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Integrated Nutrition and Retrospective Mortality
SMART Survey (Jabel Mara December 2014/January 2015) - Sudan

Tearfund Nertiti in partnership with State Ministry of Health, Central Darfur, Sudan

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(iv) Acronyms:

DRC	Danish Refugee Council
CD	Central Darfur State
CI	Confidence Interval
CMAM	Community-based Management of Acute Malnutrition
ENA	Emergency Nutrition Assessment
EPI	Expanded Program of Immunization
FBPMAM	Food Based Prevention of Moderate Acute Malnutrition
FMOH	Federal Ministry of Health
GAM	Global Acute Malnutrition
HAZ	Height for Age Z-score
HH	Households
IBSFP	Integrated Blanket Supplementary Feeding Program
IR	Islamic Relief
IYCF	Infant and Young Children Feeding
JM	Jabel Marra
KAP	Knowledge, Attitude and Practices
MAM	Moderate Acute Malnutrition
MUAC	Mid Upper Arm Circumference
NGO	Non-Governmental Organization
OTP	Outpatient Therapeutic Program
PHCC	Primary Health Care Centre
PHCU	Primary Health Care Unit
SAM	Severe Acute Malnutrition
SC	Stabilization Centre
SMOH	State Ministry of Health
SMART	Standardized Monitoring and Assessment of Relief and Transition
TF	Tearfund
TSFP	Targeted Supplementary Feeding Program
UNICEF	United Nations Children's Fund
WFP	World Food Program
WHO	World Health Organization
WHZ	Weight for Height in Z-score
WAZ	Weight for Age in Z-score

1. Executive summery

The integrated nutrition and retrospective mortality survey was carried out by Tearfund in Jabel Mara, Central Darfur State in collaboration with CD SMOH. Located in West and Central Jabel Mara localities, east part of the State, the result of these surveys will be used as baseline data /benchmark for program intervention in Upper Jabel Mara (Golo and Guildo catchment area).

Objectives

The key objective of the survey was to assess nutritional status and mortality rate amongst children aged 6-59 months in Jabel Mara, providing timely and reliable data in a standardized way, understanding the magnitude and severity of malnutrition, by quantifying the acute malnutrition and mortality in Jabel Mara which can help to prioritizing humanitarian assistance for program and policy decisions.

Results

Table 1: *Key anthropometric and death results*

Index	Indicators		Result
Anthropometry **WHO 2006 Standards**	WHZ	GAM ZS <-2 and /or oedema	(208) 25.7 % (19.9 - 32.5 95% C.I.)
		Severe Acute Malnutrition W/H <-3 z and /or Oedema	(92) 11.4 % (7.9 - 16.1 95% C.I.)
	HAZ	Stunting	461) 58.1 % (52.7 - 63.2
	WAZ	Underweight	(335) 45.6 % (40.0 - 51.4 95% C.I.)
CMR (deaths/10,000 people / day)			0.59 (0.40-0.86) (95% CI)
U5MR (deaths in children under five/10,000 children under five/day)			2.45 (1.48-4.03) (95% CI)

The prevalence of oedema is 8.8 %

The prevalence of Oedema (8.8%) is three times over WHO SAM emergency threshold (3%), children morbidity two weeks prior to survey was reported to be respiratory infection (51.3%), diarrhoea (29%) and Malaria/Fever 18.24%. Measles and Vitamin A coverage are 72.92%, 64.6%, respectively; both are less than the 80% WHO target.
Sanitation conditions were found to be poor with 61.6% consuming untreated water, 60.3% using unimproved source of drinking water, the average of water consuming is 67L for HH, 11L/person/day, and this is less than the minimum recommended in Sphere Standard (15L per person per day)*.

* Humanitarian Charter and Minimum Standards in Humanitarian Response,Sphere Handbook Standard 2011

Though majority of children (94.6%) born in the last 24 months were breastfed , only 36.48% infants 0-6 months were exclusively breastfed, 45.01% of children 6-23 months received food prepared for children, and 55.99% received only 2 meal per day within 24 hours prior to survey with all family.

31.33% of respondent HH, evident that their yield in the last season was less than the previous season, however 40.27% evident that their yield was redundant in current season, and there are 9.55% were not cultivate. That indicates that the probability of increasing the proportion of HH with inadequate food during this year to 40.88 %.

Recommendation

- Strengthen and scale –up of current nutrition program in Guildo by training more health workers and increasing number of OTP, TSFP and FBPMAM for better coverage.
- Expansion of nutrition program in Jabel Mara to cover the most affected villages, Golo, Kiling, Daya, Kebely and Sorong.
- Integration of PHC service and nutrition service.
- To establish at least one in–patient program at Guildo/Golo hospital to allow management of undernourished with medical complications in Jabel Mara as there is no such facility within the area.
- Improve facilities on water and sanitation through multi sectorial program implementation approach.
- To develop a strong behavioral change communication program through community health workers to promote proper hygiene and sanitation practices.
- To develop a strong awareness raising program to improve Infants and Young Children Feeding Practices.
- Start food security and livelihood program in Golo and Guildo, to reduce the proportion of HHs with inadequate food.

2. Background

Jabel Mara has very few developed infrastructures in terms of health and nutrition facilities or economic infrastructures. Few international humanitarian organizations are currently operating in west Jabel Mara. Those are Tearfund, DRC and IR, with focus of intervention on nutrition, strengthening primary health care, food distribution, livelihood, wash and Emergency response. 3localities situated in Jabel Mara, East Jabel Mara, Central Jabel Mara and West Jabel, due to conflict in Darfur since 2003 people displaced from upper Jabel Mara to Nertiti and Guildo, Tearfund is the only INGO providing the nutrition services to those area since the termination of INGOs by GOS in 2009, currently Tearfund nutrition program catchment areas covering two localities, in Jabel Mara (West& Central),but the program beneficiaries are coming from all Jabel Mara (3 localities, East, west and Central Jabel Mara). The nutritional situation of the population living affected by instability of security situation as the result of military skirmishes between GOS and SLA, and as the result of the lack of health and nutrition service in that area.

the prevalence of Global Acute Malnutrition is high in the presence of aggravating factors e.g. deficiency of food (quality and quantity), continued household food insecurity due to a poor

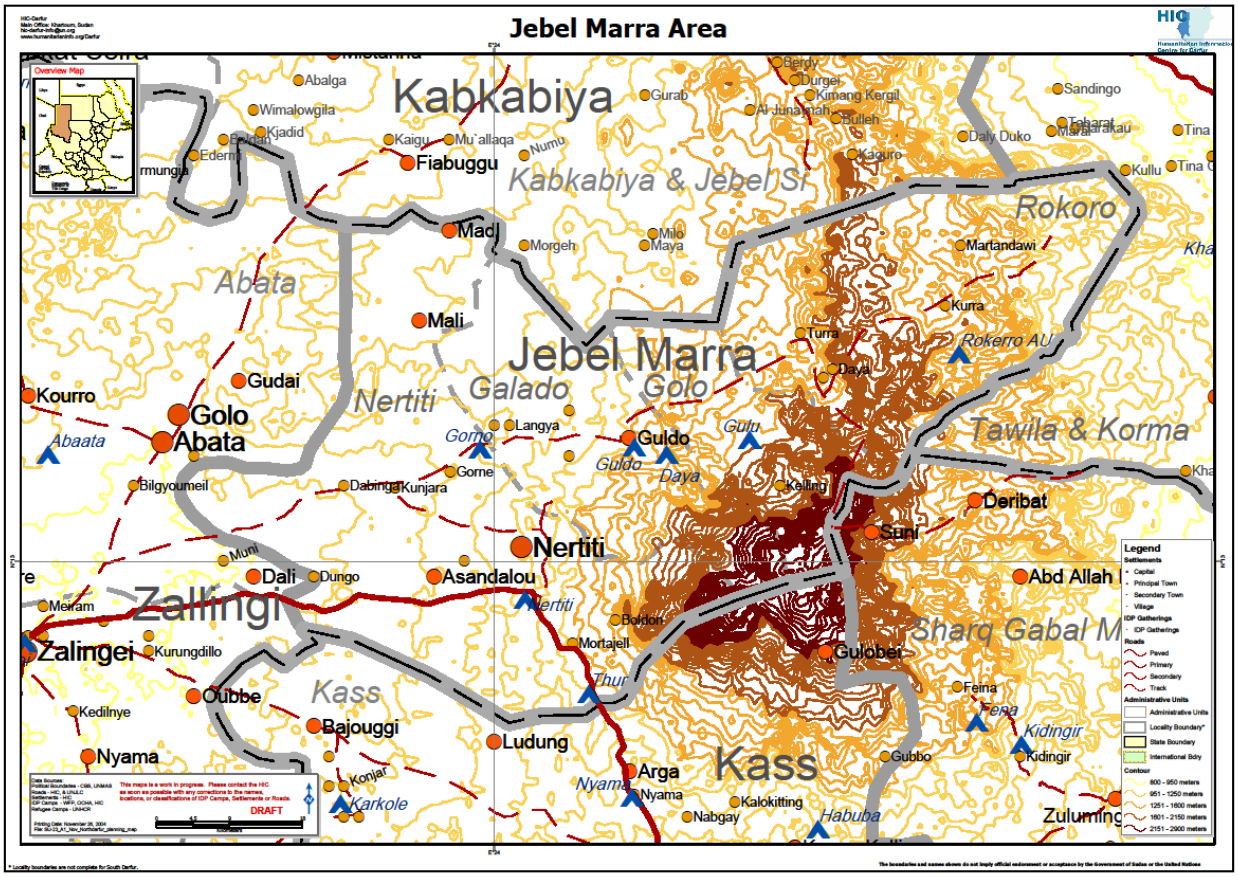
harvest season and security situation, lack of primary health care PHC, , increased food prices and high disease burden.

