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ORIGINAL ARTICLE

DIET PATTERNS AND THE PREVALENCE OF DIABETES IN EDO CENTRAL, NIGERIA

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Abstract

It is said that over five million Nigerians are officially diagnosed as suffering from diabetes. The labelling of chronic diseases as "diseases of affluence" is no longer valid as they also appear in poorer countries, too. Paradoxically, diabetes is occurring at a faster rate in developing countries than it did in the industrialised regions of the world half a century ago. This paper is based on fieldwork conducted in 2015. The fieldwork aimed to verify the connection between diet and diabetes by focusing on a particular group of people in the semi-urban area of Edo State. The aim of this study is to establish, through an analysis of fieldwork data, if diet and nutrition has a direct impact on the prevalence of diabetes. Another aim is to ascertain whether education, profession, and religious and social status influence dietary trends in a society. The information gathered from the questionnaire was coded and recorded on the spreadsheets, and fed into the computer for statistical analysis using the SPSS and Genstat Release (2002) software. For all percentages and proportions, bar charts were used for data interpretation. The study revealed that there is a direct connection between diet and the prevalence of diabetes among the people of the Esan Central area of Edo state. The study suggests that a preventive approach to health-care is a better policy than the cure-oriented approach that is currently prevalent in the world.

Keywords: *diabetes; diet patterns; prevalence; glycaemic index; Edo Central*

INTRODUCTION

It is said that over five million Nigerians are diagnosed as suffering from diabetes (Ifijeh 2017). This figure does not include those not yet officially diagnosed to be diabetic, which may in fact be more than those diagnosed. The burden of chronic disease is rapidly increasing worldwide. It has been calculated that in 2001, chronic diseases contributed to approximately 60% of the total 56.5 million reported deaths in the world, and to approximately 46% of the global burden of disease. The proportion of the burden of non-communicable diseases (NCD) is expected to increase to 57% by 2020 (WHO 2003). Almost half of the total chronic disease deaths are attributable to cardiovascular diseases; obesity and diabetes also show worrying trends, not only because they already affect a large proportion of the population, but also because they have started to appear earlier in life.

Chronic diseases are largely preventable diseases (WHO 2003). Although more basic research may be needed on some aspects of the mechanisms that link diet to health, the currently available scientific evidence provides a sufficiently strong and plausible basis to justify taking action now (WHO 2005). Beyond the appropriate medical treatment for those already affected, the public health approach of primary

prevention is considered to be the most cost--effective, affordable and sustainable course of action to cope with the chronic disease epidemic worldwide. The adoption of a common risk-factor approach to chronic disease prevention is a major development in the thinking behind an integrated health policy.

This paper examines the issue of diet and disease patterns among the Edo Central ethnic group of Nigeria and relates the findings to the prevalence of diabetes in the area.

Demography of Edo Central, Nigeria

Esanland is made up of small towns and villages on the periphery of Benin City, the Edo state capital, which is some 200 km away. A mostly rural and semi-urban territory, it has no large city. The Binis form the largest ethnic group in the present Edo state, and they tend to regard the Esans as their historical subordinates (Omokhodion 1998).

There are 35 clans in present-day Esanland, each of which is headed by a king called an *Onojie*. The clans are: Ekpoma, Uromi, Ekpon, Emu, Ewohimi, Ewatto, Irrua, Ubiaja, Egoro, Wossa, Ukhun, Ugbegun, Igueben, Idoa, Ohordua, Okhuesan, Oria, Ogwa, Okalo, Ebelle, Uzea, Onogholo, Orowa, Urohi, Ugun, Udo, Ujiogba, Iyenlen, Ifeku, Iliushi, Amahor, Opoji, Ugboha, Uroh and Ewu. The Nigerian government divided these clans into five Local Government Areas (L.G.A):

- Esan West L.G.A., with headquarters at Ekpoma
- Esan Central L.G.A., with headquarters at Irrua
- Esan North East L.G.A., with headquarters at Uromi
- Esan South East L.G.A., with headquarters at Ubiaja
- Igueben L.G.A. with headquarters at Igueben.

