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Nutritional Situation In Africa: An Update (UPNIA-2020)

REVIEW ARTICLE

Update on the Nutrition Situation in Nigeria

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Abstract

Background: The role of adequate nutrition in national and human development has been recognized; hence nutrition has become one of the global development agenda. This has led to the setting up of global goals and targets of the 2030 Agenda for Sustainable Development. Nigeria, with other nations in African have been making efforts towards the achievement of the Sustainable Development Goals (SDGs). **Aim:** This review is aimed at providing update on the nutrition situation in Nigeria with a view to providing recommendations for addressing gaps and barriers that may hinder progress. **Materials and methods:** Desk review was carried out. Information was obtained from the most recent published national and sub-national surveys, country profiles, reports from ministries and development agencies and individual researches from universities and research institutions. **Results:** There is limited data to adequately assess the nutrition situation in Nigeria. Despite all the efforts, most of the nutritional indices are below global averages. Nigeria has a stunting rate of 37%, the second highest in the world. Non-communicable diseases are also emerging rapidly as a result of poor intake of foods and dietary components. The high prevalence of malnutrition in all its forms can be attributed to food insecurity, poor infant and young child feeding practices, low socio-economic status, corruption and poor governance, to mention a few. **Conclusion:** Nigeria is still struggling to meet the 2030 nutrition targets; however, there are opportunities to accelerate progress in tackling malnutrition in all its forms.

Keywords: Nutrition situation, malnutrition, dietary intake, food insecurity, Nigeria.

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1 Introduction

Nigeria is located between Latitude 4°N and 14°N and Longitudes 4°E and I5°E and one of the West African countries. It is the most populous nation in Africa. It is estimated to have a population of over 200 million by the end of the year 2020. Nigeria constitutes about 2.35 % of the total population of the world [1]. There are hundreds of ethnic groups with Hausa, Igbo and Yoruba as predominant tribes. Islam and Christianity are the two major religions in Nigeria.

In addition to human capital described as ingenuous, resilient, nation's most priceless assets, Nigeria is endowed with abundant renewable and non-renewable resources. These include abundant arable land and water resources with huge agricultural potentials, oil and gas, deposits of limestone, coal, lead, iron ore, zinc and tin. Solar energy is another abundant resource but has not been effectively tapped in Nigeria. The country is believed to be the largest economy in Africa with potentials to be global player in the future [2]. Nigeria Economic Sustainability Plan [3] has been developed to address the impact of COVID-19 pandemic on the economy.

The National Policy on Food and Nutrition, NPFN [4] recognizes Nutrition as a multi-sectoral and multidisciplinary issue comprising various sectors including health, agriculture, science and technology, education, trade, economy, and industry. According to NPFN [4], "The implementation of the National Policy on Food and Nutrition is the responsibility of the authorities at the three levels of government (Federal, State and Local Government) in collaboration with other stakeholders including the organized private sector, development partners, professional bodies, civil society organizations (CSOs): Non-Governmental Organizations (NGOs), Faith Based Organizations (FBOs), and communities". Multi-sectoral nature of nutrition requires involvement of stakeholders from various sectors. The main stakeholders involved directly or indirectly in nutrition activities in Nigeria include:

a. Relevant Government MDAs (Presidency/National Council on Nutrition (NCN), Ministries of Agriculture, Health, Finance, Budget and Planning, Water Resources and Humanitarian Affairs, National Primary Healthcare Development Agency (NPHCDA), National Agency for Food and Drug Administration and Control (NAFDAC), and Standards Organization of Nigeria (SON);
b. Development Partners and International Organizations: World Health Organization (WHO), Food and Agricultural

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Organization (FAO), United Nations International Children's Emergency Fund (UNICEF), World Food Programme (WFP), Global Alliance for Improved Nutrition (GAIN), Family Health International (fhi/Alive and Thrive), Action Against Hunger (ACF), Save the Children International/ACI, Bill and Melinda Gates Foundation (BMGF), Technoserve;

c. NGOs (Civil Society Initiative for Scaling-Up Nutrition in Nigeria, (CS-SUNN), Aliko Dangote Foundation, Aisha Buhari Foundation, CISLAC);
d. Professional Bodies (Nutrition Society of Nigeria, NSN; Pediatric Association of Nigeria, PAN);
e. Private Sector (FrieslandCampina WAMCO, Cadbury, Nestle, etc.);
f. Education Institutions (Production of Human Resource, Teaching and Research in Nutrition).

Substantial efforts have been made towards the achievement of Sustainable Development Goals (SDGs) and Scaling-Up Nutrition (SUN). Achievement of SDGs are measured with the aid of identified indicators. Although nutrition has been identified as the nourisher of all SDGs [5], SDG2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture) is more nutrition-specific and have targets and their respective indicators shown in Table 1 [6]. Surprisingly, the recent Voluntary National Review on SDGs in Nigeria [7] did not report progress on SDG2 as it was excluded from the seven SDGs (SDGs 1, 3, 4, 5, 8, 16, and 17) considered to be current development priorities [7] of Nigeria. However, the Development Initiatives [8] reported that "Nigeria is on course to meet the global target for under-five overweight but is off course to meet the targets for all other indicators analyzed with adequate data. There is insufficient data to assess Nigeria's progress for low birth weight". This suggests that Nigeria is still struggling to meet the 2030 nutrition targets; however, there is opportunity to accelerate progress in tackling malnutrition in all its forms.

In a renewed effort to eliminate all forms of malnutrition through collective action, the SUN Movement based its activities on the principle that everyone has a right to food and good nutrition. In its efforts to improve nutrition, SUN Movement brings together governments, civil society, the United Nations, donors, businesses and scientists. Nigeria is one of the 61 countries (as of year 2020) that have signed up for SUN Movement. SUN countries are aiming collectively to reach the global targets by 2025 agreed by the World Health Assembly in 2012 [9]. Nonetheless, Nigeria appears to be far from achieving the SUN Movement targets. This review is aimed at providing update on the nutrition situation in Nigeria with a view to giving recommendations for addressing gaps and barriers that may hinder progress and strengthening on identified strengths and opportunities for better nutrition outcomes in Nigeria.

2 Methods

This systematic review was conducted using the 2015 Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) guidelines. Computerized bibliographic databases such as Scopus, PubMed and Embase were searched. The databases available on dietary intake, micronutrient deficiencies, Non-communicable diseases, Infant and Young Child Feeding practices were accessed to search for the latest Demographic and Health Surveys (DHS), Global Nutrition Reports and Regional surveys for Nigeria. This information was complemented by the data collected from published and unpublished reports by international NGOs working in the field of nutrition. We also reviewed other relevant documents that contain information not found in the sources above, such as certain documents from UN agencies (WHO, UNICEF, etc.).

3 Dietary intake

Dietary intake describes the food consumption patterns as well as the quality of the foods consumed. Dietary intake of the Nigerian population is dynamic and influenced by several factors: culture, religion, socio-economic, geographical location, the prevailing food systems, and the nutrition transition through urbanization, technology, social media, and improved transportation [10]. In southern Nigeria, starchy roots, tubers and fruits form the major staple food, while cereals grains predominate in the north. This can be attributed to the food production systems in the northern and southern zones of Nigeria. It has also been observed that rice and wheat-based products are becoming more and more popular in the south due to changing dietary patterns [10]. Animal-source foods, fresh fruit, vegetables and pulses constitute essential sources of key nutrients. Generally, it has been found that fruits and animal source foods (ASFs) are the least consumed food groups in Nigeria and these have strong association with diet quality/nutrient adequacy [11,12]. Consumption of some of these foods are affected by socio-economic as well as rural urban divide. Kuku-Shittu *et al.* [11] in their comprehensive food security and vulnerability analysis, showed that diet quality and quantity improve with wealth. While 80% of all wealth quintiles, livelihood, geographical region consumes starches 5 times or more per week, the wealthier households can afford more nutrient-rich foods (meat, eggs, fish and milk) than poorer households. Mekonnem *et al.* [12] showed that egg, milk, and milk products were consumed by less than 40% of households, while fruits and meat were consumed by less than 60% of household, even though the proportion of households consuming each of these food groups was more in the urban than in the rural area of the country.

