Save the Children

NUTRITIONAL ANTHROPOMETRIC SURVEY

Daura and Zango LGAs, Katsina State, Nigeria
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LIST OF ABBREVIATIONS

ARI	Acute respiratory tract infection
BMI	Body Mass Index
CMAM	Community Management of Acute Malnutrition (see CTC)
CTC	Community Therapeutic Care (see CMAM)
CMR	Crude mortality rate, Crude death rate
ENA	Emergency Nutrition Assessment (software)
GAM	Global acute malnutrition
H/A or HFA	Height-for-Age
HEA	Household Economic Analysis
HH	Household
INGO	International Non-Governmental Organisation
IYCF	Infant and young child feeding
LGA	Local Government Area (administrative unit like district)
NGO	Non-Government Organisation
MS	Microsoft®
MSF	Médecin Sans Frontières (INGO)
MoH	Ministry of Health
MUAC	Mid-upper arm circumference
NCHS	National Centre for Health Statistics (USA)
PHCDA	Primary Health Care Development Agency
PRRINN/MNCH	Programme for Reviving Routine Immunisation in Northern Nigeria/Maternal & Child Health
SAM	Severe acute malnutrition
SD	Standard deviation
SMART	Standardized Monitoring and Assessment of Relief and Transition
SPHCDA	State Primary Health Care Development Agency
SPHERE	Humanitarian Charter and Minimum Standards in Disaster Response
SQUEAC	Semi-Quantitative Evaluation of Access and Coverage
U5MR	Under-five mortality rate, Under-five death rate
UK	United Kingdom
US	United States (of America)
UNICEF	United Nation's Children and Educational Fund
U5MR	Under-five mortality rate
W/H or WFH	Weight-for-Height
WHO	World Health Organisation

EXECUTIVE SUMMARY

INTRODUCTION

One million children under five die every year in Nigeria, 35% (350,000) of them due to causes attributed to malnutrition[1]. This makes Nigeria one of the six countries that accounts for half of all child deaths worldwide[2]. According to the Nigeria Demographic Health Survey (DHS) 2008, 40.6 % of all children <5 in the country are stunted, 23.1 % are underweight and 13.9 % are wasted. Seven percent suffer from severe wasting. Extrapolated this to the total number of <5s living in Nigeria, an estimated 2 million children are suffering from severe acute malnutrition alone. This marks the single highest number of children suffering from severe acute malnutrition in a country on the African continent with an elevated risk of mortality.

One of the Northern states where malnutrition is highest in the country is Katsina State with wasting or acute malnutrition at 20.3% and severe wasting at 10.2% (DHS, 2008). Daura and Zango LGAs are two of the 34 Local Government Areas of Katsina State situated in the north east of the Katsina State bordering Niger (See Map 1 below). Administratively, Daura LGA and Zango LGA are divided into 13 wards and 10 wards, respectively, with Daura Town and Zango Town as main hubs. Total population of both LGAs is estimated at 421,193[3] (247,028 Daura LGA and 174,165 Zango LGA).

Map 1 *Geographical location of the survey*

Katsina State (including Daura and Zango LGAs) is part of the *Northwest Millet and Sesame* livelihood zone[4] which lies in a relatively arid ecology, the Sahel Savanna, with millet as the major food crop. With limited rainfalls, little fadama[5] land and the challenge of desertification and erosions, there is limited diversity in terms of diet, food and cash crops. Most of the poor households with limited landholdings heavily depend on markets for their foods as their household food reserves barely exceed 7 months.

Daura and Zango LGAs were selected by the SPHCDA and Save the Children to pilot a Community Management of Acute Malnutrition (CMAM) programme in order to treat severe acute malnutrition in 15 health facilities in close collaboration with the PHCDA and limit mortality from malnutrition amongst children under five in the targeted area. Currently this programme is one of the few existing treatment programmes for acute malnutrition in the whole country and serves as a role model for other LGAs.

In order to assess the nutrition situation at the start of the CMAM programme a nutritional anthropometric survey was conducted in the two LGAs of Daura and Zango from 27th October to 6th November 2010 as a joint assessment between the State Primary Health Care Development Agency (SPHCDA) and Save the Children in collaboration with PRRINN/MNCH.

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1 **Situation analysis and action plan for newborns, Federal Ministry of Health, 2009**

2 **Summary of The Lancet child survival series: Child survival Partnership**

3 **Projection of 2006 Population Census data to 2010**

4 **There are 44 livelihood zones identified by FEWS NET across 15 states in Northern Nigeria**

5 **Hausa term for irrigable**

METHODOLOGY

Two-stage cluster sampling using SMART methodology was applied to randomly identify clusters with the probability of being selected proportional to the population size in each cluster. The number of clusters and children measured was as following:

36 clusters of 18 children aged 6 – 59 months from 241 localities in Daura and Zango LGAs

The sampling frame covered all settlements/localities in Daura and Zango LGAs. As the second step, in each cluster households were randomly selected and surveyed using the "spinning of the pen" method. All children aged between 6 and 59 months of the same family, defined as a female with her own and/or adopted children, were included in the survey for anthropometric measurements. For households with children 0-23 months of age the Infant and Young Child Feeding (IYCF) questionnaire was administered. A retrospective mortality survey over the past 80 days was undertaken alongside the anthropometric and IYCF questionnaire, using SMART methodology. Anthropometric and mortality data were analyzed using Nutrisurvey software[6], version October 2007 (EpiInfo version 6 for Chi-square test), and for analysis of the IYCF questionnaire MS Excel was used.

CONCLUSIONS

The survey conducted in the two LGAs of Daura and Zango found the following:

- Acute malnutrition in children 6-59 months of age is high with rates above the internationally recognized emergency threshold and absolute numbers for moderate and severe acute malnutrition estimated at 9,100 and 5,100, respectively
- High levels of acute malnutrition at a time of increasing food availability (2 months into main harvest)
- Mortality levels are elevated (but still less than regional alert level)
- Morbidities are high especially malaria; also measles suspected in 17 cases and the risk of further spread with measles vaccination coverage extremely low in the two LGAs
- Infant and Young Child Feeding practices are poor and are seen as the underlying reason for younger children (6-29 months) being at higher risk of acute malnutrition and older children being stunted.
- Suggested level of Integrated Food Security Phase Classification (IPC)[7] to be "**Phase 3 – Acute Food and Livelihood Crisis**" at the moment

Although this survey only represents the two LGAs the results should not be seen isolated from the rest of Katsina State and neighbouring areas in Northern Nigeria and Southern Niger. It can be assumed that the situation is similar in the mentioned areas within the same livelihood zone. Given the absolute numbers there is an enormous need for action towards addressing malnutrition in Northern Nigeria which can only be successful with all stakeholders involved and combined effort.

RECOMMENDATIONS

1. Acute malnutrition rates and total numbers found demand for continued CMAM intervention in the two LGAs in order to save lives. Taken that the malnutrition situation in surrounding LGAs is very likely similar all efforts should be taken to expand the programme to other LGAs for treatment of SAM immediately before treatment of moderate cases is considered.
2. Lobby for additional assistance from other stakeholders (government, non-government, UN) to address acute malnutrition in the wider area of Katsina State immediately.
3. Integrate proven food security and livelihoods interventions for most vulnerable groups into the current CMAM approach in order to address some underlying reasons for malnutrition.

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6 **Download nutrisurvey2007.exe at: http://www.nutrisurvey.de/**

7 **Webpage** http://www.ipcinfo.org**: Phase 1 – Generally food secure, Phase 2 – Moderately / Borderline food insecure, Phase 3 – Acute food and livelihood crisis, Phase 4 – Humanitarian emergency, Phase 5 – Famine**

4. Establish a food security / nutrition surveillance system[8] to monitor the situation over time and to function as an early warning for a deteriorating food security / nutrition situation.
5. A multi-lateral approach for improvement of Infant and Young Child Feeding (IYCF) practices is recommended involving governmental health institutions, religious leaders and the community.
6. Improvement in coverage of measles vaccination and vitamin A supplementation is seen as urgently necessary.

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8 **This can include basic indicators like: data from growth monitoring at MoH hospitals/health centres, cases of acute malnutrition in MoH hospitals/health centres, morbidities related to malnutrition, market price monitoring, population movements**

METHODOLOGY

2.1 Type of Survey and Sample Size

Two-stage cluster sampling using SMART methodology was applied to randomly identify clusters with the probability of being selected proportional to the population size in each cluster. Population data for Daura and Zango LGAs was taken from Daura EPI office and Zango PHC office where geographical units (localities or clusters) were structured according to population numbers from 2006 Population Census projected for 2010. The geographical units and their respective population were then entered into Nutrisurvey for SMART software October 2007 for random cluster selection.

The total population for all localities in the two LGAs is estimated as 421,193:

<div align="center">
Daura LGA: 247,028 in 160 localities
Zango LGA: 174,165 in 181 localities
</div>

At the first stage, the sample size was determined by entering necessary information into the Nutrisurvey software for both anthropometric and mortality surveys. The information included estimated total population, estimated prevalence rates of mortality and acute malnutrition, the desired precision and design effect. With the calculated sample size and the number of children each team is able to measure in one day to finish one cluster (18 children), the total number of clusters for the survey was calculated (34).

