Consensus Summit: Lipids and Cardiovascular Health in the Nigerian Population


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Authors’ contributions

This work was carried out in collaboration between all authors. Authors OOA and KKA conceptualized and planned the summit. Author KKA designed the report. Author YAO managed the literature search and drafted the first manuscript. All authors facilitated the summit, contributed to the manuscripts, read and approved the final manuscript.

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ABSTRACT

Aims: To issue a consensus statement on Lipids and Cardiovascular Health and the impact of their interrelationship in Nigerian Population.

Study Design: Experts from a range of relevant disciplines, deliberated on different aspects of Lipids and Cardiovascular Health in the Nigerian Population at a Summit.

Place and Duration of Study: The Summit was held in April 2016 at the Nigerian Institute of Medical Research.

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Methodology: Presentations were made on central themes after which expert participants split into four different groups to consider the questions relevant to different sub themes of the title. Consensus was arrived at, from presentations of groups at plenary.

Conclusion: With the increase in the prevalence of NCDs, especially Cardiovascular Disease in Nigeria, and the documented evidence of deleterious effects of lipids, the expert panel called for an urgent need to advocate for the general public and health professionals to make heart-friendly choices in food consumption.

Keywords: Lipids; dyslipidemia; heart health; Nigerian population.

1. INTRODUCTION

More people die annually from CVDs than from any other cause and more than 80% of the global burden of CVD occur in low- and middle-income countries [1]. Coronary heart disease deaths in Nigeria reached 53,836 or 2.82% of total deaths, and are responsible for the greatest proportion of the total mortality due to non-communicable diseases (NCD) [2]. While in economically stable countries, death from cardiovascular and cerebrovascular diseases come from long and productive life, in developing countries almost half of such deaths occur among people in the prime of their age [3,4]. The upsurge of these diseases in the developing countries is as a result of increasing behavioral risk factors such as unhealthy nutrition, physical inactivity, tobacco use and alcohol which are modified by social determinants like poverty, urbanization and globalization. Others factors that can modulate predisposition include aging and genetics. Most cardiovascular diseases can be prevented by addressing behavioral risk factors [1]. The publication of the Federal Ministry of Health (FMOH), Nigeria - National Nutrition Guidelines on Non-communicable Diseases Prevention, Control and Management address these issues [3].

Dietary fats and oils provide calories, essential fatty acids and are sources of fat-soluble vitamins A, D, E, and K. However the lipid content of dietary fats and oils have a bearing on serum lipid profile as dyslipidemia is associated with CVD risk [5]. The effects of both the amount and quality of dietary fat have yielded conflicting results. Saturated fatty acids are associated with large less dense LDL while carbohydrates are associated with the denser small LDL particles that predispose to CVD [6]. Positive relationship between CVD mortality and raised total cholesterol and raised total triglycerides at younger ages is reversed in seniors. In current times, low HDL cholesterol of about 1 mmol/L and high total cholesterol:HDL cholesterol ratio or total triglyceride:HDL cholesterol ratio are the best known indicators of CVD risk [7]. Plasma concentration of apolipoprotein B the major protein carrier of LDL, Intermediate Density lipoprotein (IDL) and very low density lipoprotein (VLDL), indicates the total number of potentially atherogenic particles, correlating with the non-HDL cholesterol levels. The ratio of apo B with apolipoprotein A-1 the major protein in HDL is best below 0.9 for men and 0.8 for women [8]. Foods rich in saturated fatty acids (SFA), trans fatty acids, foods with high glycemic index or load, have been considered unhealthy; whereas, monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA) are considered beneficial [9]. More recent systematic research and meta-analysis however reveal that substituting SFA and MUFA calories in nutrition with PUFA did not reduce CVD events, although substituting 5% of energy from either MUFAs or SFAs with the same amount of energy from carbohydrate was associated with 62–68% higher CHD mortality [7]. Caloric restriction (CR) has proved to be the most effective and reproducible dietary intervention to increase healthy lifespan and aging, and strong evidence supports a valid reversed association of vegetables, nuts, the “Mediterranean” and high-quality dietary pattern with CHD [10]. This summit set out to evaluate information available on the relationship between dietary fats and CVD in the Nigerian context. The stakeholders reviewed the current situation and the best practices to adopt in the Nigerian population. The Summit deliberated on policy documents that are available and those that are yet to be put in place.

