

Grey Literature

CONSENSUS SUMMIT: LIPIDS AND CARDIOVASCULAR HEALTH IN THE NIGERIAN POPULATION

ABSTRACT (ARIAL, BOLD, 11 FONT, LEFT ALIGNED, CAPS)

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.

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 from non-communicable diseases (NCD). 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 [2][3]. The upsurge of this disease in the developing countries is as a result of increasing prevalence of risk factors including poor nutrition (too much sugar, fats and salt but too little fibre), obesity, physical inactivity and tobacco use. Determinants that drive CVD are socio-economic and cultural changes including, globalization, urbanization, an ageing population, poverty, nutrition, stress and also hereditary factors.

Most cardiovascular diseases can be prevented by addressing behavioral risk to these factors and prevention can be effected both at individual or population level through intervention on the part of the government and non-governmental bodies [1]. Nutrition plays a central role and efforts are guided by policies that adopt Global Health principles and targets, which are tailored to country specific needs. The Federal Ministry of health(FMOH) published "Nutritional guidelines for the prevention control and management of NCDs in Nigeria, addresses issues at Public health level, including health promotion and campaigns encouraging lifestyle changes which address diet, physical inactivity, reduction of alcohol consumption, cessation of tobacco use and avoidance of other risk factors for the control of Cardiovascular disease. Creating awareness stimulate self-effort at lifestyle changes which is a key component of control.

Dietary fats and oils provide calories and essential fatty acids and are sources of fat-soluble vitamins A, D, E, and K. However the lipid content of dietary fats and oils has been shown to have a bearing on serum lipid profile as dyslipidemia is associated with CVD risk [4]. Foods rich in saturated fatty acids (SFA) and trans fatty acids are generally considered unhealthy; whereas, monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA) are considered beneficial. On the other hand, there is plenty of evidence that effects of the major food types are not significant when the BMI is optimum [5][6]. For example, the cholesterolemic ability of palm oil has been shown in mice to be minimal [7] and there are no documented evidence of establishing high level of saturated fatty acids present in palm oil with ischemic heart disease in the Nigerian population.

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 with a view to decide best practices (consensus) 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. Proceedings of the summit are submitted in this publication.

2. METHODOLOGY

To achieve this objective, the Summit brought 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 Organisation of Nigeria, other Research Institutes, Universities, Civil Society Organizations, Consumers, Food manufacturers and other relevant Stakeholders to deliberate on this important issue. There was a plenary session where presentations were made to outline the goals of the summit; 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 are presentations that were made. The Stakeholders then split into four groups in a breakout session, including, Research, Manufacturing, Government and Regulation groups, Experts in respective fields of the group, anchored deliberations and pre-outlined questions pertinent to best practices as it concerns lipids and cardiovascular health. Reports from each group were presented in a second plenary session. A panel of specialist, drawn from amongst stakeholders was then invited to field questions from the audience to reach a consensus on a communique that was presented to the house at the close of the summit.

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 and 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 Labeling Programme is voluntary. Companies that are interested subject their products to underlying 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 to all packaged food items that fulfill the criteria, while all packaged food items with contents exceeding the stated levels of sodium, sugar, cholesterol and transfat as defined in the criteria, are excluded from carrying the logo.

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 noncommunicable diseases. Cardiovascular diseases account for nearly half (48%) of deaths due to noncommunicable diseases[1]. In Nigeria, according to WHO, NCDs accounts for about a quarter of all deaths annually and CVDs are responsible for about 7%, the highest cause of deaths due to NCDs[2].

While deaths from noncommunicable diseases mainly occur in adulthood, exposure to risk factors begins in childhood and builds up throughout life, underpinning the importance of legislative and regulatory measures. Policies, plans and services for the prevention and control of noncommunicable diseases need to take account of health and social needs at all stages of the life course. This will include maternal health, preconception, antenatal and postnatal care. Proper infant feeding practices, including promotion of breastfeeding and health promotion for children, adolescents and youth, promotion of a healthy working life, healthy ageing and care for people with noncommunicable diseases in later life are also necessary[3].