Sample size and cluster number calculation

Using a malnutrition prevalence of 11% based on estimates for 84,200 under fives, a precision of 3.6%, a design effect of 2, a sample size of 578 children was obtained. The mortality session for the total population of 421,200 with an estimated prevalence of 0.5/10,000/day, a desired precision of 0.4, a design effect of 2 and 80 days for recall period resulted in a sample size of 2,979 people.

A buffer of 5% in sample size was included in order to compensate for missing data, thus resulting in a sample size of 607 children in the anthropometric survey and 3,228 people for the mortality survey.

Given the operational circumstances and the fact that one cluster needed to be finished in one working day per team, 18 children aged 6-59 months were estimated to be measured in one cluster which yielded in a total of 34 clusters (607 target / 18 children = 34 cluster). For the mortality session, 98 people present at the time of the survey were included for each cluster to reach the target of 3,228 for the full survey. **(See ANNEX 1)**

Two more clusters were selected to account for possible incomplete data and to make sure targets are reached within 6 data collection days.

At the second stage, selection of households to be visited in each of the 36 cluster was done using the "spinning of the pen"- method. Teams were lead to the centre of the cluster by a village representative. There, the team randomly choose the direction to head for by spinning a pen. The team then walked in the direction indicated by the pen counting each house on the way. Using simple balloting, the first house to be visited was selected at random by drawing a number between one and the number of households counted when walking. The second house and each following were taken by proximity, always choosing the houses on the right hand when standing with the back to the main door. In the selected house all females with own or adopted children were identified - a random number decided which female was to be surveyed as family in case more than one female was found in the house. For all children aged 6-59 months in the selected family the anthropometrical questionnaire was administered and for all children aged 0-23 months the IYCF questionnaire was filled in. If there were no children 6-59 months in a household, the house remained a part of the "sample" that contributed zero children to the anthropometrical part of the survey. The household was recorded on the anthropometrical data sheet as having no eligible children.
The mortality questionnaire was administered to all households that were selected with the above mentioned methodology (all people that were eating from the same pot as the selected female were included).

2.2 Data Collection

Measurers and enumerators were subjected to a standardization test to ascertain their capability in taking accurate and precise measurements, so as to minimize errors during data collection.

Anthropometrical survey

For each eligible child aged 6-59 months, information was collected during the anthropometric survey using an anthropometric questionnaire. The information included **(See ANNEX 2):**

- **Age:** Determined with the help of a local calendar of events
- **Sex:** Recorded as 'm' for male and 'f' for female
- **Weight:** Children were weighed to the nearest 100 g with a Salter hanging scale of 25 kg. All scales were checked daily by using a standard weight of 1.6 kg and adjusted (to "0" with an empty weighing pant for boys or empty weighing pant plus standard dress for girls) before each measurement. Boys were measured undressed. Girls were undressed and redressed with a standard dress before measuring the weight.
- **Height:** Children were measured on a measuring board (Shorr board with precision of 0.1 cm). Children less than 85 cm were measured lying down, while those equal or greater than 85 cm were measured standing up.
- **Mid-Upper Arm Circumference (MUAC):** Was measured in mm at mid-point (between olecranon and the acromion process) of left upper arm to the nearest 2 mm with a non-stretchable tape for all children 6-59 months of age (MSF model).
- **Bilateral Oedema:** Assessed by the application of moderate thumb pressure for at least 3 seconds to both feet (upper side). Only children with bilateral oedema were recorded as having nutritional oedema.
- **Currently treated in nutrition programme:** Mothers of children aged 6-59 months were asked whether or not the child is currently receiving PlumpyNut from the Save the Children supported nutrition programme in health facilities of Daura and Zango LGAs. Therefore a sample of PlumpyNut sachet was shown to the mother. A child was recorded as currently enrolled (Yes) if the mother could show that PlumpyNut was in the house and the child's last consultation was less than 3 weeks before.
- **Measles vaccination:** Status for children aged 9-59 months was copied from their health cards. If no card was available at the time of the survey, the mother was asked if the child had been immunized against measles or not. For children with confirmed immunization (by date) on the vaccination card, the status was recorded as "C" (Card) otherwise as "N" (No). Oral confirmation without proof of health card was recorded as "M" (Mother confirmed).
- **Vitamin A supplementation:** The mother was shown vitamin A capsules (blue and red colour) and asked whether of any of those capsules the child has received in the last 6 months.
- **Sickness in the last 2 weeks prior to the survey:** The mother was asked which sickness the child was suffering from during the last 2 weeks. A list of 9 common diseases was ticked against by the team leader. Up to a maximum of 2 diseases, the team leader recorded the main sickness first followed by the minor ones, if applicable.
- **Mother's MUAC:** Mothers of children 6-59 months were measured for Mid-Upper Arm Circumference (MUAC) at mid-point (between olecranon and the acromion process) of left upper arm in cm with a non-stretchable tape. Reading was done to the nearest 2 mm.
- **Source of drinking water for the household members:** The mother was asked about the primary source of drinking water that is used for the household.
- **Type of toilet used by household members:** The mother was asked about the type of toilet used by all house members.
- **Sex of head of household:** The mother was asked about the sex of the household head.

Infant and young child feeding questionnaire

Data on Infant and Young Child Feeding (IYCF) practices was collected using a 24 hour recall questionnaire that was previously used in a Save the Children IYCF assessment in Afghanistan[9] and Pakistan[10] and is based on the WHO Indicators for Assessing IYCF practices, 2008[11]. **(See ANNEX 4)**

Mortality survey

Each family selected at random (even if there was no child aged 6 - 59 months) was asked to state all family members and indicate their age and sex. The family was then asked to indicate which of the listed family members were present now[12] and at the beginning of the recall period, which members joined or left during the recall period, and whether there was any birth or death in the family during the recall period.
11th August 2010 (First day of fasting of the last Ramadan) was chosen as the start of the recall period for survey and the total recall time was therefore 80 days.

Data collection sheet used for the mortality survey is attached in **ANNEX 3.**

2.3 Indicators, Guidelines, and Formulas used

2.3.1 Acute Malnutrition

Weight for Height Index

Acute malnutrition rates are estimated from the weight for height (WFH) index values combined with the presence of oedema. The WFH indices are expressed in both Z-scores (standard deviation or SD score) and percentage of the median, according to both NCHS[13] and WHO references[14]. The complete analysis was, however, done with the WHO reference. The expression in Z-scores has true statistical value and allows inter-study comparison. The percentage of the median, on the other hand, is commonly used to identify children eligible for admission to feeding programmes.

Guidelines for the results expressed in Z-score:

- Severe acute malnutrition…………………WFH < -3 SD and/or existing bilateral oedema
- Moderate acute malnutrition………………WFH < -2 SD and ≥ -3 SD and no oedema
- Global acute malnutrition…………………WFH < -2 SD and/or existing bilateral oedema

Guidelines for the results expressed in percentage of median:

- Severe acute malnutrition…………………WFH < 70 % and/or existing bilateral oedema
- Moderate acute malnutrition………………WFH < 80 % and ≥ 70 % and no oedema
- Global acute malnutrition…………………WFH < 80 % and/or existing bilateral oedema

Children's Mid-Upper Arm Circumference (MUAC)

The weight for height index is the most commonly used index to quantify wasting in a population in emergency situations where acute forms of malnutrition are the predominant pattern. However, the mid-upper arm circumference is a useful tool for rapid screening of children at a higher risk of mortality. MUAC

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9 **Nutrition Assessment in Jawzjan province, Northern Afghanistan, July 2009, Kiross Tefera, Alison Maclaine**

10 **Two nutritional anthropometric surveys: Swat and Buner Districts, Khyber Pakhtunkhwa, Pakistan, May 2010, Christoph Andert**

11 **Indicators for assessing infant and young child feeding practices : conclusions of a consensus meeting held 6–8 November 2007 in Washington D.C., USA.**

12 **Slept in the house last night**

13 **NCHS: National Center for Health Statistics (1977) NCHS growth curves for children birth-18 years. United States. Vital Health Statistics. 165, 11-74.**

14 **WHO reference, 2005**

measurements are significant for children with a height of 65 cm and above which. The guidelines are as follows (new WHO recommended cut-offs):

MUAC < 115 mm	Severe acute malnutrition and high risk of mortality
MUAC ≥ 115 mm and <125 mm	Moderate acute malnutrition and moderate risk of mortality
MUAC ≥ 125 mm and <135 mm	At risk of malnutrition
MUAC ≥ 135 mm	Adequate nutritional status

2.3.2 Chronic Malnutrition

Height for Age Index

Chronic malnutrition rates are estimated from the height for age (HFA) index values. The HFA index is expressed in Z-scores (SD-scores), according to WHO reference.

Guidelines for the results expressed in Z-score:

- Severe chronic malnutrition…………………HFA < -3 SD
- Moderate chronic malnutrition………………HFA < -2 SD and ≥ -3 SD
- Global chronic malnutrition…………………..HFA < -2 SD

2.3.3 Mortality

Mortality data was collected using Standardized Monitoring and Assessment of Relief (SMART) method. The crude mortality rate (CMR) is determined for the entire population surveyed for a given period. The CMR is calculated using Nutrisurvey for SMART software[15], version October 2007, for Emergency Nutrition Assessment.

