Problems Associated with Dietary Assessment in Nigeria

Emmanuel, Bidemi Bernice   omalebernice@gmail.com

Food science and technology, Federal University Wukari, Nigeria

ABSTRACT

Dietary assessment is a scientific assessment of eating pattern that could detect nutrient deficiency. Accurate and representative dietary data are essential to scientists, policy makers, and many other stakeholders. This is because it is important for planning, developing and evaluating nutrition intervention programs. Despite the importance of dietary assessment data for a broad range of policy and research applications, there are some problems/challenges encountered when it comes to the assessment of dietary data in Nigeria. Currently, there is a lack of time-relevant dietary data in Nigerian on which the government can base their programme on. There is a general lack of commitment by government at all levels such that researchers are not given adequate financial support. The poor funding/lack of funds for conducting dietary assessment research, variation in food preparation/the use of non-standard recipes, culture/language barrier, time burden, insecurity and lack of comprehensive country-specific food composition data are some of the barriers/problems to dietary data collection in Nigeria.

Keywords: dietary data, dietary research, challenges, Nigeria

INTRODUCTION

Dietary assessment is a scientific assessment of eating pattern that could detect nutrient deficiency. Dietary assessment encompasses food supply and production at the national level, food purchases at the household level and food consumption at the individual level. Dietary intake assessment provide critical information in understanding individual and community health status **(Wojtusiak, Gewa & Pawloski, 2011**). Accurate and representative dietary data are essential to scientists, policy makers, and many other stakeholders. One of the best uses of dietary assessment methods is for planning, developing and evaluating nutrition intervention programs **(Taren, Dwyer, Freedman & Solomons, 2002).** Inaccurate dietary assessment poses a serious obstacle of evaluating and understanding the impact of dietary factors on disease (**Waruni, Rupasinghe, Harshani & Nirmali, 2020).**

Despite the importance of dietary assessment data for a broad range of policy and research applications, there are some problems/challenges encountered when it comes to the assessment of dietary data in Nigeria. Dietary assessment includes looking at past or current intakes of

----

nutrients from food by individuals or a group to determine their nutritional status. The Nigerian government is currently working in the dark, due to a lack of time-relevant dietary data on which to base their programme.

MATERIALS AND METHODS

THE PROBLEMS ASSOCIATED WITH DIETARY ASSESSMENT IN NIGERIA
POOR FUNDING/LACK OF FUNDS FOR CONDUCTING DIETARY ASSESSMENT RESEAACH
Inadequate/lack of funding and coordination of nutrition research activities in Nigeria is a challenge when conducting dietary assessment in Nigeria as a researcher. Traditional 'Gold Standard' dietary assessment methods, such as weighed food intakes, can be costly (**Foster & Adamson, 2014**). Many developed countries fund national nutrition surveys on a regular basis. This is not so in Nigeria. There is a general lack of commitment by government at all levels to the effect that researchers are not given adequate financial support (**Chikwe, Ogidi & Nwachukwu, 2015**).Resource limitations can sometimes present a challenge when convincing governments in low medium income countries (LMICs) including Nigeria to provide direct financing for a national dietary survey (FAO and Intake-Center for Dietary Assessment, 2020). An additional cost is required to add foods or nutrients to the food composition database (FCDB). This often requires lab analyses to obtain compositional information. A less accurate but lower cost method involves imputing missing values using FCDB data from other countries, which may not reflect the nutritional content of the locally consumed foods (**Coates et al., 2017**). The more accurate method of obtaining food composition data through chemical analysis is quite expensive and time consuming; hence, in compiling food composition database, it is usually acceptable to use data from published works in the literature. This saves cost and time needed to generate analytical data. Unfortunately, most of the data contained in some journals articles, students' theses/dissertations, and reports from Research Institutions and organizations on Nigerian foods/recipes are not adequately reported for inclusion in food composition tables/food composition databases for a variety of reasons (**Ene-Obong, Sanusi, Udenta, Williams, Anigo, Chibuzo, Aliyu, Ekpe, & Davidson, 2013**).
LACK OF COMPREHENSIVECOUNTRY-SPECIFIC FOOD COMPOSITION DATA
Dietary assessment requires comprehensive food composition databases. There is a dearth of country-specific, or even regional-specific, food composition data for many low-income countries (LICs) (**Coates, Colaiezzi, Bell, Charrondiere & Leclercq, 2017**). Nigeria is not an exception to this. A major challenge facing nutritionist/dieticians in Nigeria is the correct measurement of dietary intake and this is due to an inadequate food database and food consumption instrument. Food composition database forms the bedrock for sound nutrition practice. Unfortunately, the development of food composition data has been given little research attention in Nigeria and is seldom included in nutrition programmes and intervention (**Ene-Obong et al., 2013**). Nutrition has not being on the priority list of the Nigerian government. A successful national dietary survey requires political will and engagement from the country government where the survey will be carried out, but generating political will for a first dietary survey in low- or middle-income country like Nigeria can be especially challenging. The limited investment in FCDBs is one of the largest gaps in the dietary assessment research infrastructure in Nigeria (**De Bruyn, Ferguson, Allman-Farinelli, Darnton-Hill, Maulaga, Msuya& Alders, 2016**). The relatively high costs associated with conducting laboratory analyses of local foods as

