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JCIMCR OPEN ACCESS Journal of Clinical Images and Medical Case Reports

ISSN 2766-7820

Research Article

Open Access, Volume 5

Prevalence and determinants of stunting and wasting among under-5 children in Lagos State, Southwestern Nigeria

Amoran Olorunfemi E[1]*; Adebayo Omowunmi T[2]; Mautin James J[1]; Sodehinde Kolawole O[3]; Ekundayo Adeola A[1]; Salako Albert A[1]

[1]Department of Community Medicine and Primary Care, College of Health Sciences, Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria.

[2]Agbowa General Hospital, Lagos State Hospital Management Board, Lagos State, Nigeria.

[3]Department of Community Medicine and Primary Care, College of Health Sciences, Babcock University Teaching Hospital, Ilisan, Nigeria.

***Corresponding Author: Olorunfemi AE**

Department of Community Medicine and Primary Care, College of Health Sciences, Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria.

Email: drfamoran@yahoo.com

Received: Jan 22, 2024

Accepted: Feb 07, 2024

Published: Feb 14, 2024

Archived: www.jcimcr.org

DOI: www.doi.org/10.52768/2766-7820/2859

Abstract

Introduction: Malnutrition continues to be a major public health problem in developing countries. It is the most important risk factor for the burden of disease causing about 300,000 deaths per year directly and indirectly responsible for more than half of all deaths in children. This study was therefore carried out to determine the prevalence and determinants of wasting and stunting among under-fives in Lagos, Nigeria.

Methodology: This was a Community based, cross-sectional, descriptive study, investigations such as dietary survey, anthropometry and clinical examination were done. A multistage sampling technique was used in the study. Data was collected via pretested, open ended, interviewer administered questionnaire. The questionnaires obtained from the study was analyzed using Statistical Package for Social Sciences (SPSS version 20) software programme.

Results: A total of 407 respondents were recruited into the study. Generally, 51.8% of the children were wasted and 57.5% were severely stunted. The highest risk of stunting was among children aged 25-36 months (47.0%) and 13-24 months (30.8%). The factors associated with child's stunting in this study are older age of caregivers, educational status, income and occupation (χ^2=9.895; p=0.042; χ^2=3.880, p=0.049; χ^2=1.108, p=0.006 and χ^2=10.623, p=0.014). The age of caregivers [p=0.336], educational status [p=0.587], income [p=0.241] and occupation [p=0.409] were not found to be factors associated with the child's wasting.

Conclusion: This study show that wasting in under-fives does not depend on the socio-demographic characteristics of the mothers. The highest risk of stunting was among children age 12-36 months. The study emphasized the need for multidimensional and multisectoral intervention aimed at addressing high prevalence of chronic malnutrition such as stunting and wasting.

Keywords: Prevalence; Determinants; Stunting; Wasting; Under-fives; Nigeria.

Introduction

Malnutrition refers to a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients. It is a state of nutrition where the weight for age, height for age and weight for height indices are below-2Z-score of the NCHS reference [1]. Malnutrition continues to be a major public health problem in developing countries. It is the most important risk factor for the burden of disease causing about 300, 000 deaths per year directly and indirectly responsible for more than half of all deaths in children [2,3]. Health and physical consequences of prolonged states of malnourishment among children are: delay in their physical growth and motor development; lower Intellectual Quotient (IQ), greater behavioral problems and deficient social skills; susceptibility to contracting diseases [4]. Major types of nutritional problems in developing countries are under-nutrition and nutritional disorders which results from inadequate food intake both in quality and quantity, particularly of calories, proteins, vitamins and minerals; and parasitic infection and disease [5]. Malnutrition remains a serious obstacle to child survival, growth and development in Nigeria and other developing countries. Prevalence of malnutrition among under five children is high with 48.6% in the country. Protein-Energy Malnutrition (PEM) and micronutrient deficiency are the most common types of malnutrition [6]. Children whose weight-for-age is below minus two standard deviations from the median of the reference population are considered underweight. The measure reflects the effects of both acute (weight-for-age) and chronic (Height-for-weight) under nutrition. Nearly three in ten children (30 percent) are underweight and 8 percent are severely underweight [1,6]. The effects of malnutrition on human performance, health and survival have been the subject of extensive research for several decades and studies show that malnutrition affects physical growth, morbidity, mortality, cognitive development, reproduction, and physical work capacity [7,8]. Malnutrition is an underlying factor in many diseases in both children and adults, and it contributes greatly to the disability-adjusted life years worldwide. Malnutrition is particularly prevalent in developing countries, where it affects one out of every three preschool-age children [9]. A well-nourished child is one with access to adequate food supply, care and health. This study was therefore carried out to determine the prevalence and determinants of wasting and stunting among under-fives in Lagos, Nigeria.