3. Introduction

3.1. Geography and population Jabel Mara

The inaccessibility to Jabel Mara area in Central Darfur due to frequent clashes it has resulted displacements and increased vulnerability of the affected population in the area to high levels of food insecurity, disease and malnutrition. There are no recent nutrition surveys in that area, however according to June 2013 localized surveys conducted in Nertiti – West Jabel Mara locality reported global acute malnutrition of 19%, also the S3M reported 8.6% GAM, the 2surveys conducted, during the same period with different results. Poor child feeding practices due to displacement, poor hygienic/ sanitation environment were most displaced and limited access to health facilities and limited access to the water in addition to the unprotected sources of drinking water, all those increased the vulnerability among the community.

The total population is estimated to 137744 (Guildo & Golo)* mainly agrarian and nomads, and most of them are from two tribes Fur and Arab. Geographically this survey covered Central Jabel Mara locality and Guildo Division Unit in Wes Jabel Mara locality. This assessment conducted in collaboration with CD State Ministry of Health SMOH and Sudanese Red Crescent SR.



* EPI CD Targeted population 2014

3.2. **Justification to conduct the survey**:

Tearfund carried out two nutrition surveys in west Jabel Mara locality (Nertiti) base line in December 2012 and monitoring survey on June 2013 both nutrition surveys show high malnutrition rates as below table:

Table 2: *Nertiti SMART Surveys in last 3years*

Month	**GAM**	**SAM**
December 2012	**15.0 % (12.4 - 18.1 95% CI)**	3.7 % (2.5 - 5.3 95% C.I.)
June 2013	*19.0% (15.7-22.7 95% CI)*	*6.0% (3.5-10.2 95% CI*

As the result of those surveys, Tearfund implemented OTP/SFP in 9 project sites and a pilot Integrated Blanket Supplementary Program IBSFP at Thur Village; besides supporting the Stabilization Centre SC in Nertiti Hospital since 2012 up to Now. All the components are being implemented in collaboration with State Ministry of Health and Sudanese Red Crescent SRC.

As part of the programming, there was need to update the information on current nutritional status of Jabel Mara. The result of these surveys will be used as baseline data /benchmark for program intervention in Upper Central Jabel Mara, Additionally, based on the result of the survey, Tearfund will adapt its program to respond to the need of the beneficiaries, and this will assess impact on ongoing interventions in Guildo. The survey is specifically to assess and monitor nutritional status in Jabel Mara and the findings of the standard nutrition survey will be used to understand the overall nutrition, food security and health status across the area and give recommendations for planning and decision making.

3.3 The objectives:

The key objective of the survey was to assess nutritional status and mortality rate amongst children aged 6-59 months in Jabel Mara, providing timely and reliable data in a standardized way, understanding the magnitude and severity of malnutrition, by quantifying the acute malnutrition and mortality in Jabel Mara which can help to prioritizing humanitarian assistance for program and policy decisions.

3.4. Specific objectives include:

- Assessing the prevalence of acute malnutrition in children aged 6-59 months.
- Estimating the Crude and under five mortality rates.
- Determine the Infant and Young child feeding practices among children 0 – 23 months.
- Investigate household food security and food consumption patterns.
- To determine the morbidity and health seeking behaviors.
- To estimate immunization and Vitamin A coverage in the both areas.
- Determine the proportion of households with access to safe water.
- To make recommendations for a program intervention strategy.

4. Methodology

4.1 **Sample size and Clusters sampling**

This integrated and retrospective mortality survey was conducted using SMART survey methodology. ENA for SMART software 2011 version was used to calculate the sample size of anthropometry component, a total of 684 children in 816 households were calculated as representative using the parameters shown in table 3 below., Similarly, for mortality component, 1580 people in 271 households were required to get a representative sample. Since the two components are integrated, the higher household size was taken as the sample size for the survey; therefore, the sample size for the survey was 816households. Considering 7 teams collecting data in 5 days covering 27 households per day per team, a total of 817 households were covered- slightly higher than the 816 generated by ENA software. Table 3 below indicates the variables used to determine the sample size using ENA for SMART 2011 software.

Table 3: *variables used to determine the sample size using*

Variable	Value for Anthropometry	Value for Mortality	Rationale
Estimated prevalence	19	2	Since there was no any SMART survey conducted in Jabel over the last four years,

			and the S3M and local SMART survey were conduct in the same period, this survey used 2013 SMART survey of Nertiti. This Locality was selected because of having similar livelihood zone with Jabel Mara. The result of this survey **in table 2**
Desired precision	4	1	In line with the above Nertiti Survey confidence interval
Design effect	1.7	1.7	Considering population heterogeneity
Average household	6	6	Based on west Darfur Census 2008, and Tearfund KAP survey in Nov2014.
% children under 5 years	16	NA	Based on SMOH recommended proportion of U5s in Sudan
% non-respondent rate	3	3	It is assumed that most of the families wouldn't be away on their farms, as the survey is planned after harvest season
Recall period	NA	90	Based on FMOH SMART Survey Guideline
Number of children to be included	684	NA	Suggested by ENA software
Number of households to be included	816	271	Taking the bigger size, a total of 816 households was targeted for the survey (both for Anthropometry and mortality)
Population to be included	NA	1580	Suggested by ENA software

4.2 Selection households and children:

A two stage cluster sampling method was used for selecting villages and sampled households. The first stage was the assignment of clusters using villages as geographic units. A total of 30 clusters were selected by ENA software with additional 4 villages/clusters identified as reserve clusters (see annex 2). Population at village level was projected from the data availed by SMOH- EPI which was the result of house-to-house polio and acceleration campaign conducted in 2014.

The geographical centre of the village was found with a community member help, from the centre of the village a direction was determined by spinning a pen into the air. The team followed the direction of the pen until the boundary of the village. From that point the pen was spun again, and the team walked in that new direction counting the number of houses passed on the right and left by marking houses with a chalk till the end of the village. The number of houses marked was written on pieces of paper from 1 to the final number with one number per piece. The pieces of paper were put in a bag and shaken, and a child was let to pick out one piece. The selected household number was used as the first house to start the survey. Turning to the right and going to the nearest household was continued until the 27 households were visited in the given cluster.

All children between 6-59 months in each selected house were included in the anthropometric assessment. The same household was assessed for mortality, water source, livelihood, and IYCF questionnaire was administered if there are children between 0-23 months within the selected household.

When the administrative boundary of the village was reached, the enumerators returned back to the center of the village and repeated all the above steps going in different direction and never assessed the same household twice.

4.3 Case definitions and inclusion criteria

- Household: A household define as consisting of all persons with family or other social relationships among themselves eating from the same cooking pot and sharing a common resource base.

4.3.1 Anthropometric indicators

- **Age**: Immunization cards or birth certificates used as primary source of information, in the absence of these, a local calendar of events was developed from discussions with community members, enumerators and key informants and used to estimate the child age in months.

- Weight: Electronic / hanging scale was used to measure the children's weight during data collection and survey enumerators' training.

- Height: A wooden height board was used to measure height for children above 2 years of age (≥ 87 cm) while length will take for children less than 2 years of age (≤87 cm) with height board lying down.

- MUAC: MUAC was measured using MUAC tape on the left arm at the mid-point of the left upper arm.

- Bilateral oedema: Bilateral pitting oedema was verified by thumb pressure apply on top of both feet for three seconds.

4.3.2 Health and morbidity related indicators:

- Vitamin A supplementation in last 6 months: That was determined by care taker.

- Measles Vaccine coverage: Only children greater than or equal to 9 months was included to determine Measles coverage.

- Morbidity (type of Illness and Treatment sought): This information was collected over a two week recall period prior the survey date, by interviewing the caretaker.

4.4 Questionnaire

Nutrition, health and mortality questionnaire was administered to all selected households and anthropometric measurements for households with children 6 –59 months. IYCF questionnaire was administered to households that have children aged 0-23 months.

4.5 Training - Survey teams and supervision

7 teams of two enumerators and one team leader each in addition to 4 supervisors were trained from 25-27 December 2014 by the survey consultant, (SMOH nutrition manager). This was covered description of objectives and methodology, anthropometric measurements and mortality assessment, data collection and interview skills. A Standardization test and field pilot test in a village that was not selected for the survey was a part of the training to give opportunity to team members to familiarize with the tools. A close supervision of the data collection and daily feedback was done to ensure good quality of data.

4.6 Data entry and analysis

Daily data entry was undertaken to ensure quality of data and feedback was given to the teams on daily basis. ENA for SMART 2011 software version was used to enter and analyze anthropometric and mortality data. Anthropometric data with extreme values may be excluded by the software from the analysis using SMART flags with boundaries for exclusion could defined at +/- 3 SD of WHZ from the observed WHZ mean.

EPIINFO7 Version was used to enter and analyze other data related to health, Morbidity and IYCF components. Data was cleaned, edited and analyzed by Tearfund and SMOH with previous surveys experience.

4.7 Anthropometric indices

Table 4: *Threshold values for weight for height, height for age and weight for age indices according to WHO 2006 reference standards*

Rating of Malnutrition	Acute Malnutrition (WFH)	Chronic Malnutrition (HFA)	Underweight (WFA)

Global	<-2SD and/or bilateral Oedema	<-2SD	<-2SD
Moderate	<-2SD and >3SD and Oedema	<-2SD and >3SD	<-2SD and >3SD
Severe	<-3SD and/or existing bilateral oedema	<-3SD	<-3SD

Table 5: *Threshold values of the anthropometric measurements of MUAC*

MUAC (CMAM&FBPMAM Guideline)	interpretation
MUAC<115mm and/or bilateral Oedema	Severe acute malnutrition(SAM)
MUAC >=115mm and <125mm *(no bilateral oedema)*	Moderate acute malnutrition(MAM)
MUAC >=125mm and <135mm *(no bilateral Oedema)*	At risk of acute malnutrition

3.8 Ethical considerations

The proposal for the survey was previously submitted and approved by the technical working group of the nutrition cluster of Central Darfur State CD, the CD authorities (SMOH and HAC), and the local authorities were officially briefed on the purpose of this assessment.
Concerns of the caretakers of sampled children were respected and information collected was treated as confidential.

