Nutritional Status and Its Determinants among Fulani Children Aged 6-24 Months in a Rural Community of Kaduna State, Northwest Nigeria

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ABSTRACT

Background: Nutritional status of young children is an important measure of their health status, growth, and development. There is a knowledge gap in the nutritional status of Fulani children aged 6 – 24 months in Nigeria. Our study, therefore, aims to assess the nutritional status of Fulani children (6 – 24 months old) and its determinants.

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Methods: A cross-sectional study of 209 children were selected using a multistage sampling technique. Anthropometric measurements were obtained from the children and converted to Z-scores to determine nutritional status. Quantitative data were analyzed using SPSS version 20.0. Bivariate analysis was conducted to examine the relationships between respondents' socio-demographic factors and nutritional status. Statistical significance was determined at a p-value of ≤0.05.

Results: A majority (62.2%) of the children were aged 6 – 12 months. The prevalence's of stunting, wasting and underweight were 44.9%, 9.6% and 16.3% respectively. A higher proportion (55.3%) of male children were stunted compared to females. Most (51.1%) of the children aged 6 – 12 months were stunted compared to those aged 13 -24 months. There was a statistically significant association between stunting and age (p = 0.004). Children aged 6 -12 months (OR = 2.5, CI: 1.3 – 4.8) were at higher risk of developing stunting compared to those aged 13 – 24 months.

Conclusion and Recommendation: The proportion of children that were stunted and those that were underweight was high. Therefore, there is a need for health authorities to ensure continuous growth monitoring practices of young children among the Fulani people to detect growth failure early in life and institute interventions.

1. BACKGROUND

The nutritional status of young children under the age of 5 years is an important measure of children's health and development [1]. "The first one thousand days of a child's life is very important for optimal physical, mental and cognitive development" [2]. This period of a child's life is critical because; it coincides with when malnutrition starts in many infants and therefore, contributes to the high prevalence of malnutrition in children under the age of five years [3]. Appropriate young child feeding practices are often a greater determinant of nutritional status [4,5].

Malnutrition is one of the prevailing health problems affecting children worldwide with higher distribution in low and middle-income countries. It is associated with more than 41% of the deaths that occur annually in children from 6 to 24 months of age in developing countries [6]. The WHO estimates that 2 out of 5 children are stunted in low-income countries and that 54% of all childhood mortality were attributable, directly or indirectly, to malnutrition with sub-Saharan Africa having the highest prevalence of malnutrition [3]. Morbidity and mortality are highest among those most severely malnourished [7]. A child whose height-for-age is less than -2 standard deviation is considered stunted and the chances of the child's height being normal are reduced to less than 3 percent [7,8].

There is a knowledge gap concerning the nutritional status of Fulani children aged 6 – 24 months in Nigeria. Data on Fulani children are rare and almost non-existent [9]. The choice to study Fulani children within this age group was informed from the characteristics identified in that they are a hard to reach group residing in remote areas [10]. Therefore, this study aimedto determine the nutritional status of Fulani children (6 – 24 months old) and associated factors in Makarfi Local Government Area, Kaduna state. This knowledge will help to bring to fore the situation of these children andalso assist in designing appropriate interventions that will improve their nutrition status and overall health status.

2. METHODS

2.1 Study Area

Makarfi Local Government Area has a projected population of 596,415 from the 2006 national census [11]. The inhabitants of the area are predominantly Hausa and Fulani. The LGA covers a land mass of about 150,859 square meters [12].

The inhabitants are predominantly farmers producing cash crops like sugar cane, tomatoes, onions and pepper. They also produce food crops like maize, sorghum, millet and soya-beans to mention a few. They engage in cattle rearing and trading of their farm products in markets [12]. The Fulani people are found in

small settlements in the local government area. They are known for their unique way of life which revolves around their cattle with a few practicing nomadic characterized by being constantly moving from place to place across the entire country in search of green fodder for their cattle. Their cattle grazing route passes through the LGA, but with urbanization, conflicts and availability of food, quite a number of them have settled in the local government. However, a few still engage in cattle pastoralism and sometimes move the cattle from place to place in search of grazing fields [10,13].

