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Research Article

APPRAISAL OF PUBLIC HEALTH NUTRITION EDUCATION IN CHILD HEALTH AND DEVELOPMENT IN NIGERIA

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ABSTRACT
Inadequate nutrient intake during the window of opportunity periods has been implicated as the main cause of high infant and child mortality and morbidity in many sub-Sahara African countries including Nigeria. The effect of this also goes beyond childhood but continues into adulthood, as the development of some non-communicable diseases has been linked with poor nutrition at this crucial period of life. The quality of nutrition information available to pregnant women and nursing mothers during ante and post-natal periods has been questionable over the years, as reflected in the poor data available on nutritional status from the Nigerian National Demographic and Health Survey document, which serves as an evaluation tool of the current health situation in the country. Current methods of providing basic public health nutrition information required at this crucial window of opportunity period requires appraisal and modification. Access to simple and easy-to-follow approaches to infant and child feeding processes will assist both the health workers responsible for the provision of nutrition information at the healthcare facilities and mothers to adopt better feeding practices. The need to make nutrition a national developmental issue from the political point of view is equally suggested to the government in order to promote child nutrition as a very important component of promoting their health.

Key Word: *Public Health Nutrition Education, Infant And Child Feeding Practices, Window Of Opportunity Period, National Nutritional Data*

INTRODUCTION
Many a times, nutrition means the same thing as food to some people, including healthcare professionals. This disposition may have negative effect on the quality of nutrition information that these professionals provide to the clients. Good nutritional status depends on four basic parameters, which include quality of food intake, health status, level of care and the prevailing environmental hygiene or sanitation (Oyewole, 2007). These are the basic principles upon which the foundation of Nutrition is laid. This in essence means that nutrition can only be scientifically discussed within the context of these parameters. Research evidence has shown that a child who has access to *"good food"* may not necessarily present with good nutritional status (Oyewole, 2011). This suggests that good food alone does not guarantee good nutrition. It is suffix to add that nutrition has been found to contribute almost 60% to the causes of major childhood killer diseases and also child cognitive development is highly dependent on the state of nutrition (Wainwright and Colombo, 2006), especially during the window of opportunity period. On these premises, issues relating to nutrition require comprehensive assessment, analysis and subsequent intervention both at the local, state, national and global level to enhance quality of life of the vulnerable, especially the young children.

Infant and child feeding practices
A child is operationally defined as a baby between 0 and 5 years. They are otherwise referred to as under-5s and constitute one of the vulnerable groups in any given population. The peculiar feeding processes include breastfeeding (usually exclusive between 0-6 months), complementary feeding (6-9 months) and introduction of normal adult family diets. It should be added at this point that any default in the feeding

pattern at this stage in life may jeopardize subsequent nutritional status in later life, with high risk of developing any of the non-communicable diseases including obesity and its other attendant problems.

Nutritional status and effects on child health

One of the yardsticks to determine the level of development of any country is to consider the nutritional status of the under-5s. The under-5s are most at risk of malnutrition because they are more vulnerable to adverse environmental conditions and respond rapidly to dietary changes. They are also more at risk of becoming ill, which will result in weight loss. Consequently, their nutritional status is considered a good gauge for population-based assessment of level of malnutrition. During the developmental years, children are susceptible to skeletal growth failure in ways that adults are not when there is acute or chronic malnutrition, which are good reflections of short-term and long-term malnutrition. Data from nutritional survey of under-5s are therefore used to draw conclusions about the situation of the entire population and not just that age group. The nutritional status of under-5 children in Nigeria is presented as follow:

- 41 percent of children under five are stunted and 23 percent are severely stunted (NDHS, 2008)
- Overall, 14% of the children in Nigeria are wasted, and half of them severely wasted (NDHS, 2008)
- 23% of all children in Nigeria are underweight; almost 1 in 10 of these children are severely underweight (NDHS, 2008)
- Even if a child is only mildly malnourished, the mortality risk is increased. In Nigeria, mild and moderate malnutrition contribute to more deaths (35%) than severe malnutrition (10%) (NDHS, 2003).
- In comparing the nutritional indices of stunting, wasting and undernutrition to acceptable global standards, the following were observed:
- Stunting prevalence is 20 times the level expected in a healthy, well nourished population. Stunting reflects long standing (chronic) undernutrition
- Wasting prevalence is 4 times the level expected in a healthy, well nourished population. Wasting reflects recent onset (acute) of undernutrition
- Underweight prevalence is 14 times the level expected in a healthy, well nourished population. Underweight reflects a combination of both stunting and wasting

