Cluster Surveillance of Malnutrition Prevalence and Hunger Pattern in Kazaure Local Government Area of Jigawa State, Nigeria (2010- 2012)

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Abstracts

This paper presents the result of a statistical surveillance system carried out in Kazaure Local Government Area in Jigawa State, North-eastern Nigeria, using a multi-stage cluster sampling technique with repeated surveys which stratified the Local Government Area into three equal parts called stratum based on the principle of Population Proportional to Size (PPS). The prevalence of Severe Acute Malnutrition (SAM) was estimated with the pattern of hunger gaps within the clusters at different survey times captured from March 2010 to February 2012. The study was designed such that data were collected and analyzed through repeated surveys with the application of the Emergency Nutrition Assessment (ENA) for SMART Methodology which promptly gave the point and interval estimates of malnutrition prevalence on a 95% confidence interval with an assurance that the point and interval estimates were close enough to precision and hence could be used as a basis for generalization on the entire Kazaure population. Through this system, a data driven and informed decisions on the prevalence of malnutrition and the pattern of hunger gaps in Kazaure, targeting children between the ages of 6-59 months or those children whose heights were between 65cm-110cm from 30 randomly selected clusters were made.

Keywords: Statistical surveillance, malnutrition, severe acute malnutrition, mid-upper arm circumference, anthropometrics, emergency nutrition assessment and bilateral edema

1. Introduction

A multi-stage cluster sampling selection technique was used throughout the repeated surveys. This technique made it possible to stratify Kazaure LGA into three equal parts called stratum based on the principle of Population Proportional to Size (PPS). 30 clusters were selected with 10 clusters each from the 3 strata (Stratum A, B, and C) from where a sample of 20 eligible children per cluster was randomly drawn. At least 600 children made up the sample from the 30 clusters visited at any survey period, which was initially bi-monthly and later monthly. Analysis of the data collected was done using Emergency Nutrition Assessment (ENA) software which promptly gave the point and interval estimates of malnutrition prevalence with a 95% assurance that the point and interval estimates were close enough to precision and hence could be used to make generalization on the entire Kazaure population.

2. Results
2.0 Severe Acute Malnutrition (SAM) based on Mid-Upper-Arm Circumfrence

The execution of the nutritional surveillance system in Kazaure started in March 2010 with a survey at the 12th week. The point estimate of the prevalence of Severe Acute Malnutrition for children in Kazaure LGA based on an age criteria of 6-59 months or height between 65cm-110cm with MUAC <115 and/or with bilateral edema was above the 3% nutritional threshold considered to be an emergency situation. Apart from the 12th week in 2010, every other weekly prevalence of SAM was below the 3% emergency threshold. But in subsequent surveys during the year, the upper 95% interval estimate of SAM went above the emergency threshold as can be seen in Figure 1 below. This goes to show that for 13 weeks beginning from the 12th week in 2010 many children fell into the severely malnourished group except in weeks 44 and 52 where both the upper and the lower 95% CIs were within the emergency threshold.
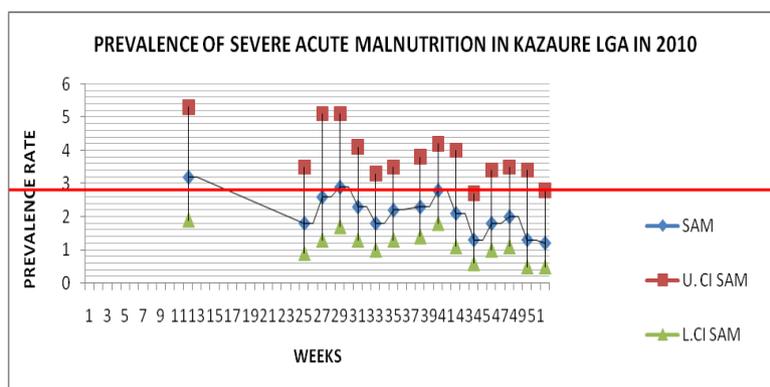