The formula below was applied:

Crude Mortality Rate (CMR) = 10,000/a*f/ (b+f/2-e/2+d/2-c/2),
Where:
a = Number of recall days
b = Number of current household residents
c = Number of people who joined household
d = Number of people who left household
e = Number of births during recall
f = Number of deaths during recall period

The result is expressed per 10,000 people per day. International thresholds are defined as following[16]:

	Crude Mortality Rate (CMR)	Under Five Mortality Rate (U5MR)
Alert level:	1/10,000 people/day	2/10,000 people/day
Emergency level:	2/10,000 people/day	4/10,000 people/day

The more specific regional threshold for Sub -Saharan Africa is (SPHERE 2004):

	Crude Mortality Rate (CMR)	Under Five Mortality Rate (U5MR)
Emergency level:	0.9/10,000 people/day	2.3/10,000 people/day

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15 Downloadable from www.nutrisurvey.de

16 Health and nutrition information systems among refugees and displaced persons, Workshop report on refugee's nutrition, ACC / SCN, Nov 95.

2.3.4 Nutrition programme (CMAM) coverage

The coverage of a nutrition programme is a performance indicator according to SPHERE standards and gives an idea about how many of all the children suffering from acute malnutrition in the targeted area are really in the programme receiving the treatment. That means how many children does the programme reach. Coverage can be distinguished between point and period coverage. Point coverage gives an indication of the situation right now (how many children identified as malnourished by the admission criteria of the programme are currently in the programme). Period coverage goes beyond this and also includes children that are not malnourished any more but are still enrolled in the programme recovering at the moment. Both, point and period coverage should be >50% according to SPHERE standards for a predominantly rural population. As the programme in the surveyed LGAs admits severe acute malnourished cases (SAM), coverage was calculated this malnutrition category only.
Following formulas were used to calculate point and period coverage:

$$\text{Point coverage} = \frac{\text{SAM cases in the programme}}{\text{Total No. of SAM cases found}}$$

$$\text{Period coverage} = \frac{\text{SAM cases in the programme} + \text{Cases in programme but recovered}}{\text{Total No. of SAM cases found} + \text{Cases in programme but recovered}}$$

2.4 Field Work

The survey was carried out by six teams, each team comprising three members: 1 team leader/enumerator, and 2 measurers. Team leaders/enumerators were made available from the SPHCDA office Katsina and the two surveyed LGAs. Team leaders/enumerators received an intensive 2-day training in Katsina prior the start of the surveys. This training provided the theoretical background for enumerators and made them familiar with the methodology and all questionnaires.
Measurers were recruited locally among the population of Daura and Zango LGA. All measurers received a 1-day training including theoretical and practical components before the survey. During this training team leaders/enumerators joined the practical session to form the teams and performed the standardization test. A pilot day for introducing the teams to the field work was included after completion of the training. All teams were closely supervised during their field work throughout the whole survey time by an international nutritionist (author) and a supervisor from the School of Nursing.

2.5 Data Analysis

Data was entered on a daily basis into ENA database and analyzed for plausibility for immediate feedback to the field teams next morning. Data processing and analysis for both anthropometric and mortality were carried out using Nutrisurvey for SMART software, October 2007 version with both, NCHS and WHO references. EpiInfo version 6 was used to perform Chi-square analysis. MS Excel was used to carry out analysis on MUAC, vitamin A supplementation, measles immunization coverage, household composition and the IYCF questionnaire.

RESULTS

3.1 Anthropometric results Daura and Zango LGAs

A total of 658 children were included in the nutritional anthropometric analysis after exclusion of 8 children that were flagged due to age discrepancies. 52.6% (n=346) of the sampled children were aged 6-29 months.

3.1.1 Distribution by Age and Sex

The distribution of the nutrition survey sample by sex and age group (Table 1) shows a total boy/girl sex ratio of 0.9 which is within the normal limits (0.8 - 1.2). Also, the sex ratio within the 5 age groups are normally distributed which indicates that all age groups are equally represented in the survey population.

Table 1 *Distribution by age and sex*

Age groups	Boys		Girls		Total		Ratio
	n	%	n	%	n	%	Boy : girl
6-17 mths	87	46.3	101	53.7	188	28.6	0.9
18-29 mths	79	50.0	79	50.0	158	24.0	1.0
30-41 mths	75	46.0	88	54.0	163	24.8	0.9
42-53 mths	50	47.2	56	52.8	106	16.1	0.9
54-59 mths	23	53.5	20	46.5	43	6.5	1.1
Total	314	47.7	344	52.3	658	100.0	0.9

3.1.2 Anthropometric Analysis

Distribution of Acute Malnutrition in Z-Scores

Acute malnutrition is caused by inadequate food intake and/or disease and can develop within a short time period[17]. In the more advanced stages (severe acute malnutrition) the child is at high risk of mortality. In the entire sample, the prevalence of global acute malnutrition was 16.9% and the prevalence of severe acute malnutrition was 6.1% (Table 2). One child was found with bilateral pitting oedema. The statistical analysis revealed that children age 6-29 months are more likely[18] to be acutely malnourished compared to those 30-59 months of age ($p<0.01$). No significant difference was found for acute malnutrition between boys and girls.

Table 2 *Weight for Height distribution by age groups in Z-scores, Daura and Zango LGAs (WHO 2005 Reference)*

Age group	n	Severe wasting <-3 z-score		Moderate wasting ≥ -3 to <-2 z-score		Normal ≥-2 z score		Oedema	
		N	%	n	%	n	%	n	%
6 - 17 mths	188	16	8.5	34	18.1	138	73.4	0	0.0
18 – 29 mths	158	10	6.3	16	10.1	131	82.9	1	0.6
30 – 41 mths	163	7	4.3	10	6.1	146	89.6	0	0.0
42 – 53 mths	106	6	5.7	6	5.7	94	88.7	0	0.0
54 – 59 mths	43	0	0.0	5	11.6	38	88.4	0	0.0
Total	658	39	5.9	71	10.8	547	83.1	1	0.2

Figure 2 shows the weight for height distribution curve of the survey sample in Z-scores compared to the WHO 2005 reference population. The entire weight for height distribution curve of the sample is shifted to the left, with a mean Z-score of -0.74 SD ± 1.28 SD which indicates a suboptimal nutrition status compared to the international reference population.

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17 **Within days or weeks depending on the food intake and disease/diseases**

18 **Younger children are 2.3 times more likely to be acutely malnourished compared to older children**

Fig. 2 *Z-scores distribution Weight-for-Height, Daura and Zango LGAs*
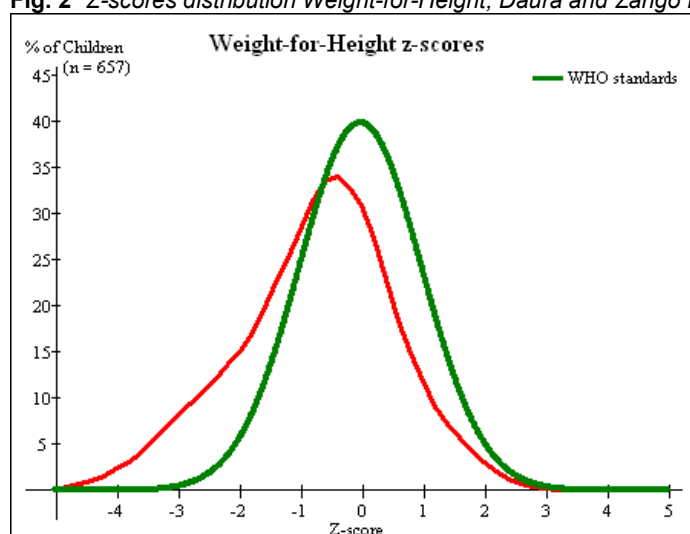
Note n=657 since for one oedema case WFH was not calculated

Table 3 *Global and Severe Acute Malnutrition in Z-scores, Daura and Zango LGAs*

6 – 59 months	WHO Reference (n=658)	NCHS Reference (n=658)
Prevalence of global acute malnutrition (WFH <-2 SD and/or bilateral oedema)	16.9% (13.1% - 20.7%)	14.0% (11.0% - 17.0%)
Prevalence of severe acute malnutrition (WFH <-3 SD and/or bilateral oedema)	6.1% (3.8% - 8.4%)	2.6 % (1.2% - 4.0%)
Prevalence of oedema	0.2%	0.2%
Design effect	1.99	1.33
Mean WHZ	-0.74±1.28	-0.88±1.06

Distribution of Malnutrition in Percentage of the Median

Table 4 *Distribution of Weight/Height by age groups in percentage of the median in Daura and Zango LGA (WHO 2005 Reference)*

		Severe wasting <70% median		Moderate wasting ≥70% to <80% median		Normal ≥80% median		Oedema	
Age group	n	n	%	n	%	n	%	n	%
6-17 mths	188	0	0.0	23	12.2	165	87.8	0	0.0
18-29 mths	158	1	0.6	9	5.7	147	93.0	1	0.6
30-41 mths	163	0	0.0	9	5.5	154	94.5	0	0.0
42-53 mths	106	0	0.0	6	5.7	100	94.3	0	0.0
54-59 mths	43	0	0.0	2	4.7	41	95.3	0	0.0
Total	658	1	0.2	49	7.4	607	92.2	1	0.2