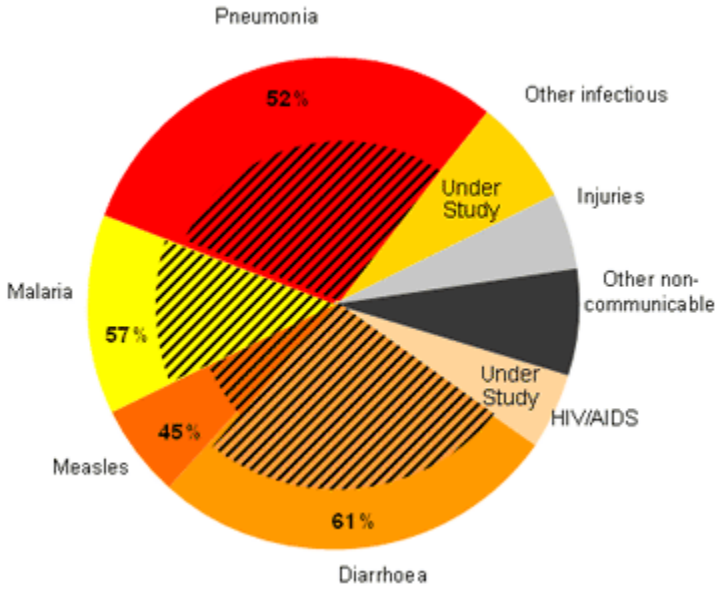

Figure 1: Deaths among children aged 28 days to five years (6.6 million per years)
The shaded area shows the % of deaths from these infection that are due to the presence of undernutrition

It is very important to state the crucial period when malnutrition usually sets in among Nigerian children. This includes the first trimester (when many women may not even know that they are pregnant at this time and if it is in adolescent girls, they will try to conceal the pregnancy either by not eating well to avoid bulging tummy or avoid visiting ante-natal care) and the 6th month post-delivery (period of transition from exclusive breastfeeding to complementary feeding and introduction of family diets). Access to adequate nutrition information and support during these periods will assist in the prevention of malnutrition.

Malnutrition starts very early in life in Nigeria; as average national prevalence of low birth weight (LBW) is 8% (NDHS, 2008). The time between 0 and 20 months is the most vulnerable period to malnutrition (NDHS 1990; 2003). This period is referred to as the second window period of opportunity to prevent or reduce the incidence of adult diseases. Usually, by 24 months, irreversible damage has already been done to the undernourished child. These periods are marked by exclusive breastfeeding and introduction of complementary feeding. The practices of these two feeding processes are far from being adequate in Nigeria. The rate of exclusive breastfeeding in Nigeria is 13% while that of breastfeeding with complementary food is 75% (NDHS, 2008). Although, the rate of complementary feeding is high, the quality of the food is questionable in most cases.

Nutritional deprivation, which starts *in-utero*, has been implicated in origin of adult diseases (Barker's Hypothesis on Foetal Origin of Adult Diseases)

The significance of the foetal origins hypothesis or the Developmental Origins of Adult Health and Disease (DOAHD) for developing countries is broad, suggesting that countries with a high prevalence of undernutrition may be at risk for hosting a large population of adults at an increased risk for chronic diseases.

The study of the Dutch Famine of 1945 provides support for DOAHD (Ravelli et al., 1976). A cohort of men born before, during, and after the Nazi-imposed famine in Holland was studied to determine the relationship between adult body weights relative to famine exposure during gestation. Men who had been affected by the famine during early gestation, which is referred to as the first window of opportunity period, were more likely to be overweight as adults compared to men who were exposed to the famine during the last part of gestation. Several other large epidemiological studies have reported an association between being born at-term with low birth weight (LBW) and chronic disease in adulthood (Curhan et al., 1996, Li et al., 2003, Osmond and Barker, 2000, Stein et al., 1996, Martyn and Barker, 1994, Poulsen et al., 1997). Of particular interest has been the association between LBW and cardiovascular disease (CVD) and hypertension.