Several dimensions of diet quality have been recognized, namely: nutrient adequacy, food variety/diversity; moderation of foods, food groups, energy and nutrients [13]. Nutrient adequacy is the provision of levels of dietary energy and macro- and micronutrients that are appropriate to age, sex, disease conditions and physical activity to maintain a healthy life [13]. Unfortunately, there are no nation-wide quantitative studies on the nutrient intake of Nigerians; available data are qualitative, limited in scope/sample size or outdated.

Inadequate intakes of energy, protein, calcium, iron, zinc, vitamin A and the B-vitamins, particularly among the vulnerable groups and low-income and rural households in Nigeria have been recognized by several researchers [14-18]. Two systematic reviews (2005-2015) in 5 African countries, including Nigeria, showed that dietary intakes of iron, vitamin A, iodine, folate and zinc were inadequate among women of reproductive age (WRA) [19]; zinc,

iron, and vitamin A among children and adolescents [20]. The severity of inadequacy varies from urban to rural, geographical zones and one population group to another. Mean nutrient intakes of pregnant rural women were significantly ($p<0.05$) higher than their urban counterparts in energy and most of the nutrients, except vitamin A, iron and zinc. Despite the variation, both groups did not meet their recommended nutrient intakes (RNI) for energy, calcium, iron and folate [21]. In a study by Japan International Cooperative Agency [22] among children 6-23 month and WRA in the Federal Capital Territory (FCT) between 50% to 100% of the pregnant women met <50% of their requirement for calcium, sodium; majority of the pregnant women, mothers and children did not meet their nutrient requirements for the essential nutrients (Table 2).

The adequacy of protein intake among Nigerian infants, children, adolescents, and women was reviewed by de Vries-ten [23] and showed that apart from adolescent girls, pregnant and lactating women, the Nigerian population had mostly adequate protein intake when compared with the most recent protein recommendation by FAO [24] and WHO/FAO/UNU [25]. Few studies have focus on preschool children and adolescents. Two studies in Akwa Ibom and Enugu States, showed low dietary intake of protein, calcium, iron [17,26] ; riboflavin, thiamin, and vitamin C among pre-school and adolescents [26].

Table 1: Targets and Indicators of SDG2

Targets of SDG2	Indicators of SDG2 Targets
2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round	**2.1.1** Prevalence of undernourishment **2.1.2** Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)
2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons	**2.2.1** Prevalence of stunting (height for age < -2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age **2.2.2** Prevalence of malnutrition (weight for height >+2 or < -2 standard deviation from the median of the WHO Child Growth Standards) among children under 5, disaggregated by type (wasting and overweight)
2.3 By 2030, double the agricultural productivity and incomes of small scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	**2.3.1** Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size **2.3.2** Average income of small-scale food producers, by sex and indigenous status
2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	**2.4.1** Proportion of agricultural area under productive and sustainable agriculture

Table 2: Percentage of mother, pregnant women and children not meeting Institute of Medicine's (IOM's) dietary reference intake levels [18]

Nutrient	Mother (n =50)	Pregnant women (n = 10)	Children (n = 49)
Five (5) Key Nutrients			
Protein	84	90	96
Fat	18	10	67
Fe (upper limit)	30 (2)	90	96
Zinc	74	90	90
Vitamin A (upper limit)	66 (8)	60 (10)	78 (8)
Nutrients that all 3 groups have >50% not meeting DRI			
Calcium	96	100	98
Sodium	74	50	76
Vitamin E	92	90	98
Riboflavin	86	90	90
Niacin	81	90	86
Folate	96	100	94
Vitamin B_{12}	98	90	92
Vitamin C	64	50	77

Generally, the diets of most Nigerians have been described as monotonous and based on starchy staples [17, 27-29]. Dietary diversity (DDS) of 1,472 women in six Nigerian States was found to be poor with a mean score of 5.81 ± 14, using a 14-food group model. The highest prevalence of poor DDS was found in the dry savannah, followed by the moist savannah and then the humid

forest for urban and rural, women, respectively [30]. A mean household DDS of 4.6 was obtained in North central zone of Nigeria [28]. Using the 2015/2016 Living Standard Measurement Surveys, Obayelu and Osho [31] found none of the low-income urban households in Nigeria had adequate. Dietary diversity also enhances the consumption of other dietary components that help to prevent the development of non-communicable diseases. Fig. 1 shows the consumption of food groups and components of Nigerians in relation to the Theoretical Minimum Risk Exposure Level (TMREL) for men and women 25 years and above [32].

Except for legumes, consumption of fruits, vegetables, nuts and seeds, milk, and whole grain are below the TMREL. Nigerian diets are also low in Omega-3, polyunsaturated fatty acids (PUFA), and calcium, while intakes exceeded the threshold for saturated fat, sodium, and sugar-sweetened beverages [33] indicating the shift in dietary habit predisposing the population to risk of Non-communicable Diseases (NCDs).

4 Micronutrient deficiencies

Micronutrient deficiency refers to inadequate or low consumption of foods rich in essential micronutrients or poor utilization of vitamins and minerals essential for good, healthy and functional human body. It is the world's most prevalent and most devastating nutritional problem of public health significance. The statistics are astounding as more than one billion people worldwide are deprived from achieving their full potentials [34]. Deficiencies of vitamin A, iron, iodine and zinc are the most common of the micronutrient deficiencies, leading respectively to cognitive impairment, blindness, anemia, high maternal and childhood morbidity and mortality rates with less severe forms resulting in impaired intelligence and strength, reduced working capacity and productivity, and impeded economic development. The prevalence of micronutrient deficiencies in Nigerian children under 5 years was reported almost two decades ago in the Nigerian Food Consumption Survey as 28%, 29.5%, and 29.6% for iron deficiency anemia (IDA), vitamin A deficiency (VAD), and Iodine deficiency disorders (IDDs) [35]. Vitamin A (VA) deficiency occurred in 42% of children 6–59 months of age [36] and 21% of the population were estimated to be at risk of inadequate zinc intake based on food balance sheets and stunting prevalence [37].

4.1 Iron deficiency Anemia

Anemia, especially due to iron deficiency, is the most common micronutrient deficiency in the West Africa region, especially among children under five years and women of reproductive age[38]. Recent data show that 71% of children 6–59 months of age, 47% of non-pregnant women 15–49 years of age, and 58% of pregnant women 15–49 years of age in Nigeria had anemia; with at least a third of the anemias attributable to iron deficiency[39].The 2018 Nigeria Demographic and Health Survey indicates that 68% of children age 6-59 months and 58% of women (15 -49 years) are anemic with higher prevalence amongst the younger (age 6-23 months) than older (age 24-59 months) children, and a peak prevalence of 81% among children age 12-17 months [39] . Anemia was higher (73%) among rural children than those in urban areas (62%). The majority of the women were mildly anemic (44%); 13% are moderately anemic, and 1% are severely anemic. Pregnant women (61%) and breastfeeding women (60%) were more likely to be anemic. Disparities between the geographical regions in the country were evident with the Northern part recording higher prevalence for anemia. Mother's education and household wealth were risk factors for IDA [40].

4.2 Iodine deficiency disorders

The prevalence of IDD is less compared to iron deficiency anemia. Iodine deficiency is not regarded as a public health issue in Nigeria since the universal salt iodization program [38]. A study conducted in Zaria (in North Nigeria), showed that 46% of pregnant women had UIC of <150 µg/l [41] and in Lagos (South west), 60.5% had insufficient iodine intake (UIC <150 µg/l) [42].

