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GLOBAL AND NATIONAL FOOD SECURITY – NEED FOR NOVEL FOODS FORMULATION: A REVIEW

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Abstract: Food is a source of livelihood for plants and animals. However, greater emphasis has been on man in this review. An overview of foods, food security (hence, food insecurity) – at global and national levels has been presented. The right to food should be respected and protected as a fundamental human right. Besides, adequate diet is a key to a person's health, hunger fallouts from food uncertainty. There is so much hope on the Sustainable Development Goals (SDG) programme of the United Nations (UN) to bring succour if there are no conscious efforts on the part of governments to provide foods for its citizenry. Governments display loyalty to their citizens by making food security policy. Boosting accessibility to food, making policy statement, improved usage of food with better nutritional status, and a tactical backup for foods already produced are measures that are being used to accomplish food security. The need of formulation of new foods as a panacea to food insecurity has been illuminated. If food security is neglected, the predicted 840 million people will be condemned to near inveterate malnutrition in 2030. Food security, worldwide and coast-to-coast should conspicuously focus on creation of new foods with value addition.

Keywords: global, national, food, security, formulation, sustainable development goals

INTRODUCTION

Food is generally referred to as any material, in any physical state, that is consumed by living organisms in order to put up with life. Of all the necessities of life, the most critical is food. Whoever may be in doubt of this may have to learn from the way of a mad man. The right to food should be seen as being very essential; as much as we see birthright. As birthright? Yes, as that, if we borrow from Christian religious lesson of a man called Esau, who exchanged his birthright for food. In this case, a denial is tantamount to an abuse of someone's right. The right to food – adequate and nutritional food – is an intrinsic component of the fundamental human right; hence the need to respect and protect it. Good nutrition plays a vital role in a person's health, ranging from growth and development to mental health, and the consumption of healthier foods significantly reduces the risk of chronic diseases, such as diabetes and heart disease. Additionally, the immune system improves and delays the aging process. In the United States, good nutrition is expensive nutrition; a luxury many low-income families abandon. Essential expenses– rent, utilities, clothing, and health are priority for many families with limited disposable, and therefore, forgoing the nutritious food option. According to UNCTAD (2017), of the nearly 795 million malnourished people in the world (every ninth person), the majority is living in developing countries and rural areas; and new, existing, and emerging technologies can be applied to address the four dimensions of food security. Adeyeye (2017) has reported that the world is faced with numerous challenges to food security involving under-nutrition, overconsumption, swelling population, increasing prices of foods and diet changes. Other problems also include; ineffective production practices, dangers posed to

agricultural production, inefficient supply chains in addition to diminishing venture into research in food systems. Africa generally has the challenges of inadequate novel food processing technologies and appropriate storage equipment. In the light of the report of Adeyeye and Idowu–Adebayo (2019), lately, science and technology are at the front burner globally in transforming agricultural production and food processing with an obvious impression on food, nutrition and family health. Undernourishment and food insecurity are associated with each other. As a matter of fact, food insecurity is significantly correlated with malnutrition (Akerle *et al.*, 2013). Where any government fails to arrest the menace of food shortage, such a government is bound to face social glitches such as robbery, civil unrest and increased number of hustlers in the streets *inter alia*. For instance, in Nigeria where the poverty rate is frightening, about 70% of the population is living on less than a dollar per day (Omorogiuwa *et al.*, 2014), the wave of criminal activities has been very worrisome. Growing population with attendant rivalry over land and other resources, climate change and other natural misadventures, and inadequate water availability are potential causes of food insecurity. As hydra-headed as the challenge is, it requires a multidimensional and multifaceted approach to solving it. Thus the objectives of this review paper are to give an overview of foods, food security (hence, food insecurity) – at global and national levels, and to identify the place of formulation of new foods as a panacea to food insecurity.

OVERVIEW OF FOOD

Raw food materials can be identified in two broad classes, namely; plant foods and animal foods. Each of these classes can further be subdivided into different types, namely; plant and animal foods/food products.

— PLANT FOODS

Plant foods are those food materials which are obtained from living organisms of the flora kingdom. There are also different types of plant foods that can be identified.