Table 5 *Global and Severe Acute Malnutrition in percentage of the median in Daura and Zango LGAs*

6 – 59 months	WHO Reference (n=658)	NCHS Reference (n=658)
Prevalence of global acute malnutrition (WFH < 80% and/or bilateral oedema)	7.8% (5.0% - 10.5%)	9.9% (7.0% - 12.7%)
Prevalence of severe acute malnutrition (WFH < 70% and/or bilateral oedema)	0.3% (0.0% - 0.7%)	0.9% (0.0% - 1.8%)

Mid upper arm circumference (MUAC) and risk of mortality

Mid upper arm circumference is a rapid screening tool for identifying children with a risk of mortality from acute malnutrition independently from their weight for height. This tool is only valid for children above 65 cm up to 110 cm of height. All children 6 - 59 months and height > 65.0 – 110 cm were included in the MUAC analysis (Table 6). New WHO cut off points were used to determine the risk of mortality. According to the MUAC data obtained 14 children (2.3%) were found with a high risk of mortality (MUAC < 115 mm). 36 the children (5.8 %) were moderately malnourished (MUAC ≥ 115 to 124 mm) and 91 at risk for malnutrition (MUAC ≥ 125 to 134 mm). 17 children[19] identified as high risk for mortality were referred after identification during the survey for immediate treatment in Save the Children supported health facilities in Daura and Zango LGAs.

Table 6 *MUAC distribution in Daura and Zango LGAs*

MUAC (mm)	Malnutrition category	Total	
< 115	Severe acute malnutrition	14	2.3%
115 - 124	Moderate acute malnutrition	36	5.8%
125 - 134	At risk of malnutrition	91	14.7%
≥ 135	Normal	476	77.1%
TOTAL		617	100.0%

41 children were less than 65 cm and therefore excluded from analysis

Chronic Malnutrition

Height for age is an indicator of growth failure or chronic malnutrition. It is the best indicator of the cumulated impact of a long term inadequate food intake and/or diseases. Frequent episodes of acute malnutrition in a child contribute to growth failure which is not reversible once evident. Chronic malnutrition is seen as an indicator for overall development of a country since it is influenced by economy, infrastructure, education, health care and food security from national down to individual level of a country.

The prevalence of chronic malnutrition in the sample was 47.7% (Table 7). 22.5% were severely stunted. There is no significant difference in the prevalence of chronic malnutrition between boys and girls or younger (6-29 months) and older (30-59 months) children. With this result approximately 40,200 under 5s in the two surveyed LGAs are affected by chronic malnutrition which does not increase their risk of mortality but diminishes their overall body development in terms of physical and cognitive capacity when they become adults.

Table 7 *Chronic malnutrition (stunting) in Daura and Zango LGAs*

	6 – 59 months (n=658)
Prevalence of global chronic malnutrition (HFA <-2 SD)	47.7% (40.2% - 55.2%)
Prevalence of severe chronic malnutrition (HFA <-3 SD)	22.5% (17.0% - 28.0%)

3.2 Nutrition programme (CMAM) coverage

Currently Save the Children is supporting 15 health facilities in Daura and Zango LGAs for the treatment of severe acute malnutrition (SAM). Admissions to the programme started on 21 Sep 2010. Aim is to reach more than 50% of all SAM children in the two LGAs for treatment according to SPHERE standards.
During the survey all mothers were asked about the enrolment of their children in the programme. Out of the 14 SAM cases (confirmed by MUAC < 115mm which is the admission criterion) found during the survey, 5 cases were currently enrolled in the CMAM programme which yielded in a point coverage of 35.7% (See

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19 **CMAM programme admits on the bases of MUAC, however, 3 children were less than 6 months and referred on the grounds of visible signs of severe wasting**

table 8). 19 more children were found to be currently enrolled in the programme but had a MUAC ≥115mm.Taken those children into account the period coverage was calculated at 72.7%. However, confirmation of programme enrolment was difficult for survey teams since records are kept at household level were mostly missing. Teams confirmed enrolled cases as having PlumpyNut to be presented to them by the mother and date of last attending the clinic less than 3 weeks before.

Table 8 *Nutrition programme (CMAM) coverage in Daura and Zango LGAs*

Total No. of SAM cases found	SAM cases in programme	SAM cases in programme but recovering [a]	Point Coverage	Period Coverage
14	5	19	35.7%	72.7%

[a] SAM cases that were admitted but now have a MUAC of ≥ 115mm

3.3 Measles Vaccination Coverage

Table 9 below presents the measles vaccination coverage among the surveyed population. The source of information on immunization was either the child's health card or the mother's recall. All children ≥ 9 months up to 59 months of age where included in the analysis. A total of 604 children in Daura and Zango LGAs were therefore included. Measles vaccination coverage (confirmed by card) was only 4.3%. Added the percentage of children confirmed by the mother of the child, measles vaccination coverage in the sample reached 32.1%. In fact during the survey 17 suspected cases of measles were found underlining the wanting situation.

Table 9 *Measles Vaccination Coverage in Daura and Zango LGAs*

Children >= 9 months	604	
Immunized confirmed by card	26	4.3%
Immunized confirmed by mother	168	27.8%
Immunized confirmed by card and/or mother	194	32.1%
Don't Know	55	9.1%

3.4 Vitamin A supplementation

The results show that 62.1% of the children in the two surveyed LGAs received at least one dose of vitamin A in the last 6 months according to the mother (Table 10). One third of children in both LGAs did not receive any vitamin A supplementation.

Table 10 *Vitamin A supplementation within the last 6 months, Daura and Zango LGAs*

Children 6-59 months	654	
Vitamin A received	406	62.1%
Vitamin A not received	218	33.3%
Don't Know	30	4.6%

3.5 Morbidity

Morbidity in the last 2 weeks prior to the survey was asked for each child and results show that 56.8% (362) of the children suffered from disease in the surveyed LGAs (Table 11). 9.6% presented with more than one morbidity in the last 2 weeks.
Symptoms of malaria were reported most frequently and counted for more than half of the morbidity burden amongst sick children, followed by ARI and diarrhoea. 17 suspected measles cases were found in 11 localities of Daura and Zango LGAs. 4 localities had more than one measles case.

Table 11 *Morbidities in the last 2 weeks, Daura and Zango LGAs*

	n=645	
Sick children 6 -59 months	362	56.8%
Multiple sickness	61	9.6%
Fever/malaria	210	58.0%
ARI	96	26.5%
Diarrhoea	39	10.8%
Vomiting	18	5.0%
Measles	17	4.7%
Infection, eyes	13	3.6%
Infection, skin	8	2.2%
Intest. Parasites	2	0.6%
Others	20	5.5%

Multiple answers possible

3.6 Maternal information

MUAC measurement was taken of all mothers[20] of children 6-59 months of age in the survey in order to assess their nutritional status (Table 12). Women with a MUAC less than 21.0 cm have a compromised nutritional status. 3.1% of mothers were found to be below this cut off point.

Table 12 *MUAC of mothers of children 6-59 months, Daura and Zango LGAs*

Mothers of children 6-59 months	426	
Moderate malnutrition (18.5 - 20.9cm)	11	2.6%
Severe malnutrition (<18.5 cm)	2	0.5%

[a] 7 mothers refused to have their MUAC taken

3.7 Household status and composition

Table 13 below gives an outline of households visited during the survey. In Nigeria's Northern states Shariya law allows a man to have up to 4 wives which can all live in different houses in the same compound and are commonly regarded as "one family". However, in this survey a family was defined as a "female with her own or adopted children" which led frequently to random selection of one of the wives and regard them as the family to survey. For the anthropometrical and mortality questionnaires all people where included that were eating from the same pot of this selected female. Households without children under five were mainly inhabited by elderly people. 5.2% of households were female headed (Table 16).

Due to the fact that the random selection of the female with her own/adopted children frequently resulted in zero children for anthropometrical measurements, the mortality questionnaire was often finished before the required number of children for the anthropometrical survey was reached for the day. Therefore, the number of <5 fives in the anthropometrical survey differs from the number in the mortality questionnaire. Household composition in table 15 below is calculated on the basis of the mortality questionnaire.

Table 13 *Household status, household composition and age group proportion*

Survey population	3,598
Adults	2,730 (75.9%)
<5s	868 (24.1%)
Number of households	660
Average number per household	5.45
Average number of <5 per household	1.32

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20 **This includes pregnant, lactating and non-pregnant and lactating**

Table 14 *Household Head status*

Household Head (n=423)		
Male	401	95.2%
Female	22	5.2%

3.8 Mortality

Mortality rates with a recall period of around three months[21] were calculated from the figures collected from selected families with or without children under 5 years old and are presented in Table 15. 22 total deaths of which 12 under five deaths were reported to have occurred in the recall period of 80 days. Both, crude mortality rate (CMR) and under five mortality rate (U5MR) are elevated but still below the Sub-Sahara Africa specific emergency threshold of 0.9/10,000/day and 2.3/10,000/day, respectively.