5. Result

5.1 Anthropometric results

A total of 809 children aged 6 – 59 months were sampled for the anthropometric component.

5.1.1 Distribution by age and sex

Table 6: *Distribution of age and sex of sample*

AGE (mo)	Boys		Girls		Total		Ratio
	no.	%	no.	%	no.	%	Boy :girl
6-17	120	48.2	129	51.8	249	30.8	0.9
18-29	107	53.8	92	46.2	199	24.6	1.2
30-41	82	49.7	83	50.3	165	20.4	1.0
42-53	65	47.1	73	52.9	138	17.1	0.9
54-59	37	63.8	21	36.2	58	7.2	1.8
Total	411	50.8	398	49.2	809	100.0	1.0

Boys and girls equally represented, the overall sex ratio was 1.0 (within expected range of 0.8 to 1.2) indicating the sample selection was not biased.

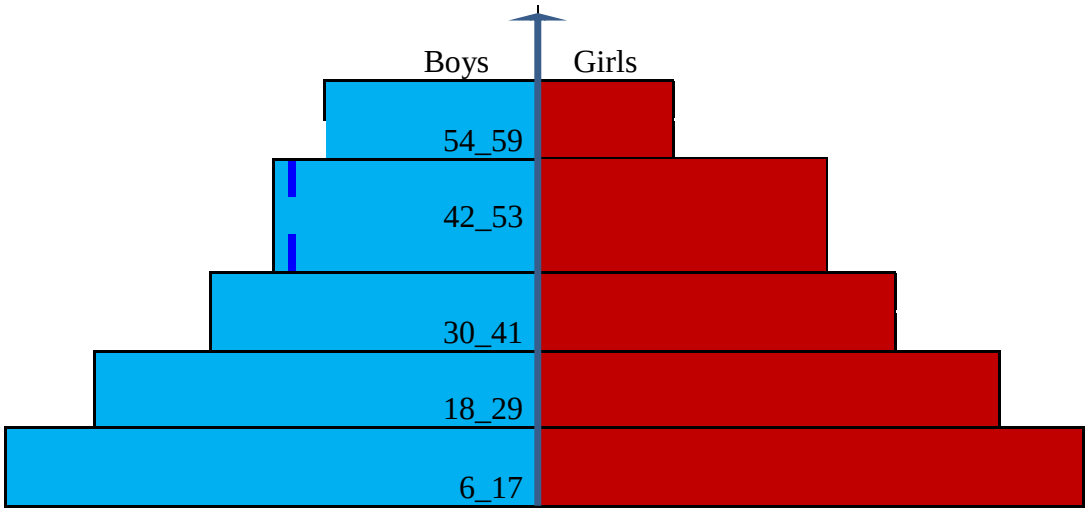


Figure 1*: Population age and sex pyramid*

5.1.2 Anthropometric results (based on WHO standards 2006)

The prevalence of GAM and SAM based on WHZ were, respectively, at 25.7 % (19.9 – 32.5.6 95% C.I.) and 11.4 % (7.9 - 16.1 95% C.I.) while the Prevalence of MAM 14.3 %(10.5 - 19.2 95% C.I.). According WHO 2006 standards Global Acute Malnutrition (GAM) is defined as W/H < -2 ZS and/or nutritional oedema while Severe Acute Malnutrition (SAM) is defined as W/H < -3ZS and/or nutritional oedema**.**

5.1.3 Distribution of Acute Malnutrition defined in Weight for Height in Z-score and / or oedema

Table 7: *Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex*

	All n = 809	**Boys** n = 411	**Girls** n = 398
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(208) 25.7 % (19.9 - 32.5 95% C.I.)	(119) 29.0 % (21.5 - 37.7 95% C.I.)	(89) 22.4 % (16.8 - 29.1 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(116) 14.3 % (10.5 - 19.2 95% C.I.)	(64) 15.6 % (11.1 - 21.5 95% C.I.)	(52) 13.1 % (9.3 - 18.1 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(92) 11.4 % (7.9 - 16.1 95% C.I.)	(55) 13.4 % (9.0 - 19.4 95% C.I.)	(37) 9.3 % (5.9 - 14.3 95% C.I.)

The prevalence of oedema is **8.9 %**

The weight for height distribution curve of the surveyed children (red curve) lies to the left. This is an indication that the surveyed population contains more malnutrition cases than the reference population WHO standards (green curve). The mean ± SD of WHZ (n=809) of 1.0 (between -0.97 and 1.09) indicates the population was normally distributed and.

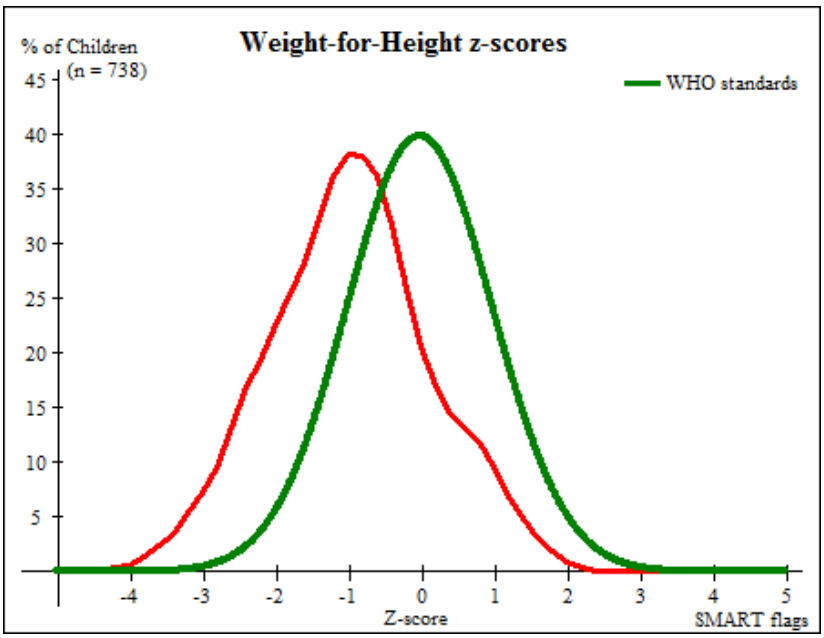


Figure 2*: Gaussian curve*

5.1.4 Distribution acute malnutrition defined in WFH in Z-score and or Oedema by age:

Table 8: *Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema*

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	249	4	1.6	40	16.1	181	72.7	24	9.6
18-29	199	5	2.5	32	16.1	134	67.3	28	14.1
30-41	165	8	4.8	23	13.9	125	75.8	9	5.5
42-53	138	2	1.4	13	9.4	116	84.1	7	5.1
54-59	58	2	3.4	8	13.8	45	77.6	3	5.2
Total	809	21	2.6	116	14.3	601	74.3	71	8.8

Of the 809 children sampled, 0 were excluded from analysis as SMART flags. And there were 71 Oedema cases (8.8%) were found during the survey, and this reflects the rate of protein deficiency among the children ageU5s in Jabel Mara.

Table 9: *Distribution of acute malnutrition and oedema based on weight-for-height z-scores*

	<-3 z-score	>=-3 z-score
Oedema present	Marasmus kwashiorkor No. 0 (0.0 %)	Kwashiorkor No. 71 (8.8 %)
Oedema absent	Marasmus No. 21 (2.6 %)	Not severely malnourished No. 717 (88.6 %)

The result showed a significant Oedema rate, in the studied area, 71 cases were found, over 2 cases in a cluster, however 11 cases were found in one village (Kosa) in Guildo division unit, 9km to Guildo town.

Table 10*: Prevalence of acute malnutrition based on MUAC cut offs (and/or oedema) and by sex*

	All n = 809	**Boys** n = 411	**Girls** n = 398

Prevalence of global malnutrition (< 125 mm and/or oedema)	(281) 34.7 % (28.9 - 41.1 95% C.I.)	(138) 33.6 % (27.2 - 40.7 95% C.I.)	(143) 35.9 % (28.7 - 43.9 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(158) 19.5 % (14.6 - 25.6 95% C.I.)	(80) 19.5 % (14.8 - 25.2 95% C.I.)	(78) 19.6 % (13.7 - 27.2 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(123) 15.2 % (11.2 - 20.4 95% C.I.)	(58) 14.1 % (9.9 - 19.8 95% C.I.)	(65) 16.3 % (11.3 - 23.0 95% C.I.)

The prevalence of GAM rate based on MUAC more than 2 times exceeded the emergency threshold (15%).

Table 11: *Prevalence of underweight based on weight-for-age z-scores by sex*

	All n = 734	**Boys** n = 368	**Girls** n = 366
Prevalence of underweight (<-2 z-score)	(335) 45.6 % (40.0 - 51.4 95% C.I.)	(174) 47.3 % (40.3 - 54.4 95% C.I.)	(161) 44.0 % (36.9 - 51.3 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(275) 37.5 % (32.1 - 43.2 95% C.I.)	(139) 37.8 % (31.1 - 45.0 95% C.I.)	(136) 37.2 % (30.7 - 44.1 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(60) 8.2 % (5.6 - 11.8 95% C.I.)	(35) 9.5 % (6.2 - 14.3 95% C.I.)	(25) 6.8 % (4.2 - 11.0 95% C.I.)

The underweight prevalence result evident that there is no deferent based on sex in underweight.

Table 12*: Prevalence of underweight by age, based on weight-for-age z-scores*

		Severe underweight (<-3 z-score)		**Moderate underweight (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	225	17	7.6	90	40.0	118	52.4	24	10.7
18-29	170	13	7.6	70	41.2	87	51.2	28	16.5

30-41	153	16	10.5	49	32.0	88	57.5	9	5.9
42-53	131	8	6.1	47	35.9	76	58.0	7	5.3
54-59	55	6	10.9	19	34.5	30	54.5	3	5.5
Total	734	60	8.2	275	37.5	399	54.4	71	9.7

Table 13: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 794	**Boys** n = 401	**Girls** n = 393
Prevalence of stunting (<-2 z-score)	(461) 58.1 % (52.7 - 63.2 95% C.I.)	(242) 60.3 % (54.0 - 66.4 95% C.I.)	(219) 55.7 % (48.9 - 62.3 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(354) 44.6 % (39.5 - 49.8 95% C.I.)	(184) 45.9 % (39.6 - 52.3 95% C.I.)	(170) 43.3 % (37.0 - 49.8 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(107) 13.5 % (10.1 - 17.8 95% C.I.)	(58) 14.5 % (10.4 - 19.7 95% C.I.)	(49) 12.5 % (8.7 - 17.5 95% C.I.)