well as the scarcity of high-quality chemical laboratories in Nigeria is a major reason for the lack of a comprehensive country specific food composition data. The lack of country specific food composition data will result in inaccurate findings from dietary survey conducted in Nigeria. This is because food composition databases (FCDBs) that rely on data borrowed from high-income countries or regions may significantly underestimate (and sometimes overestimate) the true nutrient contents of the foods in the local food supply. The genetic, soil and agro-ecological differences across geographic regions can affect the nutrient profile of the food, so that food grown in one geographic area may have different mineral and vitamin levels than the same foods grown in other geographic areas **(Greenfield & Southgate, 2003; Food and Agriculture Organization of the United Nations, 2016**). Variety-specific differences can represent the difference between nutrient deficiencies and nutrient adequacy in populations and individuals.

In addition, climatic shifts further affect levels of key nutrients. The effect of climatic shifts on nutrient contents of foods is yet another concern that will have implications for the accuracy of nutrient estimates that rely on borrowed FCDBs. This array of issues highlights the need for increased investment in FCDBs to ensure that FCDBs is available and up-to-date and reflect the true nutrient content of locally consumed foods in Nigeria. Factors that introduce variation in composition within a single geography (e.g., seasonal differences in growing conditions, soil composition) should be taken into account when FCDBs are prepared. Accurate nutrient composition data are critical to nutrition scientists, food producers, food processors, retailers, consumers and government agencies.

TIME BURDEN

Conducting dietary assessment is time consuming both for the respondents and for researchers. One limitation of some methods of dietary assessment (example, 24HRs or Dietary Records) is that they are mainly focused on short-term intake. Thus, to measure average intake, multiple 24HRs or DRs are needed. Repeated measurement requires a lot of resources and time. Furthermore, to obtain accurate data in most dietary assessment methods, respondents must be trained before participating in dietary assessment survey. Therefore, a high level of motivation is required and relatively large burden is passed onto the respondents. Traditional 'Gold Standard' dietary assessment methods, such as weighed food intakes, have high levels of participant burden resulting in poor response and low completion rates **(Foster & Adamson, 2014).**

The time required to complete a pre-survey tasks in the context of a large-scale dietary survey may range from several months to years. This depends on the starting point for the work (for example, the existence, quality and completeness of any relevant databases) and the complexity of the diet among the demographic groups of focus for the survey (FAO and Intake-Center for Dietary Assessment, 2020). The number of key personnel who are technically skilled and fully committed to carrying out the pre-survey work also has a direct impact on the time required **(FAO and Intake-Center for Dietary Assessment, 2020).**

Preparation for a traditional dietary assessment survey is time consuming. It requires the researcher to develop lists of commonly consumed foods, ensuring that a complete food composition database /food composition table is available. This is in order to convert data collected on foods and recipes into nutrient intakes, creating context-specific portion size estimation aids, developing standardized recipes for mixed dishes in order to avoid collecting ingredient details at the household level and developing conversion factors for non-standard portion sizes to gram weight equivalents. In addition, while dietary surveys are somewhat time

consuming to conduct, the time spent entering, cleaning, processing and analyzing the dietary data is much more intensive than the data collection itself.

Often times, when dietary surveys are conducted Nigeria; the food items within the questionnaire's food list are not always pre-coded to their corresponding item in the FCDB, which means that an added step is required after data entry to code all food items and ingredients. When coding occurs after data collection, as it normally does in dietary surveys conducted in Nigeria, all portions consumed must be converted to gram weight equivalents and all food items and mixed dishes must be matched to corresponding compositional data from the FCDB before the data can be analyzed in a statistical program. This step can be particularly challenging and time-consuming since items in many FCDBs in low-income countries are not clearly defined, which hinders efforts to appropriately and accurately match foods reported in consumption surveys.