Materials and methodology

Study area: Lagos state was the former federal capital of Nigeria. However it still remain the commercial capital of Nigeria. It consist of 20 local government areas. Its geographical coordinates are 6° 39' 0" North, 3° 43' 0" East. Agbowa Ikosi is one of the political constituency under Epe Local Government Area of Lagos State. It has a public General hospital located in Agbowa, E1 (Agbowa) Agbowa-Ikosi lies 35 kilometer north of Epe Division, on the south bank of a creek that extends parallel to the sea from Lagos to Ikorodu, with a mixture of indigenes and non-indigenes.

Some towns and villages surrounding Agbowa-Ikosi are, Ota-Ikosi, Ikosi Beach, Orugbo-Iddo, Igbalu, Oke-Olisa, Gberigbe, Oko-Ito, Imope, Imota, Odo Ayandelu Ado-Ikosi, Owu, Iganke. The people are mostly farmers and fishermen, accompanied by other commercial activities. The people follow Christianity, Islam and traditional beliefs. Agbowa Ikosi consists of 6 political wards namely Agbowa I, Agbowa II, Owuotta, Ajebo/orugbo, Ifesowapo and Ketu/ejirin. According to 2006 population census the total number of children was 35194.

Study design: This is a community based, cross-sectional, descriptive study in order to investigations the prevalence and determinant of wasting and stunting among under-fives in rural Lagos, Southwestern Nigeria.

Selection criteria: All children aged 0-59 months whose parents resides within Agbowa-ikosi, one of the political constituency in Epe Local Government area of Lagos State and whose guardian or parents' consent to participate in the study were included. Children with acute illness such as fever, diarrhea etc in the last one month, children with cardiovascular diseases and congenital anomalies were excluded from the study.

Sample size determination: The sample size was determined by using the formula for descriptive studies, $n=Z2\ pq/d^2$, where n = calculated sample size, Z = the standard normal deviate, usually set at 1.96 which corresponds to the 95% confidence interval. P=71% the prevalence of the proportion of nutritional status in the target population [9], d = Permissible error of estimation (0.05) and q=1.0-p

$$n=\frac{(1.96)^2 x 0.71 x 0.29}{(0.005)^2}=\frac{0.79098544}{0.0025}=316.394$$

10% attrition 316.394+31.396=347.79≈400 questionnaires

Sampling technique: A multistage sampling technique was used in the study. Epe local government area was selected by balloting out of the 20 local government in Lagos state, and Agbowa Ikosi political constituency was selected from Epe LGA. Three wards were selected out of the total 6 wards in the local government area. These were Agbowa 1, Agbowa 2 and Ejirin. Furthermore, fifteen streets in each wards totaling 45 streets (estimated number of streets in each ward are 48, 39 and 27 respectively). The streets were numbered, small pieces of papers were wrapped with a number each representing each streets, any paper randomly picked were selected and used for the study. Systematic random sampling was used to select 10 houses per street. Individuals household were selected at regular intervals from the sampling frame. The intervals are chosen to ensure an adequate sample size. The houses were numbered and the sum was divided by the number of questionnaires to be distributed, in all there were average of 45 streets containing 3150, it then follows that 3150/400=7.875≈8th house, every 8th household were selected into the study. Only one household per house was selected using simple random sampling (by balloting). In total 450 households were selected.

Data collection: Data generated in this study was carried out using descriptive quantitative interviewer based questionnaire. Three community health extension workers and five health attendants were trained for three days to assist in administering the questionnaires. Checklist was used for clinical examination. This study was carried out within the period of two months (April-June, 2018).

The pretest: Comprised of 10% of the total questionnaire was administered at Sotubo, a town a town under Sagamu Local Government, collected and analysed using SPSS version 20

Table 1: Height-for-age, Weight-for-height and Weight-for-age of index children by background characteristics.