Though the number of stunted boys was higher than girls, statistics test using Chi 2 showed there was no statistical relation between the sex and Height for Age in this sample (with p >0.648).

Table 14: Prevalence of stunting by age based on height-for-age z-scores

		Severe stunting (<-3 z-score)		**Moderate stunting (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	248	30	12.1	109	44.0	109	44.0
18-29	192	23	12.0	106	55.2	63	32.8
30-41	159	28	17.6	75	47.2	56	35.2

42-53	137	19	13.9	46	33.6	72	52.6
54-59	58	7	12.1	18	31.0	33	56.9
Total	794	107	13.5	354	44.6	333	41.9

Table 15: Mean z-scores, Design Effects and excluded subjects

Indicator	n	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	738	-0.97±1.09	3.63	71	0
Weight-for-Age	734	-1.89±0.94	2.32	71	4
Height-for-Age	794	-2.13±1.03	2.15	0	15

Contains for WHZ and WAZ the children with oedema

5.2: Mortality results

A recall period of 90 days was used to collect retrospective mortality data.

5.2.1: Households status

Table 16: *Demographic Data for Crude and Under Five Mortality*

Demographic data	Number
Current residents at house hold level	5581

Current under five residents at household	1291
People who joined the household	483
Under five who joined the household	111
People who left the household during recall period	302
Under five children who left house hold during recall period	64
Birth	52
Total deaths	29
Under five death	27
CMR (deaths/10,000 people / day)	0.59 (0.38-0.89) (95% CI)
U5MR (deaths in children under five/10,000 children under five/day)	2.45 (1.53-3.91)

The above death rates remain below emergency cut-off points of 2/10,000/day for CMR and 4/10,000/day for U5MR.

5.3: Coverage of Keys Health Indicators

The result reflect significant deficiency of micronutrient, measles and Vitamin A coverage, moreover 64% of the studied children got ill within the recall period (2weeks).

5.3.1 Measles Coverage

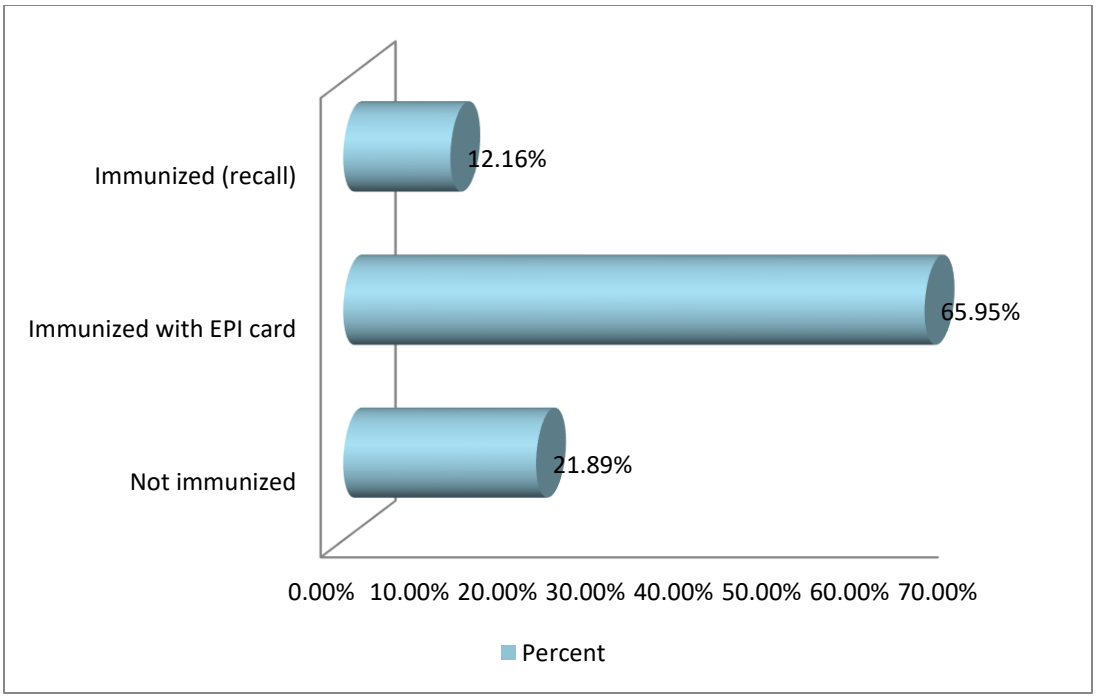


Figure 3: *Measles coverage*

78.11% of children 9-59 months were reported immunized (65.95% with EPI card). This proportion is closed to WHO recommended coverage (80%).

There are lacks of PHC services in in the area, the caretakers had to move to Nertiti seeking for service or waiting for the national/local immunizations.

5.3.2 Vitamin A supplementation in last six months

Three quarters (79.36%) of the children received Vitamin A supplementation within the last six months. but the proportion of the children U5s not supplemented is still high (20.64%).see figure4

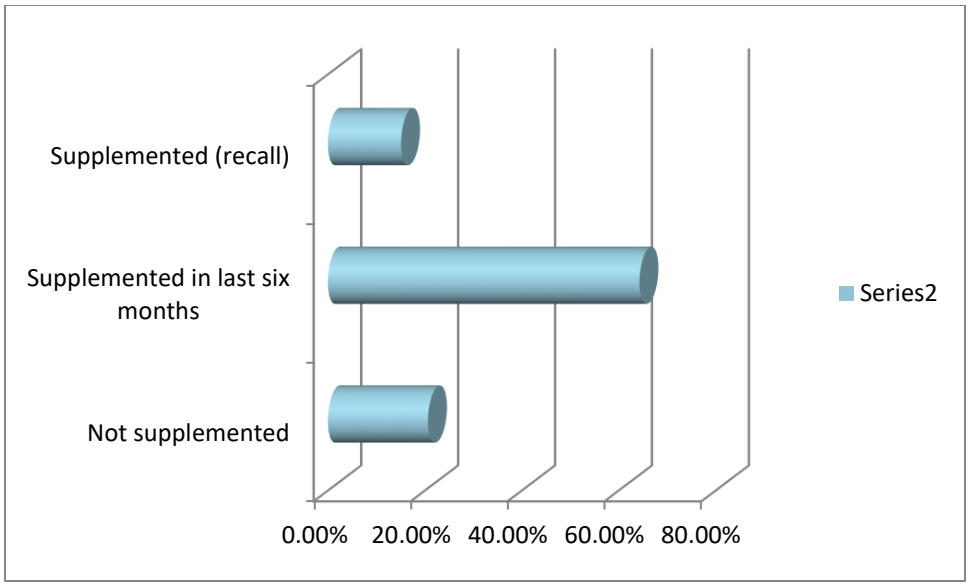


Figure 4: Vitamin A supplementation

5.3.3 Illness in past 2 weeks

Almost a two third of assessed children 518 (64.3 %) were reported sick within 2 weeks prior to survey date. Main complaints reported were respiratory infection (51.3%), diarrhoea (29%) and Malaria/Fever (18.24%).

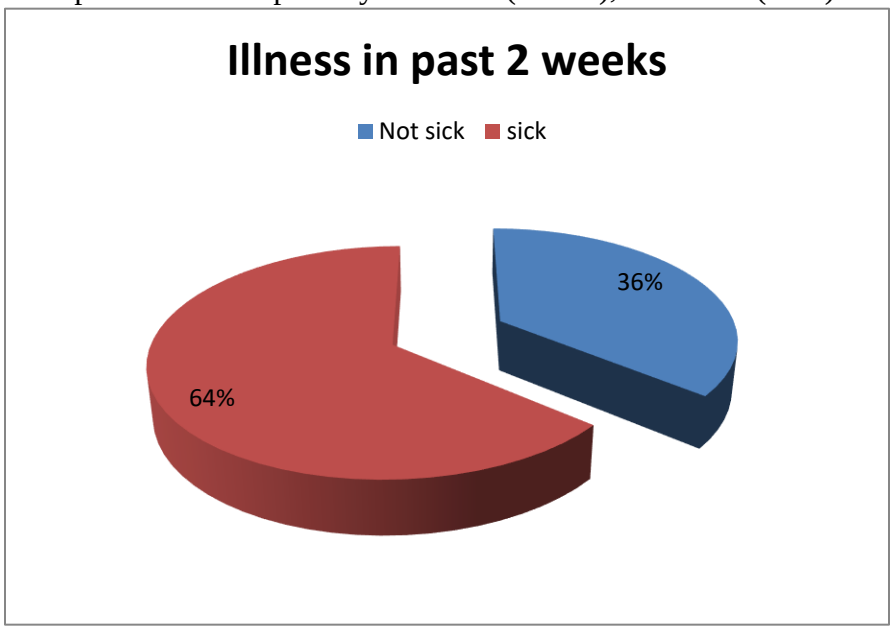


Figure 4*: Illness in past 2 weeks*

5.3.4 Children U5s admitted to nutrition program

16% of the surveyed children were registered in one of CMAM component (SFP, OTP and SC), that indicate the prevalence of malnutrition in Jabel Mara, most of them had to walk for 2 to 6 hours to reach the nutrition centre.