Table 15 *Demographic information and mortality rates*

Current household members	3,598
Current household members < 5	868
People who joined household	25
< 5s who joined household	1
People who left household	37
< 5s who left household	4
Births	50
Deaths	22
Deaths < 5s	12
Recall period (days)	80
CMR (Deaths /10,000 people/day)	0.77 [0.41 - 1.12]
U5MR (Deaths in children<5/10,000 /day)	1.76 [0.59 - 2.93]

3.9 Infant and Young Child Feeding practices

Data on Infant and Young Child Feeding (IYCF) practices was collected by 24 hour recall from children aged 0-23 months, 250 children in total. Table 16 shows results and guides on interpretation according to WHO 2008 rating[22].

According to WHO rating IYCF indicators point towards a "poor" to "fair" situation in the two surveyed LGAs. Strikingly, none of the children < 6 months was exclusively breast fed. All mothers seem to give at least water with the breast milk to their babies. Low dietary diversity, meal frequency and iron-rich food consumption was found in the study population and underlines that provision of nutrients for children 6- 23 months of age is suboptimal. These inadequate IYCF practices seem to be the reason for more malnutrition in this age group compared to older children as mentioned before.

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21 Specific recall period was 80 days with recall date for the mortality survey was put at first fasting day of Ramadan (11th Aug 2010)

22 **Indicators for assessing infant and young child feeding practices : conclusions of a consensus meeting held 6–8 November 2007 in Washington DC, USA**

Table 16 *IYCF Indicators, Daura and Zango LGAs*

Indicator	Explanation of Indicator	n	Result	WHO rating
Children ever breastfed	Proportion of children born in the last 23.9 months who were ever breastfed	255	**251 (98.4%)**	
Timely (or early) initiation of breastfeeding	Proportion of children born in the last 23.9 months who were put to the breast within one hour of birth. (Note the WHO indicator requires data on all children born in the previous 23 months, living and deceased; it was not possible to do this so the 1991 indicator based on living children was used)	251	**114[a] (45.4%)**	**Fair[23]**
Exclusive breastfeeding under 6 months	Proportion of infants 0-5.9 months of age who were fed exclusively with breast milk [Using information from the previous day (24 hours)]	44	**0 (0.0%)**	**Poor[24]**
Continued breastfeeding at 1 year	Proportion of children 12 – 15.9 months of age who are fed breast milk [Using information from the previous day (24 hours)]	51	**50 (98.0%)**	
Continued breastfeeding at 2 years	Proportion of children 20 – 23.9 months of age who are fed breast milk [Using information from the previous day (24 hours)]	24	**6 (25.0%)**	
Introduction of solid, semi-solid or soft foods	Proportion of infants 6–8 months of age who receive solid, semi-solid or soft foods [Using information from the previous day (24 hours)]	43	**26 (60.5%)**	**Fair[25]**
Minimum dietary diversity	Proportion of children 6-23 months of age who receive foods from 4 or more food groups[26] [Using information from the previous day (24 hours)]	211	**67 (31.8%)**	
Minimum meal frequency	Proportion of breastfed and non-breastfed children 6–23 months of age, who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more. Minimum is defined as 2 times for breastfed infants 6–8 months, 3 times for breastfed children 9–23 months and 4 times for non-breastfed children 6–23 months. [Using information from the previous day (24 hours)]	160	**80 (50.0%)**	
Consumption of iron-rich foods	Proportion of children 6-23.9 months of age who receive an iron-rich food [b]. [Using information from the previous day (24 hours)]	210	**60 (28.6%)**	

[a] 88 mothers responded to this question with "Don't Know"   [b] Iron fortified foods were not included

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23 **0 – 29% Poor, 30 – 49% Fair, 50 – 89% Good, 90 – 100% Very good**

24 **0 – 11% Poor, 12 – 49% Fair, 50 – 89% Good, 90 – 100% Very good**

25 **0 – 59% Poor, 60 – 79% Fair, 80 – 94% Good, 95 – 100% Very good**

26 **1- grains, roots and tubers 2- legumes and nuts 3- dairy products (milk, yogurt, cheese) 4- flesh foods (meat, fish, poultry and liver/organ meats) 5- eggs**

6- vitamin-A rich fruits and vegetables 7- other fruits and vegetables

3.10 Water/Sanitation

As seen in table 17 one third of households use unsafe water sources for drinking water. A significant number of households do not use a safe way of human waste disposal (Table 18). Nearly ¼ of the households dispose their human waste unsafe, e.g. openly in the field. However, it is suspected that many young children would not use a pit latrine even when it would be available in the house.

Table 17 *Drink water source for the family*

Drinking water source (n=427)		
Tap/pipe water	164	38.7%
Hand pump	77	18.2%
Protected well	44	10.4%
Open well	113	26.7%
River, lake, pond	29	6.8%

Table 18 *Human waste disposal of the family*

| Human waste disposal (n=427)		
Water/flush toilet	13	3.1%
Pit latrine	320	75.5%
No toilet, bush or field	87	20.5%
Other	7	1.7%

DISCUSSION AND CONCLUSIONS

Acute malnutrition

Acute malnutrition (wasting[27]) is caused by inadequate food intake and/or disease in the most recent past of the affected child. It can develop within days or weeks depending on the food intake and underlying disease/diseases. In the more advanced stage (severe acute malnutrition) the body functions of the child are severely impaired resulting in a high risk of mortality.

The prevalence of global acute malnutrition[28] (GAM) in the two surveyed LGAs of Daura and Zango was found to be high with 16.9%[29] (14.0% with NCHS reference) and is exceeding the internationally recognized emergency level of 15%. Using the WHO crisis classification[30] the situation can be described as "critical". Acute malnutrition fluctuates according to household food availability and/or disease pattern during the calendar year and normally peaks just before harvest time – the most food insecure time of year – which starts around mid to late September in Daura and Zango LGAs. Given the fact that the survey was conducted around 2 months into main harvest time of the year it is expected that the acute malnutrition rate found in this survey has already decreased from its peak somewhere in September. Similarly, severe acute malnutrition (SAM) with 6.1% (2.5% on NCHS reference) was high underlining the serious nutrition situation for children in the surveyed LGAs.

This survey serves as a baseline for the nutrition situation in Daura and Zango LGAs at the start of the CMAM pilot and was therefore the first survey in the mentioned area as such. However, a nutrition survey conducted by Save the Children in the *Northwest millet and sesame* livelihood zone of Northern Nigeria (19 LGAs in Katsina and Jigawa states) in July 2007 included both, Daura and Zango LGAs in its sample frame and showed with 10.4% GAM and 0.9% SAM much lower rates for acute malnutrition than the current findings (See Fig. 1 below). These rates calculated on the old NCHS reference need to be compared to the current survey's NCHS figure of 14.0% GAM and 2.6% SAM. The higher rates in the current - "post harvest" conducted -survey compared to the July 2007 "pre harvest" survey clearly indicate that the situation has deteriorated in terms of acute malnutrition for children under five and levels of acute malnutrition are alarming. In this context malnutrition seems to be related to disease burden since harvests for the last two years were reported as rather good and this year's harvest seems to be following this trend[31].

Figure 1 *Trends in acute malnutrition, NCHS reference*

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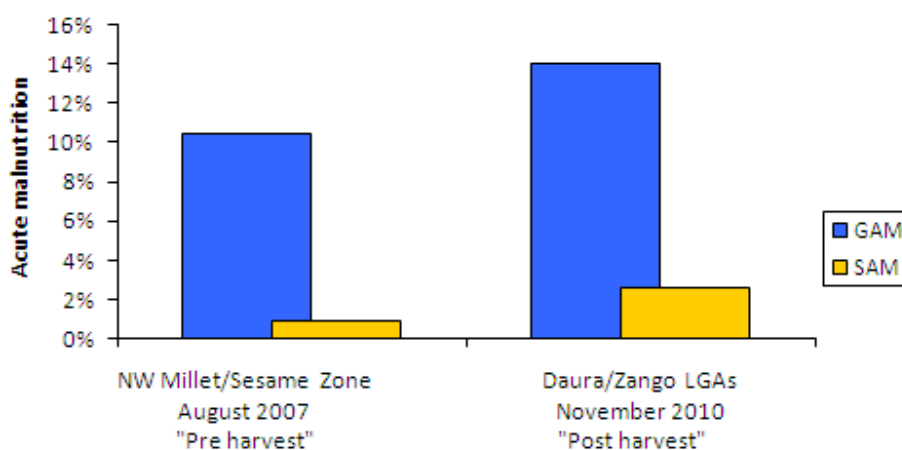
27 **Wasted children have a too low body weight for their height due to recent weight loss. As example a boy of 85 cm should have a weight of 11.7 kg to be normal. If this child looses weight down to 9.9 kg he is regarded as moderately wasted. If this child looses more weight down to 9.1 kg or less he would now be regarded as severely wasted with a high risk of mortality.**

28 **Sum of moderate and severe acute malnutrition cases**

29 **WHO 2005 reference**

30 **Acceptable < 5 %, Poor 5 – 9 %, Serious 10 – 14 %, Critical > = 15 % from "The Management of Nutrition in Major Emergencies", WHO, 2003**

31 **Currently a *Cost of Diet* assessment is underway in order to determine to which extent affordability of food is linked to malnutrition in the two LGAs.**

Nevertheless, there are now, **14,200** (16.9% GAM) **children** under five years suffering from **acute malnutrition** in the two LGAs, of them **5,100** (6.1% SAM) children are **severely acute malnourished** with a **high risk of mortality**. As of October 2010 around 2,500 children have been admitted to the nutrition programme in Daura and Zango LGAs. Around 8% of them come from other LGAs around Daura and Zango and even the neighbouring country of Niger. This indicates an eminent need for the treatment of acute malnutrition in the area. Given that acute malnutrition is a problem in the whole of Katsina State the results of Daura/Zango LGAs can be seen as **indicative** for surrounding LGAs and in the same livelihood zone suggesting a much higher number of children suffering from acute malnutrition at the moment.