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. A “Nutritional Guideline on Non-Communicable Diseases (NCDs) Prevention, Control and Management” has been developed as well as a National Strategic plan of Action for nutrition with control of diet related non communicable diseases as one of the priority areas [2]. Effective Monitoring of the Fortification Programme to ensure compliance, promotion of appropriate and adequate nutrition from birth throughout the life course; through the promotion

and support of exclusive breastfeeding for the first six months of life, continued breastfeeding until two years old and beyond. In addition, adequate and timely complementary feeding, enforcement of compliance with the regulation on the marketing of breastmilk substitutes by NAFDAC, sustained awareness creation and public enlightenment on the importance of healthy diet and Effective collaboration with industry to ensure compliance with the standards laid down and the adoption of new standards, would be a good step towards achieving success.

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 by numerous studies to promote atherogenesis, leading to atherosclerosis in the coronary and other arteries[4][5][6][7][8].
- This process can lead to coronary heart disease (CHD) with a wide spectrum of manifestation including myocardial infarction, and peripheral artery disease (PAD).
- 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”.

3.3.2 SUMMARY OF CARDIOVASCULAR EFFECTS OF DYSLIPIDAEMIA

- Abnormal lipid profile (raised TC, LDL-C, VLDL-C, TGL and low HDL-C) has been associated with CHD and PAD. These result to high mortality and morbidity rates especially in developed countries although, significantly increasing in developing economies.
- Dyslipidaemia is a well-documented risk factor for cardiovascular disease - a topmost killer globally.
- 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.

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.
2. Documented evidence of deleterious effect of lipids on Nigerians.
3. Steadily-increasing prevalence of Ischaemic heart disease in Nigeria.

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 the main 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.

Substituting other mono or polyunsaturated vegetable oil for palm oil especially for cooking purely on the basis of choosing a healthier option, is not based on sound evidence especially when such oils are subjected to high heat, when frying. Red palm oil should be used within the limits of allowed total daily calorie intake from fats. There is as yet no scientific evidence that shows that consumption of red palm oil as part of a healthy balanced diet, is harmful.

3.5 CHOICES INTERNATIONAL HEALTHY FOOD PROGRAMME

The Choices Programme is a global multi-stakeholder initiative that aims to help prevent obesity and other diet-related diseases [9]. It is based upon the WHO Global Strategy for Diet, Physical Activity and Health [10] and focuses on reformulation and consumer friendly labelling.

The nutrient profiling system as developed by the Choices International Scientific Committee, is described [11]. 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 Programme'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 programme in a country is documented in different ways. Roodenburg [12] and de Menezes [13] 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, Roodenburg [14] 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 [15].

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 [16]. 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 plants 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. Awareness for healthy eating is however gradually building up as evidenced by fruit and vegetable salads sold by vendors on street, fast-food outlets and supermarkets. Inability to afford these healthy foods classes would also contribute to making unhealthy food options.

Some advertisements of calorie dense, low nutrient food products, target children and trigger automatic snaking of available food. Responsible advertising is encouraged but more than this, government and non-governmental efforts to inculcate healthy eating and other lifestyle habits,

207 should pervade the communities through participatory activities and behavioral change
208 components so that the population is not rife with avoidable NCDs.

209 The Summit observes that there is abundance of local sources of heart-friendly nutritional lipid
210 products which are yet to be fully tapped in Nigeria. Research and development to process local
211 raw foods for storage and preserve them optimally will not only cater for the malnourished by
212 preventing destruction of nutrients, but reduce hunger by avoiding spoilage. Funding for
213 industrial innovation should be sourced not only from the private sector but the government as
214 well, so that we can develop technology specific to the local foods, taste, and healthy form.
215 Heart-health benefits of many plant products such as Ginger, Garlic, Garden Eggs, Bitter Leaf,
216 Walnuts, Pears are profuse in literature and should be taken advantage of.

