

Public Health Implications of Malnutrition in Under-Five Children in Barkin Ladi LGA, Plateau State, Nigeria

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Abstract

The importance of malnutrition regardless of its cause is due to its consequences, this is because undernutrition is one of the utmost significant universal health problems, and it affects a large number of children in developing countries including Nigeria. It is, therefore, no gainsaying that malnutrition is a multi-dimensional entity. This study was therefore initiated to investigate the public health implications of malnutrition in under-five children in Barkin Ladi LGA. To effectively understand the effects of malnutrition in under-five children, three research objectives were outlined. Thus, identify the causes of malnutrition in under-five children, identify the public health implications of malnutrition in under-five children, and examine the feasible measures as a way of recommendation towards solving the incidence of malnutrition in under-five children in Barkin Ladi LGA. The works of prominent authors including the World Health Organization, amongst others were reviewed in line with the stated objectives. Data were collected both qualitatively and quantitatively using a multistage cluster sampling technique was adopted to select the communities. Seven villages were randomly selected by balloting. Clusters of 93 Centers were selected from these seven villages. This study identifies certain risk factors, (including poor hygiene, diet-related non-communicable diseases, mortality among others), which were found to be significantly higher in children with malnutrition compared to normal children. The study also found that the educational status, as well as the economic status of the parents, was associated with the nutritional status of the child. The study recommends both short and long-term measures that include family planning education, improve the provision of infrastructural facilities to rural communities and security of lives and properties.

Keywords: Undernutrition, Nutritional Status, Mortality Rate, Wasting, Stunting, Nigeria

Introduction

Undernutrition is one of the utmost significant universal public health problems, and it affects a large number of children in developing countries including Nigeria

(Ansuya, Nayak, Unnikrishnan, Anice, Shashidhara, Suneel & Vasudev 2018; Kandala, Fahrmeir, Klasen & Priebe, 2009). The United Nations Children's Fund Report (UNICEF, 2015) ranked Nigeria second on the highest burden of stunted children worldwide, with a national prevalence rate of 32% of under-five children. It is a well-known fact that the nutritional status of children is one of the major indicators of the economic development of a nation. Economic growth is considered one of the important indicators for the assessment of nutritional status. It is measured as weight-for-age, weight for height and height for age indexes. The common nutritional status of children under 5 years old in every country such as underweight, stunting and wasting are considered as nutritional disorders, which the evaluation of these criteria reflects the general health status of that country (Mohammadinia, Sharifi, Rezaei & Heydari Khayat, 2012).

Proper nutrition of children is identified as leading to adequate growth and good health is the essential foundation of human development. However, the World Health Organization states that malnutrition in all its forms includes undernutrition (wasting, stunting, and underweight) inadequate vitamins or minerals, overweight, obesity, and resulting diet-related non-communicable diseases. UNICEF report (2006) reported that the causes of childhood malnutrition as insufficient diet, frequent infections, poor breastfeeding practices, delayed introduction of complementary food and inadequate protein in the diet. Other factors that influence food intake include health status, food taboos, growth and personal choice related to diet. According to UNICEF Report, (2018) Nigeria has the second-highest burden of stunted children in the world, with a national prevalence rate of 32% of children under five. An estimated 2 million children in Nigeria suffer from severe acute malnutrition (SAM), but only two out of every 10 children affected is currently reached with treatment. Seven per cent of women of childbearing age also suffer from acute malnutrition.

The World Health Organization report shows that in 2014 approximately 426 million adults worldwide were underweight, while 1.9 billion were either overweight or obese. In 2016, an estimated 155 million children under the age of five years were suffering from stunting, while 41 million were overweight or obese. The report also indicated that around 45% of deaths among children under five years of age are linked to undernutrition. These mostly occur in low and middle-income countries. At the same time, in these same countries, rates of childhood overweight and obesity are rising. In responding to the challenges of malnutrition, on 1 April 2016, the United Nations (UN) General Assembly proclaimed 2016-2025 as the United Nations Decade of Action on Nutrition, which set a timeline for implementation of the commitments made at the Second International Conference on Nutrition (ICN2) to meet a set of global nutrition

targets and diet-related NCD targets by 2025, as well as relevant targets in the Agenda for Sustainable Development Goal (SDG) to end hunger, achieve food security and improved nutrition and promote sustainable agriculture (Tasnim, 2018). Similarly, the World Health Organization 2016-2025 nutrition strategy aimed at working together with the Member States and partners towards universal access to effective nutrition interventions and to healthy diets from sustainable and resilient food systems (WHO, 2020).