2.2 Study Design

The study design is a community based cross-sectional descriptive survey.

2.3 Study Population

The study population comprised Fulani children aged 6 – 24 months old with their mothers/caregivers residing in the area.

2.4 Inclusion Criteria

1. Fulani children within age 6 - 24 months residing within Fulani settlements in Makarfi LGA.
2. Fulani mothers/caregivers with at least one child within the age group 6 - 24 months in Makarfi LGA.

2.5 Exclusion Criteria

1. Fulani children within the age bracket of 6 - 24 months with features of chronic diseases such as sickle cell disease, congenital heart disease, cerebral palsy etc.

2.5.1 Sample size determination

The minimum sample size *n* for the study was determined using the Cochrane formula [14].

$$n = \frac{Z^2 pq}{d^2}$$

Using a prevalence of 14.3% from a previous study,[2] the sample size was then calculated as;

Therefore $n = \dfrac{(1.96)^2 \times 0.143 \times 0.857}{(0.05)^2} = 188.32$

Adjusted sample size $n = 1/(1-f)$[14]

Where, f = anticipated non-response i.e. 10% of all the subjects enrolled in the study.

Thus: $1/(1 - 0.9) \times 188 = 209$

Therefore, a total of 209 mother/caregiver–child pairs were recruited for the study.

2.5.2 Sampling technique

A multi-stage sampling technique was used to select the participants. Five wards (out of a total of 10 wards in the LGA), where the Fulani people are known to reside permanently, were purposively selected.

Stage 1 selection of settlements within each ward: A list of all Fulani settlements in the selected ward above was compiled. Using simple random sampling technique by balloting method, eight (8) settlements were selected from the list of settlements from each of the selected wards.

Stage 2 selection of households within settlements: All the households in the selected settlements were also listed. Using a systematic random sampling method, the households were selected for the study.

Stage 3 Selection of respondent: A mother/ caregiver with at least one child within the age of 6 - 24 months was selected per household. If there was more than one mother-child pair in a household, one mother–child pair was selected by simple random sampling by balloting.

2.6 Study Instruments

2.6.1 Structured questionnaire

Quantitative data was collected using apre-tested structured interviewer-administered questionnaire consisting of closed-ended questions. The tool was adapted from a previous study [15]. The questionnaire comprised two sections. Section 'A' obtained information on socio-economic/ demographic characteristics of the primary care giver and child. Section 'B' contained anthropometric measurements of the child. The questionnaire was translated to Hausa language and back-translated into English language. The Hausa version was used on the field for data collection to eliminate language barrier. However, for some mothers who do not understand the Hausa language, an interpreter fluent in Hausa and *Fulfude* was engaged to interpret the questions. The questionnaire was pretested and validated in Madobi community of

semi-settled Fulani people in Giwa LGA which is about 50km away and share similar characteristics with the study LGA, before embarking on data collection.

2.6.2 Data collection methods

The quantitative data collection was done by the researcher and a team of four trained community extension workers (CHEWs) recruited from the communities to serve as research assistants. Research assistants were trained by the researcher prior to the commencement of the survey. All the questionnaires were completed and retrieved. The completed questionnaire was checked by the researcher for accuracy, completeness, and consistency.

2.6.3 Anthropometric measurement

A UNICEF infant/child-length measuring board was used to measure the children's recumbent length and height, respectively to the nearest 0.1 cm following standard procedures.[2] The weight was measured using lightweight SECA scales (with digital screens) to the nearest 0.5 kg and the child wearing light clothing. The weighing scale is set to zero points. For children who were able to stand on the weighing scale, the weight was read directly and recorded. For children who were too young to stand on the weighing scale, the mother was asked to step onto the scale carrying the child. The combined weight of the mother and child was then recorded. The mother's weight alone without the child was also measured. The weight of a child was then determined by subtracting the weight of the mother from the combined weight of mother and child. The child's height/length was also measured. First, the child was made to lie gently on the board, the head firmly secured and the knees extended to avoid bending. The measurements were repeated twice then an average of the two measurements recorded. The trained research assistants were responsible for weighing and measuring of the height/length of the children under the supervision of the researcher.