2. METHODOLOGY

The Summit invited partners from the Federal Ministry of Health, Federal Ministry of Agriculture, National Institute of Medical Research, Nigeria Center for Disease Control, National Agency for Food, Drug Administration and Control, Standard Organization of Nigeria, Research Institutes,
Universities, Civil Society Organizations, Consumers, Food manufacturers and other relevant Stakeholders to deliberate on this important issue. At a plenary session the following presentations were made - “The Nigerian Heart Foundation Heart Check Food Labelling Programme”; “Current Status of Cardiovascular Diseases and Operational Policies in Nigeria”; “Dietary Lipids and Cardiovascular Disease in Nigeria”; “Palm oil and Heart health in Nigeria” and “Choices International healthy food programme”. The stakeholders then split into a breakout session consisting of Research, Manufacturing, Government and Regulation Groups. Reports from each group were presented at a second plenary session. A panel of experts, drawn from amongst participating stakeholders was invited to field questions from the audience to reach a consensus.

3. PRESENTATION SUMMARIES

3.1 The Nigerian Heart Foundation Heart Check Food Labelling Programme

Nigerian Heart Foundation (NHF) in its effort to reduce Non-communicable diseases-related morbidity and mortality in Nigeria; recognized that healthy diets play a major role in the prevention and control of non-communicable diseases. The initiative, “Nigerian Heart Foundation Heart Check Food Labelling Programme” was developed in 1998 in collaboration with the Federal Government of Nigeria parastatal - National Agency for Food, Drug Administration and Control (NAFDAC) which regulates and controls the manufacture, importation, exportation, distribution, advertisement, sale and use of food, drugs, cosmetics, chemicals, medical devices and packaged water in Nigeria.

The NHF Heart Check Food Labelling Programme is voluntary. Companies that are interested subject their products to standardized nutrition profile evaluations, guided by a set of scientific criteria. The criteria was developed by the Nigerian Heart Foundation, and approved by NAFDAC. The criteria include approved levels of sodium, sugar, cholesterol and trans-fat. The Nigerian Heart Foundation grants permission to use the Logo on all packaged food items that fulfill the criteria. The Nigerian Heart Foundation Heart Check logo is used in all the geographic regions of Nigeria, and in a few countries in West Africa.

3.2 Current Status of Cardiovascular Diseases and Operational Policies in Nigeria

Nearly 70% of deaths that occur globally every year are due to non-communicable diseases. Cardiovascular diseases account for nearly half (48%) of deaths due to non-communicable diseases [1]. In Nigeria, NCDs account for about a quarter of all deaths annually while CVDs are responsible for 7%; and the highest cause of deaths due to NCDs [3]. While deaths from NCDs mainly occur in adulthood, exposures to risk factors begin in childhood and builds up throughout life. Policies, plans and services for the prevention and control of NCDs need to take account of health and socio-economic changes throughout the life course [4].

Government policies aimed at tackling the challenge of NCDs include the Mandatory Fortification of Wheat Flour and Vegetable oil with Vitamin A. The NAFDAC Food Fortification with Vitamin A regulations of 2005, addresses the prohibition of sales of the specified food vehicles, without adequate fortification with Vitamin A and Labelling of Vitamin A fortified foods among others.

The “National Nutrition Guideline on Non-Communicable Diseases (NCDs) Prevention, Control and Management” and the “National Strategic Plan of Action for Nutrition” are policy documents that addresses Nutrition as priority areas for non-communicable diseases in Nigeria [3].

3.3 Dietary Lipids and Cardiovascular Disease in Nigeria - Situational Analysis

3.3.1 Lipids as major cardiovascular risk factor

- Lipids (TC, LDL-C, VLDL-C, and TGL) have been shown to promote atherogenesis, leading to atherosclerosis in the coronary and other arteries [11,12].
- This process can lead to coronary heart disease (CHD), peripheral artery disease (PAD) [13] and Cerebrovascular events [14].
- In contrast to the effects of the lipids mentioned, HDL enhances the reverse cholesterol transport and has anti-oxidative, anti-inflammatory, antithrombotic, and vaso-protective effects. This has earned it the name “good cholesterol” [15].
3.3.2 Summary of cardiovascular effects of dyslipidemia

- Abnormal lipid profile (raised TC, LDL-C, VLDL-C, TGL and low HDL-C) has been associated with CHD, PAD and cerebrovascular events. This results in high mortality and morbidity rates especially in developed countries although, progressively increasing in developing economies.
- Dyslipidemia is a well-documented risk factor for cardiovascular disease - a topmost killer globally [16].
- The DASH (Dietary Action to Stop Hypertension) Diet – rich in fruits and vegetables and low in oils and fats is recommended as a result of the above observations [17].