Esanland's landscape is flat; it is lacking in rocks and mountains and is well suited for agricultural purposes. Rubber trees and palm trees rank the highest among Esan's trees. The land's great variety of fruits includes mangoes, oranges, grapes, pineapples, guava, cashews, bananas, plantain, black pears, avocado, limes, walnuts and others. Cassava, yam, cocoa yam, sweet potato, pepper, okra and rice are some of its farm produce. It has numerous streams, but they are not suitable for fishing. Many of them serve as sources of water and centres of ritual for traditional religion. It is common to see shrines located near streams in Esanland.

The Esan people are fun loving, and their various festivities and ritualistic traditions are evidence of this, many of which are centred upon water rituals and farm festivals like the New Yam festivals. Their folktales and folklores serve as forms of learning and entertainment, and as a way of maintaining order and obedience to established traditions (Omokhodion 1998). As in many traditional settings in Africa, adherents of the Esan traditional religion, rituals and festivities have decreased under the onslaught of Christianity, and some combine the traditional religion with Christianity.

The Esan people are proud of their ancestry and heritage. They are positive in their outlook, very hospitable and intelligent. The men have a tendency towards polygamy, and commitment to the family is often weak. They value children and want to have as many as possible. It is commonplace to see families of 10, where the children have the same mother but different fathers, or the same father but different mothers (Ikuenobe-Otaigbe 2012).

There are various, often conflicting histories of the Esan people. One popular version is that they hailed from the ancient Bini, the dominant tribe of the present Edo state, and their language is a Kwa subdivision of the Niger-Congo language family. The Esan dialect has different variations and accents, which makes it difficult for even native speakers to understand. For example, the Esan word for person (or somebody) is different in the various dialects, for example it can be ọria (Uromi dialect), ọhia (Uzea dialect), ọyia (Unea dialect), and ọhan (Ugbọha dialect). The difficulties associated with speaking dialects other than one's ownhas given rise to the widespread use of Pidgin English, which is a concoction of British English, Nigerian English and Nigerian local languages (Omokhodion 1998).

The population of Esan Central in Edo State is said to be 105,310, comprising 53,834 males and 58,912 females. Out of this number, Ewu has a population of 20,000 (Federal Government of Nigeria 2007).

Problem statement

It has been projected that, by 2020, chronic disease will account for almost three-quarters of all deaths worldwide, and that 71% of deaths will be due to Ischaemic Heart Disease (disease characterised by a reduced blood supply of the heart muscle, usually due to coronary artery disease), 75% of deaths will be due to stroke, and 70% of the deaths due to diabetes will occur in developing countries (Beaglehole and Yach 2003). In the developing world, the number of people with diabetes will increase by more than 2.5-fold, from 84 million in 1995 to 228 million in 2025. On a global basis, 60% of the burden of chronic diseases will occur in developing countries. Even now, cardiovascular diseases are more numerous in India and China than in all the economically developed countries in the world put together. As for overweight and obesity, not only has the current prevalence already reached unprecedented levels, but the rate at which it is annually increasing in most developing regions is substantial. The public health implications of this phenomenon are staggering and are already becoming apparent (UN 1996).

The rapidity of the changes in developing countries is such that a double burden of disease may often exist. India, for example, currently faces a combination of communicable diseases and chronic diseases, with the burden of chronic diseases marginally exceeding that of communicable diseases. Nevertheless, projections indicate that communicable disease will still occupy a critically important position up to 2020 (Omran 1971). Another good example is obesity, which is becoming a serious problem throughout Asia, Latin America and parts of Africa, despite the widespread presence of under-nutrition. In some countries, the prevalence of obesity has doubled or tripled over the past decade (Drewnowski and Darmon 2008).