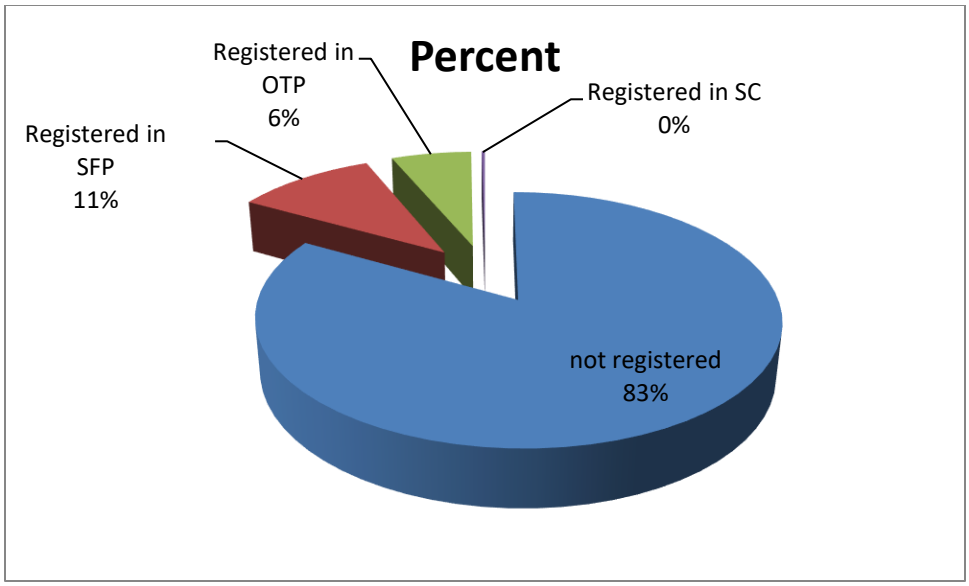


Figure 5*: Nutrition program Admission*

5.4 IYCF Results

As the impact of the human nature, and local culture more than 90% of the children from 0-23 age are usually breastfed in Darfur generally and particularly in Jabel Mara (92%), 91.5% initiated in the first hour after delivery. but the main problems are related to exclusive (38.24%) breastfeeding, complementary feeding and early weaning. And also the local culture has deep impact on caretaker's practice; epically when the woman discovered that she got pregnant she will automatically stopped breastfeeding even if the child was less than 12 month age. They believe that the pregnant breast milk is harmful during pregnancy period, and they identified it as one of the causes of diarrhoea for children.

For the current complementary feeding practice, the children were usually fed from family meals; only one quarter of caretakers was devoting food for their children (24%). See figure 6,8,9,10,11.

5.4.1 Child ever breastfed

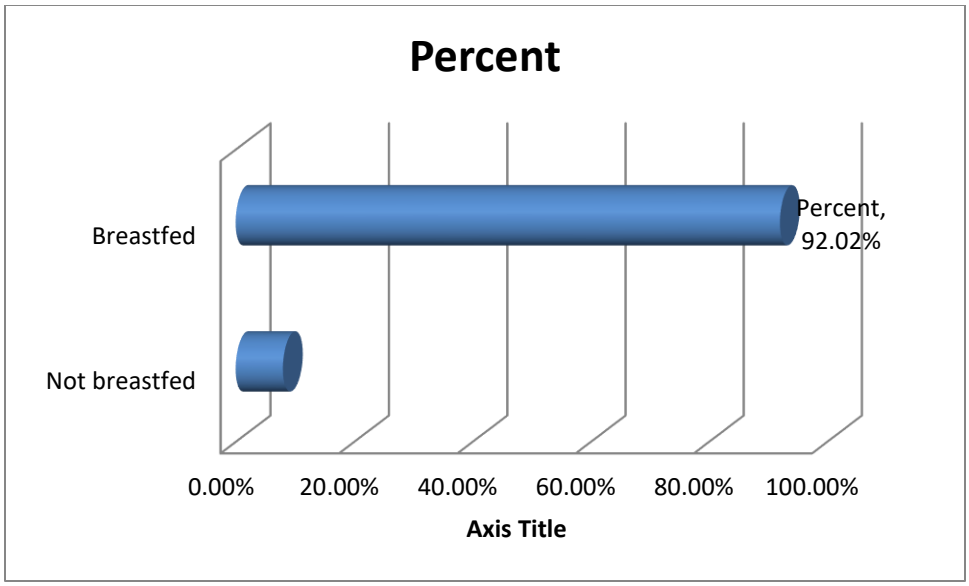


Figure 6*: Breastfeeding practices*

5.4.2 Early initiation of breastfeeding

Of the 261 children born in the last 24 months that were breastfed, high proportion 244 (91.5%) was put to breast immediately in less than 1 hour after birth.

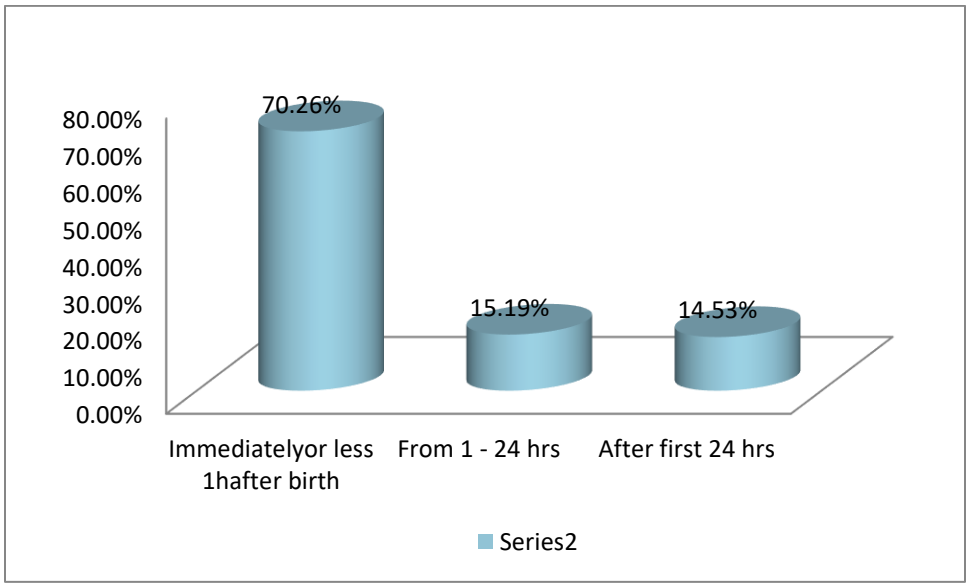


Figure 7: *initiation of breast feeding*

5.4.2: Children are still breastfeeding at the survey period

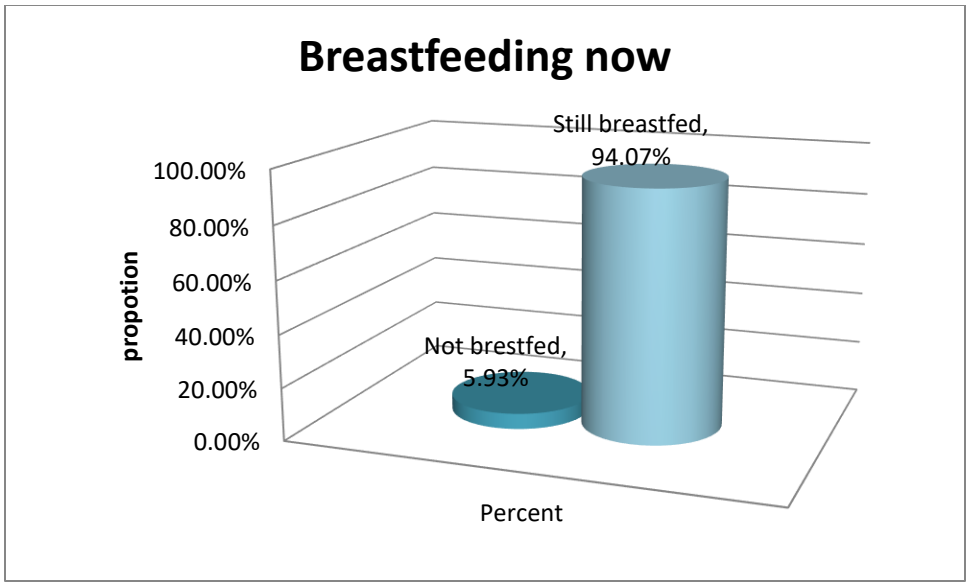


Figure 8: *Breastfeeding Now*

High proportion (94.07%) of children above 12 months of age is still on breast milk feeding.

5.4.4 Exclusive breastfeeding under 6 months

Of the 489 infants less than 6 months, proportion of infants fed exclusively with breast milk is less than a half (only 38.24%)

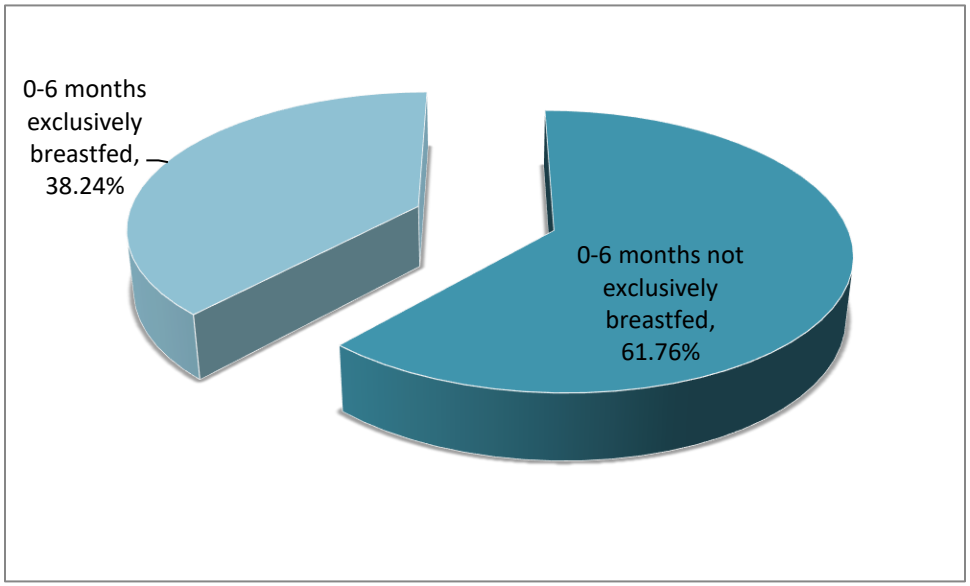


Figure 9: *Exclusive Breastfeeding*

5.4.5 Minimum meal frequency

half (49.52 %) of breastfed and non-breast fed children aged 6-23 months do not received food during last 24hours, and 3% received 1 meal, in admission to 23.44% were received 2 meal per day, this indicate that 3 quarters (75.96%) of children received inadequate food , only 24% are received more 3 or more meals a day See figure 11

For this age group meal includes solid, semi-solid, or soft foods (but also milk feeds for non-breastfed children).