2.7 Data Management

2.7.1 Anthropometry (Stunting, wasting and underweight)

Stunting, wasting and underweight were determined by taking the child's height/recumbent length and weight, and converting to sex-and age-specific Z scores relative to the National Center for Health Statistics/World Health Organization (NCHS/WHO) standard using ANTHRO PLUS, computer software that performs the nutritional status calculation. Stunting was defined as height/length-for-age less than (-2SD) Z score, wasting as weight-for-height less than (-2SD) Z score and underweight as weight-for-age also less than (-2SD) Z score. Children whose Z-scores were greater than or equal to (-2SD) were considered to be of normal nutritional status [8].

2.7.2 Statistical analysis

The quantitative data were checked for consistency and completeness. Data were entered and analyzed using IBM statistical package for social sciences [16] (SPSS) version 20.0. Double data entry was done to minimize error due to data entry. Continuous variables were summarized using summary statistics, while categorical variables were summarized as frequencies and percentages.

The mother and child socio-demographic characteristics were reported as frequencies, percentages and summary indices. Other data were presented as tables and charts. Chi-square test and Fishers Exact test with p-value set at ≤ 0.05 was conducted to determine the relationship between mothers' socio-demographicfactors and child's nutritional status. All the variables that were statistically significant (p ≤ 0.05) at bivariate analysis were subjected to binary logistic regression to adjust for confounders.

3. RESULTS

A total of 209 Fulani mother-child pair were studied. The mean age of the children studied was 12.3±5.3 months with a majority (62.2%) of them being within the age range of 6 – 12 months. Both sexes were equally represented with males being slightly higher (50.2%) (Table 1).

The mothers were between the ages of 17 to 45 years with a mean age of 26.1±6.0 years. Many of the mothers (67%) belonged to the age group 15-29 years with 64.1% of them having informal education (Qur'anic education). Most (80.3%) of the mothers were housewives with only 8.6% engaging in a waged labour (Table 1).

Most (73.3%) of the fathers had informal education (Qur'anic education). Most (56.5%) were mainly farmers. The mean family size was

7.31 ± 4.16. A majority (75.6%) of the households belonged to the higher quintile of socioeconomic status. (Table 1).

A majority (44.9%) of the children examined were stunted, 9.6% were wasted while 16.3% were underweight. (Fig. 1).

A higher proportion (55.3%) of male children were stunted compared to females (44.7%), while 55.9% of those that are underweight were males. There was no significant association between the nutritional status and sex of the child. Most (51.1%) of children belonging to age group (6 – 12 months) were stunted as compared to 48.9% in the age group (13 -24 months). The majority (70%) in the age group 6 -12 months were wasted while 64.7% in

this same age group were underweight. The relationship between age and stunting was statistically significant (*P* = 0.004) (Table 2).

There was no significant association between the parent's socio-demographic characteristics and nutritional status (stunting and wasting) of the children. However, there was a significant association between fathers' educational and weight of the children (Table 3).

The age of the child (OR = 2.56, *P* = 0.004) was found on logistic regression to be the only significant predictor of stunting among the children. Children of age (6 – 12 months) are 2.56 times more likely to be stunted than those of age group (13 -24 months) (Table 4).

