in Berber locality, infectious diseases (gastroenteritis and respiratory infections) and incomplete vaccination were significantly associated with wasting (p-0.001) and socioeconomic status (p-0.034), poor household sanitation (p-0.022), large family size, lack of family spacing and infant weaned suddenly were risk factors for underweight.

Study conducted by Jamal EldeenAbdElrazigJomah (2018) to assess the determinants of child malnutrition in Sudan, secondary data was obtained from multiple cluster surveys for the year 2014 from central Bureau of as Statistic in collaboration with UNICEF, the results; breast feeding practices, sanitation and care of maternal health and nutrition were risk factors.

Study conducted in Musi IDPs camp South Darfur, Sudan, by Ahmed Hussein et al (2015); they established that malnutrition increase among children their family income less than 250SD was 12.9%, the children affected with respiratory disease highly affected with malnutrition, there was strong relation between child low birth weight and malnutrition(p –value=0.000) and parent jobless (p- value=.036). risk factors for PEM are; low family income, low education level of mother, low birth weight, number of meals per day and mother occupation.

Study conducted in Kosti and TandaltyHospial, White Nile State, Sudan by EptihagAbdelmokaram et al (2017); showed that house hold income, maternal education and breast feeding practices and maternal nutritional knowledge were factors related to under five malnutrition.

1.2. Problem Statement

Sever acute malnutrition continue to be a significant public and developmental concern not only in the developing countries but its worldwide and its prevalent is reflected in all regions and its burden increasing in Asia and Africa. In Sudan, 1 million children under 5 years of age are suffering from severe acute malnutrition 550000 among them are severely malnourish and at risk of death; and other 2 million are stunted due to chronic malnutrition, resulting in average GAM rate of 16.3% for the entire country. OCHA, (2017). Each year UNICEF treats more than 130.000 children aged 6 months to five years for severe acute malnutrition.

Survey results revealed that 130 of total 184 localities have stunting rate classified as high above 30% and 54 localities have a severe acute malnutrition rate determined by measuring the circumference of child upper arm classified as very critical. There are differences between Sudan states level of malnutrition. The prevalence of SAM in Sudan was 16.3%. While 38.2% of children were stunted, the report also highlighted that 31.5% of women of reproductive age in Sudan suffer from anemia Red sea state localities have GAM

rates as high as 46.7% in Tokar locality and 37.4% in Agig locality children suffering from SAM while 3,909 children were detected with moderate acute malnutrition (MA). Malnutrition is serious problem in Sudan even in capital Khartoum under nutrition is major threaten to families. (UNICEF, 2013).

One – third of infant born with low birth weight. Current rate of anemia in preschool 58%, 28% vitamin A deficient and 1 million infants remain unprotected from iodine disorders. According to study conducted in north Darfur by Sudanese community development (CDO, 2015) under supervision of NORTH DARFUR, state ministry of health (SMOH) for 2402 child between 6-59 months of age in Alait locality;the findings was 31% severely malnourished, this result was alarming where Alait is neighboring to the study area and the environmental circumstances are similar.

1.3. Justification of the Study

Children are the future of nations their health status should be the top concern. Good nutrition allows child to grow, develops, learn, play, participates and contribute into the community; whereas malnutrition is the commonest nutritional disorders in the developing countries. A cross the globe the children under 5 years old are affected by severe acute malnutrition; where children with SAM are nine times more likely to die than well-nourished children these death are direct result of malnutrition its self or indirect result of childhood illness like diarrhea and pneumonia that malnourish children are too weak to survive. UNICEF, (2012).

Thus, the study is going to assess the prevalence of SAM among under 5 and socioeconomics and demographic characteristics of mother and child vaccination status, feeding practices of child on nutritional status of under five in the study area. Adding to that the study will support the local government and its community partners in the policy making toward addressing the roots causes of malnutrition and its related factors to participate in the development and improvement of health and nutritional services in the study area.

1.4. Research Objectives

1.4.1. General Objective

The general objective of the study was to determine the prevalence of severe acute malnutrition and the most common risk factors associated with among children under 5 years of age in Um-kaddada locality.

1.4.2. Specific Objectives

1. To assess nutritional status among children under five years old based on weight for -length/height, mid -upper arm circumference, bilateral pitting edema and height for age.
2. To recognize the association between SAM and family size, maternal age, education level, employment, antenatal care of mother, child age, sex, birth interval, 2 weeks illness previous to study, vaccination status and breast feeding practices in the study area.
3. To recognize coverage rate of Expanded Program on Immunization.

1.5. Research Questions

1. What's the prevalence of severe acute malnutrition among children below 5 years old in study area?
2. What are the most common risk factors associated with severe acute malnutrition (SAM) among less than 5 years old in the study area?
3. What is coverage rate of Expanded Immunization Program (EPI) the study area?

2. Methods

2.1. Study Area

Um-kaddada locality is found in North Darfur state (Al Flashier); about 165 km Eastern part of Al Fishier, where western salvation road passed through. It has the climate change of Semi-desert, arid of poor savanna. The area has coordinate of latitude [12° - 15° N and longitude 25°25 -28°E]. The communities are homogenous in their living condition. The total population 128,226 people last update from the Ministry of Health North Darfur, with growth rate 3.6., and 21786 children below 5 years old. EPI Department, (2017). It has four administrative units and eight higher secondary schools; four for boys and four for girls. The locality has one rural hospital, which composed of one theater for emergency, Obstetrical, gynaecological and surgery services, one ward for pediatrics, one for adults, and one for the nutrition purposes, delivery room, lab services and pharmacy. Adding to that there are; four health centers which provide primary health care and expanded immunization program (EPI) services and 20 health units. With total 66 villages. About 80% of populations are depending on traditional rain fed farming and livestock breeding is the main sources of livelihoods incomes and other are engaging in government officials and trading activities.

2.2. Inclusion Criteria

All children below 5 years of age who were attended health centers and units in Um-kaddada Area.

2.3. Exclusion Criteria

Children under 5 years of age with chronic illness.

The children whose care givers refuse to participate in the study.

2.4. Sample Techniques

A systematic random sample technique was used which; the locality was divided into administrative units, then administrative units were divided into heath center, then probable sample was taken from health centers and units according to the number of population.