	Height-for-age			Weight-for-height			Weight-for-age		
Age	**Moderate stunting (-2SD to -3SD) (%)**	**Severe stunting (<-3SD) (%)**	**Mean score SD**	**Moderate wasting (-2SD to -3 SD) (%)**	**Severe wasting (<-3 SD) (%)**	**Mean score SD**	**Moderate underweight (-2SD to -3SD) (%)**	**Severe underweight (<-3SD) (%)**	**Mean score SD**
6-12	19(11.0)	18(7.7)	1.49	25(12.8)	12(5.7)	1.32	19(8.7)	18(9.6)	1.49
13-24	68(39.3)	72(30.8)	1.51	54(27.6)	86(40.8)	1.61	72(32.9)	68(36.2)	1.49
25-36	71(41.0)	110(47.0)	1.61	81(41.3)	100(47.4)	1.55	100(45.7)	81(43.1)	1.48
37-48	5(2.9)	21(9.0)	1.80	13(6.6)	13(6.2)	1.50	14(6.4)	12(6.4)	1.46
49-60	10(5.8)	13(5.6)	1.57	23(11.7)	0(0.0)	0	14(6.4)	9(4.8)	1.39
Gender									
All	173(42.5)	234(57.5)	1.57	196(48.2)	211(51.8)	1.52	219(53.8)	188(46.2)	1.46

Table 2: Prevalence of stunting, wasting and underweight by sex.

Nutritional	Male	Female	Total	χ^2	P-value
Stunting					
Moderate stunting	101(58.4%)	72(41.6%)	173(100.0)	5.546	.019*
Severe stunting	125(53.4%)	109(46.6%)	234(100.0%)		
Wasting					
Moderate wasting	98(50.0%)	98(50.0%)	196 (100.0%)	.386	.534
Severe wasting	112(53.1%)	99(46.9%)	211(100.0%)		
Underweight					
Moderate underweight	113(51.6%)	106(48.4)	219(100.0)	.000	1.000
Severe underweight	97(51.6)	91(48.4)	188(100.0)		

Table 3: Relationship between socio-demographic characteristics of caregivers and the Childs' stunting.

	Stunting				
Variables	**Stunted**	**Not stunted**	**Total**	χ^2	**P-value**
Age					
≤24	4(44.4%)	5(55.6%)	9(100.0%)		
25-39	41(64.1%)	23(35.9%)	64(100.0%)	9.895	0.042*
40-49	69(44.8%)	85(55.2%)	154(100.0%)		
50-59	77(57.0%)	58(43.0%)	135(100.0%)		
≥60	28(62.2%)	17(37.8%)	45(100.0%)		
Type of marriage					
Monogamous	129(55.1%)	105(44.9%)	234(100.0%)	.386	0.534
Polygamous	90(52.0%)	83(48.0%)	173(100.0%)		
Type of family					
Nuclear	141(57.8%)	103(42.2%)	244(100.0%)	5.849	0.119
Extended	78(47.9%)	85(52.1%)	163(100.0%)		
Marital					
Married	192(49.1%)	199(50.9%)	391(100.0%)	.677	0.077
Separated/Divorce	4(25.0%)	12(75.0%)	16(100.0%)		
Education					
Tertiary	8(88.9%)	1(11.1%)	9(100.0%)		
Complete secondary	51(56.7%)	39(43.3%)	90(100.0%)	3.880	0.049*
Complete primary	64(49.2%)	66(50.8%)	130(100.0%)		
No formal education	96(53.9%)	82(46.1%)	178(100.0%)		
Income					
< N10,000	126(56.0%)	99(44.0%)	225(100.0%)	1.108	0.006*
N10,000 – N49,000	63(52.1%)	58(47.9%)	121(100.0%)		
N50,000 – N100,000	30(49.2%)	31(50.8%)	61(100.0%)		
Occupation					
Artisan	156(53.2%)	137(46.8%)	293(100.0%)	10.623	0.014*
self employed	39(54.9%)	32(45.1%)	71(100.0%)		

house wife	24(66.7%)	12(33.3%)	36(100.0%)		
Blue collar job	0(0.0%)	7(100.0%)	7(100.0%)		
Parity					
≤4	105(54.7%)	87(45.3%)	192(100.0%)	.113	0.234
>4	114(53.0%)	101(47.0%)	215(100.0)		

*= significant.