Following its annual pattern acute malnutrition will decrease further from its peak in September with household's food availability increasing due to incoming harvest and market prices for staple foods expected to drop slightly. The situation will, however, remain a public health problem throughout the next year and beyond unless adequately addressed.

Compared to national figures from the DHS, 2008 which was also calculated on the WHO 2005 reference, wasting in Daura and Zango LGAs was slightly higher, though lower than the Katsina State figure (20.3% GAM and 10.2% SAM). The survey found that although there was no significant difference between boys and girls in terms of acute malnutrition, younger children (6-29 months) showed to have a higher risk of acute malnutrition compared to older ones (30-59 months), $p<0.01$. Inadequate feeding practices in this age group seem to be the reason for this finding (see IYCF discussion section below).

Chronic malnutrition
Chronic malnutrition, unlike acute malnutrition, develops over a long period of time (months and years) and manifests itself in growth failure - stunting[32] - of the child. Chronic malnutrition is the result of long term inadequate food intake and ill/health of the child in its past starting from intrauterine events until present. Frequent episodes of acute malnutrition with loss and regain in body weight in a child contribute to this growth failure which is not reversible once evident.

The prevalence of chronic malnutrition (stunting) amongst the study population of 6-59 months old children in Daura and Zango LGAs showed high levels of 47.7%, of which 22.5 % were severely stunted. Compared to the Katsina State figures from the DHS 2008 a slight decrease in stunting was found in the surveyed population, however Daura and Zango LGAs are still higher than the national average of 40.6%.

With the results of the surveys approximately **40,200 under fives** in Daura and Zango LGAs are affected by **chronic malnutrition** which does not put them at risk of mortality but significantly diminishes their overall body development in terms of physical and cognitive capacity when they become adults. Chronic malnutrition is seen as an indicator for overall development of a country since it is influenced by economy, infrastructure, education, health care and food security from national level of a country down to the individual. High levels of chronic malnutrition point towards low overall development of a country or a specific area in a country.
Since there is no treatment for chronic malnutrition only the above mentioned multi-disciplinary approaches over the long-term are adequate to deal with this major problem. However, the long-term results might only then be evident in the next generation of under fives that fully benefited from an overall better health, nutrition, hygiene and economic environment when they grow up.

Nutrition programme (CMAM) coverage
Currently Save the Children is supporting 15 health facilities in Daura and Zango LGAs for the treatment of severe acute malnutrition (SAM). In line with SPHERE standards the aim is to reach more than 50% of all SAM cases at a given time with the life-saving treatment. The results of the survey show that only period coverage[33] (71.9%) reached SPHERE standards whereas point coverage[34] failed with 35.7%. A low coverage shows that not all children that are in need for treatment are getting it and therefore remain at high risk of mortality although treatment is available nearby. As learned from CMAM programmes in other countries there

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32 **Stunted children are too short for their age**

33 **Number of children enrolled in the programme (currently malnourished or already covered) divided by all children malnourished + already recovered**

34 **Number of malnourished enrolled in the programme divided by all malnourished; means how many children that are malnourished are in the programme receiving treatment**

are boosters and barriers to programme access that influence coverage. Further investigation using newly developed SQUEAC methodology to reveal these factors is necessary to clarify findings.

With the programme newly introduced to the two LGAs a low coverage is not abnormal, however, the result should be used to strengthen community engagement especially for recognition of acute malnutrition amongst children in the community and for proper awareness rising on CMAM amongst communities as such.

Confirmation of programme enrolment was difficult for survey teams since records are kept at household level were mostly missing. Teams had to rely on mother's "word" and the presentation of PlumpyNut (the special food used as treatment) by her which might have led to overestimation of coverage especially period coverage as some children found to be currently enrolled in the programme had high MUACs of >140mm.

Mortality
Retrospective mortality rates - Crude (CMR) and Under-five (U5MR) mortality - showed to be high with 0.77/10,000/day and 1.76/10,000/day respectively, but were still below emergency levels for Sub-Saharan Africa[35]. Mortality is always assessed retrospectively and mirrors the situation before the anthropometric measurements (which are the basis for the calculation of GAM and SAM rates) are taken from children under five. High mortality is likely to be associated with malnutrition and diseases - malaria, measles, and other - in the area before the survey. However, reasons for death were not included in the survey due the difficulty in establishing the real reason in absence of medical records.

Similarly mortality rates were found in the 2007 survey by Save the Children which shows that unfortunately high levels for mortality are common in the north of Katsina.

Other health and nutrition related indicators

Measles vaccination coverage of <5s (confirmed by card) was only 4.3%. Even when added the percentage of children confirmed by caretaker (27.8%) measles vaccination coverage did not meet the 95% target set by WHO as international standard to prevent outbreaks. During the survey a total of 17 children (14 in Daura and 3 in Zango LGA) were found to have suffered from measles in the last two weeks according to the mother. Although there has been no evidence that measles was directly associated to acute malnutrition in those 17 children, there is a clear connection between measles and acute malnutrition and vice versa documented elsewhere[36]. Although these are only suspected cases, findings are alarming and should be addressed immediately to improve measles vaccination coverage on a wider scale.

Vitamin A supplementation is a cheap intervention to combat vitamin A deficiency (VAD) which has been shown to impair the immune status and eye sight of children and adults. One capsule[37] of vitamin A every 4-6 months is recommended by WHO to achieve a protective result against infections and reduce morbidity and mortality in children. DHS, 2008 data suggests a national coverage of only 25.8%. Findings from this survey show that 62.1% received the supplement within the last 6 months. Still, more than one third of children missing out on this protective measure in the surveyed area where consumption of vitamin A rich foods is low.

Morbidity: Disease is one of the two immediate causes in the conceptual frame work of malnutrition[38]. Any disease can increase the risk for weight loss leading to malnutrition through increased energy consumption and decreased appetite/food intake of the individual. Diarrhoea additionally reduces the absorption of food and can lead to massive weight loss and acute malnutrition within a short time.

Morbidity in the last two weeks in children 6-59 months was found to be very high. More than half of all children 6-59 months suffered from illness, and 9.6% presented with multiple morbidities. At the end of the rainy season malaria is by far the most reported disease with more than half of all sick children affected, followed by ARI (26.5%) and diarrhoea (10.8%).

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35 **Regional emergency level for Sub-Saharan Africa (SPHERE 2004) : CMR 0.9 per 10,000 per day and for U5MR 2.3 per 10,000 per day**

36 **Malnutrition, measles, mortality, and the humanitarian response during a famine in Ehiopia: Salama P, Assefa F, Talley L, Spiegel P, van Der Veen A, Gotway CA,Journal of the American Medical Association, Aug 2001**

37 **International units according to age group**

38 **According to this framework, developed by UNICEF, malnutrition occurs when dietary intake is inadequate and health is unsatisfactory, being the two immediate causes of malnutrition http://www.unicef.org/sowc98/silent4.htm**

Cause for concern are the findings on measles. This communicable disease was suspected in 17 children (in four localities more than one case) and has the potential to spread rapidly amongst children with adverse consequences. This finding has to be investigated thoroughly and dealt with appropriately in order to prevent spreading.

Optimal **Infant and Young Child Feeding practices** (Exclusive breastfeeding for the first six months of life, thereafter, infants should receive nutritionally adequate and safe complementary foods while breastfeeding continues for up to two years of age or beyond.) are vital for optimal growth and health of the child.

Exclusive breastfeeding of children below 6 months was nonexistent in the surveyed population (0 out of 44 <6 months) – all children received at least water additionally to breast milk. This result illustrates the inadequate feeding practices for <6 months olds in the two LGAs. Even the national average of 13.1% (DHS, 2008) is just rated "poor" according to WHO. This means that none of the children in Daura and Zango LGA benefit from the protective potential of exclusive breastfeeding for health and growth[39].

Not only exclusive breastfeeding for 6 months reduces the risk of mortality for the newborn dramatically, breast feeding must be started within one hour after delivery. Timely initiation of breastfeeding in both LGAs was, however, "fair". 45.4% reported to have put their newborn to the breast within one hour after birth; that is slightly more than the national average (38.4%). As Nigeria has one of the lowest exclusive breastfeeding rates in the region[40] and timely initiation is low major efforts need to be done for improvement for this life-saving practice[41].