2.5. Sample Size

The sample size was determined by using a single proportional formula assuming the prevalence of Severe Acute Malnutrition (SAM) was 31% from previous study conducted in Al-lait locality which neighboring the study area and they were formerly one locality, 95% confidence interval, (0.4) 4% margin error.

$$\text{Sample size} = Z^2 P(1-P)/D^2$$

Where:

Z= confidence interval at 95% (standard of 1.96)

P= estimate prevalence of SAM 31% (previous survey in Al-lait locality, North Darfur)

D = margin of error 4% or (0.04)

So based on the equation above = $1.96^2 * 0.31*(1-0.31)/(0.04^2)= 513.5739 \approx 514$

Therefore; the sample size required for the study was approximately= 514

Then the calculation of sample size for finite population 21786, (EPI department Umkaddada, 2017).

$$\text{Sample size= n0/1+(n0-1)/pop}$$

Where:

n0 = sample size in infinite population

Pop = total number of population (children below age of 5 years in the study area)

Therefore, the new sample size was 514/1+(514-1)/21786 = 514 then, this sample was divided into four administrative units; Brooch, Um-gafala, Um-kaddada and Abu-hemaira according to their number of under five population, 180, 130, 120 and 100 respectively. Also administrates units was divided in to villages (health centers and units) and the sample has taken randomly as in the table below:

2.6. Study Design, Data Collection and Analysis

The study was across sectional, observational, descriptive health centers and units based.

The data was collected from secondary data include; references books, UN agencies; (UNICEF, FAO, WHO, WFP and OCHA); Sudan Federal Ministry of health, NGOs, published medical papers and the primary data was collected using structured pre-designed questionnaire by researcher himself and assisted by nutritionists, trained staff under direct observation of researcher at the health centers and units. The study analyzed by using SPSS version 21, model of Microsoft excel program and regression was applied.

2.7. Research Tools and Measurements

1. Weight for height/length the WHO standard growth reference 2006 was used.
2. Lower limbs pitting edema detected by applying thumbs on dorsum of both feet for seconds leaving impression on feet.
3. Stando-metre and infanto- meter for length and height were used.
4. Pediatrics scale for weight.
5. Shakir tape for mid- upper arm circumference measurement was used.
6. Numbered tape for head circumference.
7. Designed –pre test questioners.
8. Stationeries'.

2.8. Study Variables

2.8.1. Independent Variables

1. Family size, 2. Maternal age, 3. Education level, 4. Maternal employment, 5. Antenatal care, 6. Child age, 7. Child sex, 8. Birth interval, 9. Vaccination status, 10. Feeding practices, 11. previous illness experienced by child.

2.8.2. Dependent Variable

Severe Acute Malnutrition (SAM)

3. The Results

3.1. Prevalene of Severe Acute Malnutrition

A total of 529 childen less than 5 years old were recurited in the study 195 (36.9%) were found severely malnurished. Figure 1.

3.2. Prevalence of Severe Acute Malnutrition Based on SAM Indices Versus Administration Unit

The prevalence of SAM was the highest in Brooch administration unit based on MUAC index 46 (35.9%), followed by Abu-hemira 35 (27.5%), Um-gafala 31 (24.2%) and Um-kaddada 16 (12.5%). Um-kaddada admin unit showed the highest prevalence of SAM 32 (26.4%) followed by Brooch 26 (26%), Um-gafala 24 (24%) and Abu-hemira

showed 20 (20%) based on weight for height or length. Figures 2 and 3.

3.3. Distribution of Family Size and Maternal Related Factors

Concerning the family size; 223 (42.2%) had 3-5 persons, 162 (30.6%), had 6-8 persons and 144 (27.2%) had more than 8 persons. Figure 4.

The mothers education; 98 (18.5%) of mothers were illiterates, 274 (51.8%) got primary education, 130 (24.6%) got high secondary school, 26 (4.9%) were university graduates and only (0.2%) was postgraduate. The employment among mothers were 497 (94%) and 32 (6%), housewife and officially employed respectively.

While 466 (88.1%) of mothers were recived regular antenatal care during their pregnancy, 63 (11.9%) did not receivde regular antenatal care (ANC) and they were attributed to non availabilty of health facilty in the area; 452 (84%) reported that the health facility was available but in afar distane, whereas, 52 (84%) whereas the age reported as follows; 21-25 age represneted 172 (32.5%), 26-30 age 155 (29.3%), 31-40 age 121 (22.9%), 15-20 age 73 (13.8%) and more than 40 age only 8 (1.5%).

3.4. Distribution of Child Related Factors

The child related factors; 44 (8.3%) were below 6 months of age, 179 (33.8%) their ages between 7-11months, 75 (14.2%) their ages between 12-18 months, 56 (10.6%) their ages between19-24 months, 88 (16.6) their ages between 25-34 months and those ages between 35-59 months were 87 (16.4%) and 274(51.8%) of children were males and 255 (48.2%) were females respectively while, 71 (13.4%) were first child born to their parents, 5 (0.9%) their birth interval were less than 12 months, 72 (13.6%) their birth interval between 12-18 months, 135 (44.4%) their birth interval between 18-23 months and146 (27.6%) their birth interval more than 24 months. Figure 7.

Concerning illness; 195 (36.9%) of recurited children were experinced illness two weeks before the survey, 334 (63.1%) of them no illness was reported and according to the type of illness 60 (11.3%) were developed diarrheal disorders, 89 (16.8%) were respiratory disorders, 97 (18.3%) were febril illness, 13 (2.5%) developed persistent vomiting and no case of measles or whooping cough were reported and 429 (81.1%) of them were fully vaccinated, 37 (7%) wer not vaccinated and 63 (11.9%) were partially vaccinated and reasons behind why they did not or partially vaccinated, (47%) of children their mom justified that no vaccination facility in their residencey (48%) were justified by farness of vaccination facility and (5%) did not vaccinated due to taboos about vaccination, wheras; (13).523 (98.9%) of children were intiated breast feeding within first hour of their life, 342 (64.7%) were exclusively breast fed during the first 6 months, 50 (96.2%) were received complementory feeds at the age of 6 months, 3.8% (20) were not received complementory food, 155 (29.3%) were received breast feeding for up to 24 moths of age with introduction of exrta foods, 115(21.7%) did not complete breast feeding for up to 24 moths and 259 (49%) were on breast feeding durig the study. Figures 5, 6, 7, 8, 9 and 10.