Dietary data collection applications in use in high-income countries, such as the Automated Self-Administered 24HR (ASA24) and Intake24, often contain food lists that are pre-coded to corresponding items in food composition databases, thus removing the need for post-interview coding **(Coates et al., 2017).** However, they are not in use in Nigeria because of the relatively high cost, low literacy level of the respondents and other challenges. TECHNICAL COMPLEXITY/POOR LABORATORY FACILITIES

Technical considerations related to expertise and capacity development, availability of personnel (including interviewers and statisticians), equipment, software, etc. all influence dietary data assessment in Nigeria. Standardized and streamlined technologies are needed to improve the ease, time, and cost of data collection and processing and also ensure high-quality standardized data entry, analysis, consistency, and comparability across dietary data (**Micha, Coates, Leclercq, Charrondiere & Mozaffarian, 2018).**

The lack of basic research equipment/facilities is another major challenge in Nigeria. Laboratories are under-equipped, mismanaged and not maintained properly in Nigeria. Incessant power failure (which slows down the pace of analytical work in the laboratories), attrition of analysts and their limited knowledge of modern analytical techniques **(Ene-Obong et al., 2013).** The cost of high quality laboratory facilities in low resource settings may be higher as a consequence of tool adaptation required for local use, and taking into account access to remote or inaccessible geographical areas and communities.

PROBLEM OF VARAIATION IN FOOD PREPARATION/THE USE OF NON-STANDARD RECIPES

Throughout sub-Saharan Africa, which includes Nigeria, cooking is typically done by memory and taste, rather than with the use of standard measurements and recipes, estimating food intake with the use of standard measurements may not be culturally relevant **(Wojtusiak et al., 2011**). Another issue is the increasing consumption of vendor- and restaurant-prepared foods in low medium income countries (LMICs) (FAO, 2020). Identifying and obtaining the recipes for such prepared foods is essential to the compilation of the dietary assessment, but doing so can be difficult. The composition of natural foods shows a wide variability related to geographical and weather conditions, cultivation techniques and crop varieties.

In prepared foods, differences in recipes add additional complexity **(Pennington, 2008; Elmadfa & Meyer, 2014).** There is a variation in the preparation of food especially soups in Nigeria. These differences occurs not just across geographical locations but also even within same location. A study conducted by **(Eno-obong et al. (2013)** found that there were some variations in the preparation of the semi-solid pastes as well as soups across the geopolitical

zones and within individual zones in Nigeria. These pastes and soups are habitual diets, and therefore errors in their description and analysis will lead to over-or under estimation of nutrients. The major sources of variations observed in their study were in the use of animal proteins (type and quantity), the use of cooking oil, use of thickeners, use of vegetables, use of potash and seasonings/flavourings.

CULTURAL/LANGUAGE BARRIER

The complexity of the diet among the Nigerian culture/ethnicity can pose a challenge when conducting dietary assessment. Questionnaires or interviews may need to be translated into local languages. The translation may not necessarily be accurate due to language differences and cultural interpretations **(Wojtusiak et al., 2011).**

At individual level, food preferences, taboos, specific socio-economic characteristics (such as high priced foods, preservation and transportation facilities, low socio-economic status and inability to adapt to temporary shortfalls in income) and also demographic ones (literacy and household composition) affect food habits. In Nigeria, dietary assessment in low resource rural areas poses additional methodological challenges and differs from low resource urban areas in terms of food systems, food habits, culinary practices, accessibility and food supply.

LOW LITERACY LEVELS

In Nigeria, most respondents especially in the rural areas have low literacy level/educational backgrounds. This problem has resulted to errors in dietary assessment. Low literacy levels create greater challenges for participants responding to questionnaires or community health workers conducting interviews **(Wojtusiak et al., 2011).** Literacy also affects the completion of the record of dietary assessments like food dairies. Furthermore, studies have revealed that underreporting is associated with lower levels of education and socioeconomic status **(Rasmussen et al., 2007).**

MISREPORTING

Misreporting is a problem when conducting dietary survey in Nigeria. Most of the data contained in some journals articles, students' theses/dissertations, and reports from Research Institutions and organizations on Nigerian foods/recipes are not adequately reported **(Ene-Obongnet al., 2013).** Dietary reports are compromised by misreporting, whether in-advertently or deliberately **(Suchanek, Poledne, & Hubacek, 2011).** Part of this problem in Nigeria might be due to methodological causes and deliberate misreporting by respondents. An inevitable limitation of most dietary assessment method is that all information depends on the respondents' memory and the skills of a well-trained interviewer to minimize recall bias **(Jee-Seon et al., 2014).**Deliberate misreporting by the participants can seriously weaken the validity of nutritional surveillance data **(Archer, Hand & Blair, 2013).**

Misreporting due to methodological causes occurs as a result of inadvertent omission of food items and errors in portion size estimation. Misreporting arising from inadvertent omission of food items and errors in portion size estimation can be minimized by the use of food models, pictures or modern information and communication technologies, which allow a more direct and easier recording of the food consumed **(Suchanek et al., 2011).** Examples include computer-assisted recording of foods and the taking of pictures of the meals with a mobile phone. However, the costs in low resource settings like Nigeria may hinder the adaptation of these tools especially in large-scale studies.