■ Fruits and Vegetables

Fruits and vegetables are food materials which contain important vitamins, minerals, dietary fibre and plant chemicals. Several varieties of these food materials are available; and there are many ways to prepare, cook and/or serve them. A diet high in fruits and vegetables can help protect someone against devastating diseases as cancer, diabetes, and cardiovascular diseases. Examples of fruits include mango, pineapple, apple and orange, etc.; and vegetables are pumpkin, water-leave, bitter-leave, etc.

■ Cereals

In the Food Agricultural Organization (FAO) concept; cereals denote crops harvested for dry grain only. For international trade classifications, fresh cereals (other than sweet corn), whether or not suitable for use as fresh vegetables, are classified as cereals (FAO, 1994). Generally, cereals are members of the grass (gramineous) family (*Gramineae*), which include the cereal grains such as wheat, maize, and rice, as well as those of barley, rye, triticale, oats, sorghum and pearl millet. This type of fruit is commonly called a *kernel* or *grain*.

■ Legumes

Legumes and cereals have played an imperative role in ameliorating the challenges of undernourishment worldwide (Awuchi, 2019). They are rich sources of carbohydrates, protein and lipids and are used as major constituents in the formulation of starch and protein based food. Legumes are members of the bean family, *Fabaceae*, which includes all types of beans and peas as well as soybeans, peanuts, alfalfa and clover. This large, widely distributed family also includes various trees and ornamentals such as black locust, wisteria, lupine and the Texas bluebonnet.

■ Roots and Tubers

Root and tuber crops, including yam, cassava, potato and sweet potato are the most important food crops for direct human consumption in Africa. They are grown in varied agro-ecologies and production systems ranging from highland densely populated regions to lowland drier areas prone to droughts or floods. These four crops account for about 95% of the total root and tuber crops production in Africa and produce more than 240 million tons annually on 23 million hectares (Sanginga, 2015). The aggregate value of yam, cassava, potato and sweet potato exceeds all other African staple crops, and is much higher than the value of cereal crops (cereals annually producing on average 169 million tons from 108 million ha of land). The major root and tuber crops of the tropics are cassava (*Manihot esculenta* Crantz), yam (*Dioscorea* spp.), sweet potato (*Ipomoea batatas* L.), potato (*Solanum* spp.) and edible aroids (*Colocasia* spp. and *Xanthosoma sagittifolium*). They are

widely grown and consumed as subsistence staples in many parts of Africa, Latin America, the Pacific Islands and Asia (FAO, 1977).

■ Cash / Tree Crops

These are orchards of trees grown for their economic and environmental benefits. Examples include: oil palm, coconut, cashew, rubber, etc.

■ Oil Crops

These are plants which grown mainly for the oil they produce. They are sometimes called oil-bearing crops. Sunflower, rapeseed and coconut are three examples of oil-bearing crops.

■ Spices and Herbs

The Geneva-based International Organization for Standardization (ISO) defines spices and condiments as: vegetable products or mixtures thereof, free from extraneous matter, used for flavouring, seasoning and imparting aroma to food. Herbs and spices play a pivotal role in the customary life of mankind as important flavouring agents in foods, beverages and pharmaceuticals and also as ingredients in perfumes and cosmetics (Peter, 2006). They have tremendous importance in the way we live, as ingredients in food, alcoholic beverages, medicine, perfumery, cosmetics, colouring agent and also as garden plants. Ginger, for instance, has been reported to have medicinal value and digestive aid as well as being a spiritual beverage (Bag, 2018). Spices and herbs have antioxidant, antimicrobial, pharmaceutical and nutritional properties (Peter, 2006). In addition to the known direct effects, the use of these plants can also lead to complex secondary effects such as salt and sugar reduction, improvement of texture and prevention of food spoilage. India is known the world over as the 'land of spices' (Peter, 2012). Generally, the leaf of a plant used in cooking may be referred to as a culinary herb, and any other part of the plant, often dried as a spice (Tapsell *et al.*, 2006). Examples of spices and herbs include: pepper, aiden fruit, turmeric, garlic, onion, etc.