3.5. Association Between Severe Acute Malnutrition and Mother Related Factors

The null hypothesis of no associated between (family size in person, maternal age in year, maternal education level, maternal employment, maternal antenatal care, child age, child sex, child birth interval, child illness, vaccination and breast feeding and severe acute malnutrition was used.

The depended variable was severe acute malnutrition coded as follow 0 = not severe, 1 = severe.

In case of family composed of more than 8 persons, the child has 3.086 times to be affected by SAM at (p-value =.003, COR =3.086,95% CI1.486-6.410) and by multinomial regression showed 2.958 times at (p- value .001, COR=2.958,95% CI1.565-5.528), when family composed of 6-8 persons, the child has tendency to develop severe Acute malnutrition (p-value.001COR=2.625,95% CI, 1.519-4.534), no statistically significance association between mother age and SAM, when mother age 21-25 yr (p-value =0.177), age 26-30yr (p-value =0.140), age 31-40yr (p-value =0.341 and age above 40yr (p-value =0.999), no statistically significance association between mother employment and SAM, when mother was employed or not (p-value=0.905), no statistically significance association between mother ANC and SAM, when mother was on regular ANC or not (p-value =0.299) and no statistically significance association between mother education level and SAM, illiterate mother (p value =0.527), secondary school graduate (p- value =0.619), university graduate p-value =0.951) and postgraduate (p-value =1.000). Table 1

3.6. Child Related Factors and Severe Acute Malnutrition

Child age has significant statistical association with severe acute malnutrition when age between 12-17 months, the child was 54.552 times highly to be affected by SAM at (p- value =.000, COR=54.552,95% CI, 10.524-282.788). age less than 6 months was significantly at (p-value=0.000 COR 36.136(95% CI (6.161-211.947), when age between 6-11months was significantly at (p- value =0.000, COR 42.910 (95%CI8.461-217..604) and when age between 18-23 months was significantly at (p-value =0.032, COR 0.315(95%

CI.110-.906).

Female child was 1.773 times exposed to SAM than male child at (p-value =.027, COR=1.713, 95% CI, 1.063-2.760), for the other variables by multinomial logistic regression showed that female child was 1.883 times affected by SAM at (p- value =.003, COR =1.833, 95% CI1.225-2.741). Table 2.

Multinomial logistic regression showed that birth interval was 3.854 times to be affected by SAM at (p-value =.002, COR=3.854,95% CI, 1.675-8.872) and Previous illness, it has slight effect, the children who were ill two weeks prior to the survey were 1.684 times risk to SAM at (P-value=.034, COR=1.684, 95% CI 1.041-2.725) in comparison with the children who were not ill. More over; multinomial logistic regression showed that previous illness has a little effect, the children with some illness prior to the survey were 1.627 times expose by SAM at (P-value=022, COR=1.627, 95%CI 1.074-2.465), more specifically by multinomial logistic regression showed that the children who had diarrheal illness were 1.969 times affected by SAM at (P-value=.014, COR=1.969, 95% CI 1.026-3.776) while; the child who was not vaccinated was 2.796 times affected by SAM at (P-value=.044, COR=2.796, 95% CI 1.030-7.586). Table 2.

The child initiation of the breast feeding in the first hours, whether the child exclusively breast fed in the first 6 months or not, and whether the mother introduced supplementary feeds at 6 months or not, were not statistically significant (p-value =0.061), (p-value =1.000), (p-value =0.344) and (p-value =0.581) respectively. whereas the children who had completed the breast feeding up to 24 months were 4times high risk to SAM at (P-value=.002, COR=4.563, 95% CI 1.754-11. and those who on breast feeding has statistically significantly associated with SAM (p-value 0.032). Table 2.

Table 1. Association between maternal related factors and sever acute malnutrition.

	Severe acute malnutrition							
	P-value	**OR (95% CI)**	**P-value**	**OR (95% CI)**	**P-value**	**OR (95% CI)**	**P-value**	**OR (95% CI)**
Family size								
3-5		Ref		Ref				Ref
6-8	.084	1.772(.927-3.387)	.048*	1.907(1.006-3.614)	1.000	.360(.000)	.001**	2.625(1.519-4.534)
More than 8	.003*	3.086(1.486-6.410)	.094	1.923(.895-4.130)	1.000	.448(.000)	.001**	2.938(1.563-5.525)
Maternal age								
15-20		Ref		Ref				Ref
21-25	.177	.574(.256-1.285)	.633	1.221(.539-2.766)	1.000	.054(.000)	.694	.870(.435-1.741)
26-30	.140	.498(.197-1.258)	.751	.860(.339-2.180)	1.000	3.596(.0000)	.242	.624(.283-1.374)
31-40	.341	.616(.227-1.670)	.516	.705(.246-2.024)	1.000	4.184(.000)	.211	.577(.244-1.365)
more than 40	.999	.000	.835	.811(.113-5.820)	1.000	3289.823(.0000)	.191	.275(.040-1.901)
Maternal educationa level								
Illiterate		Ref		Ref				Ref
basic school	.527	.806(.414-1.571)	.992	1.003(.518-1.943)	1.000	1.200(.000)	.550	.845(.485-1.470)
secondary school	.619	1.210(.571-2.567)	.482	1.305(.621-2.743)	1.000	22.240(.0000)	.470	1.263(.671-2.378)
Graduate	.951	1.044(.264-4.118)	.240	2.224(.587-8.426)	1.000	.528(.000)	.815	1.146(.365-3.601)
post graduate	1.000	.000	1.000	.000	1.000	70.543(.000)	1.000	.000
Maternal employment								
house wife	.905	1.069(.356-3.213)	.211	2.247(.631-8.003)			.596	1.297(.496-3.391)
Employed		Ref		Ref				Ref
Maternal antenatal care								
Irregular		Ref		Ref				Ref
on regular	.299	.679(.327-1.410)	.880	1.061(.492-2.288)			.585	1.195(.631-2.264)

Table 2. Association between child related factors and severe acute malnutrition (SAM).