Fig. 1: Trend of Lower and Upper Confidence intervals SAM prevalence in 2010

As the feeding program gathered momentum with treatment intensified, access and relief becoming widespread, SAM trend changed in 2011. This became obvious as can be seen in figure 2 below, the first 3 weeks in January recorded a very low prevalence with both the point and the interval estimates of SAM lying below the 3% emergency threshold, this may be attributed to food availability at that time, a period not too far from the post harvest period. However in the course of the year, from week 27 to week 45 we noticed a sharp rise in the prevalence rate, this may be due to the seasonal variation occasioned by intense preparation for farming activities, hence scarcity of food and preparation for harvest. But in week 46 to 49 a sharp drop in the prevalence rates was noticed signifying abundance. Still in figure 2, we noticed a low and relatively stable SAM prevalence up to the 15th week. This was possible because there was a continuous surveillance in 2011. But this cannot be said about the first 15 weeks in 2010 since adequate surveillance was not possible then. Again, we noticed from the SAM trend in 2011 in figure 2 that only 5 weeks upper CI prevalence were above the emergency threshold, as against the 13 weeks in 2010 meaning that in 2011, not so many children in the target population were severely malnourished an indication of probably a wide program coverage and food sufficiency or adequate dietary intake and improved hygiene.
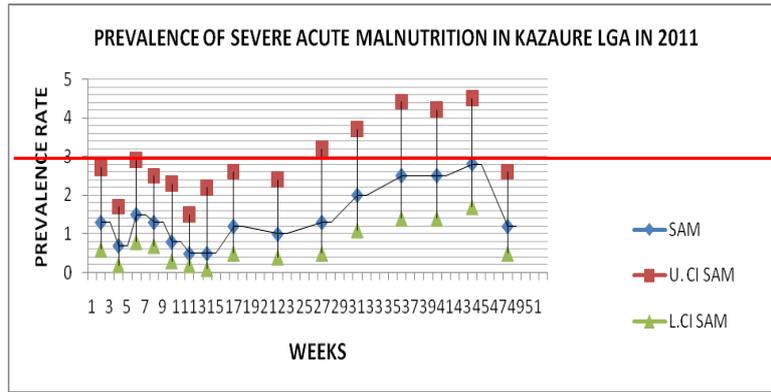
Fig. 2: Trend of Lower and Upper Confidence intervals of SAM prevalence in 2011

But we noticed from figure 3 below that the prevalence rate at the 3rd week of 2012 is already very low with the upper CI not reaching the emergency threshold, this is almost similar to the situation at the 4th week in 2011 in figure 2 above. Week 7 in figure 3 was a nutrition and mortality survey it showed that the SAM prevalence is beginning to rise.
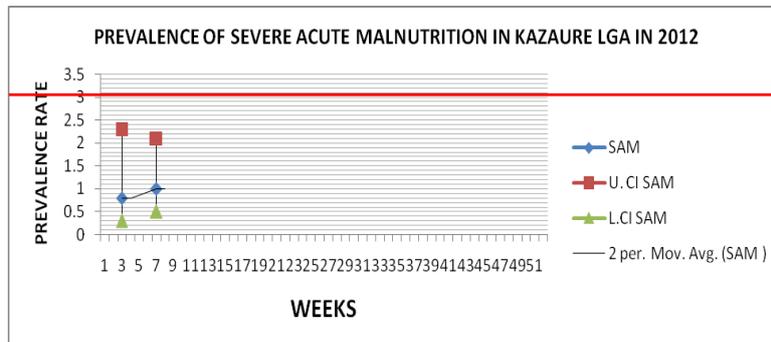

Fig. 3: Trend of Lower and Upper Confidence intervals of SAM prevalence in 2012

The trend in 2010 showed a high prevalence of SAM with a three point fluctuation from week 25 to the end of the year with the prevalence of weeks 30 and 40 getting so close to the emergency thresholds. The overall SAM prevalence in 2011 showed a sharp reduction particularly from week 4 to 13 indicating a relatively hunger-free period coupled with perhaps access to feeding program. However, from the 17th week a steady rise in the prevalence of SAM was noticed up to the 44th week signifying some level of food scarcity and very likely children defaulting from feeding program. But 2012 started with the lowest prevalence in the third week with a 20% rise in February. Active surveillance is required to monitor the prevalence in the remaining months to come