3.3.3 Dietary lipids: Situational analysis in Nigeria

Recent studies in Nigeria have shown:

1. Appreciable level of cholesterol in commercially available oils in Nigeria [18].
2. Documented evidence of deleterious effect of lipids on Nigerians [19].
3. Steadily-increasing prevalence of Ischaemic heart disease in Nigeria [20].

3.4 Palm Oil and Heart Health in Nigeria

Raw red palm oil is a rich source of phytonutrients, carotenoids, tocopherols, tocotrienols, sterol, phospholipids and polyphenols.

Refined palm oil is in mainly heat stable, largely tasteless and trans-fat free.

The argument against the use of palm oil is because it contains palmitic acid (44%), a saturated fatty acid which by extrapolation increases risk of cardiovascular disease. However, palm oil also contains oleic acid (40%) which is monounsaturated and the major constituent of olive oil. Palm oil is also a very rich source of vitamins A and E as well as other anti-oxidants [21].

Red palm oil should be used within the limits of allowed total daily calorie intake from fats as there is as yet no scientific evidence that shows that consumption of red palm oil as part of a healthy balanced diet is harmful [22].

3.5 Choices International Healthy Food Program

The Choices Program is a global multi-stakeholder initiative that aims to help prevent obesity and other diet-related diseases [23]. It is based upon the WHO Global Strategy for Diet, Physical Activity and Health [24] and it focuses on reformulation and consumer friendly labelling.

The nutrient profiling system as developed by the Choices International Scientific Committee, is described [25]. It is based on a classification of all foods and beverages (except medical food, infant formula and alcohol containing products) in 28 food groups, derived from a collection of the dietary guidelines in major countries. Aiming at a contribution to the prevention of obesity and non-communicable diseases, the nutrients that have been identified as relevant for this aim by WHO are included in the system: trans fatty acids, saturated fats, (added) sugar, salt, dietary fibre and energy.

For each food group, cut-off points for all relevant nutrients have been determined. In order to guide consumers to the healthiest option in each food group, to motivate producers to innovate toward a healthy direction and to help retailers select and promote healthy product offerings, the maximum levels for the nutrients (and minima for dietary fibre) are set so that 10-30% of the products in the food group can comply.

In order to further encourage food product innovation and reformulation, the Choices Scientific Committees periodically review the Choices Program’s nutritional criteria. To do so, they take into account the latest developments in nutritional science, food technology and consumer preferences as well as dominant market trends.

The impact of the implementation of a Choices program in a country is documented in different ways. Roodeburg [26] and de Menezes [27] both calculated the potential effect of the full change from a normal diet to a diet composed of comparable Choices compliant products. Intake of sugar, salt and saturated fat showed a decrease with 20-40%, while the intake of trans-fatty acids was almost reduced to zero. Although, the Choices criteria only address several macro-nutrients, Roodeburg [28] concluded that the micro-nutrient intake of young Dutch adults significantly increased in the same setting.
Vyth concluded in her PhD thesis that the introduction of the labelling program in The Netherlands caused a high level of efforts by food producing companies to improve the composition of many of their products according to the Choices criteria [29].

By means of changes in both consumer purchasing behaviour and product composition, a substantial change in nutrient intake can be established. Although not yet substantiated by intervention studies, it can be expected that these changes in nutrient intake causes a more beneficial picture of bio-parameters for non-communicable diseases. This of course might be relevant in the end for improved public health and decrease in health care costs. Choices International is a global programme that can be implemented in both mature and emerging economies. In all countries in the world, figures for obesity and NCDs are rising, as per capita income spent on food, the figures for consumption of pre-packaged food as well as the position of retail in the food market [30]. This nutrition transition causes a huge shift in food patterns and nutrient intake. A program such as Choices helps to steer this development in a healthier direction.

4. GROUP SUMMARIES

4.1 Manufacturing Group

Many fats and oils manufacturing industries are found in Nigeria and many manufactured foods also contain quantities of fats and oils. Discussions in this group revolved round issues bothering on heart health in the Nigerian population as well as good manufacturing practices in the production of fats and oils.

There has been sub-optimal emphasis on Heart Healthy foods which contribute to the low awareness of healthy foods in relation to Heart Health. Knowledge for healthy eating is however gradually building up as evidenced by fruit and vegetable salads sold by vendors on streets, fast-food outlets and supermarkets. Inability to afford these healthy foods classes limits the options by social class, contributing to making unhealthy food choices.