	Severe acute malnutrition							
	P-value	**OR (95% CI)**	**P-value**	**OR (95% CI)**	**P-value**	**OR (95% CI)**	**P-value**	**OR (95% CI)**
Child age								
<6 months	.000*	36.136(6.161-211.947)	.217	.420(.106-1.666)	1.000	.001(.000)	.202	1.949(.698-5.440)
6-11 months	.000*	42.910(8.461-217.604)	.718	1.174(.491-2.807)	1.000	.729(.000)	.006**	3.056(1.374-6.797)
12-17 months	.000*	54.552(10.524-282.788)	.411	1.457(.594-3.571)	1.000	7.035(.000)	.002**	3.854(1.675-8.872)
18-23 months	.006*	10.464(1.964-55.749)	.032*	0.315(.110-.906)	1.000	.465(.000)	.637	.811(.341-1.933)
24-35 months	.147	3.524(.642-19.345)	.087	.473(.201-1.114)	1.000	28.957(.000)	.592	.809(.373-1.756)
39-59 months		Ref		Ref				Ref
Child sex								
Male		Ref		Ref				Ref
Female	.027*	1.713(1.063-2.760)	.023*	1.738(1.078-2.803)			.003**	1.833(1.225-2.741)
Child birth interval								
First		Ref		Ref				Ref
< 12 months	.999	.000	.999	.000	1.000	1.156(.000)	.999	.000
12-17 months	.038*	3.045(1.063-8.722)	.615	.769(.276-2.145)	1.000	36.420(.000)	.685	1.202(.495-2.917)
18-23 months	.111	2.146(.840-5.483)	.867	.930(.396-2.185)	.999	.003(.000)	.613	1.211(.576-2.546)

	Severe acute malnutrition							
	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)
More than 23	.090	2.352(.874-6.330)	.766	.872(.353-2.155)	1.000	1.031(.000)	.452	1.352(.616-2.965)
Previous illness								
No		Ref		Ref				Ref
Yes	.405	1.645(.510-5.305)	.034*	1.684(1.041-2.725)	.999	1007.105(.000)	.022*	1.627(1.074-2.465)
Diarrhea								
No		Ref		Ref				Ref
Yes	.723	.816(.266-2.507)	.410	1.560(.541-4.493)	1.000	.002(.000)	.041**	1.969(1.026-3.776)
Respiratory								
No		Ref		Ref				Ref
Yes	.135	.460(.166-1.274)	.499	1.362(.556-3.339)	.999	.001(.000)	.268	.634(.283-1.420)
Fever								
No		Ref		Ref				Ref
Yes	.874	.924(.350-2.442)	.738	1.162(.481-2.807)	.999	.000(.000)	.719	1.156(.524-2.553)
Vomiting								
No		Ref		Ref				Ref
Yes	.645	1.407(.329-6.018)	.712	.756(.171-3.334)	.997	1043310197.295	.649	.736(.196-2.761)
Measles								
No		Ref		Ref				Ref
Yes	.723	.644(.056-7.365)	.505	.462(.048-4.486)	1.000	.000(.000)	.297	.369(.057-2.401)
Vaccination status								
Not vaccinated	.044*	2.796(1.030-7.586)	.888	1.086(.342-3.447)	1.000	.070(.000)	.388	1.508(.594-3.831)
Fully vaccinated	.316	1.446(.703-2.974)	.887	.947(.446-2.011)	.999	.000(.000)	.274	.701(.371-1.325)
Partially vaccinated		Ref		Ref				Ref
Did the child initiate the breast feeding in the first hours								
No	.061	6.379(.917-44.382)	.999	.000			.593	1.643(.266-10.153)
Yes		Ref		Ref	1.000	.001(.000)		Ref
Did the child exclusively the breast feeding in the first 6 months								
No		Ref		Ref				Ref
Yes	.344	1.287(.763-2.171)	.835	.949(.578-1.558)	.999	70.050(.000)	.611	1.117(.729-1.712)
Did the mother introduce the supplementary feeding after 6 months								
No		Ref		Ref				Ref
Yes	.581	1.414(.413-4.838)	.663	.780(.255-2.387)	1.000	1.324(.000)	.620	1.294(.467-3.591)
Did the child complete the breast feeding at 24 months								
No		Ref		Ref				Ref
Yes	.002*	4.563(1.754-11.868)	.284	.701(.366-1.342)	.999	.025(.000)	.692	1.129(.618-2.062)
On feeding	.187	1.850(.742-4.610)	.032*	.435(.203-.933)	.999	.016(.000)	.503	.792(.400-1.567)

Note: * significant associated by binary logistic regression
** Significant associated by multinomial logistic regression

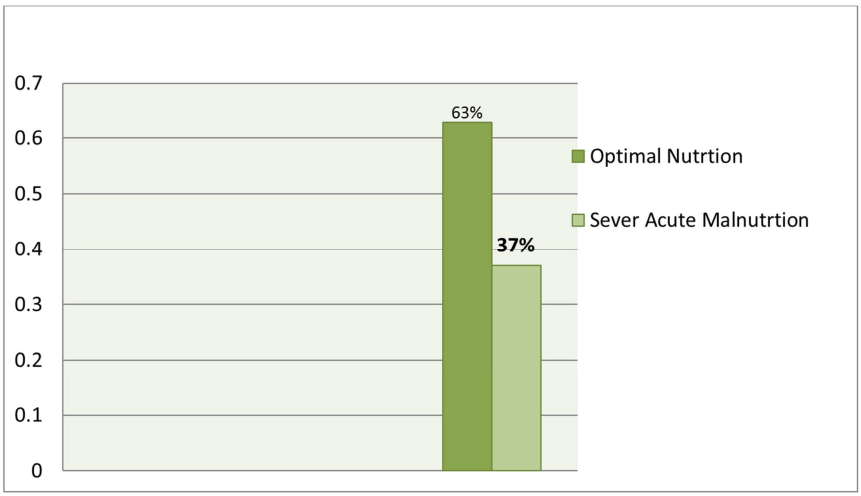

Figure 1. Shows the prevalence of sever acute malnutrtion in Umkaddada localtiy.