The alarming rate of malnutrition in Nigeria can be attributed to many factors among which are, high rate of unemployment, poor infrastructural facilities, insurgency and ethnoreligious violence, as well as economic instability. However, the importance of malnutrition, regardless of its cause is due to its consequences, because it causes skin rashes, hair loss, impaired immune response and susceptibility to infections, digestive problems, night blindness, impaired wound healing and a change in emotional behaviour (Taheri, *et al*, 2006). On the other hand, the height and weight measurements are important information sources for the assessment of growth and nutritional status. Malnutrition can be detected in the early stages before clinical symptoms by anthropometric measurements to provide suitable solutions according to the degree of malnutrition.

Objectives of the study

1. To identify the causes of malnutrition in under-five children in Barkin Ladi LGA.
2. To identify the public health implications of malnutrition in under-five children in Barkin Ladi LGA.
3. To examine the feasible measures as a way of recommendation towards solving the incidence of malnutrition in under-five children in Barkin Ladi LGA.

Statement of the problem

Malnutrition among children aged below five years is a serious public health problem in developing countries, particularly in Africa and Asia regions (Tasnim, 2018). Malnutrition can increase the risk of both morbidity and mortality in children under five years old. Statistics have shown that about 54% of deaths among children under five years old are caused by malnutrition. Malnutrition in early childhood can also increase impaired psychological and intellectual development. The disturbance in both psychological and intellectual development can lead to low school performance and behavioural disturbance. Furthermore, malnutrition in early childhood is often associated with low individual's economic productivity that leads to social and economic deprivation. It prevents children from reaching their full physical and mental potential. 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 behavioural problems and deficient social skills; susceptibility to contracting diseases (Kandala, N, Tumwaka, P. M, Jacques, B. O, Kikhela, P. D and Francesco, P. C, 2011). Furthermore, child malnutrition is associated with approximately 60% of under-five mortality in developing nations including Nigeria. The majority of studies on child nutritional status have described the prevalence of malnutrition among under-five children and analyzed socioeconomic, demographic and cultural factors associated with child malnutrition.

Despite budgetary allocations towards tackling the menace of malnutrition and the constant ongoing enlightenment on the need for proper nutrition in the early stages of a child's life, the spate of malnutrition has continued to increase in Nigeria, most especially in the rural areas and the Northeastern part of the country. Malnutrition is estimated to contribute to more than one-third of all child death, although it is rarely listed as the direct cause. Lack of access to highly nutritious foods, especially in the present context of rising food prices is a common cause of malnutrition (UNICEF, 2020). Poor feeding practices such as inadequate breastfeeding, offering the wrong foods, and not ensuring that the child gets enough nutritious food, contribute to malnutrition. Infection particularly frequent or persistent diarrhoea, pneumonia, measles and malaria also undermine a child's nutritional status.

Studies over the years including the UNICEF reports, WHO (2020) and the World Bank reports (2003) stated that malnutrition makes children in particular much more vulnerable to disease and death. Tasnim, (2018) further stated that health inequities in developing countries are caused by unequal distribution in income, power, goods and services. This condition leads to unfairness inaccessibility of health care, education and employment. Therefore, children under five in lower socioeconomic positions often have worse nutritional status than those in higher socioeconomic positions (Tasnim, 2018). In Nigeria, economic and political instability is also identified as one of the major causes of malnutrition in a child as well as adults. Hence, this article investigates the causes and effects of malnutrition among children with the primary aim of recommending solutions to reduce the increasing rate of child mortality rate in Barkin Ladi LGA.

Methods and materials

Study design

The study is a Community-Based Case-control, which was conducted in Barkin Ladi LGA, Plateau State Nigeria. Survey questionnaires were used to gather data from the selected mothers from the study area. In addition, the service of a research assistant was employed to translate the research tools to the Birom language (local language), then re-translated to English to check the language validity.

Study participants

The study was conducted among the sample of children between three to five years, in Barkin Ladi and their mothers.

Sampling technique and sample size

A Survey was carried out to identify the children with malnutrition. A multistage cluster sampling technique was adopted to select the communities. Seven villages were randomly selected by balloting (i.e Foron, Ropp, Gana, Werei, Fan, Kassa and Dogo Na Hauwa). Clusters of 93 Centers were selected from these seven villages. 1485 children were assessed for nutritional status from 93 selected centres. Among these 1485 children, 362 were identified as malnourished based on World Health Organization (2006) child growth standards (weight for age). The control group was selected based on 1:2 ratios. Thus, a sample of 190 cases and 380 controls were included in the study. For each malnourished child identified (case), two normal-weight children (controls), who met the inclusion criteria were selected immediately succeeding to the child's register number in the attendance register maintained in the selected centres.