Complementary feeding practices for children < 2years are wanting in the surveyed LGAs. Meal frequency was inadequate for half of all children < 2 years and dietary diversity was particularly low with 31.8%. Furthermore, only 60.5% of children 6-8 months received solid food additionally to breast milk as internationally recommended at this time in life. The survey revealed that younger children (6-29 months) are more likely to be malnourished than older children. Findings of the dietary intake for this age group support this view. However, due to time constrains no data on food intake was collected for older children, 30-59 months, which could have been used for comparison in this regards.

Water/Sanitation: The majority of households in Daura and Zango LGAs (67.3%) are using safe sources for drinking water and similarly high is the use of improved sanitation facilities, 78.6%. However, there are some 33.5% and 22.2% of households in the area for which potentially contaminated water and unsafe human waste disposal are still normality with a risk of spreading waterborne diseases like diarrhoea. It is also suspected that many young children would not use a pit latrine even when it would be available in the house adding to the risk of spreading E.coli bacteria and/or diseases.

CONCLUSIONS

The survey conducted in the two LGAs of Daura and Zango found the following:

- Acute malnutrition in children 6-59 months of age is high with rates above the internationally recognized emergency threshold and absolute numbers for moderate and severe acute malnutrition estimated at 9,100 and 5,100, respectively
- High levels of acute malnutrition at a time of increasing food availability (2 months into main harvest)
- Mortality levels are elevated (but still less than regional alert level)
- Morbidities are high especially malaria; also measles suspected in 17 cases and the risk of further spread with measles vaccination coverage extremely low in the two LGAs

According to the 5-tier Integrated Food Security Phase Classification (IPC)[42] (See ANNEX 6) developed by UN agencies, Save the Children and other INGOs in the nutrition sector, the above mentioned indicators suggest the situation in the two LGAs to be "**Phase 3 – Acute Food and Livelihood Crisis**" at the moment.

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39 **Exclusive breastfed children have a 14 times less risk of mortality compared to non-exclusively breastfed children**

40 **Own investigation from unicef web page http://www.unicef.org/infobycountry/centralafrica.html**

41 **13% of all <5 deaths could be prevented if exclusive breastfeeding is widely practiced: "How many child deaths can we prevent this year? "Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS; Bellagio Child Survival Study Group. Lancet 2003 Jul 5;362(9377):65-71.**

42 **Webpage** http://www.ipcinfo.org**: Phase 1 – Generally food secure, Phase 2 – Moderately / Borderline food insecure, Phase 3 – Acute food and livelihood crisis, Phase 4 – Humanitarian emergency, Phase 5 – Famine**

Following its annual pattern acute malnutrition will decrease further from its peak in September. The situation will, however, remain a public health problem throughout the next year and beyond unless adequately addressed by all stakeholders. Infant and Young Child Feeding practices are poor and are seen as the underlying reason for younger children (6-29 months) being at higher risk of acute malnutrition and older children being stunted.

Although this survey only represents the two LGAs the results should not be seen isolated from the rest of Katsina State and neighbouring areas in Northern Nigeria and Southern Niger. It can be assumed that the situation is similar in the mentioned areas within the same livelihood zone. Given the absolute numbers there is an enormous need for action towards addressing malnutrition in Northern Nigeria which can only be successful with all stakeholders involved and combined effort.

RECOMMENDATIONS

1. Acute malnutrition rates and total numbers found demand for continued CMAM intervention in the two LGAs in order to save lives. This intervention should at least cover the next 'hunger season' (Aug/Sep 2011). Currently only severe cases of acute malnutrition are treated due to capacity reasons in the facilities. Taken that the malnutrition situation in surrounding LGAs is very likely similar all efforts should be taken to expand the programme to other LGAs for treatment of SAM immediately before treatment of moderate cases is considered.

2. Lobby for additional assistance from other stakeholders (government, non-government, UN) to address acute malnutrition in the wider area of Katsina State immediately. There is an urgent need to jointly develop a road map that defines responsibilities and shows the way forward for ending malnutrition in the state and beyond.

3. Integrate proven food security and livelihoods interventions for most vulnerable groups into the current CMAM approach in order to address some underlying reasons for malnutrition. Consider social protection intervention if *Cost of Diet* results pointing in this direction.

4. Establish a food security / nutrition surveillance system[43] to monitor the situation over time and to function as an early warning for a deteriorating food security / nutrition situation.

5. Breastfeeding and complementary feeding practices are poor in the surveyed area and seen as immediate reasons for high acute malnutrition. A multi-lateral approach for improvement of Infant and Young Child Feeding (IYCF) practices is recommended involving governmental health institutions, religious leaders and the community. IYCF needs to be put high up on the agenda for addressing acute malnutrition:

   - Integrate IYCF interventions into CMAM in the currently served and future health facilities[44]
   - Facilitate trainings on IYCF for health staff at hospital and health centre level
   - Communicate IYCF messages in communities, include men
   - Sensitise mullahs for support of optimal IYCF practises
   - Establish women support groups for IYCF
   - Establish a network of peer councillors for breast feeding
   - Design and run a media/communication campaign for IYCF awareness

6. Improvement in coverage of measles vaccination and vitamin A supplementation is seen as urgently necessary.

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43 **This can include basic indicators like: data from growth monitoring at MoH hospitals/health centres, cases of acute malnutrition in MoH hospitals/health centres, morbidities related to malnutrition, market price monitoring, population movements**

44 *Integration of IYCF into CMAM.* **Downloadable at** http://www.ennonline.net/resources/722

7. Increase community awareness for CMAM in order to increase programme coverage. Investigate boosters and barrier for service uptake among the communities using SQUEAC methodology.

8. Conduct a follow up nutrition survey at the end of the next hunger season (August/September 2011) in the same area in order to evaluate the situation after one year of nutrition intervention.

9. Three studies were conducted in the same time period in Daura and Zango LGAs. Consolidate *Nutrition Survey*, *Cost of Diet* and *HEA* results and recommendations in order to define a strategy for addressing hunger and malnutrition in the area.

ANNEX

ANNEX 1 *Clusters in Daura and Zango LGAs*

LGA	Ward	Locality		Cluster
Daura	SARKIN YARA (A)	u/ wazai		1
Daura	SARKIN YARA (A)	Shadanbu village		2
Daura	MADOBI (B)	Gusamawa		3
Daura	SABON GARI	D/ maliki		4
Daura	SABON GARI	Nasarawa Sani (A)		5
Daura	SABON GARI	Nasarawa		6
Daura	SABON GARI	Gurjiya arewa		7
Daura	MAZOJI (B)	Kamfawa Y		8
Daura	MAZOJI (B)	Dan – nakola (B)		9
Daura	UNGUWAN DAWAKI (A)	Tsohuwar kasuwa		10
Daura	UNGUWAN DAWAKI (A)	Tawalala (A)		11
Daura	MADOBI (A)	Skwanawa		12
Daura	TUDUN WADA	T /wada (C)		13
Daura	TUDUN WADA	k/ badalani (A)		14
Daura	TUDUN WADA	D/Gabas (A)		15
Daura	SARKIN YARA (B)	U/Kaura N		16
Daura	SARKIN YARA (B)	Ayana S		17
Daura	UBAN DAWAKI (B)	Filin polo		18
Daura	KUSUGU	Makada		19
Daura	MAZOJI (A)	Sharifawa M/Gari		20
Daura	MAZOJI (A)	Mazoji Gari		21
Zango		KAWARIN KUDI		22
Zango		GIDILA TSOHUWA		23
Zango		KANDA		24
Zango		KUTUTTURE		25
Zango		YARDAJE		26
Zango		ROGOGO MASAUKA		27
Zango		ROGOGO CHIDARI		28
Zango		UNG GAJE FULANI		29
Zango		LAFI'A		30
Zango		GARNI		31
Zango		YANDAKA FULANI		32
Zango		ZANGO KK		33,34,35
Zango		TARKE		36

FORM 1

Anthropometric survey data form

Nutrition Survey Daura and Zango LGA, Katsina State, Nigeria November 2010

LGA:_____   Locality:_____

Date: _____   Cluster number: _____   Team number: _____

Only children 6-59 months (born from December 2005 to May 2010)

EUROPEAN COMMISSION — Humanitarian Aid

Save the Children

Child number	Household number	Sex (F, M)	Age (months)	Weight (kg)	Height (cm)	Oedema (Y,N)	MUAC (mm)	Weight/Height Z-score (<-3, <-2, -)	Programme enrolment(If yes note Date of last consultation)	Measles vaccination(C=Card, M=Mother, N=No, DK)	Vitamin A supplement in the last 6 months(Y,N, DK)	Sickness in the last 2 weeks 1=Not sick 2= Diarrhea 3=Vomiting 4= Fever with chills like malaria 5=Fever, cough, difficult breathing 6= Intestinal Parasite 7= Measles 8= Eye infections 9= Skin infections 10=other (specify)	Mother MUAC (mm)	Source of drinking water for the HH 1=Tap/pipe water 2=Hand pump 3=Open well 4= Protected well 5= River, lake, pond 6= Other	Type of toilet used by members of HH 1=Flush toilet 2= Latrine 3= No toilet, field, bush 4=Other	Sex Head of Household(M,F)	Remarks (Twin, Disabled, FORM 4)
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	

Signature: _____ (Team leader)