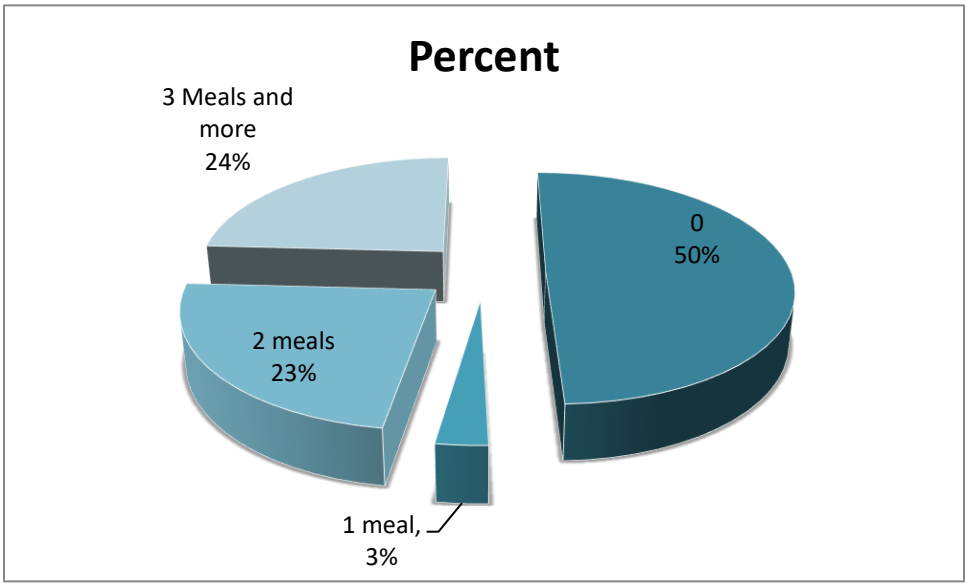


Figure 10: Minimum meal frequency

5.5: WASH results

The result reflects many consequences related to water sanitation and hygiene practice, 60.22% of HH are access to the water from unprotected source, however the average of water consumption 68L/HH/day, the average of HH was found 6P, that means there is 11L/person/day, the average consumption of water in emergency should be 15L/person/day.

5.5.1: water source

Of the 817 respondents HH, only 325 (39.78%) have access and using water from protected water source, 33.78% from hand bumps and 6.0% from protected wells.

And there is no any kind of water treatment on the ground there, and in many villages (ex. Kebely village); people and animal are sharing the same surface water.

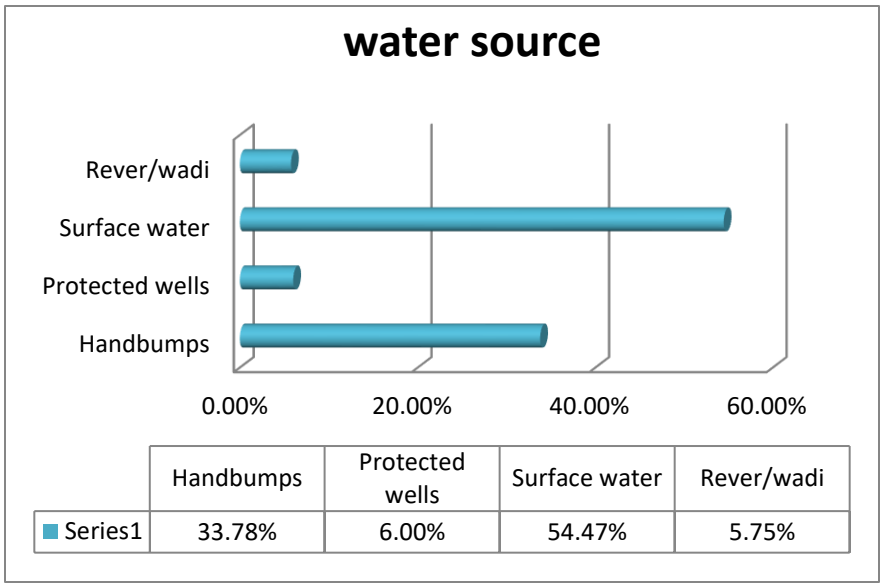


Figure 11: water source

5.5.2: Use of sanitary facilities

The majority of the households (78.46%) have latrines in their houses, 11.87% are using VIP latrines, but still there are 9.67% of HH are using unimproved facilities, including undesignated open area.

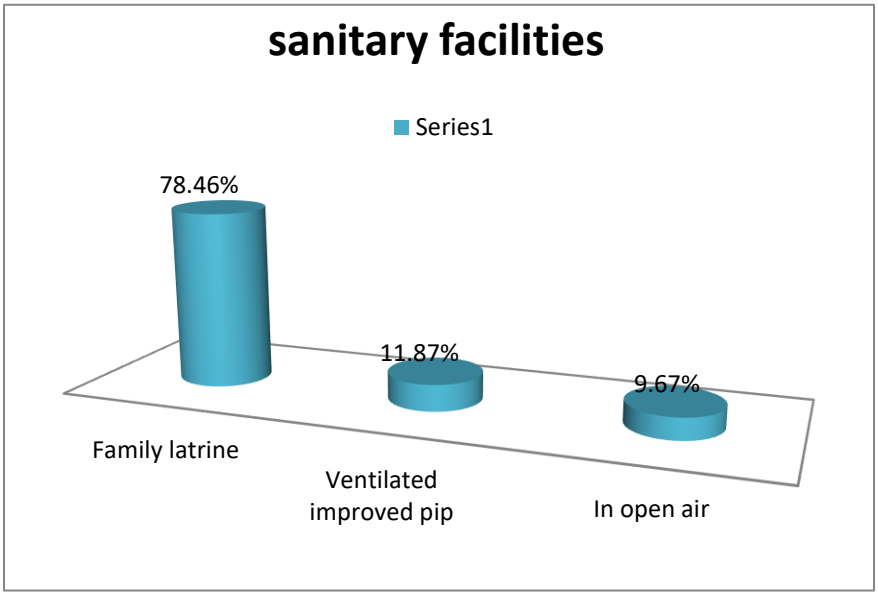


Figure 11: sanitary facilities

5.6: Household food security

People in Jabel Mara depends in their livelihoods on cultivation and herding, most of them are farmers (95%) and 5% are herders. The main agricultural crops are Millet (84%), Maize (13%), and 1% of Okra and 2% for the other corps Groundnuts and sesame. and most of their production for Most for domestic consumption. (See figure12)

5.6.1: Crops

Carbohydrates at the forefront of the corps in Jabel Mara (84% millet), and it is the stable food for the residents.

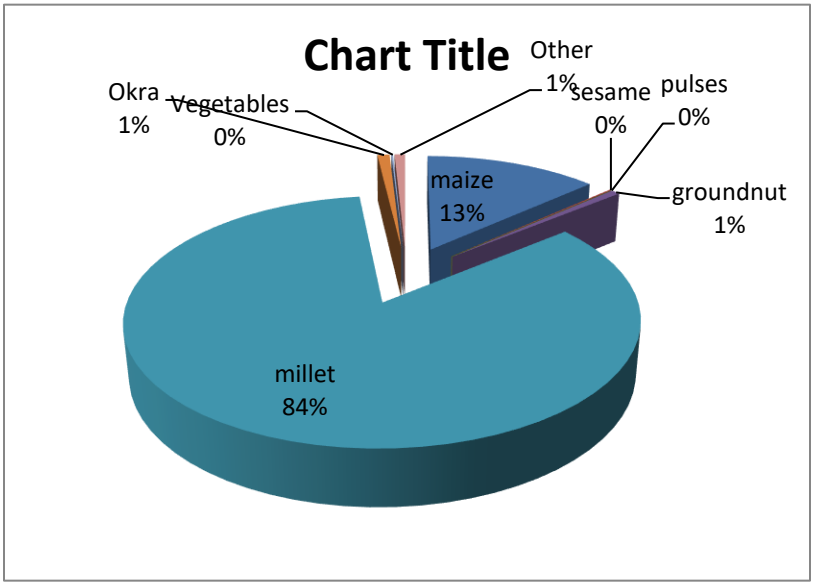


Figure 12: Crops

5.6.2: The yield in this season compare to the previous season

31.33% of respondent HH, evident that their yield in the last season was less than the previous season, however 40.27% evident that their yield was redundant in current season, and there are 9.55% were not cultivate. That indicates that the probability of increasing of proportion of HH with inadequate food during this year by 40.88 %.(see figure13)