Modern dietary patterns and physical activity patterns are risk behaviours that travel across countries. They are transferable from one population to another much like an infectious disease, and thus affect disease patterns globally. While age, sex and genetic susceptibility are non-modifiable, many of the risks associated with age and sex are modifiable. Such risks include behavioural factors (e.g. diet, physical inactivity, tobacco use, alcohol consumption); biological factors (e.g. dyslipidemia – an abnormal amount of lipids such as cholesterol or fat in the blood, hypertension and obesity); and finally societal factors which include a complex mixture of interacting socioeconomic, cultural and other environmental parameters (Choukem et al. 2007, Menke et al. 2015).

Food and food products have become commodities produced and traded in a market that has expanded from an essentially local base to an increasingly global one. The changes in the world food economy are reflected in shifting dietary patterns, for example, increased consumption of energy-dense diets high in fat (particularly saturated fat) and low in unrefined carbohydrates. These patterns are combined with a decline in energy expenditure that is associated with a sedentary lifestyle – motorized transport, labour-saving devices in the home, the phasing out of physically demanding manual tasks in the workplace, and leisure time that is predominantly devoted to physically undemanding pastimes (Erasmus et al. 1989).

Because of these changes in dietary and lifestyle patterns, chronic NCDs – including obesity, diabetes mellitus, cardiovascular disease (CVD), hypertension, strokes, and some types of cancer – are becoming increasingly significant causes of disability and premature death in both developing and newly developed countries. This places additional burdens on already overtaxed national health budgets (Murray and Lopez 1996, Patnode et al. 2017).

Objectives of the study

Nutrition is coming to the fore as a major modifiable determinant of chronic disease, with scientific evidence increasingly supporting the view that alterations in diet have strong effects, both positive and negative, on health throughout life (Lean 2006). Most importantly, dietary adjustments may not only influence present health, but may determine whether or not an individual will develop diseases such as cancer, cardiovascular diseases and diabetes much later in life (Shaw 2010). However, these concepts have not led to a change in policies or practice. In many developing countries, food policies remain focused only on under-nutrition and do not address the prevention of chronic disease. This research work focuses on type 2 diabetes, which is the type

that prevails among the study population. The objectives of this study are as follows:

1. To objectively examine the link between diet and the prevalence of diabetes mellitus among different categories of people in Esan Central district of Edo State.
2. To ascertain whether education, profession, religious and social status influence dietary trend in a society.
3. To establish, through an analysis of field work data, if diet and nutrition have a direct impact on the prevalence of diabetes.
4. To examine and develop recommendations for diet and nutrition in the prevention of chronic diseases, especially diabetes.

Significance/rationale of the study

The chronic disease problem is far from being limited to the developed regions of the world. Contrary to widely held beliefs, developing countries are increasingly suffering from high levels of public health problems related to chronic diseases (Hennekens and Buring 1987). In five out of the six WHO regions, deaths caused by chronic diseases dominate the mortality statistics. Although Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS), malaria and tuberculosis, along with other infectious diseases, still predominate in sub-Saharan Africa and will continue to do so for the foreseeable future, 79% of all deaths worldwide that are attributable to chronic diseases are already occurring in developing countries (King et al. 1998).

It is clear that the earlier labelling of chronic diseases as "diseases of affluence" is increasingly becoming a misnomer, as they emerge both in poorer countries and in the poorer population groups in richer countries. This shift in the pattern of disease is taking place at an accelerated rate; furthermore, it is occurring at a faster rate in developing countries than it did in the industrialized regions of the world half a century ago. This rapid rate of change, together with the increasing burden of diseases, is creating a major public health threat in Africa – which demands immediate and effective action (Wilson and Mabhala 2008, Hendriks et al. 2014).

This research study is of utmost importance as a reference for other researchers, and as an information guide for the general public, as well as an action plan guide to government and policy makers.

MATERIALS AND METHODS

Location of the study

This study focuses on Ekpoma and Irrua, both located within the Esanland of Edo state. The Esanland is divided into five districts:

- Esan-central, with headquarters at Irrua. Esan-West, with headquarters at Ekpoma.
- Esan-north-east, with headquarters at Uromi. Esan-south-east, with headquarters at Ubiaja. Igueben, with headquarters at Igueben town.

The population of Esan central in Edo state is said to be 105,310 comprising 53,834 males and 58,912 females (Federal Government of Nigeria 2007).