Measurements

Measurement of the weight of the preschool children was done to identify the malnourished children. The nutritional status was graded as per the World Health Organization 2006 child growth standards. Children in the age group of 3–5 years, with a weight for age ratio less than -2 SD ($-2Z$ Scores) and not suffering from any chronic illness were considered a case. Controls were healthy children in the same age group with a weight for age ratio above -2 SD ($>-2Z$ scores).

Ethical consideration

Approval for carrying out the research was obtained from the Plateau State Ministry of Health. All participants were provided with clear information and asked if they would be willing to participate or not. Only those who were willing to participate were involved and written consent was obtained. All information

obtained for the study was treated with the utmost confidentiality and the names of the respondents were not required to ensure anonymity.

Findings

Table 1 shows that the majority of children Cases $n=110$ (57.9%) were from the nuclear family, while Controls $n=214$ (56.3%) which signifies that type of family has no much influence on child nutritional status as there is no much difference between these groups of children. However, the father's educational statuses have an influence on the child nutritional status as presented in Table 1. Above this can be attributed to the fact that children whose fathers are educated are more likely to be employed and have high socioeconomic status as compared to fathers who are primary school certificate holders.

Further investigation of this study found between malnutrition and immunization status of the child as well as the educational status of mother (χ^2 (df) =15.8(3), $p<0.001$) and the father (χ^2 (df) =22.2(3), $p<0.001$). A child's risk of malnutrition was higher when he/she was partially immunized, as compared to a child who was completely immunized OR 2.31, 95% CI (1.58–3.36) $p<0.001$]. The Child-related risk factors presented in Table 2 depicts that children with birth weight less than 2000g were 1.9 times, and those between 2000 and 2500g were 3.9 times at a higher risk of being malnourished, as compared to children with birth weight more than 2500g. Second and third birth order children were 3.8 times and 2.7 times higher risk of being malnourished as compared to the firstborn. The study also found that the birth interval between the first and the second child and between the second and the third child, if less than 3 years, had a high risk of malnutrition ($p<0.001$).

As shown in Table 2 a malnourished child was noted to have a 6.9 times higher risk of having suffered from recurrent cold and cough, and 10 times the risk of having recurrent diarrhoea in the previous year. In addition, a malnourished child has 4.6 times and 6.8 times higher risk of having suffered from worm infestation and poor appetite respectively.

The finding of this study revealed that environmental risk factors (water and sanitation characteristics) Children practising open defecation were more among cases (14.7%) than in controls (6.8%), and they also tend to have a 2.3 times higher risk of being malnourished, compared to children using a sanitary latrine 95%CI (1.37– 4.14), $p=0.002$. Children whose families had open drainage system around the house was noted to be more in cases (74.7%) than controls (58.2%), and were at 2.0 times at a higher risk of being malnourished than families that had underground and piped drainage system 95%CI (1.329–3.29), $p<0.001$. Factors such as a source of water and method of water storage in the house did

not have any association with malnutrition, but the method of extracting the drinking water (for example, immersing both the glass and the hand into the stored water) by the children had the significant association with malnutrition. Children who had the habit of immersing both their hand and the glass to extract drinking water, and children who had the habit of immersing only in the glass and not their hand, was noted to be more in cases compared to controls. They had 4.7 times 95%CI 2.02–11.05, $p < 0.001$ and 7.25 times 95%CI: 3.00–17.49, $p < 0.001$ higher risk, respectively, of being malnourished as compared to children using a long spoon to extract drinking water from a stored vessel.

Discussion

Findings revealed that the nutritional status of children under the age of five is affected by different factors including poor hygiene, diet-related non-communicable diseases, mortality, impaired immune response and susceptibility to infections, digestive problems, night blindness, impaired wound healing and a change in emotional behaviour among others. Certain risk factors such as diarrhoea, pneumonia, measles and malaria were found to be significantly higher in children with malnutrition compared to normal children. The educational and socioeconomic status of the parents was associated with the nutritional status of the child. The socio-economic status of the family was independently associated with under-nutrition as the study populations were from rural areas. Hence, in richer households, often children are well fed and cared for, through which they are more likely to survive, to have fewer diseases and illnesses, and to fully develop thinking, language, emotional and social skills (UNICEF, 2007). However, in poorer households, most children are affected by the resurgence of kwashiorkor due to a lack of proteins in the diet and other related illnesses. This is certainly due to the increasing poverty among parents who cannot afford to buy proteins (groundnuts, beans, meat, fish, and milk) for their children.