Table 4: Relationship between socio-demographic characteristics of caregivers and the Childs' wasting.

	Wasting				
Variables	**Wasting**	**Not-wasting**	**Total**	**χ^2**	**P-value**
Age					
≤24	3(33.3%)	6(66.7%)	9(100.0%)		
25-39	38(59.4%)	26(40.6%)	64(100.0%)	4.557	0.336
40-49	71(46.1%)	83(53.9%)	154(100.0%)		
50-59	61(45.9%)	73(54.1%)	135(100.0%)		
≥60	22(48.9%)	23(51.1%)	45(100.0%)		
Type of marriage					
Monogamous	115(49.1%)	119(50.9%)	234(100.0%)	.215	0.643
Polygamous	81(46.8%)	92(53.2%)	173(100.0%)		
Type of family					
Nuclear	124(50.8%)	120(49.2%)	244(100.0%)	1.730	0.118
Extended	72(44.2%)	91(55.8%)	163(100.0%)		
Marital					
Married	192(49.1%)	199(50.9%)	391(100.0%)	3.57	0.059
Separated/Divorce	4(25.0%)	12(75.0%)	16(100.0%)		
Education					
Tertiary	6(66.7%)	3(33.3%)	9(100.0%)		
Complete secondary	41(45.6%)	49(54.4%)	90(100.0%)	1.930	0.587
Complete primary	60(46.2%)	70(53.8%)	130(100.0%)		
No formal education	89(50.0%)	89(50.0%)	178(100.0%)		
Income					
< N10,000	100(44.4%)	125(55.6%)	225(100.0%)	2.845	0.241
N10,000-N50,000	63(52.1%)	58(47.9%)	121(100.0%)		
N50,000-N100,000	33(54.1%)	28(45.9%)	61(100.0%)		
Occupation					
Artisan	136(46.4%)	157(53.6%)	293(100.0%)	2.891	0.409
self employed	35(49.3%)	36(50.7%)	71(100.0%)		
house wife	22(61.1%)	14(38.9%)	36(100.0%)		
Blue collar job	3(42.9%)	4(57.1%)	7(100.0%)		
Parity					
≤4	91(47.4%)	101(52.6%)	192(100.0%)	.084	0.771
>4	105(48.8%)	110(51.2%)	215(100.0)		

to ascertain the validity of the instrument. All the instruments employed for the study were pretested using independent sample of twenty under-5 children from Sotubo village along Ikorodu road. Sotubo is one of the local government political ward in Sagamu local government stitualted along Ikorod road immediately after cement factory sagamu, ogun state prior to the study in order to ascertain the validity and reliability of the instruments.

Study instrument: The study instrument was interviewer administered questionnaire containing 5 sections to collect information regarding patients' age, sex, residence, birth weight, natal history of prematurity, breast feeding practices. Additional information that was obtained included mothers occupation, information about family size and education level of the parents were obtained.

Anthropometric parameters measurement: Anthropometry is a technique that uses human body measurements to draw conclusion about the nutritional status of individuals and population and often applied to pre-school children below the age of 5 years. Anthropometric measurements were carried out using child's age, height and weight. Recumbent length (for children less than 24 months of age) and height (for children more than 24 months of age) were taken. Height and recumbent length was measured with United Nations Children Fund (UNICEF) standard wooden length board, sourced from the State UNICEF office and recorded to the nearest 0.1 cm with both clothes and shoes off. Trained field workers measured weight to the nearest 0.01 Kg using a 'camry' weighing scale.

These measurements were used in generating indices such as, height-for-age, weigh-for-age and weight-for-height. In order to ensure consistency and reduce error in taking the measure-

ments during field work, each measurement was taken twice, and the mean of the two readings was recorded during training. If any pair of readings exceeded the maximum allowable difference for a given variable, the measurements were repeated. Participants were categorized using the indices that were compared with standard reference values of World Health Organization (WHO) standards recommendations to obtain the Z-scores.

Data analysis: The questionnaires obtained from the study was analyzed using Statistical Package for Social Sciences (SPSS version 20) software programme. The data was presented in frequency distribution tables with percentages. Frequency tabulation was used to describe the socio-demographic characteristics of respondents. Inferential statistical analysis used to determine association between some variables such as socio-demographic characteristics and malnutrition of under 5 children by the respondents was Chi-square. The level of significant was taken at $p \leq 0.05$.