Respondents of the study

The respondents of the study are the inhabitants of Esan central who are 18 years and above. This population was chosen because the study deals with basic human activity that traverses every age, sex, culture and time. Eating and drinking is an essential human activity. The study focuses on the age range of 18 and above, because anybody who is 18 or over is considered an adult who takes decisions and bears responsibility for them.

Sample size

A sample of 1000 was selected for the study. It comprised 500 males and 500 females. The sample size was chosen based on the time, logistics, finance and feasibility of the study. Of the 1000 questionnaires that were sent out, 775 were completed.

Sampling design

In the study, Ekpoma, Irrua and Uromi communities were selected to represent Edo Central of Edo State. Each of the towns is arranged into quarters and streets. In each, five quarters were e randomly selected. The houses in each of the selected streets were listed and numbered where numbering is non-existent. In each street, systematic random sampling was adopted – which involved selecting every fifth building beginning with the first house. Within each selected building, a household was

chosen and the residents (above 18 years) in the households were given the questionnaire.

Questionnaire design

The questionnaire was comprised of the demographic background of respondents, such as age, sex, marital status, financial status, tribe, education, religion, occupation and residence, as well as information on respondents' health status, dietary habits, common foods and health awareness.

Method of data analysis

The information gathered from the questionnaire was coded and recorded in spreadsheets. It was then fed into the computer for statistical analysis using the SPSS and Genstat Release (2002) software. The Chi-square test of significance and the F-ratio (Analysis of variance ANOVA) were used to test the hypotheses.

RESULTS

Educational status and health knowledge

Table 1 shows the connection between educational status, health knowledge and dietary choices among the respondents. The basic question is: Does educational status play any role in the dietary trends of a population? Of the 63 respondents with no formal education, 33 (51.8%) knew what a balanced diet is, while 30 (47.6%) did not know what a balanced diet is. 15 (23.8%) had knowledge of chronic diseases and their causes, while 35 (55.5%) had no knowledge of chronic diseases and their causes. Also, 25 (39.6%) in this group said they could identify a diet of poor nutrition, while 38 (6.3%) said they could not. Among the respondents with an elementary/primary/school certificate, 90 (40.9%) of the 220 did not know what a balanced diet was, while 130 (59.9) knew what a balanced diet was. 101 (45.9%) had knowledge of chronic diseases and their causes, while 119 (54%) had no knowledge of chronic diseases and their causes. 187 (85%) could identify a diet of poor nutrition, while 33 (15%) could not. Among the 344 respondents with OND/HND/BA/BSC degrees, 340 (98.8%) knew what a balanced diet was, while 4 (1.16%) did not know what a balanced diet was. 343 (99.7%) had knowledge of chronic diseases and their causes, while just 1 person (0.29%) had no knowledge of chronic diseases and their causes. 344 (100%) could identify a diet of poor nutrition. Of the 119 respondents with MA/MSc/PhD, 119 (100%) knew what a balanced diet was, 100% had knowledge of chronic diseases and their causes, and 100 could identify a diet that consists of poor nutrition.

Dietary trends of the respondents

Table 2 shows the dietary trends of the respondents. Rice, cassava, beans, plantain and yam constitute the major diet of the respondents. All of the respondents consume rice, cassava, beans, plantain and yam at least three times a week. The frequency of consumption of rice among the 770 respondents is as

Table 1 – Educational status and health knowledge of the respondents

Qualifications	Knows what a balanced diet is	Doesn't know what a balanced diet is	Have knowledge of chronic diseases and causes	Have no knowledge of chronic diseases and causes	Can identify food of poor nutrition	Cannot identify	*N*
No education	33 (51.80%)	30 (47.60%)	15 (23.80%)	35 (55.55%)	25 (39.68%)	38 (60.30%)	63
Elementary/ primary school/ school certificate	90 (40.91%)	130 (59.09%)	101 (45.91%)	119 (54.09%)	187 (85.00%)	33 (15.00%)	220
OND/HND/BSC/BA	340 (98.84%)	4 (1.16%)	343 (99.71%)	1 (0.29%)	344 (100%)	–	344
MA/MSC/PHD	119 (100%)	–	119 (100%)	–	119 (100%)	–	119