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

227 Although most oils in the market claim to have no or low cholesterol, it is not certain that they
228 meet the cholesterol free standards by the CODEX criteria of less than, 0.005g per 100g solids,
229 0.005g per 100ml liquids with less than 1.5g saturated fat per 100g solids or 0.75g saturated fat
230 per 100ml liquids and 10% energy from saturated fats [3].

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

233 There are various dietary lipids available in the Nigerian markets, both of plant and animal
234 origins, including groundnut oil, palm kernel oil, coconut oil, soybean oil, sunflower seed oil,
235 cotton seed oil, maize oil, palm oil and so on. Over 40 vegetable oils were published under
236 different trade names as being available on the Nigerian market [17], but only four have been
237 endorsed by NHF. These are established as cholesterol-free oil in the Nigerian market and their
238 production promoted by the NHF heart friendly endorsement.

4.2 REGULATIONS

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 Internationally standards. The awareness level for food labeling 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 product for labeling purpose are Standards Organization of Nigeria (SON) and NAFDAC itself, if their capacity is strengthened.

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. Again the agency needs to be empowered to live up to its responsibility in the drive to enforce this programme. There is a need for improved surveillance and verification of label claims by engaging in increased market-level monitoring. The National Agency for Food and Drug Administration and Control can split the task and the burden, collaborating with law enforcement agencies among relevant department in Government. Strengthened and continued collaboration among relevant government agencies, to prevent the influx of smuggled products into the country and targeting the cottage industries for capacity building to fortify staple food products, will aid compliance.

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. *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, the DRI of the USA FDA which is 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 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. Non-governmental and Government Organizations like NAFDAC, Ministry of Health and its line ministries promote dietary health awareness, but the Nigerian Heart Foundation Heart Check Food Labelling Programme is the foremost Organization that provides endorsement, based on strict criteria, through accredited laboratories. This initiative is of great benefit and complementary to the regulatory efforts of NAFDAC in ensuring informed choice from options in edible oil and other food products, on the food market.

The predominant local edible fats and oils are Palm Oil, RBD Oil, Palm Kernel Oil, Soybean oil, and Groundnut oil amongst others. Of these, palm oil is the main vegetable oil produced and consumed in Nigeria, with its prospects of providing income and economic development to a large number of the rural poor. From being the world's leading producer and exporter of palm oil in the 1960s, Nigeria has fallen to being a net importer of palm oil to meet the growing domestic needs. Demand is primarily driven by the household consumers who prefer to consume the refined palm oil because of its flavour profile. Palm oil has health benefits as the single richest natural source of β -carotene, which is the precursor of Vitamin A. In the light of reviewed evidences, the Summit agreed that it was time to revisit the Heart health issue of this staple source of edible oil and not forfeit the health benefits of raw palm oil, by encouraging informed return to its consumption by the populace.

The role of Government is primary in all of these, to provide a roadmap to healthy living through the promulgation of policy guides and Acts. Funding is necessary in empowering the appropriate arm and departments to perform necessary functions. In addition, technical assistance is provided to the Government through Global Health/Agricultural Organizations when the theme is of prominent significance. Thus several documents are in place to guide food and food products formulation and consumption to, amongst other goals and objectives, reduce diet-related, non-communicable diseases. The strategic Plan of Action for Nutrition is key and the general objective is to build upon the framework outlined in the National Food and Nutrition Policy to improve the nutritional status of the Nigerian population. Delivery of this goal will be accomplished through Behavioral Change Communication, Service delivery, Capacity building, Advocacy, Resource mobilization, Research monitoring and Evaluation, Coordination and Multisectoral partnerships. Some Policy documents bothering on Nutrition and Heart health are listed in the appendix.

The National Plan for Action on food and nutrition Policy was reviewed in August 2016 with technical help from WHO. Some other reference documents however still need to be put in place or, those prepared for other countries that have been adopted, adapted to fit Nigerians nutritional profile. These will include Daily dietary allowances specific for the Nigerian population

and Food Composition table for Nigerian type diets. Improved level of population data on CVD in Nigeria will serve to inform policies and programmes. Of the interdisciplinary, multidisciplinary and collaborative interventions that will achieve these targets, research plays a major role so that findings and evidences will continue to feedback into policy reviews and intervention updates.