In another cohort of men and women born in the Hertfordshire region of England (Barker et al., 1989), men and women with lower birth weight were more likely to suffer from CVD than men and women with normal birth weight. Barker et al reported that a correlation exists between birth weight and CVD mortality in a cohort of 1,586 men born between 1907 and 1924. These findings have been confirmed in other cohorts throughout the world, such as England (Barker et al., 1993), Croatia (Kolacek et al., 1993), Sweden (Leon et al., 1998), and the United States (Curhan et al., 1996). Explicit mechanisms for DOAHD are lacking, but usually include abnormalities in the hypothalamic-pituitary axis that affect metabolism, central body fat distribution, impaired fat oxidation and abnormal control of energy intake.

Roles of micronutrients in child nutrition

Vitamins and minerals are referred to as micronutrients and are very essential in the utilization of macronutrients. The burden of disease attributed to micronutrient deficiencies is often referred to as "hidden hunger". The clear link between a poor physical state and a lack of carbohydrate, protein and fat in the diet is not as readily seen when considering micronutrient deficiency. Moreover, sub-clinical levels of deficiency can have serious and irreparable health consequences. Micronutrient deficiencies are most common in areas where diets lack varieties, level of sanitation, knowledge and practice of care is poor. Such diets are common in many rural communities of Nigeria or in poorer urban households that cannot afford to purchase fruits, vegetables, or animal-source foods (Amosu et al., 2011), and at the same time

lacks basic hygiene principles coupled with poor knowledge of importance of fruits/vegetables in the diets and poor caring practices.

Four principal micronutrient deficiencies are of public health concern in Nigeria and these include vitamin A, iron, zinc, and iodine. Consideration for folic acid is yet to gain national attention, in spite of the fact that it is very essential during pregnancy. The national prevalence of micronutrients deficiencies of public health significance is presented below:

- Vitamin A deficiency = 28.4%
- Iron deficiency = 27.5%
- Zinc deficiency = 20.0%
- Iodine deficiency = 11.0% (NGMDC, *2005*)

Basic child anthropometry and mortality risk

The fact that severe malnutrition has a significant effect on mortality is biologically plausible and hardly ever disputed (Gomez, 1956). Several other studies have documented that severely malnourished children are at a much greater risk of dying than are healthy children (Schofield and Ashworth, 1996). An equally important question is, how strong is the association between mild or moderate malnutrition and the risk of child mortality? An accurate answer is important for the success of child survival programmes as the number of children with mild and moderate malnutrition is several times greater than the numbers who are severely malnourished (de Onis Blössner, 1997). If mild and moderate malnutrition are strongly associated with increased mortality, efforts to reduce child mortality should be directed at improving the nutritional status of all children, instead of focusing primarily, or exclusively, on severely malnourished patients.

Few large prospective studies of mortality during childhood have examined this issue. The one by Chen et al., 1980, who studied a cohort of Bangladeshi children (15–26 months at enrolment) for two years, has been highly influential. Their observations, which had important programmatic implications, showed a pronounced threshold effect: mortality increased with worsening nutritional status. More so, Pelletier et al., *1993 and* Pelletier, 1994 reviewed 28 community-based prospective studies on the relationship between anthropometric indicators of malnutrition and child mortality. The authors reached two important conclusions. First, the accumulated results were consistent in showing that the risk of mortality was inversely related to anthropometric indicators of nutritional status and that there was an elevated risk even at mild-to-moderate levels of malnutrition. Moreover, when considering the relative proportions of severe versus mild-to-moderate malnutrition in populations, the authors showed that the majority of nutrition-related deaths were associated with mild-to-moderate, rather than severe, malnutrition. In programmatic terms, this implies that strategies focusing primarily or exclusively on severely malnourished children will be inadequate to improve child survival in any significant way. To make a substantial impact on mortality, the burden of mild and moderate malnutrition in a population must also be reduced. The second important result from the review by Pelletier et al., 1993 is the confirmation that malnutrition has a multiplicative effect on mortality. Malnutrition, rather than acting in a simple additive fashion, was in fact observed to multiply the number of deaths caused by infectious disease.