— ANIMAL FOODS

Animal foods, on the other hand, are those food materials which are obtained from living organisms of the fauna kingdom. There are equally different types of animal foods that can be identified.

■ Seafoods

These include all products of aquaculture whether natural or man-made. Seafood is any form of sea life regarded as food by humans, prominently fish (tilapia, catfish, sardine, etc.) and shellfish (such as clams, oyster mussels). Seaweeds and some algae plants called sea vegetables.

■ Dairy Foods

These are types of food produced from the mammary glands of mammals such as cows, goats, buffaloes, etc.). They contain milk. Examples of such products are dried and condensed milk, yoghurt, cheese, etc.

Poultry Products

Poultry are domesticated birds kept by man for their eggs, meat and, in some cases, feathers. Examples include: chicken, turkey, guinea-fowl, to mention but three.

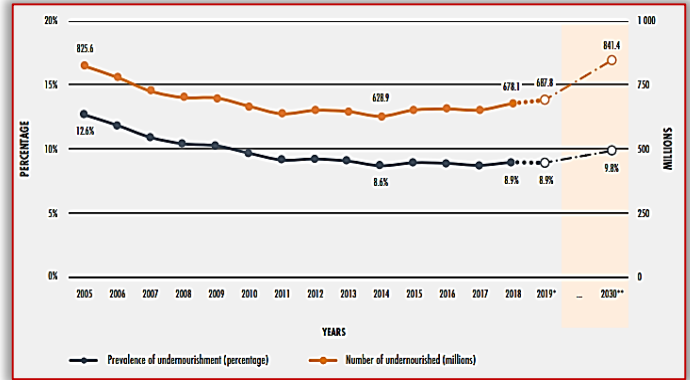
Piggery Products

Piggery involves a branch of animal husbandry that has to do with raising pigs as livestock. It is the ability of the swineherd to manage the farm in such a way that there is a production of maximum number of marketable pigs in the shortest time possible influences the profit he makes over a period of one year (FAO, 2009).

FOOD SECURITY

Food security and nutrition are closely interlinked. It is essential in maintaining an optimum dietary status, and the requirement for nutritious food is fundamental to its definition, which refers not only to sufficient quantities of food (in terms of calories), but also to sufficient quality – in terms of variety and micronutrient content (Ghattas, 2014). Food security is intrinsically important to the ability of human to bloom. According to Barrett (2020), at the 1996 World Food Summit, a unanimous definition was proffered that *food security exists if and only if “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”*. The legal right to food has been recognized in treaties, including Article 25 of the 1948 Universal Declaration of Human Rights and Article 11.2 of the 1966 International Covenant on Economic, Social and Cultural Rights, and in the constitutions of countries (Vidar *et al.*, 2014). The opposite side of this coin in discourse is food insecurity. It can affect diet quality in different ways, potentially leading to under-nutrition as well as overweight and obesity. Food insecurity can lead to different manifestations of malnutrition (FAO *et al.*, 2020). One vital element that explains this connection is the food that people eat; specifically, the quality of their diet. Ensuring access to a healthy diet is a prerequisite for achieving the Sustainable Development Goals (SDG) target of eradicating all forms of malnutrition. Actually, an enough quantity of food has been; and is being produced in the world to feed its entire population. The unfortunate development is that there is a problem of access to the food – whether it be poverty or famine, discrimination, or lack of transportation. In order to ensure human rights as related to adequate standard of living, the creation of an enabling environment that provides for and allows for the procurement of adequate food becomes the mandate of government officials. Food would be adequate when the food is healthy and nutritious in a way our body requires to survival. Consuming nutritious food leads to numerous health benefits including, but not limited to, maintaining a healthy weight, allowing organs and the organ-systems to function optimally, and promoting sleep. For the most part, the good quality foods are on the high-priced side, which leads people to avoid it. Figure 1 shows the number of

undernourished people in the world; it continued to increase in 2019. If recent trends are not reversed, the SDG 2.1 zero hunger target will not be met. The SDGs is shown in Table 1.