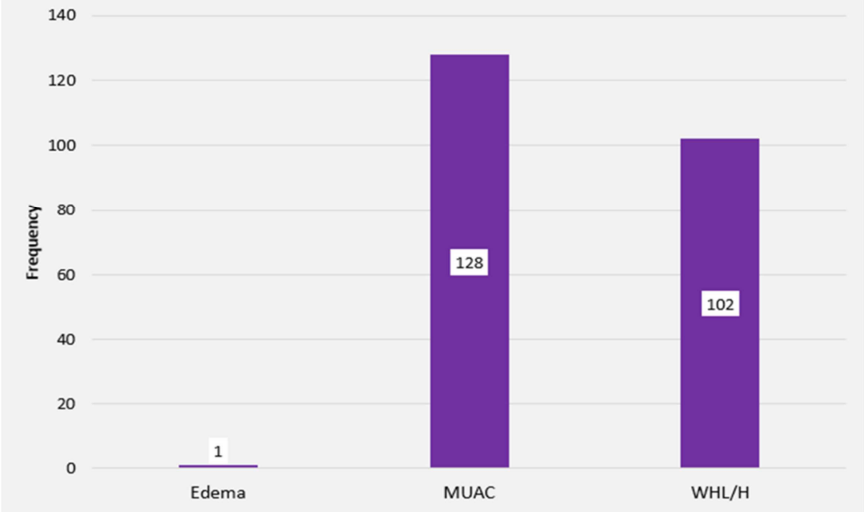

Figure 2. Shows prevalence of severe acute malnutrition based on SAM indices.

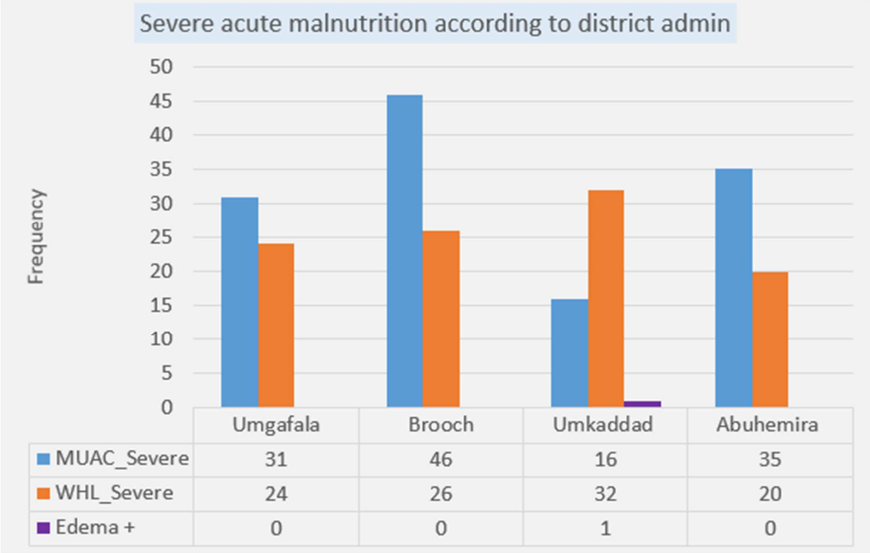

Figure 3. Shows prevalence of SAM according to indicators and adminstrations units.

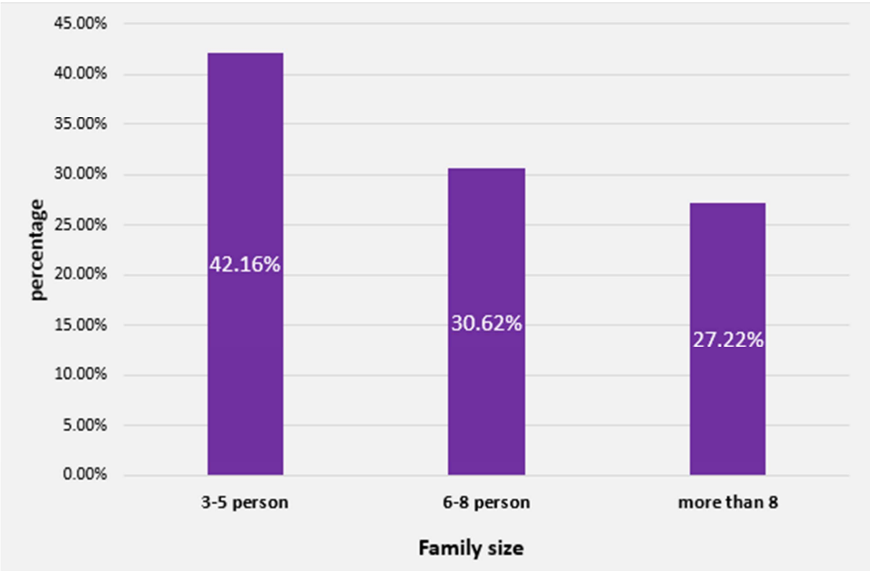

Figure 4. Shows distribution of family size in persons.

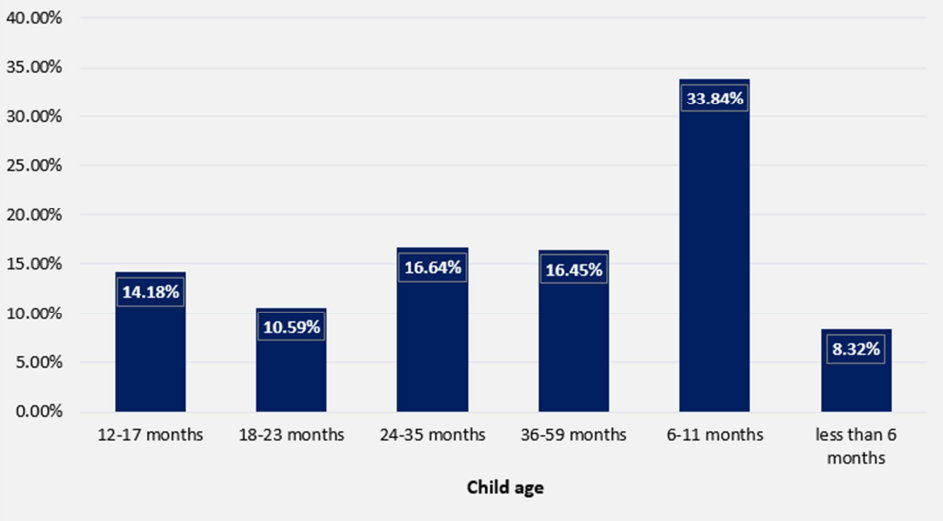

Figure 5. Shows distribution of child age in months.