Appraisal of various methods of determining nutritional status

Nutritional status can be assessed using clinical signs of malnutrition, biochemical indicators, anthropometry and dietary assessment. Inadequacies in nutritional intake eventually alter functional capacity and result in many adverse health outcomes that are distinct expressions of malnutrition's different levels of severity. Initially, children adapt to inadequate diets through reduced physical activity and slowed rates of growth. At moderate degrees of malnutrition activity and growth rates are affected to a greater degree and, in addition, signs of wasting and some biochemical abnormalities (e.g. reduction in serum albumin) begin to show. At advanced stages of severity, all linear growth ceases, physical activity is severely curtailed, body wasting is marked, and clinical signs (e.g. oedema, hair and skin changes) are noticeable. Anthropometry thus has an important advantage over other nutritional indicators: whereas

biochemical and clinical indicators are useful only at the extremes of malnutrition, body measurements are sensitive over the full spectrum. In addition, anthropometric measurements are non-invasive, inexpensive and relatively easy to obtain. The main disadvantage of anthropometry is its lack of specificity, as changes in body measurements are also sensitive to several other factors, including intake of essential nutrients, infection, altitude, stress and genetic background.

A child's body responds to malnutrition in two ways that can be measured by anthropometry: a deceleration or cessation of growth, which over the long term results in low height-for-age or stunting; and body wasting, which is a short-term response to inadequate intakes, and commonly assessed by weight relative to height. Height-for-age and weight-for-height thus discriminate between different biological processes, unlike weight-for-age, which could be low because of stunting (short stature) and/or wasting (recent weight loss). The Gómez criteria relied exclusively on weight-for-age and hence could not discriminate between short-term and long-term forms of malnutrition. Thus, patients classified on the basis of weight-for-age criteria are a mixed group in terms of their clinical nutritional status. In post-Gómez classifications, weight-for-height has emerged as a very important indicator (Waterlow, 1977; WHO, 1995) and, in fact, several authors have identified low weight-for-height as the indicator of choice for screening severely malnourished children who are at increased risk of dying (Bern, 1997; van den Broeck, Meulemans and Eeckels, 1994; Trowbridge, 1979; WHO, 1999).

The substantial contribution to child mortality of all degrees of malnutrition is now widely recognized. As a consequence, current international efforts such as the Integrated Management of Childhood Illness strategy, which focuses on the most important causes of child death, include a number of key nutritional interventions. It was pioneers like Federico Gómez and his colleagues who laid the groundwork for today's approach by developing the concepts that the international nutrition community now uses and continues to refine in an effort to understand better the magnitude of malnutrition and its impact on health. Those who believe that assessing nutritional status is a fundamental tool for protecting child health are indebted to this pioneering work.

Stages and frequency of feeding as the child increases in age

- Feed 6– 8 month old infants complementary foods 2– 3 times per day
- Feed more than 8– 11 month old infants complementary foods 3– 4 times per day
- Feed more than 11– 24 month old children complementary foods 3– 4 times per day
- Offer fruits, vegetables and nutritious snacks 1–2 times per day, as desired.

Suggested public health nutrition education approaches in infant feeding practices

- Feed infants directly and assist older children when they feed themselves
- Offer favourite foods and encourage children to eat when they lose interest or have depressed appetites
- If children refuse many foods, experiment with different food combinations, tastes, textures, and methods for encouragement
- Stimulate the children by talking to them during feeding, using a *'play/fun-eat'* approach
- Feed slowly and patiently and minimize distractions during meals (No watching TV or playing with toys, etc)

Note: Do not force children to eat.

Practice frequent and responsive feeding during and after illness

During illness, increase fluid intake by more frequent breastfeeding, and patiently encourage children to eat favourite foods. After illness, breastfeed and give foods more often than usual, and encourage children to eat more food at each sitting (WHO, 2000).