Note: Estimated figures are shown by dotted lines and empty circles. The shaded area signifies predictions for the longer period from 2019 – 2030 target year. The entire sequence was judiciously reviewed to reveal new information readily available.

Figure 1: The number of undernourished people in the world. Source: FAO *et al.* (2020)

Table 1: Sustainable Development Goals (SDGs)

NUMBER	STATEMENT
Goal 1	End poverty in all its forms everywhere.
Goal 2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
Goal 3	Ensure healthy lives and promote well-being for all at all ages.
Goal 4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
Goal 5	Achieve gender equality and empower all women and girls.
Goal 6	Ensure availability and sustainable management of water and sanitation for all.
Goal 7	Ensure access to affordable, reliable, sustainable and modern energy for all.
Goal 8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
Goal 9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.
Goal 10	Reduce inequality within and among countries.
Goal 11	Make cities and human settlements inclusive, safe, resilient and sustainable.
Goal 12	Ensure sustainable consumption and production pattern.
Goal 13	Take urgent action to combat climate change and its impacts.
Goal 14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
Goal 15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forest, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
Goal 16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
Goal 17	Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Source: FAO *et al.* (2020)

— GLOBAL AND NATIONAL FOOD SECURITY

The world is attempting to be on track to achieve zero hunger by 2030. According to FAO *et al.* (2020), if recent trends continue, the number of people affected by hunger would surpass 840 million by 2030; and food insecurity can

worsen diet quality and consequently increase the risk of various forms of malnutrition, potentially leading to under-nutrition as well as overweight and obesity.

■ GLOBAL FOOD SECURITY

The main concern of the world governments is to end hunger. The programme aims to ensure that at all times all people have physical, social and economic access to sufficient, safe and nutritious food that meets their preferences and dietary needs for an active and healthy life. The government of the United States of America (USA) is in the lead of the international efforts to address the need that people around the world have reliable food supply.

■ NATIONAL FOOD SECURITY

The government of every country ensures that its citizens and other people taking abode in such country have physical, social and economic access to adequate, safe and healthy food that meets their inclinations and dietary needs for an active and healthy life. Unfortunately, many in African country have fallen short of this laudable pursuit of many countries of the world. Food security becomes a policy when there is a conscious effort on the part of the government of any nation to make and enforce a law that gives the people right to food.

— MAIN CONCERN FOR ACCOMPLISHING FOOD SECURITY AND IMPROVED NUTRITION

■ Augmenting Food Availability

The priorities for increasing the availability of food and the stability of food supplies include: national food production, food imports, and food aid through an additional element relating to ensuring that there is a strategic reserve of grain or other staple foods.

■ Value-added Access to Food

This has to do with right to utilize food. The priorities established to promote better food utilization and improved nutritional status. Institutional framework for strategy implementation may be achieved through organized governmental bodies to monitor food security and nutrition.

■ Formulation of Policy Statement

Policy statement formulation that guarantees self-reliance is necessary. The interest of the food security and nutrition strategy should be with food production – both for consumption by the households that produce it and for distribution through the market. As such, the resources dedicated to agricultural research and extension efforts to enhance food and livestock production is an essential element of the path to sustainable food security.

— FOOD PRODUCTION

■ Taking Advantage of all Food Creation Outlooks

This will help address production constraints. In order to realize improvements in general welfare and poverty reduction, the food security of especially developing countries, should increasingly rely on smallholder production. However, this strategy also calls for increased attention to opportunities for production of foods that the

country has a comparative advantage in a large scale agricultural enterprise.

■ Upgrading Post-harvest Handling of Foods

Food availability can be enhanced through increased attention to post-harvest handling. For example, small-scale mechanized cassava value chain provided by private entrepreneurs will in particular, enhance market demand for the country's cassava. Establishment of local, say, rice mills would result in more local rice in the market thereby reducing demand for imported rice. Other approaches to improving processing and reduction of food wastage in storage should be explored.