Table 1. Socio-demographic characteristics of respondents in Makarfi LGA, Kaduna State

Characteristics	Frequency	Percent %
Age of the children (months)		
6 – 12	130	62.2
13 – 24	79	37.8
Sex		
Male	105	50.2
Female	104	49.8
Mothers Age (years)		
15 – 29	140	67
30 – 40	69	33
Level of Education		
Formal	77	35.9
Informal	134	64.1
Main Occupation		
Waged labour	18	8.6
Farming	23	11.1
House wife	168	80.3
Father's level of education		
Formal	47	22.5
Informal (Qur' anic)	162	77.5
Main occupation of fathers		
Farming	118	56.5
Cattle rearing	64	30.6
Civil servant	27	12.9
Family size		
1 – 4	45	21.5
5 – 9	125	59.8
≥ 10	39	18.7
Socio-economic status		
Lower Quintile	30	14.4
Middle Quintile	21	10.0
Higher Quintile	158	75.6

Table 2. Prevalence of malnutrition among fulani children by sex and age in Makarfi LGA, Kaduna State

Sex	Stunting n(%)	Wasting n(%)	Underweight n(%)
Male	52 (55.3)	10 (50.0)	19 (55.9)
Female	42 (44.7)	10 (50.0)	15 (44.1)
	$*X^2 = 1.76$; $^{\#}P = 0.21$	$X^2 = 0.001$; $P = 1.00$	$X^2 = 0.52$; $P = 0.58$
Age (months)			
6 - 12	48 (51.1)	14 (70.0)	22 (64.7)
13 - 24	46 (48.9)	6 (30.0)	12 (35.3)
	$X^2 = 9.01$; $P = 0.004$	$X^2 = 0.57$; $P = 0.48$	$X^2 = 0.11$; $P = 0.82$

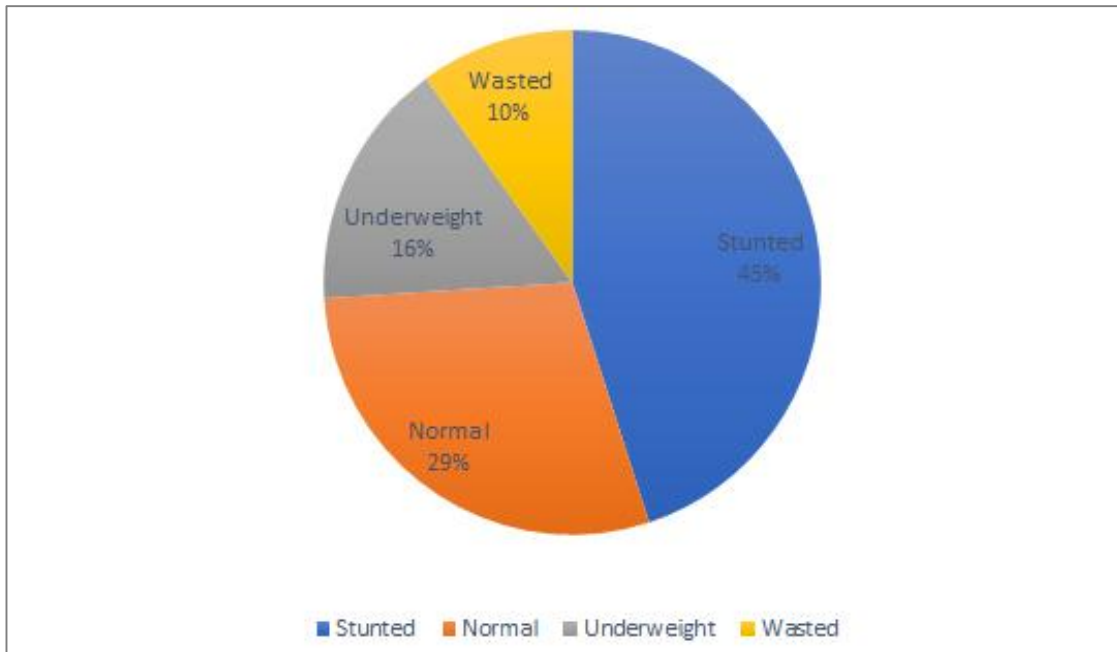$*X^2 = $ *Chi square;* $^{\#}P = $ *value*

Fig. 1. Distribution of nutritional status of fulani children aged 6 – 24 months in Makarfi LGA, Kaduna State