2.1 Hunger pattern in 2010 based on MUAC for weeks 29 and 40

Weeks 29 and 40 were randomly selected from the entire weeks repeatedly surveyed in 2010. The charts of their mean Mid-Upper-Arm-Circumference (MUACs) in mm with their corresponding Standard Deviations (SD) showed that in week 29 Daurawa Habe and Kael settlements, representing clusters 19 (135.50 ± 14.70) and 15 (136.90 ± 10.75) had lowest mean MUACs indicating a more serious cases of malnutrition. Similarly in week 40 Walawal and Badad-Fulani representing clusters 30 (135.60 ± 14.96) and 17 (136.70 ± 15.78) also had the lowest mean MUACs indicating more serious cases and consequently a wider hunger gap as can be seen from Figures 4 and 5 respectively.
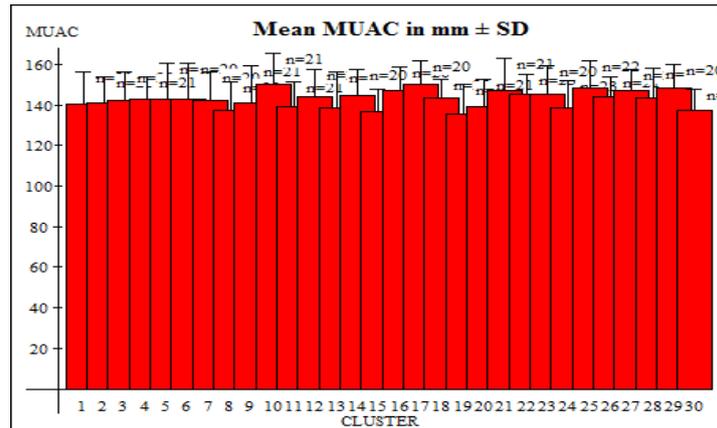
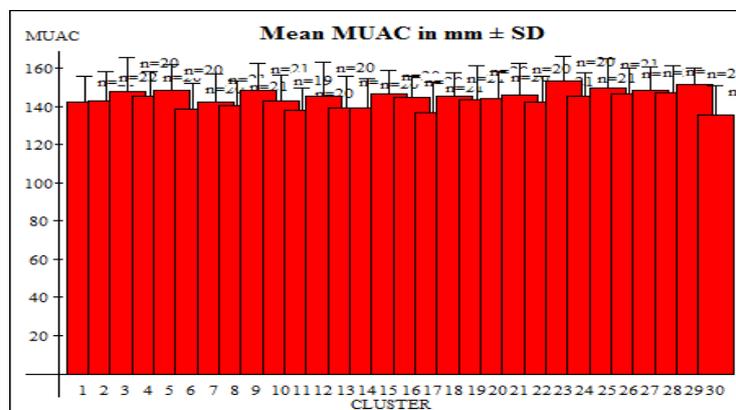**Fig. 4: Pattern of hunger gap based on MUAC in week 29 of 2010**

Fig. 5: Pattern of hunger gap based on MUAC in week 40 of 2010

2.2 Hunger pattern in 2011 based on MUAC for weeks 10 and 27

Weeks 10 and 27 were randomly selected from the entire weeks repeatedly surveyed in 2011. The charts of their mean Mid-Upper-Arm-Circumference (MUACs) in mm with their corresponding Standard Deviations (SD) showed that in week 10 Tsadan Makuta and Danbaza Fulani settlements, representing clusters 26 (135.90 ± 12.53) and 25 (137.60 ± 12.74) had lowest mean MUACs indicating a more serious cases of malnutrition. Similarly in week 27 Sabon Todarya and Sabaru representing clusters 1(133.50 ± 18.61) and 9 (138.20 ± 16.21) respectively also had the lowest mean MUACs indicating more serious cases and consequently a wider hunger gap as can be seen from Figures 6 and 7.
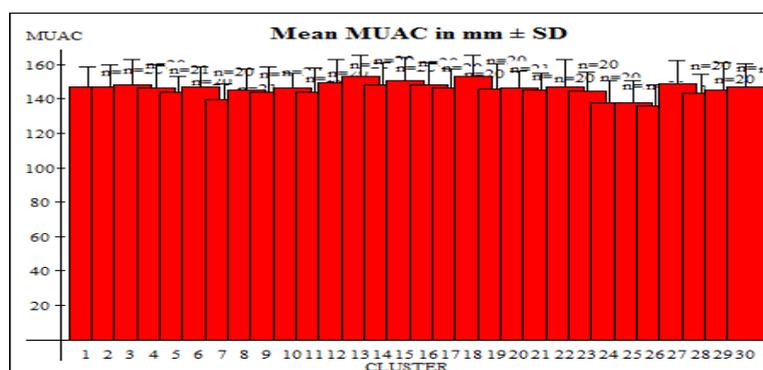

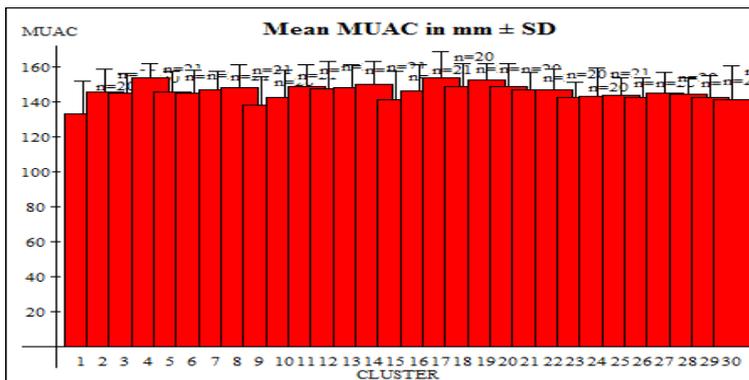**Fig. 6: Pattern of hunger gap based on MUAC in week 10 of 2011**