■ Diversification of Food Products

The central concern for most developing countries of Africa is the reduction of both hunger and expenditure on food imports. Countries that have heavily depended on food imports until now are looking for new approaches to increase the use of locally grown crops (Abass *et al.*, 2016); and research efforts on making gluten-free bread have been increasing rapidly (Masure *et al.*, 2015). Strategic attention should be paid to diversification in the food produced domestically in the nations – cereals, legumes, roots and tubers, vegetables, fruits and livestock. The benefits of doing this include: increased diet diversity (associated with improved micronutrient intake) thus reducing micronutrient-deficiency effects; and a more expanded food system which is more resistant to shocks, principally those associated with crop and livestock epidemic – diseases or pest infestations.

■ Deliberately Safeguarding Key Collective Assets and Incomes

Local production of food is enhanced through the deliberately safeguarding the key assets (such as forests, waters, and other ecosystems that are important for the production of food plants and animals, games and fish) collectively reserved. As government formulates management mechanisms and administers same for these assets, the protection role in contributing to the food security of the communities in their environs and to the nation all together would be guaranteed.

■ Tactical Food Reserve

Availability of food under all circumstances in any country must be planned. A key element of such planning in many countries in sub-Saharan Africa is the establishment of a strategic backup for staple foods as it is done in Nigeria; though not sufficient for her teeming population. Many of the factors that stimulate the creation of such reserves in some countries are natural disasters such as droughts and other weather-related calamities. Underprivileged access to imported foods may not apply to some other countries. Strengthening strategic food reserve mechanisms, perhaps in part, because the risks of severe disruptions to food systems in the country is necessary. While this system may prove to be adequate, more rigorous analysis of how the country can reliably maintain rapid access to adequate food

supply is indispensable. Peradventure it exists; appropriate use of international food assistance should be ensured. However, such food assistance is a potentially useful resource for consolidating social and economic recovery and for development in the country where it applies. Also of critical status are food-based interventions such as nutrition supplements targeted at pregnant and breast-feeding women, infants and school children.

■ Enhancement of the Access to Use Food

Increasing people's access to food mainly centres on the jurisdictions of increasing opportunities for a reliable source of income. Improving the extant communication and distribution network will boost physical access to food.

■ Better Food Consumption and Value-added Diets

Disparity in availability of food or access to food does not provide a complete explanation for the key determinants of food security and comprehensive nutritional status. This is evident in the persistent high levels of chronic child under-nutrition, especially in some third-world countries, even when the presence of war is not obvious.

— NEW FOODS FORMULATION & VALUE ADDITION AS PANACEAS FOR GLOBAL & NATIONAL FOOD SECURITY

Igbabul *et al.* (2014) has noted that in some years past, there has been an enhanced inclination towards healthy eating resulting from the development of many novel functional foods together with use of other locally obtainable crops for bread production. In the baking industry, there has been an increasing trend in the usage of non-wheat flours in the manufacture of baked goods such as bread, cake, biscuit, snacks, pasta products and other confectioneries (Oladunmoye *et al.*, 2010). Such products, that have found acceptability worldwide, are used to increase protein intake especially in developing countries (Satin, 1988). Minerals contents and dietary fibre of baked products can be enhanced by composite flours (Karina de Simas *et al.*, 2009). The use of indigenous raw materials in replacement for wheat flour is increasingly necessary (Ajibola and Olapade, 2019). Cassava (*Manihot esculentum* Crantz) is a target for biofortification because of its importance as a staple crop. The Bill and Melinda Gates Foundation has supported a global effort to develop cassava germplasm enriched with bioavailable nutrients since 2005. This initiative is called 'BioCassava Plus', and has 6 major objectives, namely; to increase the: zinc and iron; protein; vitamins A and E as well as to decrease cyanogen content; delay postharvest deterioration; and develop virus-resistant varieties (Montagnac *et al.*, 2009). Figure 2 shows the uses of the derivatives of cassava, a typical case of value addition.