Anthropometric parameters and scoring: Children with height-for-age Z-score of below minus 2 and below minus 3 standard deviation from the median of the reference population were considered stunted and severely stunted while, children with weight-for-age Z-score less than minus 2 and less than minus 3 standard deviation from the median of the reference population were regarded as underweight and severely underweight. Lastly, children with Weight-for-height Z-score less than minus 2 and minus 3 standard deviation from the median of the reference population were classified as wasted and severely wasted.

Weight for height: Weight and height of child is measured using standard seca digital balance and stadiometer respectively and index is expressed in standard deviation units from the median of WHO child growth standards adopted in 2006. Children whose weight-for-height is below minus one standard deviations is considered mildly wasted similarly below minus 2 and 3 standard deviations are considered moderately and severely wasted respectively.

Weight for age: Children whose weight-for-age is below minus two standard deviations from the median of the reference population are considered underweight. The measure reflects the effects of both acute and chronic under nutrition.

Height for age: Children whose height-for-age is below minus two standard deviations from the median of the reference population are considered stunted or short for their age. Stunting is the outcome of failure to receive adequate nutrition over an extended period and is also affected by recurrent or chronic illness [10].

Ethical approval: Permission was sought from the community leaders and staff of the general hospital in the study area for easy access to the community. Ethical approval was obtained from Health Research and Ethics Committee of Olabisi Onabanjo University Teaching Hospital Sagamu with No: OOUTH/HREC/218/2018AP. Written informed consent was obtained from the participants and confidentiality of the information was also be maintained by keeping the questionnaires completed anonymous.

Results

Socio-dermographic characteristics of respondents: Four hundred and fifty (450) questionnaires were administered to respondents while four hundred and seven (407) were fully completed and returned. The response rate was 90.44% as 407 questionnaires were returned. The mean age of the children under study was 26.58±10.10 months, majority, 210(51.6%) were males.

Prevalence of stunting, wasting and underweight by sex: Table 1 show that the mean height of the respondents was 11.21±1.43, weight to height range from -2.92-2.58 with mean as 1.2±1.00, height for age having the mean as 1.3±1.00 while mean weight for age was 1.1±1.00. Generally, 51.8% of the children were wasted and 57.5% were severely stunted. The prevalence of under-weight among the under-5 children in the study was 46.2%. Stunting is apparent and high even among children of age 25-36 months (47.0%). It is shown that stunting decreases with increase in the age of the child through the first five years of life. Thus wasting and stunting was more prevalent among children aged 25-36 months accounting for 47.0 and 47.4% respectively.

Table 2 show that that female children are less likely to be severely stunted when compared to male children (53.4% and 46.6%, p=0.019). While prevalence of underweight and wasting was not affected by sex [p=1.000 & 0.534]. However, prevalence of stunting was statistically significant associated with gender [χ^2=5.546, p-value=0.019].

Relationship between socio-demographic characteristics of caregivers and the Childs' Nutritional status: Age of caregivers was found to be associated with stunting in the child (p=0.042). Caregivers aged 25-39 years had the highest percentage of children with stunting (64.1%), this was followed by caregivers greater that sixty years and those that are 56-59 years of age (57.0%). Significantly more caregivers who had tertiary level of education had 88(88.9%) children who were stunted [p=0.049]. Among those who had completed secondary, primary and no formal education had 51(56.7%), 64(49.2%), 96(53.9%) stunted children respectively. Majority of the housewives [66.7%] who are not financially independent were significantly associated [p=0.014] with stunting. Income was also found to be associated with stunting [p=0.006]. Caregivers earning less than $25 [10,000 Naira] had more stunted children 126(56.0%) than those earning $25-$120 [N10,000-N50,000] which was 63(52.1%)] and those earning $120-$235 [N50,000-N100,000] was 30(49.2%)]. This is shown in Table 3.