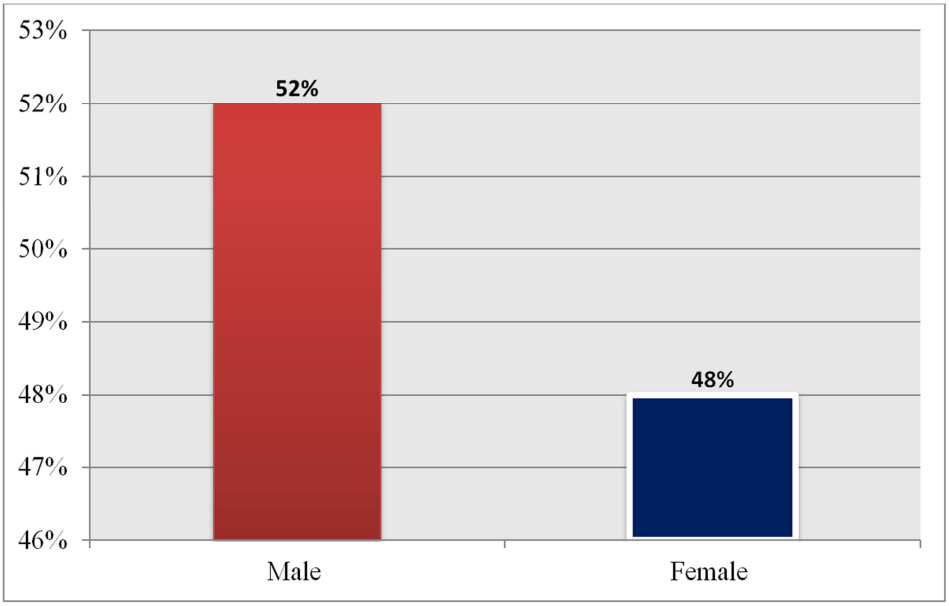

Figure 6. Shows child Sex.

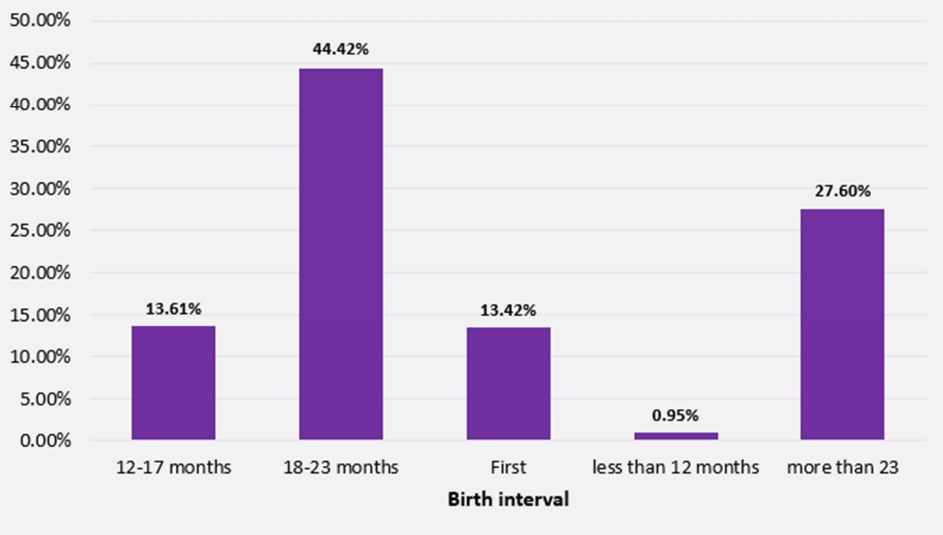

Figure 7. Shows child birth interval.

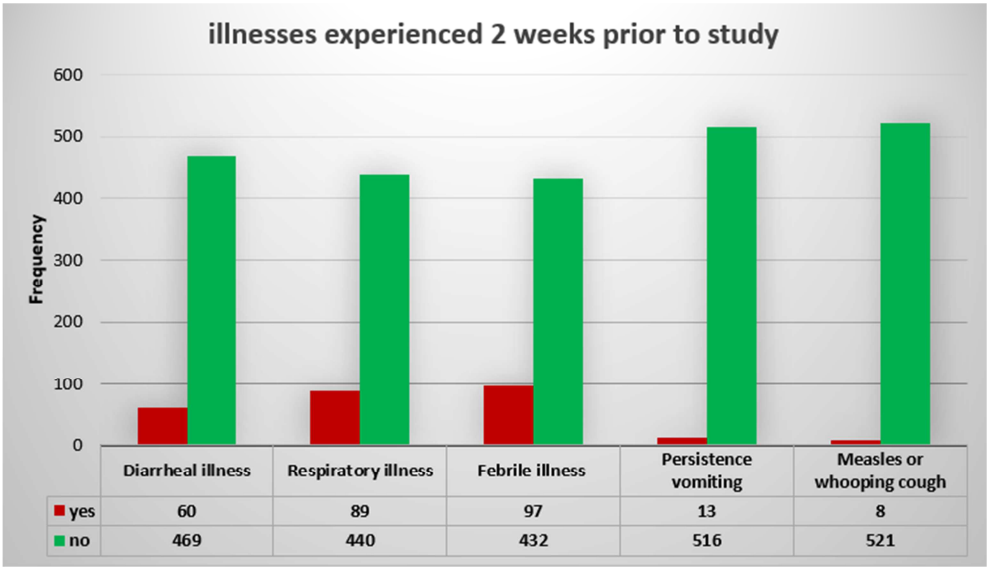

Figure 8. Shows child illness.