The development of cassava value chains focus on the following top 20 cassava producing countries in Africa (in decreasing order of annual production: Nigeria, Democratic Republic of the Congo, Angola, Ghana, Mozambique, Uganda, Malawi, United Republic of Tanzania, Cameroon, Sierra Leone, Benin, Madagascar, Rwanda, Côte d'Ivoire, Burundi, Congo, Guinea, Kenya, Zambia, Togo (Sanginga,

2015). Abass *et al.* (2016) have suggested that more study is needed to accomplish a sustainable progress in the conversion of raw cassava roots into cassava flour for production of bread.

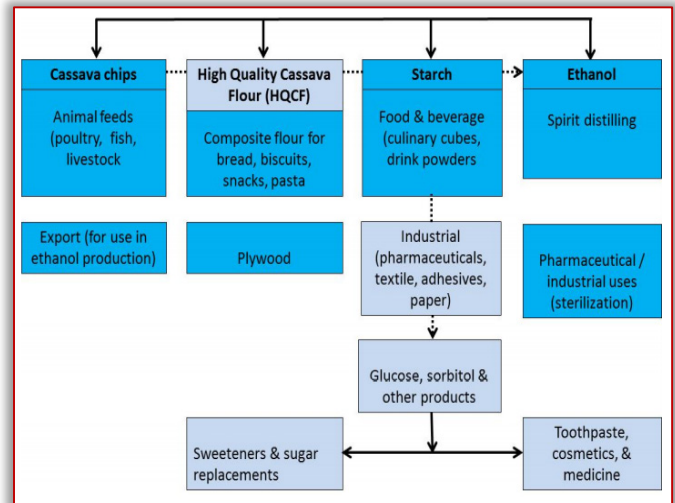


Figure 3: Cassava Derivatives and Their Uses. Source: Sanginga (2015).

The vision for sustainability for African cassava industrialization is expected to create wealth, jobs and promote sector-wide efficiency and productivity growth. It will enhance and meet the demand of emerging industrial needs, traditional products and global demand by reducing production costs and increasing the output of high quality industrial products to strengthen the continent's position in the global context for competition. Five major cassava value chains are proposed for industrialization based on the demand and supply side targets for various African countries and elsewhere as estimated from the FAOSTAT's database: High Quality Cassava Flour (HQCF), starch, chips, high fructose cassava syrup (HFCS) and ethanol (Riley-Mitchell *et al.*, 2012). These value chains offer tremendous potential to fuel the economic growth in the continent as this will create jobs for women and youth, improve food security and generate wealth. Production should be expanded to: (i) meet domestic, industrial demand and export markets through promotion of industrial applications of key value chains (HQCF, livestock feed, starch, ethanol, etc.); (ii) encourage the involvement of large scale farming as a driving force for industrialization; and (iii) encourage private sector investment and engagement. Each country can develop her industry according to her available resources and market opportunities within a globally competitive framework. The limited number of processed forms of yam, poor market linkages and inconsistent policies affecting prices of other cheap energy sources lead to inconsistency in demand or prices of yam tubers for producers. A broader and more diverse range of products will help make the demand for yam more constant and thus reduce risks for yam producers, processors and traders. Increased conversion of fresh ware yams to products with longer shelf life through processing combined with improvements in marketing channels will bring the benefits from the crop to a broader

range of consumers and value chain actors. It will reduce the annual postharvest losses; extend the period of availability; increase competitiveness in terms of affordability to increase yam consumption when compared to rice, maize and wheat; and give actors in the yam value chains additional flexibility to respond to market opportunities (seasonally fluctuating market prices). The conversion of fresh ware yams to other products which are more convenient for the rapidly expanding urban populations to handle and prepare into food will cater better to their needs and broaden the range of regular yam consumers. Activities will include:

- study and document the status and potential of manufacturing and marketing of novel yam products;
- conduct workshops to promote opportunities for novel yam products among the value chain actors (producers, processors, traders, transporters, exporters, consumers, policy makers, input suppliers, and research and development agencies);
- organize consultation meetings with value chain actors;
- undertake industrial trials with processors/factories to identify suitable yam varieties;
- develop, and assess consumer acceptability and market potential of novel yam-based products;
- promote consumption of novel and improved traditional yam-based products through social marketing;
- train processors in the preparation of new yam-based products and in improving processing efficiency, nutritional quality, food safety (including avoidance of mycotoxin accumulation), and storage of traditional products;
- adapt, fabricate, and introduce appropriate yam processing equipment for small- and medium-scale processors and train them in their use.

