

Nutritional Outlooks of *Moringa oleifera* and African Malnutrition Challenges: A Case Study of Nigeria

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Abstract: Securing adequate nutrition for the growing population is a major development agenda being pursued by many African policy makers. However, hunger and malnutrition are still among the major economic and human development challenges in many African countries. In Nigeria, the growing dimension of the nation's food problem cumulatively impacts many development indicators. This paper therefore sought to provide an outlook of *Moringa oleifera*'s nutritional composition in relation to Nigerian current food challenges. It was argued that *Moringa* provides some nutritional potentials for reducing the rate of vitamin A deficiency among Nigerian children. It is also cost-effective given its ease of propagation, resistance to drought and high vegetative growth. The onus rests on Nigerian farmers and individuals to explore these opportunities, while government provides the necessary supports to ensure availability of viable seeds and other technical assistance.

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1. Overview of African Hunger and Malnutrition Outlook

A major challenge facing many African policy makers is how to utilize scarce available resources in a manner that sets sustainable platforms for reducing hunger and malnutrition (FAO, 2010). Hunger results from inability to have enough food to eat and it is a pervasive problem that undermines people's health, productivity and survival (Smith *et al*, 2006). When food consumed is of inadequate quality and quantity to provide the body's requirements of energy, protein, fat, and vitamins, malnutrition sets in. These issues are pathetic because food is the basic need of man and its essentiality for mankind survival cannot be over-emphasized. A hungry person is not only angry but may in desperation get involved in some vices that can be inimical to society's peaceful coexistence. These and lots more reasons have made policy makers around the world to make provision of adequate and sufficient food a highly prioritized development agenda. This is reflected in both the goals of World Food Summit and Millennium Development Goal (MDG). Specifically, between 1990–92 and 2015, the World Food Summit seeks to reduce the number of undernourished people by half, while the Millennium Development Goal 1 (target 1c) seeks to reduce by half between 1990 and 2015 the proportion of people suffering from hunger.

The online business dictionary defined food as “edible or potable substance (usually of animal or plant origin), consisting of nourishing and nutritive components such as carbohydrates, fats, proteins,

essential mineral and vitamins, which (when ingested and assimilated through digestion) sustains life, generates energy, and provides growth, maintenance, and health of the body” (Business Dictionary, undated). This definition emphasizes that food is not just meant to fill the stomach, but after digestion it should be able to supply the needed nutrients that are required for healthy growth. Closely related to this is the definition of food security which is a situation where “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” (World Bank, 1986; World Food Summit, 1996). International acceptability of this definition is based on its emphasis on income, access and utilization as the strong pillars upon which the notion of food security rests. The essence of eating food is to survive on the nutrients therefrom. Therefore, if food is not nutritious, its primary purpose of sustaining man would have been totally defeated.

Some authors distinguished between food and nutrition security. The nutrition aspect focuses on caring practices, health services and healthy environments. This emphasizes what is more precisely called ‘nutrition security’, which can be defined as provision of “adequate nutritional status in terms of protein, energy, vitamins, and minerals for all household members at all times” (Benson, 2004). That is why policy makers all over the world are very keen on how to provide food of adequate nutrients to the people as a major economic development priority. But it is pathetic to note that

hunger and malnutrition are responsible for higher proportion of child mortality in many African countries. Also, in many developing countries, more and more people are annually intricately trapped in the webs of malnutrition and hunger. In Africa, hunger remains the bane of underdevelopment whichever way the die is cast. This is more pronounced among children that are less than five years old (Oyekale and Oyekale, 2009).

The implications of malnutrition for human development vary with the group of people affected at every point in time. Specifically, severe health consequences can result if children and pregnant women are among the victims of malnutrition. Shah (2010) noted that out of 9 million people that annually die of hunger and malnutrition in the world, about 5 million are children. Estimates by the Food and Agriculture Organization shows that 239 million people in sub-Saharan Africa were undernourished in 2010 with 925 million people hungry worldwide. Africa has the second largest number of people that are stricken with hunger with 239 million after Asia and the Pacific with 578 million. Further analysis shows that in 2010, estimated 30 percent of SSA population was undernourished as compared to 16 percent in Asia and the Pacific (FAO 2010).

No doubt, disparities exist in hunger and malnutrition statistics across different regions. However, one clear point is that the entire region is endemic to poverty, hunger and under-nutrition. The gravity of malnutrition in sub-Saharan Africa can be vividly understood from the fact that 33 percent of the population is undernourished as against 17 percent in developing countries. At regional levels, within SSA, FAO (2004) submitted that 55 per cent of population in Central Africa was malnourished. The average number of food emergencies in Africa per year almost tripled since the mid-1980s. This raises serious concern for the future given several uncertainties in the form of drought, flooding, political instability, communal crises and HIV&AIDS that have challenged every effort at attaining stable equilibrium in food production and supply in many SSA countries. Also, poverty is highly endemic in SSA where 47 percent of the population lived on \$1.25 a day or less in 2008 (United Nations 2012).