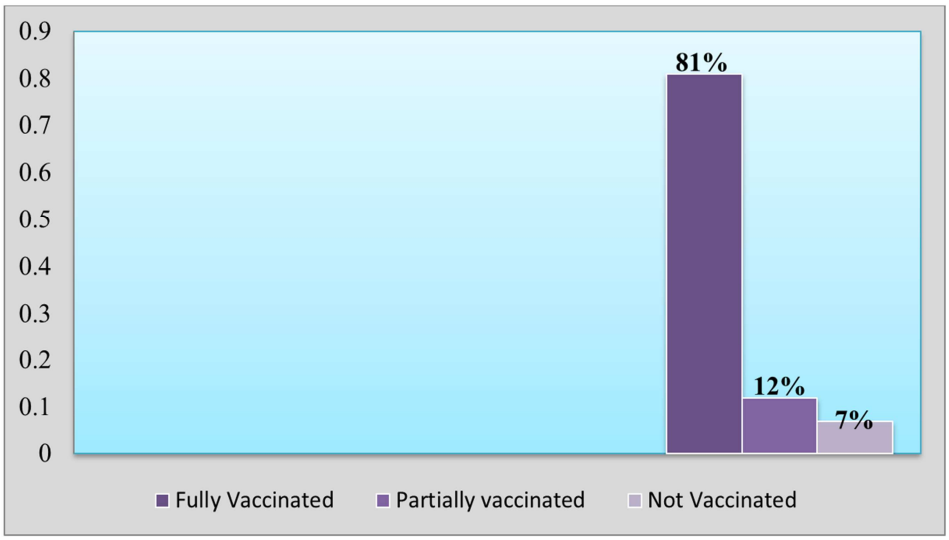

Figure 9. Shows child Vaccination status.

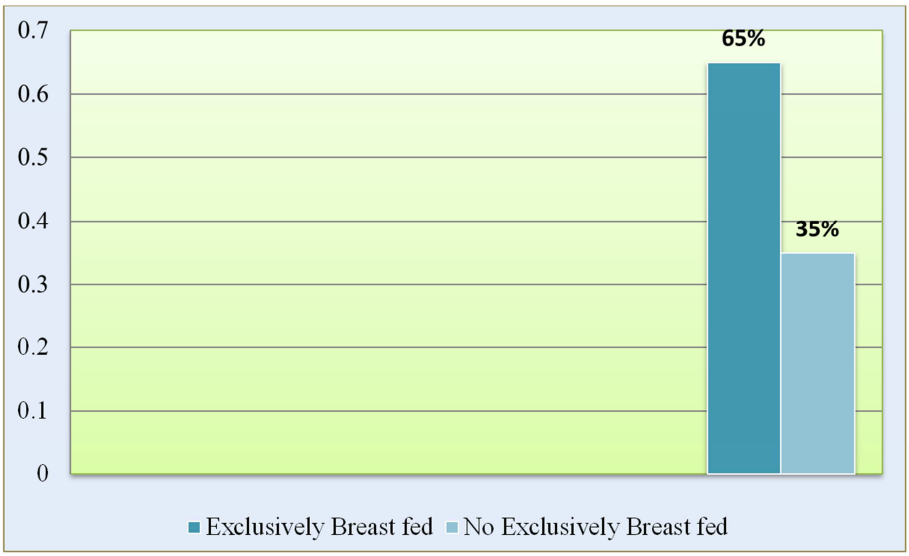

Figure 10. Shows child breast feeding.

4. Discussion

The study revealed that prevalence of severe acute malnutrition among under five in the study area were (36.9%). The rate of severe acute malnutrition was considered above extremely critical threshold (>15%) and it was an emergency situation in the area as per (WHO) standard; and the reason behind this extremely critical prevalence might be attributed to what so called hunger gap during the period of survey, this result was not surprising because; similar results of SAM was reported in Toker 37% and higher findings was revealed 47% in Agig locality in Red Sea State (UNICEF, 2013) and lower prevalence of SAM was reported in the River Nile State; 21% wasting (Ahmed Abdalrhim et al, 2018). The prevalence in the area was higher comparing to what has been reported in Dar Elsalam and Kilimindo 25.3% and 31.3% in ALleit localities (CDO and SMOH, 2015) and this result was consistent with regional and global trends of severe acute malnutrition, as in Ethiopia Semenu Johannes Kassa et al, (2016) 49.2% and 25.2 of underweight and wasting respectively and 56.4% of wasting reported by Dr. R. Ravindranth et al, (2017) and 67.7% of wasting in Bellary Talk region. HarshalPendre, (2017) in India.

Brooch village demonstrated the highest prevalence of severe acute malnutrition (38.41%) as administration unit and a village, this high prevalence could be attributed to bias occur during the time of the samples taking when some children were already on nutritional program and they were came for their rations during the survey and at the same time they were interviewed.

Regarding immunization coverage there; was 81.7% which was lower than (WHO) goal that aimed to maintain coverage rate up to more than 90% and the result was consistent with several studies showed that no reach optimal coverage rate; Shaza. O. H. Kanan and Mohammed. O. Swar, (2016) in Sudan. Elias Legess and WorkuDechas in Ethiopia (2016), VK Desain et al, (2013) India, Louis Samiak and Theophius I. Emetoin Guinea, (2017).

The results of feeding practices were consistent with data from different countries, analysis of data from 123 countries showed that around the world most babies are exclusive breast fed and at some point in their lives this rates varies widely between low, middle and high income countries, and wide variation in proportion among each group. Different also between rich and poor groups in the west 64% of babies are still breast fed at 24 months compared to only 41% among richest families. West and central African region where 63% of babies in poorest families still received breast milk at 2 year compared to only 26% in richest families, this gap between poors and richest group is smallest in Eastern Europe and central Asia where both poorest families and wealthiest have low rate of breast feeding at 2 years 31% and 23% wealthiest, reports showed exclusive breast feeding practices, in India 46%, Vitenam 17% sebeiria 90.45, Seirraleone 97%, south Sudan 92.7% (UNICEF 2016). In comparison to Nordic countries higher in Hungary 98% and lower in Uk 15% the incidence of exclusive of breast feeding and it is duration tends to be higher /longer in countries with long periods of maternity leave /paternal and determinants of breast feeding include infants characteristics and cultural attitude towards breast feeding (Chart CO1.5.A).