Target number of children per cluster: **18**

Nutrition Survey Daura and Zango LGA, Katsina State, Nigeria November 2010

Household Mortality Questionnaire (one sheet/household)

Locality:_____ LGA:_____

Cluster number:_____HH number:_____Date:_____

Team number:_____

ID	1 HH member	2 Present now	3 Present at **Start of Ramadan** (include those not present now and indicate which members were not present at Start of Ramadan)	4 Sex	5 Age	6 Born during recall period?	7 Died during the recall period
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

Y in Col **2**		Total HH members
Y in Col 2 AND Age < 5 in Col **5**		<5 HH members
X in Col **3** (exclude births)		Total arrived since Start of Ramadan
X in Col **3** AND Age <5 in Col **5** (exclude births)		<5 arrived since Start of Ramadan
X in Col **2** (exclude deaths)		Total left since Start of Ramadan
X in Col **2** AND Age <5 in Col **5** (exclude deaths)		<5 left since Start of Ramadan
Birth in Col **3** AND Y in Col 6		Total Birth since Start of Ramadan
X in Col **2** AND Y in Col **7**		Total Death since Start of Ramadan
X in Col 2 AND Age <5 in Col 5 AND Y in Col 7		<5 Death since Start of Ramadan

FORM 4

Nutrition Survey Daura and Zango LGA, Katsina State, Nigeria November 2010

Date: Cluster number: Team number:

Save the Children

For Children 0-23 months

Child number:_____   HH number:_____   Sex: _____   Age:_____

1. Has (NAME) ever been breastfed at any time in his/her life?	1	Yes
	2	No
	3	DK

2. How long after birth did you put (NAME) to the breast?	1	Within 1 hour
	2	Within 4 hours
	3	Other

3. Is (NAME) still being breastfed?	1	Yes
	2	No
	3	DK

4. Yesterday, during day and night, did (NAME) receive any of the following:

a)	Plain water	1 Yes	2 No	3 DK
b)	Sweetened, flavoured water or fruit juice or tea	1 Yes	2 No	3 DK
c)	Tinned, powdered or fresh milk, animal milk	1 Yes	2 No	3 DK
d)	Infant formula (NAN, SMS Gold, or any other brand)	1 Yes	2 No	3 DK
e)	Any other liquids	1 Yes	2 No	3 DK
f)	Solid or semi-solid or soft food	1 Yes	2 No	3 DK

If 4 f) is YES. How many times:	Times_____

5. Tell me everything that (NAME) eat yesterday during day and night (whether at home or outside the home).

A) Think about when (NAME) woke up yesterday. Did (NAME) eat anything at that time? What was it?
Probe **Anything else?** until respondent says **Nothing else.**

B) What did (NAME) eat after that?
Probe **Anything else?** until respondent says **Nothing else.**

Repeat questions until respondent says the **child went for sleeping until next day.**

a) Bread, rice, millet, cassava, corn or any other food from grains, including grain-based porridge	1 Yes	2 No	3 DK
b) Legumes, beans, lentils, nuts	1 Yes	2 No	3 DK
c) Meat/chicken, fish	1 Yes	2 No	3 DK
d) Egg	1 Yes	2 No	3 DK
e) Cooking oil/fats,	1 Yes	2 No	3 DK
f) Vegetables	1 Yes	2 No	3 DK
g) Green leafy vegetables	1 Yes	2 No	3 DK
h) Fruits	1 Yes	2 No	3 DK
i) Milk, yoghurt, cheese, etc	1 Yes	2 No	3 DK
j) Sugary foods such as chocolate, sweets, cake, biscuits	1 Yes	2 No	3 DK
k) Spices, ground	1 Yes	2 No	3 DK

ANNEX 5 *Integrated Food Security Phase Classification (IPC)*

Phase Classification		Key Reference Outcomes *Current or imminent outcomes on lives and livelihoods.* *Based on convergence of direct and indirect evidence rather than absolute* *thresholds. Not all indicators must be present for classification..*		Strategic Response Framework *Objectives:* *(1) mitigate immediate outcomes,* *(2) support livelihoods,* *and (3) address underlying causes*
1A	Generally Food Secure	*Crude Mortality Rate*	< 0.5 / 10,000 / day	Strategic assistance to pockets of food insecure groups Investment in food and economic production systems Enable development of livelihood systems based on principles of sustainability, justice, and equity Prevent emergence of structural hindrances to food security Advocacy
		Acute Malnutrition	<3 % (w/h <-2 z-scores)	
		Stunting	<20% (h/age <-2 z-scores)	
		Food Access / Availability	usually adequate (> 2,100 kcal ppp day), stable	
		Dietary Diversity	consistent quality and quantity of diversity	
1B	Generally Food Secur	*Water Access / Avail.*	usually adequate (> 15 litres ppp day), stable	
		Hazards	moderate to low probability and vulnerability	
		Civil Security	prevailing and structural peace	
		Livelihood Assets	generally sustainable utilization (of 6 capitals)	
2	Moderately / Borderline Food Insecure	*Crude Mortality Rate*	<0.5 / 10,000 / day; U5MR<1 / 10,000 / day	Design & implement strategies to increase stability, resistance and resilience of livelihood systems, thus reducing risk Provision of "safety nets" to high risk groups Interventions for optimal and sustainable use of livelihood assets Create contingency plan Redress structural hindrances to food security Close monitoring of relevant outcome and process indicators Advocacy
		Acute Malnutrition	>3% but <10 % (w/h <-2 z-score), usual range, stable	
		Stunting	>20% (h/age <-2 z-scores)	
		Food Access / Availability	borderline adequate (2,100 kcal ppp day); unstable	
		Dietary Diversity	chronic dietary diversity deficit	
		Water Access / Avail.	borderline adequate (15 litres ppp day); unstable	
		Hazards	recurrent, with high livelihood vulnerability	
		Civil Security	Unstable; disruptive tension	
		Coping	"insurance strategies"	
		Livelihood Assets	stressed and unsustainable utilization (of 6 capitals)	
		Structural	Pronounced underlying hindrances to food security	
3	Acute Food and Livelihood Crisis	*Crude Mortality Rate*	0.5-1 / 10,000 / day; U5MR 1-2 / 10,000 / dy	Support livelihoods and protect vulnerable groups Strategic and complimentary interventions to immediately food access / availability AND support livelihoods Selected provision of complimentary sectoral support (e.g., water, shelter, sanitation, health, etc.) Strategic interventions at community to national levels to create, stabilize, rehabilitate, or protect priority livelihood assets Create or implement contingency plan Close monitoring of relevant outcome and process indicators Use "crisis as opportunity" to redress underlying structural causes Advocacy
		Acute Malnutrition	10-15 % (w/h <-2 z-score), > than usual, increasing	
		Disease	epidemic; increasing	
		Food Access / Availability	lack of entitlement; 2,100 kcal ppp day via asset stripping	
		Dietary Diversity	acute dietary diversity deficit	
		Water Access / Avail.	7.5-15 litres ppp day; accessed via asset stripping	
		Destitution / Displacement	emerging; diffuse	
		Civil Security	limited spread, low intensity conflict	
		Coping	"crisis strategies"; CSI > than reference; increasing	
		Livelihood Assets	accelerated and critical depletion or loss of access	
4	Humanitarian Emergency	*Crude Mortality Rate*	1-2 / 10,000 / day; >2x reference rate, increasing; U5MR > 2 / 10,000 / day	Urgent protection of vulnerable groups Urgently food access through complimentary interventions Selected provision of complimentary sectoral support (e.g., water, shelter, sanitation, health, etc.) Protection against complete livelihood asset loss and / or advocacy for access Close monitoring of relevant outcome and process indicators Use "crisis as opportunity" to redress underlying structural causes Advocacy
		Acute Malnutrition	>15 % (w/h <-2 z-score), > than usual, increasing	
		Disease	Pandemic	
		Food Access / Availability	severe entitlement gap; unable to meet 2,100 kcal ppp day	
		Dietary Diversity	Regularly 3 or fewer main food groups consumed	
		Water Access / Avail.	< 7.5 litres ppp day (human usage only)	
		Destitution / Displacement	concentrated; increasing	
		Civil Security	widespread, high intensity conflict	
		Coping	"distress strategies"; CSI significantly > than reference	
		Livelihood Assets	near complete & irreversible depletion or loss of access	
5	Famine / Humanitarian Catastrophe	*Crude Mortality Rate*	> 2 / 10,000 / day (example: 6,000 / 1,000,000 / 30 days)	Critically urgent protection of human lives and vulnerable groups Comprehensive assistance with basic needs (e.g. food, water, shelter, sanitation, health, etc.) Immediate policy / legal revisions where necessary Negotiations with varied political-economic interests Use "crisis as opportunity" to redress underlying structural causes Advocacy
		Acute Malnutrition	> 30 % (w/h <-2 z-score)	
		Disease	Pandemic	
		Food Access / Availability	extreme entitlement gap; much below 2,100 kcal ppp day	
		Water Access / Avail.	< 4 litres ppp day (human usage only)	
		Destitution / Displacement	large scale, concentrated	
		Civil Security	widespread, high intensity conflict	
		Livelihood Assets	effectively complete loss; collapse	