4.3 Zinc deficiency

Data on zinc deficiency in the West African countries are scarce and few countries include serum zinc levels as a proxy in their national nutrition surveys [38]. Zinc deficiency occurs as a result of inadequate dietary intake, malabsorption, increased losses, and/or barriers to its utilization. This results in growth retardation, hypogonadism, immune dysfunction, and cognitive impairment [38]. Nigeria, in its food consumption survey used a cutoff < 80 µg/dl and found that only 20% of young children and 28% of women had low Plasma Zinc Concentration (PZC)[35]. The prevalence of low PZC among women is at least about twice the estimated percentage of population with inadequate dietary zinc intake. In Nigeria, the two estimates indicate a similar proportion of the population as being at risk of zinc deficiency (28% low PZC vs 21% inadequate dietary zinc intake) [35,37]. Nigeria is considered at low risk of zinc deficiency based on PZC of young children, but at high risk of zinc deficiency based on the stunting prevalence [31]. In one Nigerian study, involving children between the age 4 and 60 months the prevalence of severe zinc deficiency was 37% [43]. Other Nigerian studies involving urban and rural preschool children reported high prevalence rates ranging from 59.09 to 87.3% from the North Central, the South East and South West regions of the country [44-45].

4.4 Vitamin A deficiency

In Nigeria, VAD is of severe public health importance, affecting over 20% of preschool age children [46]. All West African countries have serious vitamin A deficiency for children under five years old. The prevalence of this deficiency in Nigeria has been reported in times past as 28.1% and 29.5% respectively by Ajaiyeoba [47] and Maziya-Dixon *et al.* [35] with severe VAD prevalence as 7.0 and 4.7% respectively. Several recent studies in various parts of the Nigeria have reported VAD prevalence ranging from 5.3 - 74.6%[48-50].

5 NCDs

Non-communicable diseases (NCDs) described as chronic medical conditions that are non-infectious with long duration and slow progression have become major causes of disease and death in Nigeria with increasing prevalence in all regions of the country.

Globalization, urbanization, affluence, physical inactivity, and nutrition transition are responsible for the trend. In 2013, estimates showed that NCDs caused 24% of total deaths that occurred in Nigeria, with 20% of these arising from CVDs, cancers, diabetes, and chronic respiratory diseases [51]. The national NCDs prevalence as at 2018 stood at 29% with CVDs (11%), cancers (4%), and diabetes (2%) as the primary causes of NCD-related deaths [52]. Studies across the country indicate a positive relationship between NCD prevalence and increasing age[53,54]. The prevalence of CVDs in some hospital-based studies in Nigeria varied from 20.46% in the South East [49] to 32.1% in South West [55]. Hypertension is the most prevalent form of CVDs in the country with prevalence ranging from 8 – 48% [54,56,57]. Prevalence of diabetes mellitus is defined by a fasting blood sugar (FBG) ≤ 100mg/dl. In 2008, the estimated mortality due to a combination of CVD and diabetes was put at 435.9/100,000 males and 475.7/100,000 females [58]. Recently, a national diabetes prevalence of 6.3% for adult men compared to 6% for women was reported [59]. Regional studies indicate prevalence for diabetes mellitus to range between 3.6% in the south east and 14.7% in the South-south [57]. Reports of cancer prevalence in Nigeria are scanty and hospital based due to paucity of cancer registers. Commonly occurring cancers in Nigeria include cervical, breast prostrate, skin, and gastric cancers. It was projected that by 2020, cancer incidence in Nigerian males will rise to 90.7/100,000 and for females to 100.9/100,000 [60]. It was projected that by 2020, cancer incidence in Nigerian males will rise to 90.7/100,000 and for females to100.9/100,000 [61]. Obesity is a risk factor for DM, hypertension, and cancer; thus, an increasingly obese population will bear the increased burden of these NCDs [62]. The Nigerian population is becoming more overweight and obese as shown by recent Global Nutrition report which indicates a prevalence rate of 36.1% and 13.1%, respectively in women and 21.7% and 4.6%, respectively in men [63].

6 Special focus on infant and children < 5 y

Childhood is an important stage of human life and it is critical in defining the future of any country. It is well established that under-nutrition among children still remain a major public health problem, especially in developing countries. Inadequate nutrition and poor health of infant and young children often lead to malnutrition and in turn increase the risk of morbidity and mortality of children [64-70]. UNICEF [67] revealed that while urbanization, climate change, and poor eating choices are driving unhealthy diets across the world, no fewer than 50 per cent of children under five in Nigeria are malnourished. This corroborates the 2018 NDHS [40] and 2018 National Nutrition and Health Survey (NNHS) conducted by the National Bureau of Statistics [68] which revealed that acute malnutrition levels in Nigerian children have remained at alert levels over the past six years and is higher than the global estimates. The persistence of childhood malnutrition accounts for about one-fifth of all disability-adjusted life-years (DALY), with Nigeria being ranked amongst the ten countries with the highest prevalence of underweight, stunting, and wasting in children younger than 5 years [69]. Stunting, wasting, and underweight amongst other indicators of malnutrition; have been extremely useful indices in determining nutritional status of children because they are simple to administer and do not require complex or expensive equipment [70].

According to the 2018 Global Nutrition Report [62], almost 7 million children die yearly before their fifth birthday with about 150.8 million children stunted, while about 50.5 million children wasted globally. About a third of the stunted and wasted children are reportedly found in Africa [71].

Nigeria, being the most populous country in Africa has stunting prevalence decreased from 43% in 1990 [72] to 37% in 2013 [73]. The current prevalence of stunting among children under five years of age still stands at 37% [40], the second highest in the world. There was an increase in the prevalence of wasting from 11% in 2003 to 29% in 2013; however, a significant decline was reported for wasting in 2018 NDHS report as wasting prevalence dropped to 7 percent [40], a little low than the developing country average of 8.9% [8].

There is an increase in the prevalence of underweight among under-five children in Nigeria; from 18 percent in 2013 to 21.8 percent in 2018. Seven percent of children born in Nigeria are born with low birth weight (LBW) and this distribution varied across different zones in Nigeria.

Generally, LBW, stunting, wasting, and underweight vary depending on the mother's educational status, rural versus urban residence, geographical zone and wealth quintiles (Table 3). These indices decreased with increases in mothers' educational level and wealth of household. Children who reside in the rural areas showed poorer nutritional indices than their urban counterparts. The distribution of LBW, stunting, wasting, and underweight across the six zones in Nigeria revealed that the northern region of the country is worse hit. While the highest burden of stunting (57%) and underweight (35%) are found in the North-west, the North-east has the highest burden of wasting (10%), followed by North-west (9%). The prevalence of LBW is highest in the North-west (17%) followed by North-east (11%).