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. Thus, fats are very important in terms of the structure and protection of the body from physical and physiologic damage. 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 poly unsaturated 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. In any case, there is no evidence of direct association of negative health effects of eating palm oil.

Plants have cholesterol-like phytosterol, unusable by our cells. They however compete for absorption with cholesterol in our gut thereby reducing the amount of cholesterol absorbable because of their competing similar structure to that of cholesterol. 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 modifying factor to the Nigerian diets. However, 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 [20][21][22]. The mean energy content of the Fulani diet was 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. Risk factors for cardiovascular disease 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 should each be less than or equal to 3.5, also included blood pressure: <130/85 mm Hg and homocysteine; have been described in different studies and in Nigeria [19] 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[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 countries 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 [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 [25].

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, the Food and Drug regulatory Organ has analytical laboratories that would validate not only the safety of food, food products and drugs, but other items for human use in the Nigerian populace. These resources are however inadequate and their capacity need to be strengthened to meet the challenge of needs for regulation, food labelling standards or carrying out investigations to degrees of sophistication required by a country of the size and potentials of Nigeria. These laboratories are inadequately equipped to provide the information necessary to categorize food and food items as heart friendly or not. Laboratories outside the country are therefore employed to analyze these samples for Food Endorsement. There is urgent need to build capacity within Nigeria. 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. Floating another such journal will complement efforts of the one in existence 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. Translating these research into effective individual/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 recommendations are as listed below. Taking it all together, Federal Government of Nigeria needs to convene other stakeholders and leading partners on addressing NCDs (philanthropic foundations, nongovernmental organizations, research institutions, private companies and international institutions,) to develop a strategic and sustainable plan for

collective actions on NCDs in Nigeria. In this regard, Government will continue to play a coordinating role.

6 RECOMMENDATIONS

1. The Summit recommends technical and capacity developments of Laboratories in Nigeria to improve analysis of edible oils and micro-nutrients

2. *To improve National and States data on NCDs*

Efforts should be made by the Federal and State Governments to initiate and maintain health surveillance systems to monitor and control NCDs through creation and support for NCD departments in State Ministries of Health. The Federal and State governments should allocate funds and build capacity for sustainability of NCDs Surveillance with emphasis on prevention, detection and response as a target for reducing incidence of CVDs and mitigating the impact of NCDs.

3. *Collaboration to improve diets*

The Federal government of Nigeria should collaborate with WHO, WHF, Global NCD Alliance, World Food Programme and other initiatives in conjunction with leading National CSOs to coordinate national efforts to develop collaborative strategies towards reduction of dietary consumption of trans-fats and cholesterol by the population. This initiative should include stakeholders from the public health community, multinational and national food corporations including the food services industries and retailers.

4. *Advocate for NCDs to be given Funding priority*

Leading National CSOs and Professional societies related to CVDs and other NCDs should work together to advocate for private foundations, charities, governmental agencies and private donors to prioritize funding for specific initiatives and research to prevent and control the emerging epidemic of CVD and related NCDs. For successful advocacy, these organizations should consider (a) improving awareness of Cardiovascular health, (b) Advocating for health promotion and NCD prevention policies at Federal and State levels of government, (c) Engaging the media about priorities related to NCD control and (d) Emphasizing the importance of translating research into effective individual – population interventions.

The funding should address surveillance and prevention activities and ability to diagnose CVDs using latest technologies.

5. *Advocacy For Correct Product Labelling*

Companies producing and marketing vegetable oils should label their products correctly according to the Codex Guidelines on Labelling of Pre-packaged foods and NAFDAC's Fats and Oils Regulations (2005), with emphasis on cholesterol free content.