Expected benefits include: (i) increased availability in domestic and export markets, and consumption of diverse new and traditional food products from yam; (ii) yam products meet all established standards of quality, packaging and safety in the relevant markets (e.g. mycotoxin content below the threshold levels); and (iii) entrepreneurs make better evidence-based decisions on models, tools, and technologies for upgrading sweet potato value chains. Process models, technologies, and implementation tools are becoming available for scaling up that support integrating OFSP into multiple value chains, ranging from community-based nutrition/agriculture and school-feeding programs to higher-value urban market chains for bakery products and healthy-choice snack food.

These technical and organizational tools will enable stakeholders to better manage the perishability of sweet potato roots and position it as a healthy food for all in the market place. According the report of Barrett (2020), the 1960s–70s Green Revolution in Asia and Latin America surpassed even the improvement seen earlier in the high-income countries as increased investment Research and Development drove up the yields of staple crops. This

allowed a fast-growing population to consume more calories and protein. The rapid development and diffusion of high-yielding varieties of maize, rice, wheat, and of inorganic fertilizers, irrigation, and machinery, fueled rapid productivity growth. This brought down real food prices sharply, improving calorie and protein access among the poor. It also gave way to the development of new foods. Food concerns would follow from the extensive stress on curbing starvation through calorie and protein supplies increase using starchy staple foods. Given faster growth in staple cereals, roots and tubers, the price of micronutrient-rich fruits, legumes, pulses and vegetables has risen relative to that of staples in many places (Pelletier *et al.*, 2020). Food processors, manufacturers, retailers and food service firms should be seeking better ways of presenting their products. Such ways shall include adding more values to, and formulating diverse foods from the existing diets. As the climate predicament is also going faster, changeovers from fossil fuels to renewable energy sources are growing. In the same manner diverse and more nutritious diets should be fabricated. Cassava (*Manihot esculenta crantz*) with improved nutritional value such as pro-vitamin A cassava is currently been used as an aid in reducing the prevalence of dietary Vitamin A deficiency due to its high content of β -carotene. Pro-vitamin A cassava has the potential of providing up to 25% of daily vitamin A requirements of children and women (Aniedu and Omodamiro, 2012). FAOSTAT (2019) has posited that Africa needs more diversification of cassava as food product since her major area of utilization is as food. Starch and protein from cereals, meat, fish and other sources play major roles in providing the desirable characteristics of food. Composite flour technology is being used in developing more nourishing foods globally and nationally. This in effect is important because of the benefit of reducing the economic strangulation due to food importation. In addition, there are the prospects of the utilization of underutilized crops (Ajatta *et al.*, 2016). The hospitality industry and the general public have found new healthful products in wheat-cassava composite (Ibrahim and Ukonu, 2016). Some diets have been, and are being formulated to equally have medicinal purposes; a development which has brought about a branch of studies called *Nutraceuticals*. As a matter of fact, while bringing colour and taste to the food, some spices have long been considered to possess medicinal value and have been effectively used in the indigenous systems of medicine (Rubio *et al.*, 2013). Spices and herbs are common food additions, which over the years, have been used as agents of flavoring, seasoning, and coloring and sometimes as preservative, all over the world for several hundreds of years, especially in India, China, and many other southeastern Asian countries. Herbs and spices have a customary account of usage in the food appreciation, and its links to health (Tapsell *et al.*, 2006). However, with the passing of time, spices had become indispensable in the culinary art of cooking to enhance flavour and taste of foods