7 Exclusive breastfeeding practice versus early complementary feeding

The first 1000 days of life has been recognized as a critical window of opportunity to influence growth, nutritional status and cognitive development of children [74]. The risk of malnutrition in the first 2 years (1000 days) of life has been directly linked with poor infant feeding practices of mothers together with high rate of infectious diseases [75-77]. Appropriate infant and young child feeding (IYCF) practices include early initiation of breastfeeding (within the first hour of life), exclusive breastfeeding in the first 6 months of life, continued breastfeeding for 2 years or more, and introduction of safe, appropriate, and adequate complementary foods at age 6 months [78-80,3]. There has been a drop in the proportion of children under 24 months of age who were fed in accordance with IYCF (breastfeeding and complementary feeding) guidelines in Nigeria despite a range of policy initiatives to improve (IYCF) practices, from 30% in 2009 [80] to 10% in 2013 [73]. Breastfeeding is a widespread practice among the Nigerian population with nearly all the assessed children 0-23 months ever breastfed (97.1%);

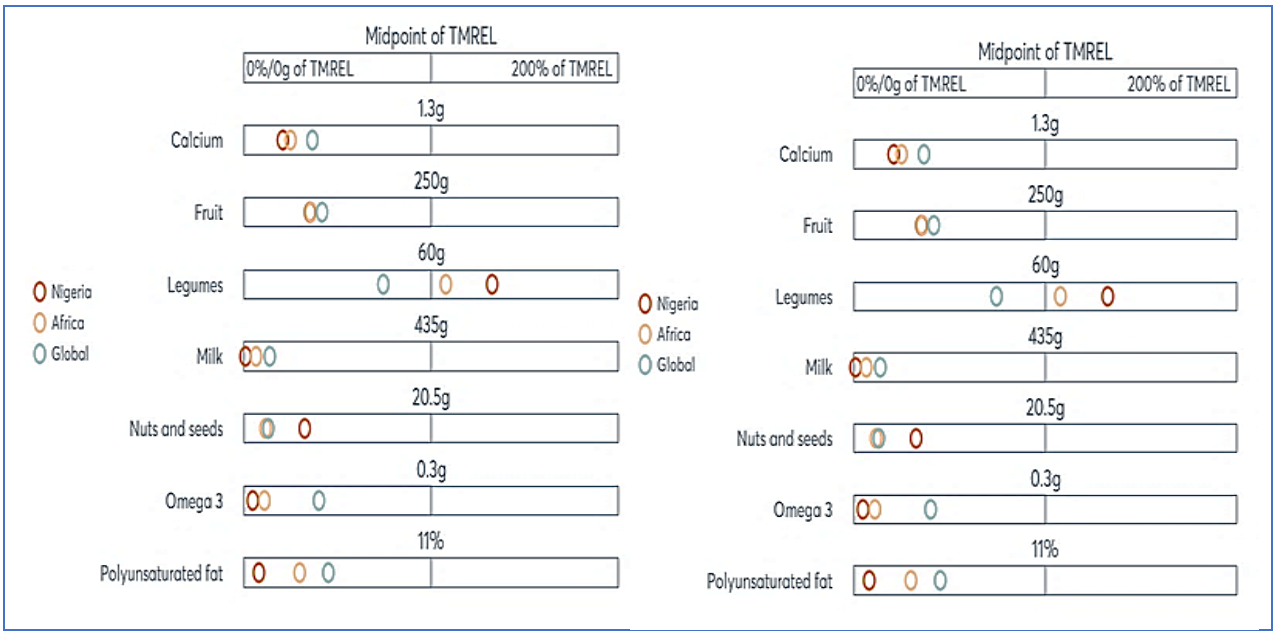

Figure 1: Total Consumption of food groups and components [32]

TMREL: Theoretical minimum risk of exposure level

however, other aspects of IYCF indicators are shown in 2018 NDHS [40] and National Nutrition and Health Survey, NNHS [9] are still poor and sub-optimal (Table 4) and almost in all cases lower than the global average.

The percentage of children who had ever been breastfed was 97% in both 2008 and 2018; the percentage of children who started breastfeeding within 1 hour of birth has increased by 9 percentage points since 2013, from 33% to 42%, while the percentage that started breastfeeding within 1 day has increased from 65% to 82% since 2008 [40]. Exclusive breastfeeding among children age 0-5 months has increased since 2013, from 17% to 29% [36]. Breastfeeding and exclusive breastfeeding declines with age, from 39% (0-1 months) to 29% (2-3 months) and 18% (4-5 months); 39% percent of children age 0-5 months are breastfeeding and consuming plain water only [40].

In Nigeria, over 50% infants are given complementary foods before 6 months and these foods are often of poor nutritional value—mostly inadequate in terms of energy, protein, and micronutrients such as iron, zinc, iodine, and vitamin A [81].

Both the 2018 NDHS [40] and the 2018 NNHS [9] showed that about 60% of the children (6-23 months) are not fed to the recommended minimum meal frequency for their age and breast feeding status; 84-89% is not meeting the minimum acceptable diet, while 65-77% has low dietary diversity. Less than 50 per cent are fed on iron-containing foods [9]. The report states further that "there are significant variations in rates of breastfeeding and complementary feeding indicators and some States especially in South West, North West and North East regions would require more effort to promote optimum breastfeeding benefits" [9].

8 Food insecurity

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life [82]. Food security is assessed using four dimensions which are food availability, accessibility, utilization, and stability[82]. Food insecurity is linked with nutritional outcome; its consequences can affect mental, social, and physical well-being of the population at risk [83]. Negative psychosocial effects of food insecurity have also been observed in women and children [84]. Cuts to health and social sector spending, economic slowdowns and downturns, commodity dependence as well as income inequalities are some factors that can accelerate food insecurity and nutrition [85].

About 2 billion people in the world are food insecure with Africa ranking first followed by Asia, Latin American, and Caribbean [85]. Food insecurity is a recurrent problem in Nigeria [86], with about 3.7 million Nigerians facing food insecurity and this figure is expected to rise [87]. About 1 million Nigerians are in emergency food situation and immediate intervention might be needed [88]. Nigeria imports most of her foods as a result of heavy dependence on oil as a source of revenue, thereby creating wide margins between the rich and the poor who are mainly peasant farmers and cannot afford to pay for imported foods [89]. About 40.3% Nigerians are under the global poverty line. Nigeria also scored 48.2% and ranks 94 out of 113 in the Global Food Security Index [90]. There is increase in population facing food crises in Nigeria because of COVID -19 pandemic and measures.

The 2020 Cadre Harmonize (CH) data in Nigeria showed that fourteen state in Nigeria including the Federal Capital Territory (FCT) are facing minimal food crises. Six States (Zamfara, Kaduna, Yobe, Adamawa, Borno, and Bauchi) are already under pressure for food insecurity. Adamawa, Yobe and Borno States are facing increased food crises, while Borno State is experiencing famine and is in emergency food insecurity situation [91]. Among the sixteen Northern States and FCT where CH analysis were conducted, 7.09 million people are projected to be food insecure in the lean season of 2020 [92].

In addition, an emergency General Household Survey (GHS) on food insecurity in conflict affected regions in Nigeria (North East, North Central, and South South) conducted by the National Bureau of Statistics [90] revealed that the average households in these regions is highly food insecure and also, out of the three regions, North east is the most food insecure. As a result of the food insecurity situation, households have adopted the reduction of meal size as one of the coping strategies [90]. With the rise in insurgency, North East and North central is worse hit with food insecurity. In the North East, 2.6 million people are experiencing food insecurity and the number is expected to rise to 3.6 million in June-August 2020 because of the planting season[93]. This can give rise to famine in these zones (Famine Early Warning System Network) [94].

Some of the challenges of achieving global food security in Nigeria are: the population growth at 3.2% per annum, greater than the growth in food production (<1%), traditional subsistent farming/low agricultural infrastructure and low public spending on agriculture [95], 90% increase in food prices as a result of the pandemic, national insecurity [96], and neglect of agriculture and high dependency on oil as a major foreign exchange earnings [97] as well as environmental issues like degradation caused by flooding, deforestation, and drought [98]. According to the 2020 wet season agricultural performance assessment in Nigeria, the COVID 19 pandemic which led to about 60% reduction in mobility has affected food security. Rainfall and weather-related challenges like severe flood in the Northwest, prolonged dry spell in the South West and poor rainfall distribution in the South-south are other impediment to production. Farm input provision, availability, and accessibility were worse in 2020 as 30 States did not get seeds and stocks, while 23 States did not get chemicals, although, agricultural mechanization was better in the year 2020 [99]. Another impediment to achieving food security in Nigeria is the high rate of corruption in government [85].