Nutritional problems confronting Africa today are generally manifesting as micronutrient deficiency and protein-energy malnutrition. Micronutrient deficiency is now a public health problem with significant socioeconomic importance. It is not only a health problem that affects low-income countries but constitutes significant health challenge in some developed countries. The segments of the population that are always affected are already

vulnerable to several income and consumption shocks. These include women, children, the middle-aged and the elderly (Tulchinsky, 2010). Micronutrient deficiency often leads to some major health crises some with global coverage.

Specifically, vitamin A deficiency (VAD) which is widespread among young children in many developing countries with globally affected children being about 127 million children (van Jaarsveld *et al.*, 2005; West 2002). VAD is able to limit human growth, weaken body immunity, cause xerophthalmia leading to blindness, and increase child mortality (Sommer and West, 1996). Many countries therefore embrace distribution of vitamin A supplements, fortifying food and engaging in other food-based strategies that are aimed at enhancing vitamin A composition of foods. Recently, Moringa is being promoted as major source of food nutrients across many African countries. This new wave may mark total victory over undernutrition given the high nutritional composition of the vegetable.

2. Nigerian Food and Nutrition Outlook

The Nigerian agriculture is a dominant sector employing more than 70 percent of the labour force, contributing more than 40 percent of the Gross Domestic Product (GDP), generating foreign exchange earnings, supplying raw materials for industrial growth and providing several environmental functions for climatic regulation. Over the past few decades, several production constraints have limited performance of its role as the food supplier for more than estimated 150 million people in the country. It is important to emphasize that food insecurity in Nigeria is unacceptably high given enormous natural and human resources the country is endowed with. It should be emphasized that cumulative impacts of agricultural sector neglect due to discovery of oil and failure of several economic policies to achieve the set objectives were responsible for the Nigeria's worsened food crisis.

There are also enough evidences indicating that after the national independence in 1960, past administrations had made several efforts at transforming the agricultural sector in a manner that makes the country self-food sufficient. In the 1970s, for instance, Nigeria started the National Accelerated Food Production Programme (NAFPP) as the first well planned and conceived food crop production programme for small scale farmer (Okigbo, 1982). The NAFPP concept was articulated and launched in 1972 but the pilot projects began in 1974. The aim was to make Nigeria self-sufficient in six basic staple food crops which were maize, rice, millet, sorghum, wheat and cassava by using individual farmers to produce and multiply improved seeds for wider

distribution to farmers. The programme's great potential for increasing the yield of the six crops can be obviously assessed from the outputs of the pilot projects where yields of maize and rice respectively increased by 115 and 100 percents when compared with the local breeds that were planted in Oyo State. The main reason for replacing the NAFPP with Operation Feed the Nations (OFN) which only succeeded as a slogan was the change in government (Okigbo, 1982). That is a good example of the extent to which workable agricultural policy intents have been twisted and distorted by political instability.

Precisely, food crisis in Nigeria assumed a dimension of alarming proportion since the mid-1980s. Specifically, the commencement of the Structural Adjustment Program (SAP) in 1986 marked the beginning of sorrows among many Nigerian rural and urban households. The situation was so bad that food rationing and different unimaginable survival strategies literally turned "SAP" to the most popular household name. With drastic reduction in purchasing power of incomes due to increased food prices, the nutritious dishes of the previous years were largely desired by many Nigerian poor households with great nostalgia. As economic crisis culminated into national austerity, food consumption and malnutrition drastically worsened. Available data show that in Borno/Yobe states, SAP accounted for 27 percent and 33 percent decreases in energy and protein intakes respectively in 1987 (Igbedioh, 1993).

All the same, Nigeria formally accepted the desirability of food security as a goal that should be pursued at the national, sub-regional, regional and global levels during the 1996 World Food Summit. However, more than a decade after the above laudable declaration, persistent stagnation of agricultural production remains a major threat to ensuring food security. Malnutrition and food problems in Nigeria are highly responsive to seasons with more concentration in northern part of the country. Northern Nigeria is not only hot spot for malnutrition, especially among under-five children for its erratic rainfall or weather vagaries, but also for political instability resulting from several religious crises. Edeh (2012) reported that based on United Nations Children's Emergency Fund (UNICEF) 2011 projection, about 1.1 million children will suffer from severe acute malnutrition in 2012 in eight countries comprising Chad, Niger, Mali, Burkina Faso, Mauritania, Northern Senegal, Northern Cameroon and northern Nigeria. It was noted that "poor nutrition jeopardizes children's survival, health, growth and development which slow down national progress towards developmental goals. The prevalence of global acute malnutrition (GAM) was

found between 5 to 15 percent in all surveys across all states and when the situation is beyond 10%, it is regarded as emergency situation. Without any intervention, severe acute malnutrition has up to 60% mortality risk and children with severe acute malnutrition are nine time likely to die from any causes than those who are not".