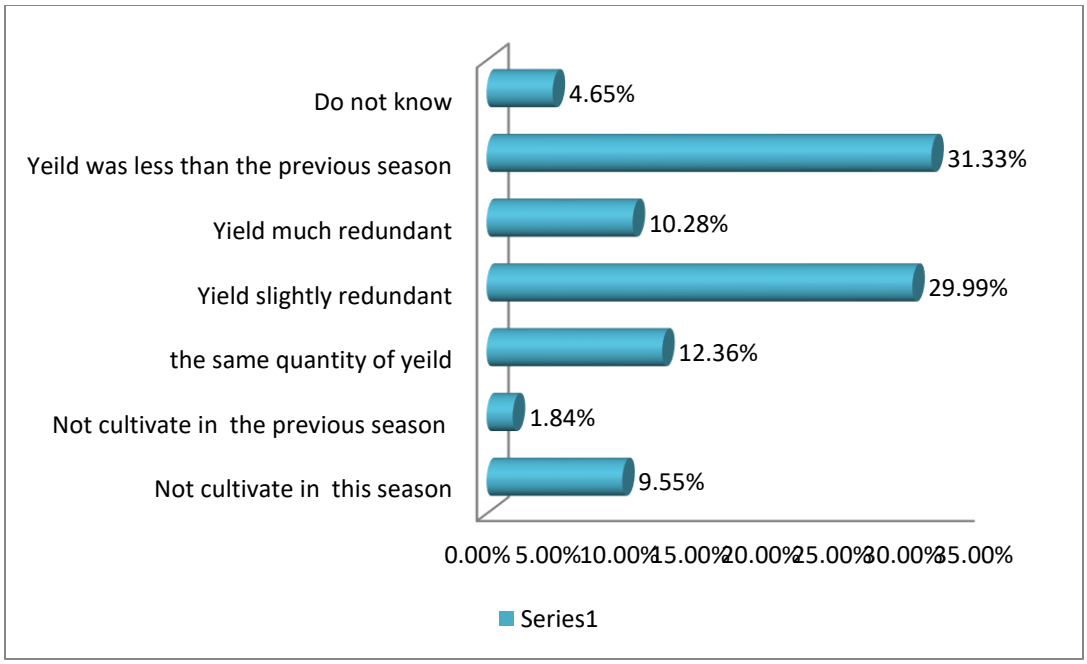


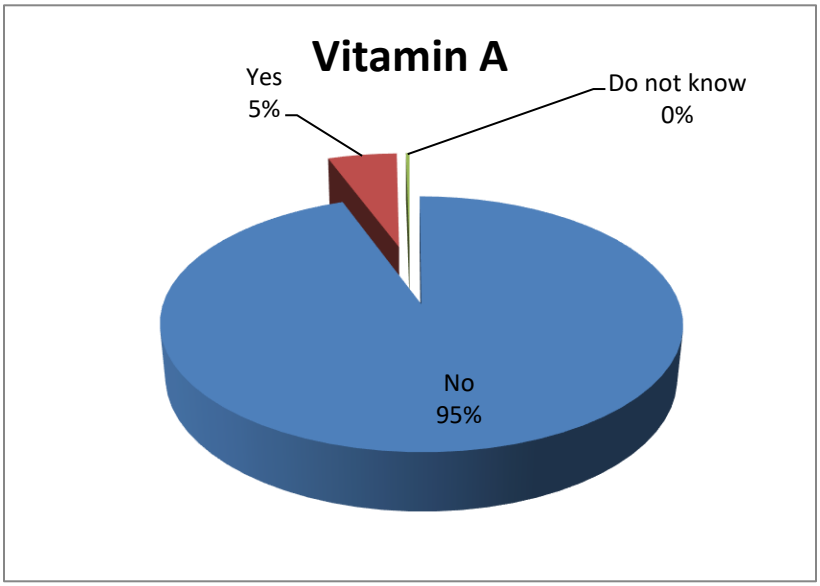
Figure 13: *yield in this season compare to the previous season*

5.6.3: The micronutrients consumption

The result showed the deficiency of micronutrient among the vulnerable groups, children U5s age, Pregnant and Lactating Women PLW, as the result of the lack of PHC service in that area.

5.6.3.1: Vitamin A after delivery of last child

Only 5% (38) from total of 718 women received Vitamin A after delivery, with the fact of deficiency of animal protein in family daily food, this generally has deep impact on the community health and nutritional status, and particularly on the vulnerable group's health and nourishment. Figure 13: ***Vitamin A after delivery of last child***



5.6.3.2: Iodine consumption

The majority of HH in Jabel Mara are (62%), are not using Iodized salt, and 27% of them are not heard about it before. mainly a large proportion of salt used in that area was made locally, historically Jabel Mara area renowned in Darfur with exporting salt to the other areas.

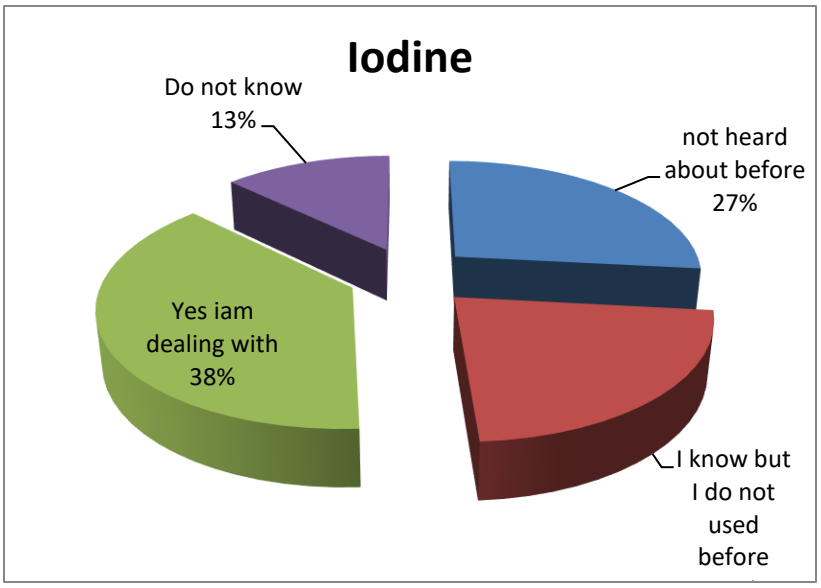


Figure 14: *Iodine consumption*

5.6.3.3: Iron with Folic acid BP capsules (Fierofol SR) consumption during the last pregnancy

Only 11% of respondent are dealing with Fierofol SR during pregnancy, thus the mothers and children will be exposed to the risk of anaemia, 88% are not having Fierofol. (See figur15).

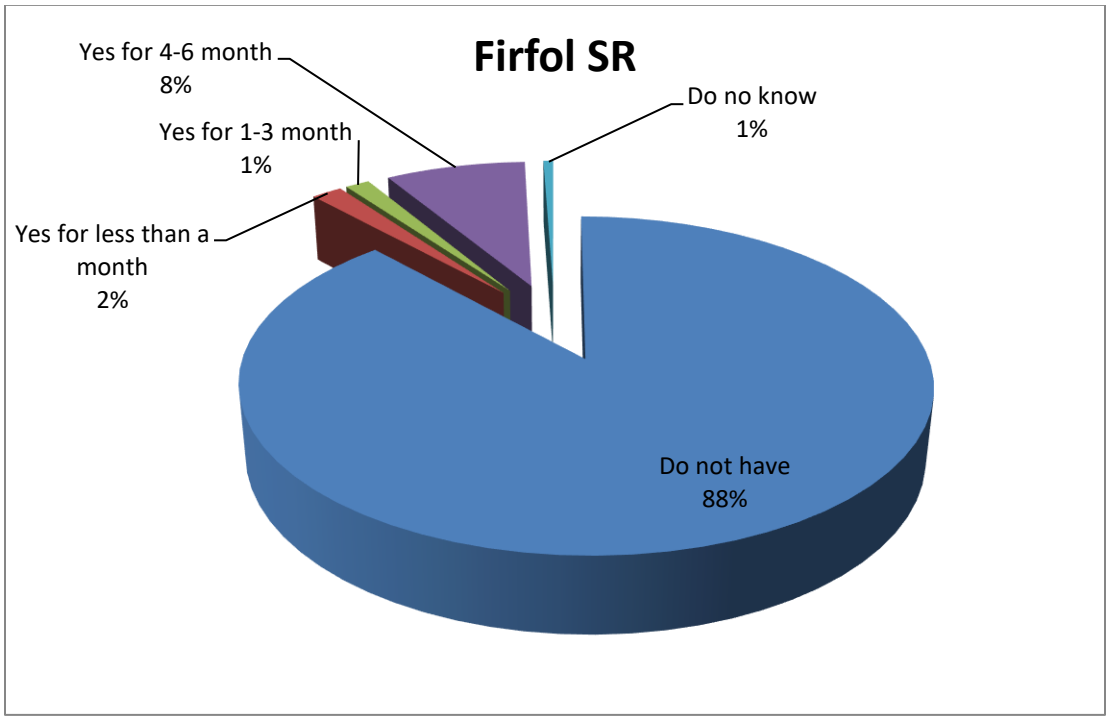


Figure 15: *Iron caps (Fifol) consumption*

5.6.3.4: Family meals

86.28% of the HH are eating 3 and over meals per day, the average of family meals in Jabal Marra is 3 meals per day (66.46), that evident the deterioration of nutrition status among the community as result of lack of food (quality and quantity).see figure16.

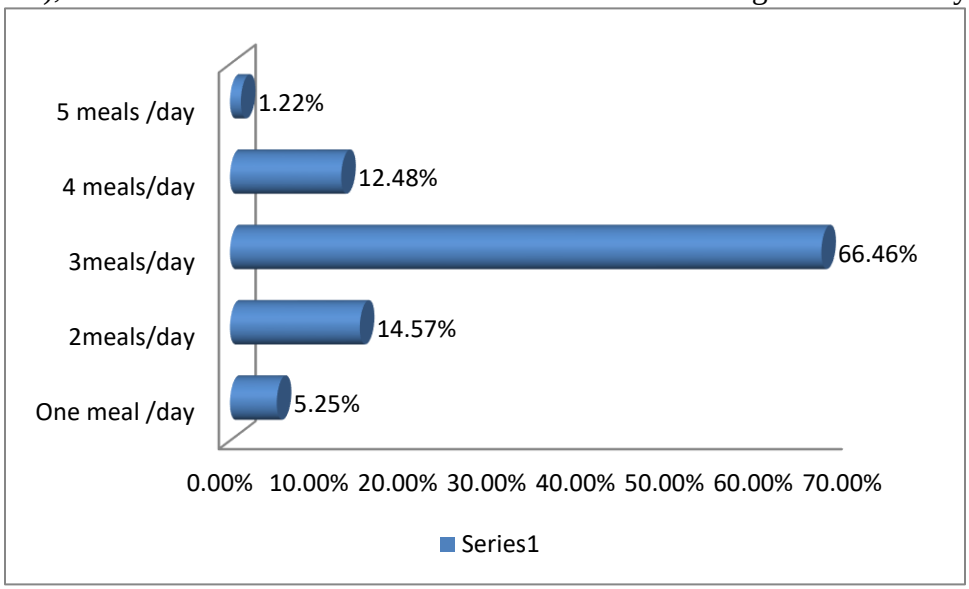


Figure 16: Family meals

6. Discussion and Analysis

- Nutritional status

According WHO, malnutrition is responsible, directly or indirectly, for 53% of deaths among children under five5. Medical and socio economic conditions play a key role as underlying causes contributing to malnutrition.