Table 3: Prevalence of low birth weight, stunting, wasting and underweight in Nigeria

	LBW		Wasting		Stunting		Underweight	
	2013	**2018**	**2013**	**2018**	**2013**	**2018**	**2013**	**2018**
Mother's education								
No education	15.2	15.5	22.7	9.5	49.7	54.0	39.7	34.1
Primary	8.0	9.1	16.0	5.5	33.1	37.9	24.4	18.9
Secondary	8.4	6.4	14.3	5.2	22.6	23.4	17.7	12.7
More than secondary	6.1	5.9	11.0	4.8	13.3	13.8	10.0	9.4
Wealth quintile								
Lowest	13.5	11.8	21.9	10.5	53.8	55.4	41.9	36.9
Second	17.3	8.4	19.7	7.7	46.1	49.4	34.8	29.3
Middle	9.1	8.6	16.8	6.7	35.1	37.8	25.7	20.2
Fourth	8.7	7.9	16.7	5.3	26.3	26.9	22.1	14.3
Highest	6.8	5.9	13.9	4.2	18.0	16.8	15.6	9.7
Residence								
Urban	7.6	7.5	17.6	5.3	26.0	26.8	22.9	15.1
Rural	9.6	6.9	18.3	8.0	43.2	44.8	32.2	27.0
Zone								
North Central	7.5	7.0	11.7	5.6	29.3	28.7	18.5	14.8
North East	13.6	11.1	19.5	9.7	42.3	49.1	30.8	29.9
North West	27.2	16.9	27.1	9.0	54.8	56.8	47.4	34.7
South East	4.3	4.0	11.9	4.5	16.0	18.4	11.4	10.4
South South	11.6	5.0	11.1	4.3	18.3	19.7	12.8	10.0
South West	3.4	7.0	10.0	4.9	22.2	24.7	14.9	14.8
Overall prevalence	**8.1**	**7.3**	**28.7**	**6.8**	**36.8**	**36.8**	**18.0**	**21.8**

Source 2013 NDHS [76]; 2018 NDHS [36]

Table 4: Infant and young Child Feeding Indicators [8,40]

Indicators	2018 NNHS (%)	2018 NDHS (%)	2018 GNR, Global data
Children 0-23 months ever breastfed	97.1	97	NA
Children 0-23 months put to breast within first hour	19.2	42	44
Children 0-23 months put to breast within first day	71.8	82	NA
Children 0-5 months exclusively breast fed	27.2	29	42.2
Children 12-15 months continued breastfeeding for I year	84.1	83	69.7
Children 20-23 months continued breastfeeding at 2 years	23.5	28	43.9
Children 6-23 months; Minimum Dietary Diversity	34.5	23	29.3
Children 6-23 months; Minimum Meal Frequency	40.2	42	53.1
Children 6-23 months; Minimum Acceptable Diet	16.5	11	18.9
Children consuming iron-rich fortified foods	45.6	ND	NA
Infants receiving Prelacteal	NA	49	NA
Introduction of solid, semi-solid and soft food (6-8 months)$	NA	66.4	69.5

NA: Not available; GNR: Global Nutrition Report; $ From 2020 GNR

9 Conclusion

Nigeria has a multi-sectoral, comprehensive, and stakeholder-driven nutrition policy and action plan and is making substantial efforts towards the achievement of the SDGs. Although, there is paucity of data to comprehensively assess the impact of these policies and programs, available data showed poor nutritional indices, indicating slow progress in meeting national/global targets. The prevalence of malnutrition in all its forms remains high and constitute public health challenges among vulnerable groups in rural areas and in the North-west and North-east zones of Nigeria. Based on this review, these poor indices can be linked to inadequate dietary intakes, food insecurity, and poor IYCF. Breastfeeding and complementary feeding indicators were below recommendations. Most of the dietary intake studies consistently showed not only inadequate intake of energy, protein, iron, zinc, folate, and vitamin A but also calcium and many B-vitamins, which are not prioritized in nutrition programming. The low dietary diversity is indicative of food insecurity (poor availability, access, and utilization). The increasing prevalence of overweight/obesity and NCDs can be linked to the low intake of fruits, vegetables, whole grains, Omega-3, and polyunsaturated fatty acids and the high intake of sodium, calcium, saturated fat, and sweetened beverages; consequences of the nutrition transition.

10 Recommendations

Having identified the limited nutrition data in Nigeria, it is recommended that government should show more commitment and invest more in nutrition with priority to the generation of nutrition data. There is need for nation-wide study on food consumption, assessment of anthropometry as well as biochemical indices and parameters for all population groups. This will help provide the much needed evidence-based information that can be used to inform policy, plan targeted nutrition action, and monitor progress on a more regular basis. The planned National Food Consumption and Micronutrient Survey is a step in the right direction. Remarkable achievements and substantial progress in the struggle against micronutrient deficiencies has been witnessed in the country though there are some signs that the momentum may be slowing as the path steepens. There is therefore need to put in place and implement appropriate policies and interventions for sustainable protection of the vulnerable groups, especially those in the northern region of the country.

Despite growing evidence of epidemiological and economic impact, the response to the problem of NCDs remains inadequate thus the need to elevate it on the health agenda of key policymakers with aim of providing better evidence about risk factor control and need for change in the health systems. The promotion, protection, and support of exclusive breastfeeding must be intensified and all barriers hindering mothers from breastfeeding their children be identified and solution proffered. There is a need to promote the production and consumption of traditional food in order to promote dietary diversity and discourage the use of ultra-processed foods.

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References

1 United Nations (2019). *World Population Prospects 2019. Data Booklet* Division of the Department of Economic and Social Affairs of the United Nations Secretariat. P. 15. https://population.un.org/wpp/Publications/Files/WPP2019_DataBooklet.pdf

2 ERGP (2017). Economic Recovery and Growth Plan (2017 – 2020). Ministry of Budget & National Planning, Nigeria. 140pp.

3 NESP (2020). Bouncing Back: Nigeria Economic Sustainability Plan. Economic Sustainability Committee, Federal Republic of Nigeria.76pp.

4 NPFN (2016). National Policy on Food and Nutrition in Nigeria. Ministry of Budget & National Planning, Nigeria. 50pp.

5 Development Initiatives (2017). Global Nutrition Report 2017: Nourishing the SDGs. Nigeria Profile. Development Initiatives. Bristol, UK. 115pp.

6 UN (2016). Report of the Inter Agency and Expert Group on Sustainable Development Goal Indicators. E/CN.3/2016/2/Rev.1. United Nations Economic and Social Council. 62pp.

7 VNR (2020). A Second Voluntary National Review; Integration of the SDGs into National Development Planning. The Presidency, Federal Republic of Nigeria. 120pp

8 Global Nutrition Report: Action on equity to end malnutrition (2020). Bristol, UK: Development Initiatives, 168pp.

9 SUN (2014). Scaling up Nutrition (SUN) Movement Progress Report 2019. Geneva. 152pp

10 Ene-Obong, H. N., Sanusi, R. A., Udenta, E. A., Williams, I. O., Anigo, K. M., Chibuzo, E. C., Aliyu, H. M., Ekpe, O. O., & Davidson, G. I. (2013). Data collection and assessment of commonly consumed foods and recipes in six geo-political zones in Nigeria: Important for the development of a national food composition database and dietary assessment. *Food Chemistry*, 140(3), 539-546. https://doi.org/10.1016/j.foodchem.2013.01.102

11 Kuku-Shittu, O., Mathiassen, A., Wawa, A., Myles, L. and Ajibola, A. (2013). Comprehensive food security and vulnerability analysis: Nigeria. IFPRI Discussion Paper 1275 Washington, D.C.: International Food Policy Research Institute (IFPRI) http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/127747

12 Mekonnem, D. A., Talsma, E. F., Trijsburg, L., Lindeshof, V., Achterbosch, T., & Brouwer, I. D. (2019). Food consumption patterns, nutrient adequacy and the food systems in Nigeria. In African Association of Agricultural Economists (Ed.), 6th African Conference of Agricultural Economists. https://doi.org/10.22004/ag.econ.295844

13 Trijsburg, L., Talsma, E. F., de Vries, J. H. M., Kennedy, G., Kuijsten, A., & Brouwer, I. D. (2019). Diet quality indices for research in low- and middle-income countries: a systematic review. *Nutrition Reviews*, 77(8), 515–540. https://doi.org/10.1093/nutrit/nuz017

14 Okeke EC, Ene-Obong HN, Uzuegbuna AO, Ozioko O, Umeh SI and Chukwuone N(2009). The Igbo Traditional Food System Documented in Four States in Southern Nigeria. In Kuhnlein HV, Erasmus B and Spigelski D (Ed), Indigenous Peoples' Food Systems: the many dimensions of culture, diversity, environment and health. Food and Agriculture Organization of the United Nations, Rome/ Centre for Indigenous Peoples' Nutrition and Environment (FAO/UN/CINE);251-281.