MOVING FROM ANALOGE TO DIGITAL/LACK OF TECHNOLOGICAL GARGETS

Most researchers in Nigeria still depends on traditional methods when conducting dietary assessment. The pen-and-paper method for collecting detailed dietary data is time-consuming

----

and costly to implement, clean, process, and analyze **(Micha et al., 2018).** There are new dietary assessment technologies that offer potential benefits in terms of cost and researcher and respondent burden and can be used for population nutrition surveys and they have the ability to produce dietary datasets more rapidly (**Coates et al.,2017).** However, these technologies remain relatively costly for implementation in Nigeria. In addition, training subjects on how to use these technologies and use a computer including accessing the internet is also required for the adoption of these new dietary assessment technologies **(Jung, Lee, Kim, Noh, Song& Kang 2013),** which is a challenge in Nigeria.

POOR TRANSPORTATION SYSTEMS

Most community's especially rural areas in Nigeria are not accessible. Researchers sometimes need to cover hundreds of kilometers in getting dietary data from most communities. Bad road network to remote geographical areas and communities makes these communities to be inaccessible for dietary assessments. Moreover, even when some communities are accessible, the high cost of fuel and fuel scarcity hinders most dietary assessment survey as the cost implication of including those areas/location is much. This can result to sampling bias when conducting dietary assessments.

LOW MAN POWER

Highly skilled professionals are required to collect information on a participant's usual diet intake (**Jee-Seon et al., 2014).** Most universities in Nigeria do not offer nutrition and dietetics program, this has resulted in the low number of nutrition graduates/professionals in Nigeria. Most of the dietary assessment methods requires skilled professional to be carried out effectively. For instance, weighed food intake requires the collection of dietary information on subjects' food preparation and consumption in their home with the objective observation of skilled field workers.

In addition, some of dietary assessment methods like the 24HR dietary recall requires the skills of a well-trained interviewer to minimize recall bias.

POOR RECORD KEEPING

There is poor record keeping of dietary assessment researches carried out in Nigeria. Ideally, dietary data should be assessed at the individual level, while their collection should be harmonized and standardized, that is, collected in a systematic, consistent, and comparable manner across nations or regions **(Micha et al., 2018).** Some of the challenges that hinders this in Nigeria are the lack of a centralized structure to house existing survey data, no available established surveillance units, lack/poor availability of resources, expertise, capacity, needs and priorities, poor local authority/expert engagement, and other challenges and constraints. This makes the data whether from large or small sample dietary surveys, often not broadly accessible for use by researchers, policy makers and other stakeholders **(Coates et al., 2017**).

LACK/PROBLEM OF POLICY OF IMPLEMENTATION

Generally, there is problem on the implementation of policy in Nigeria even when some good policies are available. The findings from dietary assessment in Nigeria is hardly implemented. The conservation outlook on the part of the executive and administrative set up in the country account for the inability to implement research results in Nigeria. Well-researched works are lying dormant at the University library shelves **(Chikwe et al., 2015).**

INSECURITY

Another major challenge for dietary assessment in Nigeria is insecurity. Researchers' inability to move freely within the country while carrying out dietary assessment affects many of the results from dietary assessment as the sample studied are usually not a true representation of the entire

population resulting in sampling bias. Some of the factors responsible for insecurity in Nigeria are political, religious, and ethnic based. For instance, the Boko Haram insurgency in northern Nigeria and the inter-tribal/communal fights in some communities in like Benue, Ebonyi and Taraba states. This makes it difficult for researchers to conduct dietary assessment in those places.