Malnutrition rates among children and women of reproductive age in Nigeria are high. These also vary significantly across rural-urban locations, geopolitical zones, and agro-ecological zones, thereby constituting a significant public health challenge (Ajieroh, 2011). Under-five mortality rate is still high in Nigeria due to some deficiency in vital food nutrients. In many instances, acute shortages of essential nutrients in breastfeeding mothers' nutrition manifest in nutritional deficiencies in children with severe long-term health and developmental consequences.

Nigeria now has vision 20:2020 that seeks to provide a development pathway to be taken in order to position the country among twenty most developed countries in the world by 2020. Government had emphasized agricultural development as a paramount goal for achieving sustainable economic growth and development. This is very vital because in order to feed the teeming Nigerian population, provide raw materials for agro-based industries, and earn good foreign exchange from exportation of the surpluses of agricultural produce, Nigeria cannot afford to undervalue the vast agricultural potentials. It had been noted that due to poor agronomic practices, poor crop types (varieties), pests and diseases, low soil fertility, average crop yields per hectare on Nigerian farms for the various crops are abysmally low, when compared to the potentials for the various crops in agro-ecological zones. This, coupled with inadequate households' incomes is hindering the potentials of the country's vast agricultural crops to ensure nutritional adequacy. It is therefore imperative to explore the food utilization pillar of food security by analyzing the great potentials loaded in *Moringa oleifera* (henceforth referred to as Moringa), which if well explored can help to reduce malnutrition in Nigeria, especially among children and women performing some reproductive responsibilities.

3. Outlook of Moringa's Nutritional Composition

There are quite a lot of leafy vegetables that are very popular in Nigerian diets. Due to rich crop combination and favourable climate, there are numerous vegetables that are grown in each agro-ecological zone. Some of these vegetables have over the decades served several nutritional functions. Over and above these, a lot of these vegetables perform some medicinal functions that include boosting

digestive functions, blood purification, tapeworm expulsion, blood pressure regulation and relief from headache (Ayodele, 2005; Durugboet *al.*, 2012). In addition, Nigerian leafy vegetables are the cheapest sources of protein, vitamins, minerals and some essential amino acid.

It is also important to emphasize that while some of these vegetables grow wild in some environments, cultivation of vegetable like pumpkin leaves, chichard, celosia etc. can be extremely demanding in terms of labour and soil nutrient inputs. The growth and performance of many leafy vegetables are also directly influenced by seasonal variability in rainfall and other agro-climatic variables. Recent instances of climatic change have limited performance of some Nigerian leafy vegetables, making them unaffordable to the poor at some periods of the year. This is one of the advantages that Moringa has over several vegetables in Nigeria. Awareness of its propagation and nutritional values is just increasing in many Nigerian rural and urban areas, although it is often claimed to have been in use in some northern parts of the country for many decades.

Typically grown in semi-dry lands, desert or tropical soil, it can thrive very well in every ecological zone in Nigeria irrespective of any already identified crop production constraints. It is able to withstand drought because the roots are able to store some moisture for prolonged periods of time as a peculiar characteristic of plants belonging to the family Moringaceae (Fahey, 2005). This implies that rainfall instability may not have pronounced impacts on Moringa productivity as it would have on other leafy vegetables. Therefore, with climatic change and its associated impacts on crop production, Moringa as a nutritious vegetable can be exempted, and it would not require wetland to guarantee its optimum performance during dry season.

Another vital advantage of Moringa is ability to be propagated both sexually and asexually. Very rare Nigerian vegetables possess this characteristic. The implication is that Moringa seeds can be planted to have it grown as well as stem cuttings. Propagation by stem guarantees survival due to ability of the stem to withstand any severe environmental stress. It also implies rapid and ease of multiplication because plants grow faster from stems than from seeds. Vegetative propagation will also reduce pest and disease infestation that would have undermined survival and development of seedlings. Moringa begins its development as a seedling to forming canopies as a big tree in just few months. The speed of growth surpasses every cash crop that is known in Nigeria be it cocoa or kolanut.