Regarding family size; the result consistent with several studies conducted by Dr. jala Nakhabi, (2016), Gabre and gudise, (2017), Okuy Nweke Chezobe et al, (2017) M. R Preshanth et al and Mukesh Chould Hary et al and Eptihag (2017) they found that large family was associated with increased risk of child malnutrition but incontrast to study conducted by Aisha Iftikhar et al, (2017); revealed that family size was insignificantly (p-value >.05) associated with severe acute malnutrition, whereas maternal age was insignificant associated with child severe acute malnutrition this finding was inconsistent with studies done by Marlana Samtos Felisbein et al, Nile shkumar et al, Amittal j Singh et al, Soon Hyan Yu et al, (2016) and Mustapha Kabir Musa et al, (2017) they found that mother age was important determinant of severe acute malnutrition (younger mother age associated with child malnutrition).

Mother education; was insignificantly associated with child severe acute malnutrition at (p-value 1.000) which was in contrast to studies carried out by Bentn A. Abuya et al (2016) Taha Musa et al, (2014) in Sudan, wherein they revealed that mother education level improved child nutrition status, but a cross countries analysis from 63 countries Smith and Hadat, (2002); found that women education was strong associated with child malnutrition in developing countries. Mother employment showed no significant association with malnutrition in children (p-value =.905), this finding was inconsistent with studies done in Uganda by AsifiaGershing, (2016); they demonstrated that better mother employment better child health and nutrition. But some studies even showed that maternal employment has negative impact on nutritional status of the child in Egypt; Ahmed Rashad, (2017) he concluded maternal employment has robust negative impact on child nutrition status. in China they found children health deteriorate when their fathers becomes unemployment. Yet when their mother becomes unemployment their health improved, maternal unemployment more likely to improve child health through changes in time use JanrekePieters. SamanthRawling, (2016). While antennal care during pregnancy was insignificantly statistically associated with

child severe acute malnutrition (p-value. 229); which was in contrast to studies conducted in Nigeria by Candy Haemel et al, (2016) in Ethiopia and Md Sazedar Rahaman, (2017) in Bangladesh they were revealed that good antenatal care improved childhood nutrition.

The child age was significantly associated with severe acute malnutrition when age between 12-17months, there was (54.552) times risk to develop severe acute malnutrition at (p-value =.000) comparing to age between 6-11months was (42.9109) times risk to become severely malnourished at (p-value =.000.); these results were consistent with several studies conducted by OkuyNweke et al, (2017), Zemenu Yohanes Kass al al, (2017) Mefero Asfaw, Bahawaludin et al, (2012), Gaber Gelana et al, (2016) and, Blessing Akombi, (2017) but contradicted to study establishede in Ethiopia by Hamna and Gabriel Kishyan, (2017).

The female child, was significantly statistically associated with severe acute malnutrition at (p –value=.027) which agreed with Vijayan K iilal et a, (2015) l and Shatanjaya Dasgupta in India and in Gaza, strip by M Schoenbaum et al, (2016) revealed gender male preference generally boys to be at advantage over gills but in contrast to Dr. Jala and Englet et al, (2013); they found male sex at more risk for severe malnutrition than female. The child birth interval was significantly statistically associated with severe acute malnutrition at (p-value =0.038) and consistent with studies conducted by Pravana NK. et al, (2016).

Previous illness experienced by child two weeks prior to interview was significantly statistically associated with SAM (P- value=.034), and the most significant one was diarrheal illness (p- value =.014) these findings was consistent with studies reported by Mohammad kamal et al, (2016). Child who was not vaccinated was significantly associated with severe acute malnutrition (p-value =044) also was consistent with researches conducted by Mustapha Musa, Kumar, Hanna et al, (2017), Ali Jafer et al, (2017) and Fundifura SR. C j Prendergast, (2015) Tanzania; but in different with Dr. P. Ravindrash et al, (2017); They found no association between SAM and vaccination status of child.

There was no significant association between severe acute malnutrition and initiation of breast feeding within first hour, exclusive breast feeding in first six months and introduction of supplementary feeds at six months (p-value=>.05) but these findings were inconsistent with studies done in Sudan by Taha Musa et al, (2014), India by Disksha Sharma et al (2017) and Mohammad Kamal et al, (2017) Jordan; they concluded that committement of mother with these breast feeding practices are associated with better nutrition status of their child. But the prolonged breast feeding was significantly associated with severe acute malnutrition among at (p-value =.002) this finding was consistent with study established in Uganda, (2017) demonstrated that prolonged breast feeding was associated with increased risk of severe malnutrition and those with breast feeding less than 12 month Dr. M. WHeijamen and VD Desle, (2017) also revealed that prolonged breast feeding was risk factor for child malnutrition.

5. Conclusion & Recommendations

The findings revealed that prevalence of severe acute was 36.9%, Brooch reported highest prevalence of acute malnutrition while Zarafa village has lowest prevalence and mid upper arm circumference (MUAC) indicator outranks weight for height or length (WH/L) and the most common risk factors associated with severe acute malnutrition (SAM) were large family size, child age, being female child, birth interval, child who were not vaccinated and prolonged breast feeding and no significant statistically association between severe acute malnutrition among under five age and maternal age, education level, employment and antenatal care of mothers, initiation of breast feeding within first hour of child, and exclusive breast feeding in the first 6 months in the study area. The coverage rate of routine immunization was 81.1% of children were fully vaccinated, 11% were partially and 7% of were not vaccinated at whole.

Based on the study the following points are recommended:

The government and it is partners have to co-ordinate for urgent intervention to save the life of children in; (Therapeutic Feeding Centre setting, Out Patient Department feeding program and Supplementary Feeding Program).

Efforts are needed to increase the coverage rate of Expanded Program on Immunization (EPI) for at least 90%.

Furthers studies with more details in this field are highly recommended.

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