15 Ene-Obong, H. N., Enugu, G. I., & Uwaegbute, A. C. (2001). Determinants of Health and nutritional Status of Rural Nigerian Women. *Journal of Health, Population and Nutrition*, 19(4), 320–330. https://www.jstor.org/stable/23498821?seq=1

16 Akerele, D. (2015a). Household Food Expenditure Patterns, Food Nutrient Consumption and Nutritional Vulnerability in Nigeria: Implications for Policy. *Ecology of Food and Nutrition*, 54(5), 546–571. https://doi.org/10.1080/03670244.2015.1041136

17 De Moura, F. F., Moursi, M., Lubowa, A., Ha, B., Boy, E., Oguntona, B., Sanusi, R. A., & Maziya-Dixon, B. (2015). Cassava Intake and Vitamin A Status among Women and Preschool Children in Akwa-Ibom, Nigeria. *PLOS ONE*, 10(6), e0129436. https://doi.org/10.1371/journal.pone.0129436

18 Akerele, D., Sanusi, R. A., Fadare, O. A., & Ashaolu, O. F. (2017). Factors Influencing Nutritional Adequacy among Rural Households in Nigeria: How Does Dietary Diversity Stand among Influencers? *Ecology of Food and Nutrition*, 56(2), 187–203. https://doi.org/10.1080/03670244.2017.1281127

19 Harika, R., Faber, M., Samuel, F., Kimiywe, J., Mulugeta, A., & Eilander, A. (2017). Micronutrient Status and Dietary Intake of Iron, Vitamin A, Iodine, Folate and Zinc in Women of Reproductive Age and Pregnant Women in Ethiopia, Kenya, Nigeria and South Africa: A Systematic Review of Data from 2005 to 2015. *Nutrients*, 9(10), 1096. https://doi.org/10.3390/nu9101096

20 Harika, R., Faber, M., Samuel, F., Mulugeta, A., Kimiywe, J., & Eilander, A. (2017). Are Low Intakes and Deficiencies in Iron, Vitamin A, Zinc, and Iodine of Public Health Concern in Ethiopian, Kenyan, Nigerian, and South African Children and Adolescents? *Food and Nutrition Bulletin*, 38(3), 405–427. https://doi.org/10.1177/0379572117715818

21 Sholeye, O.O., Badejo, C.A. & Jeminusi, O.A. (2014). Dietary habits of pregnant women in Ogun-east Senatorial zone, Ogun State, Nigeria: A comparative study. *International Journal of Nutrition & Metabolism*, 6(4): 42-49

22 Japan International Cooperation Agency (Jica). (2017). Data Collection Survey On Nutrition And Agriculture In Nigeria, Situation Analysis Of Nutrition-Sensitive Agriculture And Food-Based Approaches To Improve Nutrition. Global Link Management Inc. Ntc International Co., Ltd. https://www.jica.go.jp/nigeria/english/office/topics/c8h0vm0000azk5fv-att/170228_01.pdf

23 de Vries-ten Have, J., Owolabi, A., Steijns, J., Kudla, U., & Melse-Boonstra, A. (2020). Protein intake adequacy among Nigerian infants, children, adolescents and women and protein quality of commonly consumed foods. *Nutrition Research Reviews*, 33(1), 102–120. https://doi.org/10.1017/s0954422419000222

24 FAO. (2013). Dietary protein quality evaluation in human nutrition,Report of an FAO Expert Consultation (No. 92). Food and Nutrition Paper. http://www.fao.org/documents/card/fr/c/ab5c9fca-dd15-58e0-93a8-d71e028c8282/

25 Food and Agriculture Organization of the United Nations, World Health Organization & United Nations University. (2007). Protein and amino acid requirements in human nutrition : report of a joint FAO/WHO/UNU expert consultation (No. 935). https://apps.who.int/iris/handle/10665/43411

26 Ayogu, R. (2019). Energy and Nutrient Intakes of Rural Nigerian Schoolchildren: Relationship With Dietary Diversity. *Food and Nutrition Bulletin*, 40(2), 241–253. https://doi.org/10.1177/0379572119833854

27 Ene-Obong, N. H., & Ekweagwu, E. (2013). Dietary Habits and nutritional status of rural school aged children in Ebonyi State, Nigeria. *Nigerian Journal of Nutritional Sciences*, 33(1), 23–30. https://www.ajol.info/index.php/njns/article/view/84751

28 Agada, M., & Igbokwe, E. (2015). Dietary Diversity of Rural Households in North Central Nigeria. *European Journal of Nutrition & Food Safety,* 5(3), 150–155. https://doi.org/10.9734/ejnfs/2015/14875

29 Adegboye, O., Smith, C., Anang, D., & Musa, H. (2015). Comparing and Contrasting Three Cultural Food Customs from Nigeria and Analyzing the Nutrient Content of Diets from These Cultures with the Aim of Proffering Nutritional Intervention. *Critical Reviews in Food Science and Nutrition*, 56(15), 2483–2494. https://doi.org/10.1080/10408398.2013.862201

30 Ajani, S. R. (2013). An assessment of dietary diversity on six Nigerian States. *African Journal of Biomedical Research*, 13(3), 161–167. https://www.ajol.info/index.php/ajbr/article/view/95212

31 Obayelu, O. A., & Osho, F. R. (2020). How diverse are the diets of low-income urban households in Nigeria? *Journal of Agriculture and Food Research,* 2, 100018. https://doi.org/10.1016/j.jafr.2019.100018

32 Nigeria. (2017, September 15). Institute for Health Metrics and Evaluation. http://www.healthdata.org/nigeria (Accessed 24 August 2020)

33 Global Nutrition Report. (2020). Nigeria. Country Nutrition Profiles. https://globalnutritionreport.org/resources/nutrition-profiles/africa/western-africa/nigeria/

34 WFP. (2018). The State of Food Security and Nutrition in the World (SOFI): Building climate resilience for food security and nutrition. FAO, IFAD, UNICEF, WFP and WHO. https://www.wfp.org/publications/2018-state-food-security-and-nutrition-world-sofi-report

35 Maziya-Dixon, B. B., Akinyele, I. O., Sanusi, R. A., Oguntona, T. E., Nokoe, S. K., & Harris, E. W. (2006). Vitamin A Deficiency Is Prevalent in Children Less Than 5 y of Age in Nigeria. *The Journal of Nutrition,* 136(8), 2255–2261. https://doi.org/10.1093/jn/136.8.2255

36 Research Institute, International Food Policy. (2015). Global Nutrition Report 2015: Actions and accountability to advance nutrition and sustainable development. INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE (IFPRI).