Some advertisements of calorie dense, low nutrient food products, target children and trigger poor snacking habits for unhealthy food type. The Summit observes that there is abundance of local sources of heart-friendly lipid products which are yet to be fully tapped in Nigeria. Research and development to process local raw foods for storage and preserve them optimally will not only cater for the malnourished by preventing destruction of nutrients, but reduce hunger by avoiding spoilage. Funding for industrial innovation should be sourced not only from the private sector but the government as well, so that we can develop technology specific to the local foods, taste, and in healthy forms. Heart-health benefits of many plant products such as Ginger, Garlic, Garden Eggs, Bitter Leaf, Walnuts, and Pears are profuse in literature and should be taken advantage of.

Food processing methods that are discouraged include smoking of food products as encountered in barbecues, open air roasting of corn and yams, repeated frying of oils in home use, including manufacturing and handling processes that change the integrity and composition of vegetable oils. Overheating, bleaching, hydrogenations are extreme treatment of food and food products which usually degrade the nutritive value of the processed food and of oils in particular. Therefore recycling of frying oils that hydrogenate and oxidize oils, are some deleterious effects conferred on fats and oils, that should be discouraged. On the other hand, to preserve the antioxidants and vitamins in food and food products, boiling extraction methods of red palm oil preserves the B carotene and antioxidants better than refining process that produces tasteless white palm oil obtainable in the food manufacturing industries.

Although most oils in the market claim to have no or low cholesterol, it is not certain that they meet the cholesterol free standards by the CODEX criteria of less than, 0.005 g per 100 g solids, 0.005 g per 100 ml liquids with less than 1.5 g saturated fat per 100g solids or 0.75 g saturated fat per 100 ml liquids and 10% energy from saturated fats [4].

Compliance with local fortification regulations also need to be verified for integrity of such oils to be acceptable.

There are various dietary lipids available in the Nigerian markets, both of plant and animal origins, including groundnut oil, palm kernel oil, coconut oil, soybean oil, sunflower seed oil, cotton seed oil, maize oil, palm oil and so on. Over 40 vegetable oils were published under different trade names as being available on the Nigerian market [18], but only four have been endorsed by NHF. These are established as
cholesterol-free oil in the Nigerian market and their production promoted by the NHF heart friendly endorsement.

4.2 Regulation Group

The National Agency for Food and Drug Administration and Control (NAFDAC) has a duty to safeguard the public health of the nation by ensuring the right quality foods, drugs, and other regulated products are manufactured, exported, imported, advertised, sold and used. The National Agency for Food and Drug Administration and Control has oversight responsibilities for regulatory issues of food and food products. The regulatory capacity of this agency however needs to be strengthened. NAFDAC also has the regulatory role for daily dietary allowance of food and food products in Nigeria. There is an ACT in place to label prepackaged foods (Pre-Packaged Food (Labelling) Regulations 2005 as detailed in the DRUGS AND RELATED PRODUCTS (REGISTRATION, ETC) ACT 1999 AS AMENDED) as well as specific regulations for fats and oils (2005 NATIONAL AGENCY FOR FOOD AND DRUG ADMINISTRATION AND CONTROL ACT 1993 AS AMENDED). A mandatory procedure to protect the consumer by the government regulators, is the process of obtaining the NAFDAC registration number that indicates a minimal guarantee of safety to the consumer of food or drug product. Nutrition Labelling and Awareness Campaigns have started with the first NAFDAC Food Safety Week in 2015. It is expected that they conduct surveillance of products in the market, but again, the capacity to do this needs to be strengthened.

Food labelling in Nigeria is conducted by NHF in partnership with NAFDAC, following Codex International standards. The awareness level for food labelling practice offered by NHF in Nigeria is however low and consequently, the product participation is low. Most samples have to be sent to laboratories abroad due to insufficient accredited laboratories to analyze the food products as required by the Guidelines. Potential laboratory resources for analyzing food and food products for labelling purpose are Standards Organization of Nigeria (SON) and NAFDAC.

The Nigerian Government in the year 2000 launched the National Fortification Programme to ameliorate the worsening nutritional status, especially of women and children with regard to Vitamin A deficiency.

The Food Fortification Programme stipulates that readily available and more affordable foods be enhanced nutritionally by addition of some vital minerals and vitamins. Mandatory fortification in Nigeria took effect officially in September 2002. Under this programme, it became imperative for all flours, sugar and vegetable oils sold in the country to be fortified with vitamin A and other micronutrients as enforced by NAFDAC. Two major challenges facing the country as regards Vitamin A food Fortification include, the continued smuggling of non-fortified edible vegetable oil and sugar into the country and the existence of cottage industries, for example in milling of cereals (maize, millet, sorghum) and the manual production of edible vegetable oil, that do not have the facility to fortify their products. There is a need for improved surveillance and verification of label claims by engaging in increased market-level monitoring.