4. DISCUSSION

This study found that a high proportion (44.9%) of the children were stunted. This is consistent with the findings inBangang, Cameroon which reported a similar prevalence of stunting among children aged 0 – 24 months [17]. This similarity may be attributed to the nature of the community where the study was conducted which is basically rural. However, the finding from this study differed from that of Biye, Village, Kaduna State which reported a higher value [18]. It also differs from the study conducted among children in Ondo State and India [1,19] The difference may be attributed to regional and sociocultural factors. Ondo State being in the southern part of Nigeria has prevalence lower than national average as compared to the northern part of the country, the south also has high literacy level and socioeconomic status compared to the north. The findings from this study for stunting was higher than the National values [2,20] It is, however, lower than that for Kaduna State for the same age group [2]. The proportion of children that are stunted by age from this study was 51.1% for 6 – 12 months and 48.9% for those between 13 – 24 months old. This was similar to the findings in the study among pastoral Fulani in the southwestern zone of the country for stunting [9]. The high prevalence of stunting observed in these children could signify that these children are not being fed adequately with diverse diets both in quantity and quality. Breast-feeding practices may also be poor. The implication to

Table 3. Association between socio-demographic characteristics and child's weight in Makarfi LGA, Kaduna State

Characteristics	Nutritional status n (%)		Test statistics
	Underweight	**Not underweight**	
Mothers age (yrs)			
15 – 29	24(17.1)	116(82.9)	*X^2= 0.24
30 – 44	10(14.5)	59(85.5)	#p = 0.69
Mothers' educational level			
Formal	17(22.7)	58(77.3)	X^2= 3.52
Informal	17(12.7)	117(87.3)	p = 0.08
Mothers' occupation			
Waged labour	3(16.7)	15(83.7)	@*Fisher's* = 0.84
House wife	26(15.5)	142(84.5)	p = 0.75
Farming	5(21.7)	18(78.3)	
Fathers' educational level			
Formal	13(27.7)	34(72.3)	X^2= 5.78
Informal	21(13.0)	141(87.0)	p = 0.02
Fathers' occupation			
Farming	17(14.4)	101(85.6)	X^2= 4.07
Cattle rearing	9(14.1)	55(85.9)	p = 0.14
Civil servant	8(29.6)	19(70.4)	
Family size			
1 - 4	5(11.1)	40(88.9)	X^2= 2.21
5 - 9	20(16.0)	105(84.0)	P = 0.34
≥ 10	9(23.1)	30(76.9)	
Socio-economic status			
Lower Quintile	8(26.7)	22(73.3)	*Fisher's* = 3.28
Middle Quintile	4(19.0)	17(81.0)	P = 0.17
Higher Quintile	20(13.9)	136(86.1)	

*X^2 = Chi square; #P = value; @Fisher's exact test

Table 4. Predictors of fulani child's nutritional status in Makarfi LGA, Kaduna State

Characteristics	P value	Adjusted odds ratio	95% CI
	Stunting		
Age of child	0.004	2.56	1.35 – 4.88
Sex of child	1.71	0.65	0.35 – 1.20
Mothers age	1.64	0.84	0.40 – 1.74
Mothers' educational level	0.14	2.13	0.79 – 5.78
Mothers' occupation	0.13	1.76	0.84 - 3.65
Fathers' educational level	0.44	0.63	0.19 – 2.02
Fathers' occupation	0.18	0.36	0.08 – 1.61
Family size	0.92	0.48	0.19 – 1.13
Socio-economic status	0.57	1.39	0.44 – 4.46
	Underweight		
Age of child	0.42	0.70	0.29 – 1.65
Sex of child	0.55	0.78	0.35 – 1.76
Mothers age	0.92	0.96	0.37 – 2.48
Mothers' educational level	0.31	0.56	0.18 – 1.72
Mothers' occupation	0.26	0.59	0.24 – 1.47
Fathers educational level	0.36	0.51	0.13 – 2.11
Fathers' occupation	0.43	2.02	0.34 – 11.71
Family size	0.82	1.13	0.39 – 3.24
Socio-economic status	0.36	0.51	0.13 – 2.11

public health is that having a large number of children being stunted may alsoa high prevalence of cognitive problems in the future.