LACK OF AWARENESS

There is general ignorance with regard to the importance of dietary data collection in Nigeria especially among illiterate and rural dwellers. This lack of awareness has led to poor recipient and low maximum co-operation of researchers from their respondents during field study and data collection. Furthermore, certain personalities in high positions in public and private sectors, hardly volunteer information needed to conduct dietary assessment. This situation no doubt influences negatively on the process and outcome of dietary data collected **(Chikwe et al., 2015).**

CONCLUSION

Dietary intake assessment is very important as it provides critical information in understanding individual and community health status. Inaccurate dietary assessment may be a serious obstacle of understanding the impact of dietary factors on disease. Food composition database forms the bedrock for sound nutrition practice and so it should be comprehensive enough. However, the challenges of cost, time burden, technical issues and other challenges makes it difficult to conduct quality dietary assessments that can be used in Food composition tables. There are new dietary assessment technologies that offer potential benefits in terms of cost and researcher and respondent burden and can be used for population nutrition surveys and they have the ability to produce dietary datasets more rapidly. However, these technologies remain relatively costly for implementation in Nigeria by researchers. There is therefore need for the government of Nigeria to provide direct financing for a national dietary surve

REFERENCES

Archer E, Hand GA, Blair SN (2013). Validity of U.S. nutritional surveillance: National Health and Nutrition Examination Survey caloric energy in-take data 1971–2010. PLoS One 8:e76632.

Chikwe CK, Ogidi RC, Nwachukwu K (2015). Challenges of Research and Human Capital Development in Nigeria. Journal of Education and Practice 6(28): 1-4.

Coates JC, Colaiezzi BA, Bell WU, Charrondiere R, Leclercq C (2017). Overcoming Dietary Assessment Challenges in Low-Income Countries: Technological Solutions Proposed by the International Dietary Data Expansion (INDDEX) Project. Nutrients 9:289. doi:10.3390/nu9030289.

De Bruyn J, Ferguson E, Allman-Farinelli M, Darnton-Hill I, Maulaga W, et al. (2016). Food composition tables in resource-poor settings: Exploring current limitations and opportunities, with a focus on animal-source foods in sub-Saharan Africa. *British Journal of* Nutrition 116:1709–1719.

Elmadfa I, Meyer AL, (2014). Developing Suitable Methods of Nutritional Status Assessment: A Continuous Challenge 1–3. Advances in Nutrition 5: 590S–598S doi:10.3945/an.113.005330.

Ene-Obong HN, Sanusi RA, Udenta EA, Williams IO, Anigo KM, et al. (2013). Data collection and assessment of commonly consumed foods and recipes in six geo-political zones in Nigeria: Important for the development of a National Food Composition Database and Dietary Assessment. Food Chemistry 140 (2013): 539–546.

FAO and Intake-Center for Dietary Assessment (FAO), (2020). FAO/Intake joint meetin report on Dietary Data Collection, Analysis and Use. Rome. https://doi.org/10.4060/ca9908en.

FAO. 2018. Dietary Assessment: A resource guide to method selection and application in lo resource settings. Rome.

Food and Agriculture Organization of the United Nations (FAO), (2016). FAO/INFOODS Analytical Food Composition Database Version 1.1—AnFooD1.1; Food and Agriculture Organization: Rome, Italy.

Foster E, Adamson A, (2014). Challenges involved in measuring intake in early life: focus on methods. Proceedings of the Nutrition Society, 73:201–209. doi:10.1017/S0029665114000020.

Greenfield H, Southgate DAT, (2003). Food Composition Data: Production, Management and Use, 2nd ed.; FAO: Rome, Italy.

Jee-Seon S, Kyungwon O, Hyeon CK, (2014). Dietary assessment methods in epidemiologic studies. Epidemiology and Health 36: e2014009, 8. http://dx.doi.org/10.4178/epih/e2014009.

Jung HJ, Lee SE, Kim D, Noh H, Song S, et al. (2013). Development and feasibility of a web-based program 'Diet Evaluation System (DES)' in urban and community nutrition survey in Korea. Korean Journal of Health Promotion 13:107-115.

Micha R, Coates J, Leclercq C, Charrondiere UR, Mozaffarian D, (2018). Global Dietary Surveillance: Data Gaps and Challenges. Food and Nutrition Bulletin 39(2):175-205

Pennington JAT, (2008). Applications of food composition data: data sources and considerations for use. Journal of Food Composition Annals 21:S3–S12.

Suchanek P, Poledne R, Hubacek JA, (2011). Dietary intake reports fidelity–fact or fiction? Neuro endocrinology Lett 32:29–31.

Taren D, Dwyer J, Freedman L, Solomons NW, (2002). Dietary Assessment Methods: Where Do We Go From Here? Public Health Nutrition 5: 1001-1003.

Waruni S, Rupasinghe WA, HarshaniPerera TS, NirmaliWickramaratne MA, (2020). A comprehensive review on dietary assessment methods in epidemiological research. Journal of Public Health Nutrition 3(1):204-211.

Wojtusiak J, Gewa CA, Pawloski LR, (2011). Dietary assessment in Africa: integration with innovative technology. African Journal of Food, Agriculture, Nutrition and Development 11