Factors associated with greater stunting in this study are older age of caregivers, tertiary educational status, low income and housewife occupation (χ^2=9.895; p<0.042; χ^2=3.880, p=0.049; χ^2=1.108, p=0.006 and χ^2=10.623, p=0.014). The age of caregivers [p=0.336], educational status [p=0.587], income [p=0.241] and occupation [p=0.409] were not found to be factors associated with the child's wasting in this study. This showed that the reason for the children's wasting does not depend on any of the socio-demographic characteristics of the caretakers. This is as shown in Table 4.

Discussion

The overall assessment of nutritional status of children shows that 57.5%, 51.8% and 46.2% were stunted, wasted and underweight. The risk of malnutrition increased with age of respondents. This prevalence is similar to values reported from several studies [8-11] and high when compared to several other studies among the under five children using the same assessment tools [12,13]. This high prevalence might be due to socio-economic, developmental, and education difference. Sex

and age of children are important demographic variables and the primary basis of demographic classification in surveys. The study population is located in a rural district in Lagos with minimal social amenities and most of the study population are peasants. Providing training courses in health and nutrition education targeting rural women on the essence of breastfeeding and food consumption of the under 5 children is very essential in this population and other similar low income areas.

Majority of the housewives who are not financially independent and those with low income were significantly associated with stunting. Such a relatively low income will most likely affect the nutritional status of subjects in such homes considering the cost of living. This findings have been reported in several studies [13,14]. The income of the household head, appears to be a major factor in determining the nutritional status of mothers and children in the household. Thisfindings imply that provision of welfare and financial independence to improve the economic condition of the nursing mothers may help in the reduction of malnutrition especially prevalence of stunting and wasting among the under-fives in Nigeria and other low income countries.

The highest risk of stunting was among children age 25-36 months (47.0%) and 13-24 months (30.8%). This finding was consistent with other studies, which shows that the main associated factors for under-five stunting was age 12-23 months of the child [15]. Finding from Nairobi also reported that the prevalence of stunting among children age 6-59 months was about 47%, and the prevalence increased with age through 36-47 months (58%) [16,17]. In Democratic Republic of Congo which shows, an inverse linear association with age of the child and stunting [18]. Study in Bangladesh also indicated that the highest risk of stunting was among children age 12-23 months and children in the youngest age group, 6-11 months, had a significantly lower risk of being stunted than children in the older age groups [19] similar to this study. This age 12-23 months have implication in intervention. The mothers of children of this age group should be targeted for behavioural change communication in child survival clinics and other broader places of nutritional and health intervention.

The results of the present study revealed a higher prevalence of stunting in males (53.4%) than females (46.6%) this might indicate a physiological factor. Several studies have reported similar findings in Africans [18,20,22]. Cultural factors such as sex preference leads to preferential treatment in food supplementation during the weaning period, stopping breastfeeding earlier than the suggested 24 months etc can be implicated.

This study show that wasting in under-fives does not depend on any of the socio-demographic characteristics of the caretakers. This is in contrast with several studies [23]. It rather indicate that intrinsic factors in children may be a determinant of wasting. This may also be due to the fact that wasting is an acute problem. Lack of proper nutritional education and illiteracy amongst caregivers, parents and children contribute to the growing malnutrition epidemic. Children are not equipped to make suitable food choices and are dependent on caregivers and parents to make choices. Use of Growth charts for regular weighing of children at all health services will be helpful because it helps to detect early malnutrition as well as getting the educational messages to the mothers.

Conclusion

This study show that wasting in under-fives does not depend on any of the socio-demographic characteristics of the caretakers. The highest risk of stunting was among children age 12-36 months. The study provided evidence of high malnutrition among under-five children especially those aged 12-36 months in the study area and this, emphasized the need for multidimensional and multisectoral intervention aimed at addressing prevalence of high malnutrition. This can be achieved through strategic advocacy to policy level stakeholders, promotion of Maternal and Child Health (MCH) services and integrated health promotion focusing on caregivers of children under-fives.

Providing training courses in health and nutrition education targeting harmful cultural practices such as sex preference, essence of breastfeeding and food consumption of the under 5 children to rural women is very essential in this population and other similar low income areas. Use of Growth charts for regular weighing of children at all health services will be helpful because it helps to detect early malnutrition as well as getting the educational messages to the mothers. Provision of welfare and financial independent to improve the economic condition of the nursing mothers may help in the reduction of malnutrition especially prevalence of stunting and wasting among the under-fives in Nigeria and other low income countries.

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