37 Wessells, K. R., & Brown, K. H. (2012). Estimating the Global Prevalence of Zinc Deficiency: Results Based on Zinc Availability in National Food Supplies and the Prevalence of Stunting. *PLoS ONE*, 7(11), e50568. https://doi.org/10.1371/journal.pone.0050568

38 Diedhiou, B.M, & Jahal, C. (2018). Current Situation of Micronutrient Deficiencies in West Africa. Published Online. https://sightandlife.org/wpcontent/uploads/2018/12/06_RFSuppl18_en_art02.pdf 14/7/20

39 WHO. (2015). The global prevalence of anaemia in 2011. https://www.who.int/nutrition/publications/micronutrients/global_prevalence_anaemia_2011/en/

40 National population Commission (NPC) and ICF Macro (2018). National Demographic and Health Survey (NDHS). Abuja, Rockville: NPC and Rockville, Maryland, USA: NPC and ICF International.

41 Jibril, M. E.-B., Abbiyesuku, F. M., Aliyu, I. S., Randawa, A. J., Adamu, R., Akuyam, S. A., Manu, M., Suleiman, H. M., Adamu, S., Yusuf, R., & Mohammed, A. (2016). Nutritional iodine status of pregnant women in Zaria, *North-Western Nigeria. Sub-Saharan African Journal of Medicine*, 3(1), 41. https://doi.org/10.4103/2384-5147.176312

42 Kayode, O. O., Odeniyi, I. A., Olopade, O. B., Iwuala, S. O., Odukoya, O. O., & Fasanmade, O. A. (2019). Iodine status in pregnant Nigerian women; Does Gestational age matters? *Journal of Clinical Sciences*, 16(1), 20. https://doi.org/10.4103/jcls.jcls_3_18

43 Bilbis LS, Saidu Y, Aliyu RU (2003). Serum vitamin A and zinc levels of some preschool children in Sokoto metropolis of Nigeria. *Biokemistri*, 14:82-87.

44 Ayogu, R. N. B., Afiaenyi, I. C., Madukwe, E. U., & Udenta, E. A. (2018). Prevalence and predictors of under-nutrition among school children in a rural South-eastern Nigerian community: a cross sectional study. *BMC Public Health*, 18(1), 18. https://doi.org/10.1186/s12889-018-5479-5

45 Ibeawuchi, A. N. E., Onyiriuka, A. N., & Abiodun, P. O. (2017). High Prevalence of Zinc Deficiency in Rural Nigerian Preschool Children: A Community-Based Cross-Sectional Study. *Romanian Journal of Diabetes Nutrition and Metabolic Diseases,* 24(1), 31–39. https://doi.org/10.1515/rjdnmd-2017-0004

46 Aghaji, A. E., Duke, R., & Aghaji, U. C. W. (2019). Inequitable coverage of vitamin A supplementation in Nigeria and implications for childhood blindness. *BMC Public Health*, 19(1), 282. https://doi.org/10.1186/s12889-019-6413-1

47 Ajaiyeoba, A. I. (2010). Vitamin A deficiency in Nigerian children. *African Journal of Biomedical Research*, 4(3), 107–110. https://doi.org/10.4314/ajbr.v4i3.53882

48 Abolurin, O. O., Adegbola, A. J., Oyelami, O. A., Adegoke, S. A., & Bolaji, O. O. (2018). Prevalence of Vitamin A deficiency among under-five children in South-Western Nigeria. *Nigerian Postgraduate Medical Journal,* 25(1), 13. https://doi.org/10.4103/npmj.npmj_20_18

49 Oso, O. O. (2003). Vitamin A Status and Nutritional Intake of Carotenoids of Preschool Children in Ijaye Orile Community in Nigeria. *Journal of Tropical Pediatrics*, 49(1), 42–47. https://doi.org/10.1093/tropej/49.1.42

50 Akinyinka OO, Usen SO, Akanni A, Falade AG, Osinusi K, Ajaiyeoba IA, Akang EE.(2001). Vitamin A status of pre-school children in Ibadan (South West Nigeria), risk factors and comparison of methods of diagnosis. *West African Journal of Medicine*, 20(3), 243-8. PMID: 11922160.

51 World Health Organization. (2014). Non Communicable Diseases (NCD) Country Profiles. Geneva:World Health Organization. Available from: https://www.who.int/nmh/publications/ncd-profiles-2014/en/. Accessed on 2020 Jul 04.

52 World health statistics 2018. (2018). monitoring health for the SDGs, sustainable development goals. Geneva: World Health Organization.

53 Njoku, P. O., Enomina, M., Obehighe, E. E., Mbah, I. O., Okoro, E. O., Essen, M. E., Asalu, A. F., & Kana, U. A. (2019). Pattern of non-communicable diseases seen in a tertiary hospital in Keffi, North Central Nigeria. *Nigerian Journal of Cardiology*, 16(1), 60. https://doi.org/10.4103/njc.njc_27_18

54 Oguanobi, N. I., Onwubere, B. J. C., Aneke, E. O., Anisiuba, B. C., Ejim, E. C., Ike, S. O., & Ikeh, V. O. (2013). Pattern of cardiovascular disease amongst medical admissions in a regional teaching hospital in Southeastern Nigeria. *Nigerian Journal of Cardiology*, 10(2), 77. https://doi.org/10.4103/0189-7969.127005

55 Ogunmola, O. J., & Oladosu, O. Y. (2014). Pattern and outcome of admissions in the medical wards of a tertiary health center in a rural community of Ekiti state, Nigeria. *Annals of African Medicine*, 13(4), 195. https://doi.org/10.4103/1596-3519.142291

56 Dahiru, T., & Ejembi, C. L. (2013). Clustering of cardiovascular disease risk-factors in semi-urban population in Northern Nigeria. *Nigerian Journal of Clinical Practice*, 16(4), 511. https://doi.org/10.4103/1119-3077.116903

57 Ogah, O. S., Madukwe, O. O., Onyeonoro, U. U., Chukwuonye, I. I., Ukegbu, A. U., Akhimien, M. O., & Okpechi, I. G. (2013). Cardiovascular risk factors and non-communicable diseases in Abia state, Nigeria: report of a community-based survey. *International Journal of Medicine and Biomedical Research*, 2(1), 57–68. https://doi.org/10.14194/ijmbr.2110

58 World Health Organization. (2010). Global Status Report on Non-communicable Diseases. Geneva:World Health Organization. https://www.who.int//nmh/publications/ncd

59 Development Initiatives. Country Profile-Global Nutrition Report 2019. https://globalnutritionreport.org/nigeria. Accessed 7/24/20

60 Mohammed, A. Z., Edino, S. T., Ochicha, O., Gwarzo, A. K., & Samaila, A. A. (2008). Cancer in Nigeria: A 10-Year Analysis of the Kano Cancer Registry. *Nigerian Journal of Medicine*, 17(3), 280–284. https://doi.org/10.4314/njm.v17i3.37396

61 Awodele, O., Adeyomoye, A. A., Awodele, D. F., Fayankinnu, V. B., & Dolapo, D. C. (2011). Cancer distribution pattern in south-

western Nigeria. *Tanzania Journal of Health Research*, 13(2), 125. https://doi.org/10.4314/thrb.v13i2.55226

62 Khatib, O. (2004). Noncommunicable diseases: risk factors and regional strategies for prevention and care. *East Mediterr Health J*, 10(6), 88. https://pubmed.ncbi.nlm.nih.gov/16335764/

63 Development Initiatives. 2018 Global Nutrition Report: Shining a light to spur action on nutrition. Bristol, UK: Development Initiatives, 2018.

64 World Health Organization. (2016). Report of the Commission on Ending Childhood Obesity, 68. https://www.who.int/end-childhood-obesity/en/ [accessed 12 Jun2019].