This study found that 9.6% of the children were wasted. This was consistent with the findings from the Multiple Indicator Cluster Survey, Biye village, Bagang Cameroon and India [20,18,17,19] These studies reported similar lower prevalence for wasting. These similarities may be linked to the rural setting where these studies were done. However, despite the similarities in findings, there was a difference in the age group of children studied. The result from this study differs from that of Kaduna State and the study in Ondo State, which reported slightly higher values for wasting [1,2]. These differences may be attributed to larger sample size and involvement of children from a different socio-economic background. The mothers' level of education in these other studies may have also contributed to these differences. Similarly, for wasting, this study found that 70% (6 – 12 months) and 30% (13 – 24 months) were wasted. This is also similar to the findings in the study among pastoral Fulani in the southwestern zone of the country which reported wasting in these age group [9]. Wasting signifies acute malnutrition and mostly affects children that are of the younger age group. This makes the children more vulnerable to illness and may lead to high mortality if not addressed promptly.

This study also found that 16.3% of the children were underweight. This finding is similar to that of Ondo State, Bangang, Cameroon and Ghaziabad District India which reported lower values for underweight [1,17,19] However, the finding from this study was lower than that reported from the study done in Biye, NDHS and MICS [18,20]. This study also found that 64.7% (6 – 12 months) and 35.3% (13 – 24 months) were underweight but this differs from the above study [9]. The similarities in findings may be attributed to both groups being the same in their sociocultural characteristics. Underweight signifies that the child is not being fed adequate food both in quantity and quality. The implication of these findings is that the growth and development of the children have been severely affected and might reduce their productivity and work capacity in adulthood.

The child's age was found to be a significant predictor of a child's nutritional status in this study population. This is because the younger age group are highly dependent on the care of the parent and may not get adequate nutrition in terms of exclusive breastfeeding. The father's educational level was also found to be significantly associated with underweight children. This differed from the study done in Zambia which reported a significant association between underweight and mother's educational status [21]. Other socio-demographic characteristics like mothers' age, level of education, socioeconomic status were not significantly associated with nutritional status.

5. CONCLUSION AND RECOMMENDA-TION

The overall nutritional status of the children was poor with high prevalence of stunting, wasting and underweight. A higher proportion of male children were stunted compared to females. Most of the children stunted were aged 6 – 12 months. There was significant association between stunting and age, with children of younger age group are more likely to be stunted. Therefore, the primary health care department should encourage continuous growth monitoring practices of young children among the Fulani people to detect growth failure early in life and institute measures to control the problems.

5.1 What is Already Know on this Topic

- Nutritional status being an important measure of children's health.
- Prevalence of nutritional status of mainly under-fives (0 – 59 months).
- Nutrition being an important determinant of nutritional status.

5.2 What this Study Adds

- Prevalence of nutritional status in the younger age group (6 – 24 months).
- Socio-demographic determinants of nutritional status.
- Prevalence of stunting, wasting and underweight among Fulani children.

6. LIMITATIONS

Confirming exact children and mothers' age was difficult because of non-availability of birth certificates. Sometimes the mother/caregiver might not remember hence some important events like festive periods, election dates, beginning of raining season etc. were used for near estimation of age of the children and mothers.

ETHICAL APPROVAL

Ethical approval to conduct the research was obtained from the Ahmadu Bello University Teaching Hospital (ABUTH) Zaria Ethics and Research committee. Permission was obtained from the MakarfiLocal Government Council, the village heads and Fulani community gate keepers (*Miyetti Allah, Ardos*) before the study commenced. Written informed consent and assent was obtained from the participants through their parents/caregivers who were earlier informed of the study objectives, assured of the confidentiality of any information given and also their right to withdraw from participation in the study at any point.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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