follows: Once a week, 103 (13%), twice a week, 300 (39%), Three times a week, 167 (22%), four times a week, 103 (13%), five times a week, 50 (7%), daily, 45 (6%). The frequency of cassava consumption is as follows: Once a week, 195 (25%), twice a week, 285 (37%), three times a week, 145 (19%), four times a week, 90 (12%), five times a week, 30 (4%), and daily, 25 (3%). The frequency of yam consumption is as follows: Once a week, 244 (31%), twice a week, 296 (38%), three times a week, 150 (19%), four times a week, 60 (8%), five times a week, 20 (3%), and daily, 9 (1%). 250 of the respondents consume junk food (pies, doughnuts, fries, chips and other 'fast-food' take-aways). Refined and processed foods such as spaghetti, indomie and macaroni are consumed at least once a day by 315 (40%) of the respondents. 580 (93.5%) of 620 respondents consume fruits at least once daily.

Table 2 – Normal food and frequency of consumption by respondents

Food	Once a week	Twice	Three times	Four times	Five times	Daily	*N*
Rice	103 (13%)	300 (39%)	169 (22%)	103 (13%)	50 (7%)	45 (6%)	770
Cassava	195 (25%)	285 (37%)	145 (19%)	90 (12%)	30 (4%)	25 (3%)	770
Yam	244 (31%)	296 (38%)	150 (19.5%)	60 (8%)	20 (3%)	9 (10%)	770
Beans	400 (57%)	145 (21%)	95 (14%)	45 (6%)	15 (2%)	–	700
Junk foods, e.g. flour-based food such as cakes, biscuits, doughnuts, etc.	250 (48%)	150 (29%)	70 (13%)	50 (10%)	–	–	520
Plantain	500 (92%)	30 (6%)	10 (20%)	–	–	–	540
Pap	245 (98%)	5 (2%)	–	–	–	–	250
Spaghetti/indomie	165 (21%)	251 (33%)	123 (16%)	135 (18%)	–	96 (12%)	770
Macaroni	150 (19%)	250 (32%)	200 (26%)	90 (11.61%)	80 (10.3%)	–	775
Fruits	580 (93.5%)	20 (3.2%)	12 (1.93%)	5 (0.81%)	2 (0.32%)	1 (0.16%)	620

Table 3 shows the dietary trends of the respondents based on their age range. Among the 313 respondents that constitute young adults, 120 (38.3%) eat rice three times a week, 35 (11.18%) eat rice four times a week, 9 (2.88%) eat rice five times a week, and the same number (2.88%) eat rice every day of the week. In the middle-age group, 104 (35.1%) out of 288 eat rice three times a week, while 4 (8.3%) eat rice four times a week. In the advanced age group, 13 (7.69%) out of 169 eat rice three times a week. The dietary trend indicates a high carbohydrate diet among the different age-groups.

Disease patterns and dietary trends

Table 4 shows that of the 313 respondents belonging to the young-adults age range, 30 (9.6%) have been diagnosed with diabetes, 2 (0.6%) have kidney problems, 3 (1.0%) have stage 3 breast cancer, 40 (12.8%) have high blood pressure, 5 (1.6%) have epilepsy, and 4 (1.3%) have arthritis.