Another vital advantage of Moringa vegetable is the large volume of leaves it possesses within a very short period of time. These leaves can be harvested at any point in time during the year, making it available as food even during planting season when many rural households normally run out of food. Although nutritional composition of Moringa may vary with season and age of leaves, it is still better than the best to expect from some other major vegetables and food crops. Moringa has gotten no part of it nutritionally worthless. The stem, leaves and seeds all have important functions to perform in meeting some nutritional requirements of man. This also makes it poverty alleviating crop and emphasizes the fact that it is truly a "miracle tree". The leaves can be dried and grinded for storage, while some eat it raw. Fresh leaves of Moringa can be cooked just like any other vegetables. It can be added to food like porridge, rice, and beans to add some exceptional nutrients to family diets. Moringa seeds have peculiar sweet taste and they are very nutritious as well.

The nutritional compositions of Moringa are amazingly great. Precisely, it is commonly said that Moringa leaves contain more vitamin A than carrots, more calcium than milk, more iron than spinach, more vitamin C than oranges, and more potassium than bananas." Protein quality of Moringa leaves compares favourably with that of milk and eggs (Fahey, 2005). Vitamin A composition in Moringa is vital for addressing many health challenges among Nigerian children. Moringa tree contains many nutrients such as essential vitamins, essential minerals, amino acids, beta-carotene, anti-oxidants, anti-inflammatory nutrients, phytochemicals and it also contains both omega-3 and omega-6 fatty acids.

Moringa can reverse the statistical documentations of child mortality in the world because Vitamin A deficiency is a common and widespread nutritional disorder. Prevention and control of vitamin A deficiency is one of the priorities of the World Health Organization (WHO) and UNICEF in their efforts towards addressing malnutrition in many developing countries (WHO, 1989; UNICEF, 1990). High level of vitamin A deficiency had also been identified as a major causal factor for young child morbidity and mortality (Martorell, 1989). If well utilized, cost of vitamin A vaccines that are regularly given to children in Nigeria will be reduced. This is vital because it had been projected that inability to provide adequate vitamin A will result into more than 80,000 child death annually in Nigeria (Micronutrient Initiatives, undated). Therefore, losses to nation in form of human capital reduction would reduce and intellectual capability of the children can be enhanced by Moringa.

A very vital source of vitamin A among Nigerian rural children is palm oil (Adelekan *et al*, 1997), which many urban households may have replaced with vegetable oil. Carrot which is another source of vitamin A may not be accessible to some rural children if not cultivated by the households and it is sometimes expensive and seasonal in urban areas. Moringa can therefore serve as very cheap source of vitamin A. Babu (2000) submitted that in Malawians diets, Moringa not only contains more vitamin A, Calcium and vitamin C than cowpea leaves, turnip leaves, amaranthus leaves, beans, egg and milk, the cost is also by far cheaper. Vitamin A from Moringa was found to be so cheap to the extent that similar quantities from beans would cost 150 times, about 71 times for milk and about 15 times for eggs.

The calcium in Moringa can help to reduce bone dysfunctions among Nigerian children. Issa (2012) submitted that calcium deficiency can lead osteoporosis, reduced bone mass, hypertension and colon cancer among others. The implication is that regular intake of Moringa reduces the risk of having the afore-listed health conditions. Similarly, iron, potassium, and vitamin C that are generously found in Moringa are essential for several aspects of human body's metabolism. The leaves and pods of Moringa can also facilitate breast milk production among breast feeding mothers. This is vital for child's growth and development because some mothers give excuse of low milk production to reduce the length of time for breastfeeding.

The protein and energy compositions of Moringa offer great opportunity to address protein-energy malnutrition in Nigeria. The cheapness of protein and energy from Moringa if compared to other food stuffs makes it economical to utilize. Moringa seeds can also serve the purpose of water purification by extracting Pb(II), Co(II), Cu(II), Cd(II) and Ag(I) from water at a very low cost and very high efficiency. Removal of impurities from water implies better health for rural people due to expected reduction in incidences of water-borne diseases. It also reduces use of alum and its associated cost for water purification.

4. Conclusion and future outlook

Malnutrition and hunger pose serious challenges to socio-economic development in Nigeria. Moringa offers some solutions due to its very high nutritive value, ease of growth and ability to withstand drought. Vitamin A deficiency among children and protein-energy malnutrition can be easily addressed by essential nutrients that are contained in Moringa. The onus rests on policy makers to promote utilization of Moringa as food in

the urban and rural areas. Initiatives for setting up large scale plantations of Moringa at the state and local government levels should be paramount in the agendas of the governments. This will provide a platform for ensuring that Moringa products are readily available for people's use. Also, awareness creation through several public and private media houses will facilitate the speed of information dissemination about nutritional worth of Moringa.

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