The World Health Organization (2009) maintained that adequate nutrition during infancy and early childhood is essential to ensure the growth, health and development of children to their full potential and recommended that, for achieving optimum growth, development and health a child should be breastfed exclusively during the first six months of life. To evolve as a healthy individual, the infant should be continued with adequate and appropriate safe complimentary food along with breast milk up to two years of age or beyond.

Stunting prevalence between children from uneducated mothers or those whose mothers have a primary school level of education compared with those from mothers with a secondary or high level of education remains high. Education could make a difference by empowering mothers (decision on the type of

nutrition and/or use of preventive medicine). Education could also help the mothers make informed nutritional decisions about cultural norms on certain types of food for children. Regarding other variables, male children seem to be more exposed to the risk of malnutrition than female children are. There is however no obvious explanation for this gender difference. Similarly, older children are more prone to be exposed to anthropometric failure than their counterparts aged less than one are, mainly, older children are mixed breastfed, even not breastfed at times, while younger children may be protected by the mother's immune system at birth (Kandala NB, Fahrmeir L, Klasen S, Priebe J, 2009). The risk could be also due to the lack of foods in the households due to poverty or the lack of hygiene by mothers when cooking children foods. The direct causes of malnutrition are the lack of access to drinking water in Barkin Ladi LGA, morbidity (malaria, respiratory infections and diarrhoea) and poor food consumption.

Conclusion

Evidence has shown that undernutrition is one of the utmost significant universal public health problems, and it affects a large number of children in developing countries including Nigeria, hence, should be given top priority. This study has been able to determine that childhood malnutrition is spatially structured and rates remain very high in Bakin Ladi because it is a rural settlement and most of the populace were unemployed and have little or no access to basic social amenities including good drinking water, electricity, schools and medical facilities. The study concludes that improvement of the nutritional status of children would help avert child deaths from diarrhoea, pneumonia, malaria, HIV and measles. Consequently, it would reduce neonatal mortality, helping achieve Millennium Development Goals (MDGs), which main aim is to reduce poverty and hunger. There is an urgent need for national policies to improve the security of people and implement agricultural policies for auto-dependent agriculture. In other words, improving maternal and child nutrition is a prerequisite for achieving MDGs, to reduce the child mortality rate. In addition, nutritional programmes and policies that will try to reduce female illiteracy and provide basic infrastructures in rural areas to reduce gaps in health care between socio-economic groups are likely to succeed. The majority of the poorest household lives in rural areas and poorest children are more exposed to the risk of being malnourished. Hence, there is an urgent need to build programmes that aim to reduce poverty in both rural and urban areas.

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Table 1 Demographic Characteristics of the Participants

Demographic characteristics	Cases N=190 (%)	Controls N=380 (%)
Age in years		
Less than 1 year	40 (21.1)	87 (22.8)
1 year	31 (16.1)	138 (36.3)
2 years	44 (24.4)	69 (18.2)
3 years	32 (16.5)	43 (11.0)
4 years	43(24.0)	41 (10.0)
Sex		
Male	85 (44.7)	184 (48.4)
Female	105 (55.3)	196 (51.6)
Type of Family		
Nuclear	110 (57.9)	214 (56.3)
Extended	80 (42.1)	166 (43.7)
Highest Level of Education of Father		
Primary	55 (28.9)	297 (78.2)
Secondary	95 (50.0)	83 (21.9)
Tertiary	40 (21.1)	166 (43.7)
Highest Level of Education of Mother		
Primary	10 (5.3)	297 (78.2)
Secondary	150 (78.9)	83 (21.9)
Tertiary	30 (15.8)	166 (43.7)

Source: Field work, 2019

Table 2: Child Illness Factors and Malnutrition

Childs Illness Factors	Cases N=190 (%)	Controls N=380 (%)
Cold and cough	85 (44.7)	184 (48.4)
	105 (55.3)	196 (51.6)
Typhoid malaria	190 (100.0)	380 (100.0)
	000 (100.0)	000 (100.0)
Diarrhea	110 (57.9)	214 (56.3)
	80 (42.1)	166 (43.7)
Stunning and wasting	55 (28.9)	297 (78.2)
	95 (50.0)	83 (21.9)
	40 (21.1)	166 (43.7)
Respiratory infections	10 (5.3)	297 (78.2)
	150 (78.9)	83 (21.9)
	30 (15.8)	166 (43.7)

Source: Field work, 2019

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