Fig. 7: Pattern of hunger gap based on MUAC in week 27 of 2011

2.3 Hunger pattern in 2012 based on MUAC weeks 3 and 7

Weeks 3 and 7 were selected in 2012. The charts of their mean Mid-Upper-Arm-Circumference (MUACs) in mm with their corresponding Standard Deviations (SD) showed that in week 3 Kwadage and Gizo babba settlements, representing clusters 10 (136.90 ± 16.64) and 7 (138..60 ± 14.11) respectively had lowest mean MUACs indicating a more serious cases of malnutrition. Similarly in week 7 Maihanya Fulani and Gizzo babba representing clusters 5 (134.40 ± 12.99) and 10 (138.50 ± 12.43) respectively also had the lowest mean MUACs indicating more serious cases and consequently a wider hunger gap as can be seen from Figures 8 and 9.
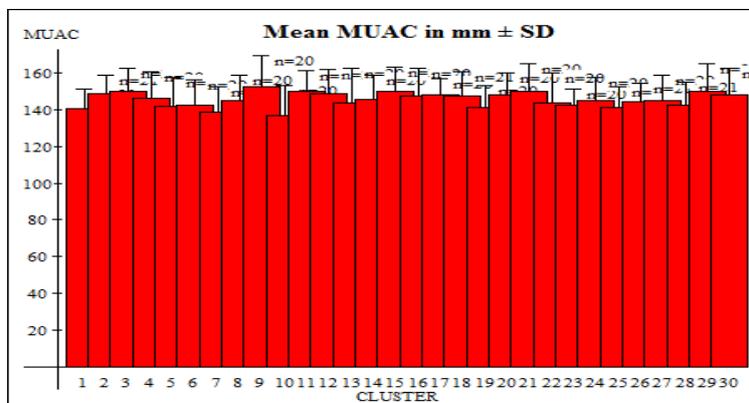

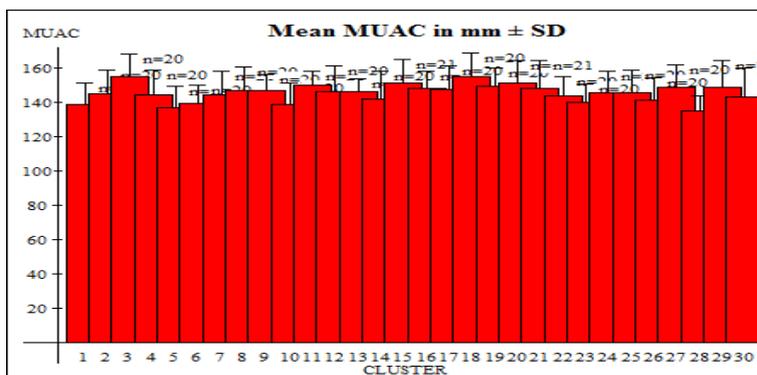**Fig. 8: Pattern of hunger gap based on MUAC in week 3 of 2012**

Fig. 9: Pattern of hunger gap based on MUAC in week 7 of 2012

3. Conclusions

In conclusion therefore, we have been able to show how the trend of malnutrition especially Severe Acute Malnutrition (SAM) can be monitored by statistical surveillance through repeated surveys on a bi-weekly or monthly basis with both upper and lower confidence interval prevalence estimates. Again, we have demonstrated how the mean Mid-Upper Arm Circumference (MUAC) can be used to pin-point clusters with more severe cases of malnutrition and by extension clusters with huge hunger gaps hence in urgent need of access to quality food, relief and treatment.

4. References

Anthony G. Turner et al., (2000) Sampling Manual for facility surveys for Population, Maternal Health, Child Health and STD Programs in Developing Countries.

Emmanuel Grellety et al; (2010) Cross sectional Nutrition baseline survey in Kazaure LGA, Jigawa State, Nigeria

Ekpo, A., (2012) Nutrition and Mortality Surveillance report in Kazaure LGA, Jigawa State

Lola Soji-Omoniwa, (2011) Nutrition and Mortality Surveillance report in Kazaure LGA, Jigawa State.

Manuel Sanchez-Montero et al; (2010) Under-nutrition: What works? A review of policy and practice