6. The Federal Government should promote and support compulsory labelling of food products based on International acceptable standards (i.e. Codex Standards; Choices International standards etc.). Information on the labelling should be clear, consistent, understandable, scientifically correct, simply presented and expressed both graphically and numerically.
7. Nutritional Labelling of dietary lipids to be made mandatory with NAFDAC enforcement by appropriating sanctions to defaulting companies
8. The Nigerian Heart Foundation should continue the Endorsement of Heart friendly oils
9. There should be periodic update of the information contained in the "Nutritional guidelines for the prevention, control and management of NCDs in Nigeria" in a way that is easy to understand, for the purpose of consumer education.
10. That Government actively encourages research into improving the quality of local sources of Heart-friendly nutritional lipid products.
11. Cohort studies to determine the Recommended Daily Allowance (RDA) of lipids for Cardiovascular health in Nigerians should be encouraged and supported
12. Cohort studies to document cardiovascular diseases incidence, lipid profile status of indigenes in areas (locations) of high production and consumption of palm oil should be conducted.
13. Effects of variously processed and cooked palm oil on the blood lipid profile of human subjects, their effects on the level of oxidation, antioxidation as well as the free radical scavenging properties of palm oil should be investigated.
14. Urgent collaborative research studies to establish the Food Composition tables for Nigeria should be instituted in appropriate Departments in Nigerian Universities and Research institutions.
15. With respect to vegetable oils the Summit urges the Nigerian Heart Foundation to coordinate necessary efforts among Nigerian scientists to carry out more comprehensive analysis locally of all Nigerian vegetable oils for their fatty acid profiles for the benefit of all stake holders.
16. The Government should be reminded of the responsibility of promoting healthy lifestyles including adoption of Heart-healthy dietary habits in partnership with the private sector, research institutions, CSO's and other stakeholders.

17. There is the need for Federal government policy to promulgate legislation with emphasis on agriculture and food, and incentives to encourage the production of local sources of heart friendly nutritional lipid products.
18. Government, the private sector, research institutions, CSO's and other stakeholders are invited to join the Nigerian Heart Foundation in the campaign for Heart - healthy food habits in Nigeria.

REFERENCES

1. World Health Organization (WHO). Non communicable Diseases Country Profiles [Internet]. Genève : WHO Press, 2014. 2014. Available from: http://www.who.int/nmh/countries/ben_en.pdf?ua=1
2. Federal Ministry of Health. National Nutritional Guideline On Non-Communicable Disease Prevention , Control and Management Non-Communicable Disease Control Programme Federal Ministry of Health Abuja , Nigeria. 2014.
3. World Health Organization. Global action plan for the prevention and control of noncommunicable diseases 2013-2020. [Internet]. World Health Organization. 2013. Available from: http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236_eng.pdf
4. Adams-Campbell LL, Nwankwo MU, Omene JA, Ukoli FA, Young MP, Haile GT, et al. Assessment of cardiovascular risk factors in Nigerian students. *Arteriosclerosis*. 1988;8:793–6.
5. Ahaneku G, Ahaneku J, Osuji C, Oguejiofor C, Anisiuba B, Opara P. Lipid and some other cardiovascular risk factors assessment in a rural community in Eastern Nigeria. *Ann Med Health Sci Res* [Internet]. 2015;5(4):284. Available from: <http://www.amhsr.org/text.asp?2015/5/4/284/160178>
6. Akinboboye O, Idris O, Akinkugbe O. Trends in coronary artery disease and associated risk factors in sub-Saharan Africans. *J Hum Hypertens* [Internet]. 2003;17(6):381–7. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/12764400>
7. Akuyam S, Isah H, Ogala W. Evaluation of serum lipid profile of under-five Nigerian children. *Ann Afr Med* [Internet]. 2007;6(3):119. Available from: <http://www.annalsafrmed.org/text.asp?2007/6/3/119/55722>
8. Akuyam S, Anaja P, Isah H, Aliyu I, Yusuf R. Lipid abnormalities: A case study of Ahmadu Bello University Teaching Hospital, Zaria, Nigeria. *Ann Niger Med* [Internet]. 2010;4(1):10. Available from: <http://www.anmjourn.com/text.asp?2010/4/1/10/73869>
9. Choices Programme. www.choicesprogramme.org.
10. World Health Organization (WHO). Global strategy on diet, physical activity and health. Geneva. World Heal Organ. 2004;
11. Roodenburg A, Popkin B, Seidell J. Development of international criteria for a front of package food labelling system: the International Choices Programme. *Eur J Clin Nutr* [Internet]. 2011;65(10):1190–200. Available from: <http://dx.doi.org/10.1038/ejcn.2011.101>
12. Roodenburg AJC, Schlatmann A, Dötsch-Klerk M, Daamen R, Dong J, Guarro M, et al. Potential Effects of Nutrient Profiles on Nutrient Intakes in the Netherlands, Greece, Spain, USA, Israel, China and South-Africa. Tomé D, editor. *PLoS One* [Internet]. 2011 Feb 23;6(2):e14721. Available from: <http://dx.plos.org/10.1371/journal.pone.0014721>
13. de Menezes E. Differences in nutrients in substitution from typical to Choices products. *Food Chem*. 2013;140(3):399–612.
14. Roodenburg AJC, Temme EHM, Davies OH, Seidell JC. Potential impact of the Choices Programme on nutrient intakes in the Dutch population. *Nutr Bull*. 2009;34(3):318–23.
15. Vyth EL, Steenhuis IH, Roodenburg AJ, Brug J, Seidell JC. Front-of-pack nutrition label