and beverages (Peter, 2012). With the development of procedures for the extraction of spice extracts, spices are extensively used in the perfumery, cosmetics and pharmaceutical industries. The technology of Nutraceuticals has led to formulation of gluten-free starchy foods to present a friendly form of foods to coeliac patients. The potential nutraceutical characteristics of starchy products have increased the interest of researchers on this biopolymer (Bello-Perez and Paredes-Lopez, 2009). Nisar *et al.* (2021) developed cookies from wheat flour enriched with powder from apricot pulp so as to improve nutraceutical properties of cookies as well as simultaneous dilution of gluten. Kaur and Bains (2020) have reported the nutraceutical and physiochemical properties, hence the benefits of chia to both humans and nonhumans alike. In the report of Alamu and Mooya (2017), food processing technologies have advanced at unparalleled levels concurrently with the developing global food system both in its degree and in its intricacy. All through the times gone by, humans conquered lack of food and ailments not only by way of harvesting foodstuffs from cultivated lands, but also by dint of processing it through available and sophisticated techniques. The commitment of authorities in Food Science and Technology to making progress in the science of food safeguarding a harmless and abundant food supply in addition to making contributions to healthier people the world over is fundamental to that advancement (Floros *et al.*, 2010). Not only those functional foods can be used to solve consumer starvation and provide health needs by having the necessary nutrients, they likewise can be used to prevent diseases which are related to nutrient shortages. In the intervening time, useable bakery products are becoming gradually popular and are normally consumed with some attachments in numerous households, industrial canteens, restaurants and such other places (Rahaie *et al.*, 2012). The food processing industry is one of the largest manufacturing industries universally (Ortega-Rivas, 2010). Researchers are expected to find new models of food development, taking cognizance of the complications intrinsic in the food material. Fito *et al.* (2010) considers "real foods" as multiphasic and multicomponent systems in which the structure plays a key role in product properties – be it physical, nutritional, sensory or safety. Quinn and Bencko (2014) have rightly stated that the public health issues of imbalanced nutrition, scanty access to food and misappropriation of resources – at the governmental and household levels – are presently affecting billions of people globally. Imbalance of food nutrition can be curbed through diversification of food products. In view of the trend of consumption of bakery products among the populace, there need to improve the nutritional value of empty calorie baked products as they are consumed very frequently (Seth and Kochhar, 2017). With increased utilization of indigenous staples, the challenge of limited access to food may be arrested. In many cases of unavailability of food, the root

cause may not be less cultivation or yield, but lack of appropriate storage facilities. In the course of new foods formulation and modification, developing food materials with longer storage life automatically falls in. The report of Berry *et al.* (2015) has shown that there has been growing agreement that sustainability is very relevant to food security over the past years. Thus availability of food is not secure if it cannot meet the current needs without jeopardizing the requirements of the succeeding generation. According to Capone *et al.* (2014), humanity, both per person and in absolute terms, is now consuming additional resources than ever. Necessary changes in the consumption and production patterns of societies are crucial for achieving global sustainable development. Since food demand surge is due mainly to changing food consumption patterns and population growth (Berry *et al.*, 2015), need therefore arises for re-ordering the consumption patterns by way of presenting assorted and novel foods; perhaps from a combination of two or more food materials. This will make formulation of new foods work like division of labour which lessens task on an individual, yet produces a superb result from synergy of different people. New and diverse foods will have different people with dissimilar inclinations thereby reducing demand pressure on a particular foodstuff.

CONCLUSION & RECOMMENDATION

Food is taken by living plants and animals – man inclusive – in order to be alive. Giving more concern to man, it would be viewed that the right to food is a fundamental human right that has to be respected and protected. Good nutrition is a key to a person's health. Food products are derivable from plants and animals. Malnutrition is as a result of food insecurity as it can affect diet quality in different ways. The Sustainable Development Goals (SDG) programme of the United Nations is expected to help eliminate all forms of malnutrition. When governments are committed to providing food for the citizens, they make food security a 'Policy'. Food Security is achieved through boosting accessibility to food, making policy statement, improved usage of food with better nutritional status, and a tactical backup for foods already produced. If the matter of food security is continually lackadaisically handled, the number of people that shall be sentenced to near irredeemable undernourishment may exceed the predicted 840 million before the anticipated time of 2030.

Steps to ensuring food security at global and national levels should prominently centre on creation of new foods with value addition.

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