65 Bartolo, MC. (2014). Nutrition in Childhood. Journal Malta College of Doctors, 3 ,12-20.

66 Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., de Onis, M., Ezzati, M., Grantham-McGregor, S., Katz, J., Martorell, R., & Uauy, R. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The Lancet*, 382(9890), 427–451. https://doi.org/10.1016/s0140-6736(13)60937-x

67 UNICEF. (2019). Division of Data Research and Policy. UNICEF Global Databases: Overlapping Stunting, Wasting and Overweight, New York.

68 National Baureau of Statistics (NBS). National Nutrition and Health Survey (NNHS). (2018) Report on the Nutrition and Health Situation of Nigeria. NBS, Main Report, Abuja, Nigeria

69 Ocheke, I. E., & Thandi, P. (2015). Malnutrition in acutely ill children at the paediatric emergency unit in a tertiary hospital in Nigeria. *Nigerian Medical Journal*, 56(2), 113. https://doi.org/10.4103/0300-1652.150695

70 Gorstein, J., Sullivan, K., Yip, R., M de Onís, Trowbridge, F., Fajans, P., & Clugston, G. (1994). Issues in the assessment of nutritional status using anthropometry. Bulletin of the World Health Organization, 74(2), 273. https://pubmed.ncbi.nlm.nih.gov/8205648/

71 UNICEF/WHO/World Bank Group. Levels and Trends in Child Malnutrition: UNICEF/WHO/WORLD Bank Group Joint child Malnutrition Estimates, Key Findings of the 2017 edition.

72 Federal Office of Statistics/Nigeria and Institute for Resource Development - IRD/Macro International. 1992. Nigeria Demographic and Health Survey 1990. Columbia, Maryland, USA: Federal Office of Statistics/Nigeria and IRD/Macro International. Available at http://dhsprogram.com/pubs/pdf/FR27/FR27.pdf.

73 National Population Commission (NPC), ICF international. (2014). Nigeria demographic and health survey 2013. Abuja, Rockville: NPC and ICF International.

74 Adair, L. S., Fall, C. H. D., Osmond, C., Stein, A. D., Martorell, R., Ramirez-Zea, M., Sachdev, H. S., Dahly, D. L., Bas, I., Norris, S. A., Micklesfield, L., Hallal, P., & Victora, C. G. (2013). Associations of linear growth and relative weight gain during early life with adult health and human capital in countries of low and middle income: findings from five birth cohort studies. *The Lancet*, 382(9891), 525–534. https://doi.org/10.1016/s0140-6736(13)60103-8

75 Arimond, M., & Ruel, M. T. (2004). Dietary Diversity Is Associated with Child Nutritional Status: Evidence from 11 Demographic and Health Surveys. *The Journal of Nutrition*, 134(10), 2579–2585. https://doi.org/10.1093/jn/134.10.2579

76 Lutter, C. K., & Rivera, J. A. (2003). Nutritional Status of Infants and Young Children and Characteristics of Their Diets. *The Journal of Nutrition*, 133(9), 2941S-2949S. https://doi.org/10.1093/jn/133.9.2941s

77 Daelman, B., Saadeh, R. (2003). Global initiatives to improve complementary feeding. SCN News, 27, 10–18.

78 World Health Organization. (2008). Training course on child growth assessment. Geneva, World Health Organization

79 United Nations Children's Fund (UNICEF). (2016). From the first hour of life: Making the case for improved infant and young child feeding everywhere, New York.

80 National Population Commission (NPC). (2009). Nigeria demographic and health survey 2008. Abuja: National Population Commission and ICF Macro.

81 Federal Ministry of Health. (2005). National policy on infant and young child feeding in Nigeria. Nigeria: Abuja.

82 FAO. (2009). Draft declaration of the world summit on food security. World Summit on Food Security.

83 Perez-Escamilla, R., de Toledo Vianna, RE. (2012). Food insecurity and the behavioral and intellectual development of children: a review of the evidence. *Journal of Applied Research on Children*, 3(1), 1-16.

84 Jones, A. D. (2017). Food Insecurity and Mental Health Status: A Global Analysis of 149 Countries. *American Journal of Preventive Medicine*, 53(2), 264–273. https://doi.org/10.1016/j.amepre.2017.04.008

85 FAO, IFAD, UNICEF, WFP and WHO. (2019). The State of Food Security and Nutrition in the World. Safeguarding against economic slowdowns and downturns. Rome. Licence: CC BY-NC-SA 3.0 IGO.

86 Global Food Security Index (GFSI) (2017). Measuring food security and the impact of resource risks. The Economist Intelligence Unit Limited 2017. Retrieved March 12th, 2019 from https://foodsecurityindex.eiu.com/Resources.

87 FAO, IFAD, UNICEF, WFP and WHO. (2018). The State of Food Security and Nutrition in the World. Building climate resilience for food security and nutrition. Rome, FAO.Licence: CC BY-NC-SA 3.0 IGO. https://creativecommons.org/licenses/by-nc-sa/3.0/igo). ISBN 978-92-5-131570-5.

88 Vanguard. (2018, March 17). 3.7m Nigerians are currently faced with food insecurity – Report. Vanguard News. https://www.vanguardngr.com/2018/03/957788/

89 FAO (2017). Food Security Information Network (FSIN). Global Report on Food Crises 2017. Retrieved from http://www.fao.org/3/a-br324e.pdf

90 Global Food Security Index (GFSI). (2020). Measuring food security and the impact of resource risks. The Economist Intelligence Unit Limited. Retrieved June 12th, 2020 from https://foodsecurityindex.eiu.com/Resources

91 Food and Agriculture Organization. (2020). Nigeria Cadre Harmonisé analysis June/August 2020. FAO in emergencies. Retrieved from http://www.fao.org/emergencies/resources/maps/detail/en/c/1250813/

92 World Food Program, WFP (2020). Terms of Reference - CH Food Security Situation Monitoring Taskforce for COVID-19. Retrieved on November 3rd from https://fscluster.org/sites/default/files/documents/ch_food_security_situation_monitoring_taskforce_covid_19_tor_modified_12_may_2020.pdf

93 National Bureau of Statistics (2018). Nigeria - Food Insecurity in Conflict Affected Regions in Nigeria 2017, Second round. NGA-NBS-FICARN-2017_VI.O. (2018) retrieved on 13th of August, 2020 from https://www.nigerianstat.gov.ng/nada/index.php/catalog/56#page=dataappraisal&tab=study-desc

94 Food and Agriculture Organization (FAO). (2020). FAO projects in Nigeria. Sustainable development goals. Retrieved from http://www.fao.org/countryprofiles/index/en/?iso3=NGA on 30th June, 2020.

95 Famine Early Warning System Network (FEWS NET) (. West Africa (Nigeria). COVID -19 pandemic and conflict impact livelihoods increasing food assistance needs. Food Security Outlook Update. (2020). Retrieved on the 21st day of July, 2020 from https://fews.net/west-africa/nigeria/food-security-outlook-update/april-2020

96 Metu, A. G., Okeyika, K. O., & Maduka, O. D. (1970, January 1). Achieving Sustainable Food Security in Nigeria: Challenges and Way Forward. Core. https://core.ac.uk/display/43010056

97 The Deadliest Conflict You've Never Heard of. (2019, January 24). Foreign Affairs. https://www.foreignaffairs.com/articles/nigeria/2019-01-23/deadliest-conflict-youve-never-heard

98 FAO (2015). Climate change and food security: risks and responses. Food and Agriculture Organization of the United Nations. Available at: http://www.fao.org/tempref/docrep/fao/010/k2595e/k2595e00.pdf

99 Federal Ministry of Agriculture and Rural development, (2020). 2020 Wet Season Agricultural Performance in Nigeria. Retrieved on November 3, 2020 from https://fscluster.org/sites/default/files/documents/aps_national_report_2020.pdf

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