4.2.1 Dietary reference intakes (DRI)

Dietary Reference Intakes refer to a set of at least four nutrient-based reference values which vary by age and gender, that can be used for planning and assessing diets, addressing issues of safety, quality and adequacy [31]. DRIs, include the Estimated Average Requirement (EAR), the Recommended Dietary Allowance (RDA), the Adequate Intake (AI), and the Tolerable Upper Intake Level (UL). The DRIs replace the periodic revisions of the Recommended Dietary Allowances, which have been published since 1941. Although physiological requirements for nutrients are expected to be similar across healthy population groups, divergent quantitative values have emerged from the different national expert groups, mostly a reflection of differences in the interpretation and use of scientific data. Criteria chosen for estimating average requirements vary from country to country, and are often based on different food habits and indigenous diets of ethnic groups. These are available only for a handful of the developed nations. While we may not need to reinvent the wheel as concerning the DRIs, those of the USA FDA which is a reference standard for Nigeria, still needs to be adapted to the peculiarities of the Nigerian population. Nigeria needs to harness the capacity and resources inherent in the line Ministries as well as academia and other research institutions as
done by its contemporaries in the developed nations, to put national values in place.

4.3 Government Group

There are many local manufacturers of edible oils in Nigeria and it is prohibited to import refined vegetable oils. Vegetable oils are however smuggled into Nigeria with a negative economic consequence and possible detriment to the people’s health as they are not monitored for quality and standards. In addition, many brands of vegetable and animal oils are manufactured and or marketed in Nigeria without appropriate labelling of their constituents and origin (plant or animal source). The NHF has endorsed only few of these products through the NHF Heart Check Food Labelling Programme. Government establishments like NAFDAC, SON, Consumer Protection Council and Non-governmental Organizations like Nigerian Heart Foundation and Nutrition Society of Nigeria promote dietary health awareness. However, the Nigerian Heart Foundation Heart Check Food Labelling Programme is the foremost Programme that provides endorsement, based on strict criteria, through accredited laboratories. This initiative is of great benefit and complimentary to the regulatory efforts of NAFDAC in ensuring informed choice from options in edible oil and other food products, on the food market.

The role of Government is primarily to provide a roadmap to healthy living through the promulgation of policy guides and Acts. The National Strategic Plan of Action for Nutrition Policy was reviewed in August 2016 with technical help from WHO. Other documents that are needed in Nigeria include Daily dietary allowances specific for the Nigerian population and Food Composition table for Nigerian type diets.

4.4 Research Group

Fat serves primarily as an energy reservoir in concentrated form and is required for the assimilation of other nutrients including fat-soluble vitamins. It is necessary for the synthesis of cholesterol, prostaglandins, testosterone, and other lipid-containing hormones and compounds, which are constituents of the normal body structures. Of total dietary energy intake from food groups in a Nigerian study, palm and groundnut oil contributed 17.6% mean and 14.9% median, while other oils contributed 9.2% mean and 7.9% median energy [18] that is a total of 26.8% mean and 22.8% median, well within the limits of 30% of calories as recommended. No more than 5-10% of energy should come from saturated fats, 10% should be from mono-unsaturated and another 10% from poly-unsaturated fatty acids [19] while trans fats are altogether undesirable. Compared to globally acclaimed healthy virgin olive which has 14% saturated fats, 85% mono and polyunsaturated fats with Omega 6:Omega 3 essential fatty acids in a ratio 8:1, palm oil has 40% saturated fats and 60% mono and polyunsaturated fats and the two essential fatty acids in the ratio 11:1. Long term consumption of palm oil in quantities provided by the Nigerian cooking and culinary culture and traditions do not point to any associated adverse events. Many other cultures of the world especially of the African and Asian origin have been known to eat palm oil for ages without documented negative health consequences. Therefore, there is no evidence of direct association of negative health effects of eating palm oil.