The survey in Jabel Mara has highlighted a GAM rate of 25.7% and SAM rate 11.4%, 8.8% were Oedema cases, which is over the alert and emergency threshold of 10 % and 15% respectively with other health related indicators at an alarming level, though this prevalence is over the emergency threshold. In fact there are lacks of nutrition and PHC service in Jabel Mara so the community are not able to benefit from this kind of programs, however SMOH was running 7OTP centres, there but it was only providing service for SAM children, with prevention activities out above mentioned interventions the situation would be worse. There is need to treat SAM children and support MAM cases to avoid the deterioration to SAM.

The prevalence of Oedema (8.8%) in absent of treatment may increase the current mortality rate (2.45/10000/day). There are children that need treatment in a stabilization centre, 32 referred to SC in Nertiti, but only 11 attend the remaining do not as the impact of the distance from deep Jabel Mara to Nertiti hospital, in addition to coast, risk of the movement. Therefore the establishment of stabilization centres in very important in that area, to provide accessible treatment to those children that needs admission.

The GAM and SAM rates, and the prevalence of stunting in Jabel Mara are however greater than those at national level found by S3M Survey June 2013, see figures 17 and 18 below.

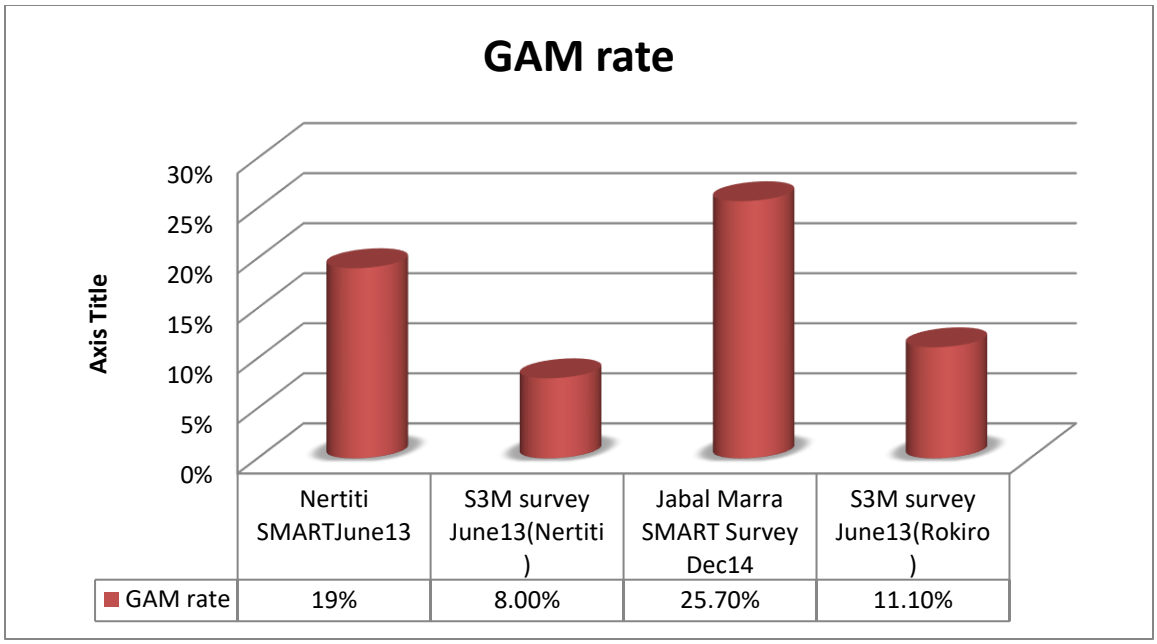


Figure 17: Current Survey result GAM rate compare to S3M surveyJune13

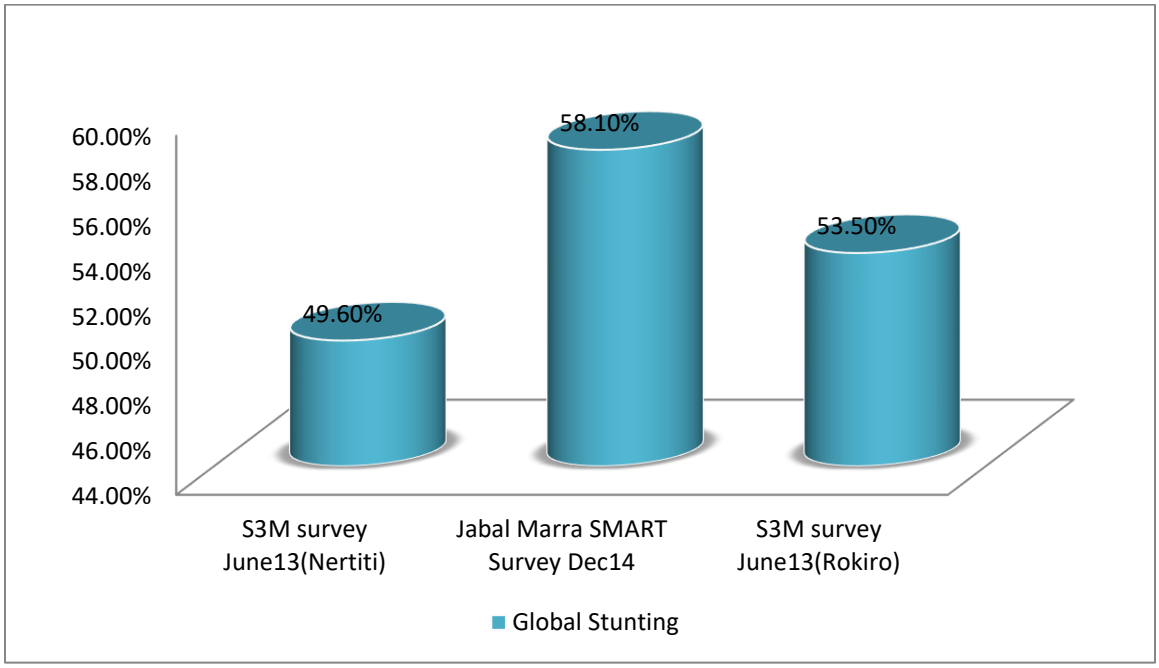


Figure 18: Current Survey global stunting result compare to S3M surveyJune13

- High prevalence of MAM (14.3) combined with high frequency of illness among children as confirmed by the 2 weeks retrospective morbidity of 64%, low measles coverage of 65.95% confirmed with EPI card suggests that high number of children need attention to avoid them evolve to severe form of under nutrition.
- The practice on hygiene and sanitation is very poor as most of the households are not using improved source of drinking water, inappropriate water treatment and Lack of water availability per capita water (11L/person/day).
- Expected number of children in Global Acute Malnutrition in Jabal Marra

Population	%U5s	MAM	SAM	GAM
137744	16%	3,447	2.748	6195

- **Death rates**

Both crude mortality rate and under-five mortality rate were below the WHO alert cut-off in Jabal Marra.

- **IYCF results**

Some of IYCF practices (Minimum meal frequency, exclusive breast feeding, timely initiation of complementary feeding, provision of additional food and liquid during illness) were found to be much lower than recommended.

- **WASH**

WASH indicators fall short of the SPHERE minimum standards and require more focus.

- **Family food security**

The main agricultural crops are Millet (84%), Maize (13%), and 1% of Okra and 2% for the other crops groundnuts and sesame. and most of their production for Most for domestic consumption.

7. Recommendation

- Strengthen and scale –up of current nutrition program in Guildo by training more health workers and increasing number of OTP, TSFP and FBPMAM for better coverage.
- Expansion of nutrition program in Jabel Mara to cover the most affected villages, Golo, Kiling, Daya, Kebely and Sorong.
- Integration of PHC service and nutrition service.

- To establish at least one in–patient program at Guildo/Golo hospital to allow management of undernourished with medical complications in Jabel Mara as there is no such facility within the area.
- Improve facilities on water and sanitation through multi sectorial program implementation approach.
- To develop a strong behavioral change communication program through community health workers to promote proper hygiene and sanitation practices.
- To develop a strong awareness raising program to improve Infants and Young Children Feeding Practices.
- Start food security and livelihood program in Golo and Guildo, to reduce the proportion of HHs with inadequate food.

Annexes

Annex 1: Plausibility check for: Guildo revised survey2014-Sudan.as

Standard/Reference used for z-score calculation: WHO standards 2006
(If it is not mentioned, flagged data is included in the evaluation. Some parts of this plausibility report are more for advanced users and can be skipped for a standard evaluation)

Overall data quality

Criteria:	Flags*	Unit	Excel. Good	Accept	Problematic	Score
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10
(% of in-range subjects)			0	5	10	20 **0** (0.0 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000
(Significant chi square)			0	2	4	10 **0** (p=0.648)
Overall Age distribution	Incl	p	>0.1	>0.05	>0.001	<0.000
(Significant chi square)			0	2	4	10 **10** (p=0.000)
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20
			0	2	4	10 **0** (2)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20
			0	2	4	10 **0** (5)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20
			0	2	6	20 **0** (1.09)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0
			0	1	3	5 **0** (0.04)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0
			0	1	3	5 **0** (-0.21)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000
			0	1	3	5 **5** (p=0.000)
Timing	Excl	Not determined yet				

	0	1	3	5			
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**15**%

At the moment the overall score of this survey is 15%, this is acceptable.