- stimulates healthier product development: a quantitative analysis. *Int J Behav Nutr Phys Act.* 2010;7:65.
16. International Food Policy Research Institute (IFPRI). 2016 Global food policy report survey [Internet]. 2016. 1-11 p. Available from: <http://ebrary.ifpri.org/cdm/singleitem/collection/p15738coll2/id/130222/rec/3>
17. Okpuzor J, Okochi VI, Ogbunugafor HA, Ogbonnia S, Fagbayi T, Obidiegwu C. Estimation of cholesterol level in different brands of vegetable oils. Vol. 8, *Pakistan Journal of Nutrition*. 2009. p. 57–62.
18. Odilia I Bermudez, Claire Toher, Gabriela Montenegro-Bethancourt, Marieke Vossenaar, Paul Mathias, Colleen Doak and Noel W Solomons. Dietary intakes and food sources of fat and fatty acids in Guatemalan schoolchildren: a cross-sectional study *Nutrition Journal* 2010; 9:20 DOI: 10.1186/1475-2891-9-20
19. Dietary fats and oils – Nutrition and you. Available from <http://www.nutrition-and-you.com/fats-and-oils.html>
20. Glew RH, Williams M, Conn CA, Cadena SM, Crossey M, Okolo SN. Cardiovascular disease risk factors and diet of Fulani pastoralists. *Am J Clin Nutr.* 2001;74(6):730–6.
21. Glew RH, Kassam HA, Bhanji RA, Okorodudu A, VanderJagt DJ. Serum lipid profiles and risk of cardiovascular disease in three different male populations in northern Nigeria. *J Health Popul Nutr* [Internet]. 2002 Jun;20(2):166–74. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/12186197>
22. Glew RH, Conn CA, Vanderjagt TA, Calvin CD, Obadofin MO, Crossey M, et al. Risk factors for cardiovascular disease and diet of urban and rural dwellers in northern Nigeria. *J Health Popul Nutr* [Internet]. 2004 Dec;22(4):357–69. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15663169>
23. Nigeria Demographic and Health Survey 2013 - The DHS Program Available from <https://dhsprogram.com/pubs/pdf/FR293/FR293.pdf>
24. Nigeria FG of. Food dietary guideline for Nigeria [Internet]. 2006. Available from: <http://www.fao.org/3/a-as841e.pdf>
25. Food and Agriculture, Organization of the United Nations (FAO). Composition of Selected Foods from West Africa. 2010.