Animal fats, a natural source of saturated fats, used to contribute minimally to diets of populations south of the Sahara, but it has become an increasing contributory factor to the Nigerian diets. Despite a diet high in saturated fat by Fulani adults, where nearly one-half of energy was provided by fat, and one-half of that was derived from saturated fatty acids, a lipid profile indicative of a low risk of cardiovascular disease compared to their urban more sedentary and higher socioeconomic counterparts in the same region was observed [32,20,33,21,34,22]. The mean energy content of the Fulani diet was however, relatively low (men, 6980 kJ; women, 6213 kJ) while the mean protein content of their diet (men, 20% of energy; women, 16% of energy) was high. The mean total cholesterol, HDL-cholesterol, and triacylglycerol concentrations of Fulani adults were within the referent ranges. Urban and rural adult Nigerian males have generally favorable risk factors for cardiovascular disease when compared with healthy North Americans.

The average Nigerian is increasingly predisposed to NCDs, attributable to changes in diet and lifestyles over time. Also evident is the worsening nutritional indices in various reports over the years, including the Nigeria Demographic and Health Survey of 2013 [23]. Literature is profuse with the significance of serum lipid profile in the clinical investigation and
management of pathological conditions such as CVD, diabetes mellitus, morbid obesity, alcoholics, and individuals of high social economic status as well as the malnourished. Optimal lipid profile for heart health including total cholesterol: <200 mg/dl; triglycerides: <200 mg/dl; HDL: >40 mg/dl; and LDL: <130 mg/dl; total cholesterol/HDL ratio and the LDL/HDL ratio less than or equal to 3.5, Apo B of 40-125 mg/dl and included blood pressure: <130/85 mm Hg.; are desirable for good heart health. [33] Although there is documented evidence of deleterious effect of lipids in Nigerians, a lot still need to be researched into the effect of indigenous fats and oils on the Nigerian population.

Nigeria has a food based dietary guideline first published in 2001 [35,24], prepared from the review of relevant dietary assessment methodologies. It strategizes to improve food consumption pattern and nutritional wellbeing of individuals in the population by addressing Public Health issues arising from local dietary patterns and resolving them in the context of locally available foods. This approach to optimize dietary health is more amenable to Nigeria and other developing counties in their notable absence of numeric targets for food and nutrients intake. Dietary Reference Intakes (Recommended Nutrient Intakes and other) which exist side by side in developed countries may be reserved for use by policy makers and health care professionals with knowledge on the interpretation of the quantitative values. Nonetheless, these values are not available for Nigeria. Food composition table is also not available for Nigeria, but it is, for West African Region, including eight other countries. First published in 2010 [36,25], it was updated in 2012 and its source of data derives from analysis of scientific publications, theses, University reports, as well as food composition databases from some of the other countries that have them [36].

Federal Institute of Industrial Research (FIIRO); NIMR and Universities are some relevant research conducting organizations, that have laboratories for research into nutrient components of food and meeting human nutrition needs. NAFDAC has analytical laboratories that would validate not only the safety of food, food products and drugs, but other items for human use in Nigeria. However, these resources are inadequate and their capacity needs to be strengthened. Laboratories outside the country are therefore employed to analyze the samples.

There is a whole lot of conflicting information in literature as to the acceptable and desirable components of health and unhealthy components of fats and oils and their attending implications. The weight of these evidences to arrive at a resolution concerning what ought to be acceptable needs to be defined by standards peculiar to Nigeria. Federal Ministry of Health in conjunction with relevant Agencies/Organizations, should release Guidelines for acceptable lipids profile for food and food products in Nigeria. The line Ministry of Health should in addition be in a position to commission research and a National survey on NCDs.

The need for more Journals on Food and Nutrition was highlighted, to provide authoritative references that proffer solutions and support policy from which evidence for intervention can be drawn and recommendations can be made. Nutrition Journal of Nigeria is the only functional journal on food and Nutrition. The Summit recommends more journals that will complement efforts of the existing one and encourage home grown researchers to publish relevant information.

5. CONCLUSION

The Summit on cardiovascular health in the Nigerian population reached a consensus on all the points summarized in the different groups. The Summit agrees that there is a gap of scientific knowledge to be filled on Lipids and Cardiovascular Health in Nigerian Population. Translating the research into effective population interventions will go a long way in exchange for relevant information in cardiovascular health, empowering us with tools for effective strategic planning and finding solutions to the burden of NCDs in Nigeria.

The Summit's conclusions and recommendations are already published [37]. The Federal Government of Nigeria needs to continue to play a coordinating role in convening stakeholders meeting consisting of philanthropic foundations, nongovernmental organizations, research institutions, private companies, industries and international institutions; on addressing NCDs periodically. This will help to develop a strategic and sustainable plan for collective actions on NCDs in Nigeria.
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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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