Practice good hygiene and proper food handling

- Wash caregivers' and children's hands before food preparation and eating
- Store foods safely and serve foods immediately after preparation
- Use clean utensils to prepare and serve food
- Serve children using clean cups and bowls, and discourage use of feeding bottles

- Pregnant women should be encouraged to attend ante-natal clinics, where basic nutrition information will be provided by nutrition professionals and other health workers who have undergone additional training in child nutrition beyond the basics
- Lastly, men and women should be encouraged to have the number of children they can cater for.

Current efforts at the national level in Nigeria towards improving child nutrition

In 2007, a consortium of experts in child health and nutrition had a meeting with the then Nigerian President to discuss the child health agenda, with emphasis on how to improve their nutritional status. At the end of the deliberation, the former President approved the setting up of National Nutrition Council, which is saddled with the following responsibilities:

- Serve as the focal point for the coordination and harmonization of all food and nutrition related policies and programmes being implemented by various line ministries and agencies
- Foster collaborative efforts of stakeholders implementing nutrition programmes in Nigeria
- Coordinate the review on a continuous basis, of policies and programmes with regards to their potential impact on food and nutrition issues
- Ensure effective implementation of the different policies and programmes by putting in place machinery for effective monitoring and evaluation mechanisms
- Maintain ongoing advocacy for food and nutrition programmes
- Ensure that adequate financial provisions are made available in the national annual budget for implementing food and nutrition policies and programmes
- Liaise with international donor agencies, financial institutions, the private sector, CBOs and NGOs when soliciting for funds and material support to complement government resources and efforts
- Coordinate the analysis and dissemination of results of important national data on food and nutrition situation to assist in budget planning and evaluation of impact of national economic, health, agriculture and other social welfare programmes on the people
- Regulate and coordinate the professional practice of food, nutrition and dietetics in Nigeria

It is hoped that government will continue to promote the course of nutrition, especially as it affects the Nigerian child by ensuring that the National Nutrition Council is fully supported. This will serve as a step in the right direction if enabling environment is provided to execute the responsibilities highlighted above.

Conclusion

No nation can afford to waste its greatest national resource… the intellectual power of its people. But that is precisely what is happening where low birth weight is common, where children fail to achieve their full potential growth, where micronutrient deficiencies permanently damage the brain, and where anaemia and short-term hunger limit children's performance at school. It is intellectual resources, not natural or physical resources that determine national power. How can a nation compete internationally when 20-50 percent of its population is intellectually compromised resulting from preventable problems of malnutrition?

Recommendations in line with public health nutrition education strategies

- Encourage adequate food intake of pregnant women, especially during the first trimester, which is the most crucial period to lay solid foundation for the unborn child in-utero. The nutritional needs of women can be supplemented by the government, non-governmental organizations and faith-based institutions among others. This seems to be the most cost-effective nutrition intervention approach because the cost per pregnant woman is affordable, even to the poorest of nations
- Practice of exclusive breastfeeding should be encouraged and nursing mothers should be adequately educated to ensure that the infants receive both the fore and hind breast milk for proper growth. Health workers in post-natal care should undergo special training on breastfeeding to enable them provide a scientifically sound nutrition to nursing mothers beyond the basic knowledge they acquired when in training

- Ensure appropriate complementary feeding, which promotes growth and prevents stunting among children 6–24 months. The period of complementary feeding is when other foods or liquids are provided along with breast milk. The 6– 11 month period is an especially vulnerable time because infants are just learning to eat and must be fed soft foods frequently and patiently (Brown et al., 1998). Care must be taken to ensure that these foods complement rather than replace breast milk. For older infants and toddlers, breast milk continues to be an important source of energy, protein, and micronutrients. Therefore, breastfeeding should continue through 24 months and beyond. Rates of malnutrition usually peak at this time with consequences that persist throughout life. Stunting is seldom reversed in later childhood and adolescence. Inadequate feeding of girl children also affects nutrient stores and subsequent reproductive health problem, which may contribute to maternal mortality statistics. Improving complementary feeding requires a combination of strategies. Energy intake can be increased by increasing breastfeeding frequency, increasing food portion sizes, feeding children more frequently, and/ or providing more energy-dense foods. Micronutrient intake can be increased by diversifying the diet to include fruits, vegetables, and animal products; using fortified foods; and/ or giving supplements. Choosing food combinations that enhance micronutrient absorption is also important (WHO, 2003).

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