Table 3 – Dietary trends of the respondents according to age distribution

Age range	Food	Once a week	Twice a week	Three times	Four times	Five times	Daily	*N*
Young adults (18–35)	Rice	40 (12.78%)	100 (31.95%)	120 (38.3%)	35 (11.18%)	9 (2.88%)	9 (2.88%)	313
	Cassava	121 (38.66%)	98 (31.31%)	84 (26.84%)	10 (3.19%)	–	–	
	Yam	221 (70.61%)	79 (25.24%)	13 (4.15%)	–	–	–	
	Beans	154 (49.2%)	120 (38.3%)	39 (12.46%)	–	–	–	
	Canned foods	211 (67.41%)	102 (32.58%)	–	–	–	–	
	Plantain	45 (14.38%)	9 (2.88%)	–	–	–	–	
	Pap	34 (10.86%)	10 (3.19%)	–	–	–	–	
	Spaghetti/ indomie	65 (20.76%)	100 (31.95%)	108 (34.51%)	40 (12.78%)	–	–	
	Macaroni	100 (31.9%)	83 (26.5%)	100 (31.95%)	30 (9.6%)	–	–	
	Fruits	200 (63.9%)	94 (30.03)	19 (6.1%)	–	–	–	
Middle age (36–55)	Rice	60 (20.8%)	100 (34.7%)	104 (36.1%)	24 (8.3%)	–	–	288
	Cassava	86 (29.9%)	120 (41.67%)	79 (27.4%)	3 (1.04%)	–	–	
	Yam	102 (35.4%)	110 (38.2%)	76 (26.38%)	–	–	–	
	Beans	98 (31.3%)	144 (50%)	46 15.97%)	–	–	–	
	Canned foods	164 (54.9%)	64 (22.2%)	30 (10.42%)	30 (10.42%)	–	–	
	Plantain	120 (41.6)	89 (30.90%)	40 (13.88%)	39 (13.54%)	–	–	
	Pap	45 (15.6%)	20 (6.39%)	2 (0.69%)	–	–	–	
	Spaghetti/ indomie	100 (31.9)	98 (31.3%)	80 (25.56)	–	–	–	
	Macaroni	99 (34.4%)	68 (23.6%)	–	–	–	–	
	Fruits	90 (31.25%)	89 (30.90%)	64 (22.2%)	45 (15.63%)	–	–	
Advanced age (56–85)	Rice	80 (47.34%)	76 (44.97%)	13 (7.69%)	–	–	–	169
	Cassava	65 (38.46%)	68 (40.23%)	36 (21.30%)	–	–	–	
	Yam	85 (50.3%)	43 (25.44%)	23 (13.16%)	18 (10.65%)	–	–	
	Beans	40 (23.7%)	41 (24.26%)	35 (20.7%)	28 (16.57%)	25 (14.79)	–	

	Canned foods	10 (5.9%)	9 (5.3%)	1 (0.1%)	–	–	–	
	Plantain	51 (30.2%)	45 (26.62%)	36 (20,5%)	20 (11.8%)	17 (10.6%)	–	
	Pap	55 (32.54%)	40 (23.67%)	38 (22.0%)	15 (8.88%)	15 (8.88%)	6 (3.55%)	
	Spaghetti/ indomie	30 (17.75%)	20 (11.8%)	–	–	–	–	
	Macaroni	29 (17.16%)	21 (12.4%)	–	–	–	–	
	Fruits	35 (20.71%)	25 (14.79%)	10 (5.9%)	11 (6.51%)	10 (5.9%)	8 (4.7%)	

Table 4 – Disease patterns and dietary trends among the respondents

Age range	Diagnosed diseases	Number of sufferers	Major food	*N*
Young adults (18–35)	Diabetes	30 (9.6%)	rice, indomie, spaghetti, macaroni, canned food	313
	Kidney	2 (0.6%)		
	Cancer	3 (1.0%)		
	Hypertension	40 (12.8%)		
	Prostate diseases	–		
	Epilepsy	5 (1.6%)		
	Arthritis	4 (1.3%)		

Table 5 shows that of the 288 respondents belonging to the middle age range, 100 (34.7%) have been diagnosed with diabetes, 10 (3.5%) have kidney problems, 30 (10.4%) have stage 3–4 cancer (20 cases of breast cancer, 5 cases of cervical cancer and 5 cases of other types of cancer), 100 (34.7%) have high blood pressure, 30 (10.4%) have prostate problems (which include cancer of the prostate), and 130 (45.1%) have arthritis.

Table 5 – Disease patterns and dietary trends among the respondents

Age range	Diagnosed diseases	Number of sufferers	Major food	*N*
Middle age (36–55)	Diabetes	100 (34.7%)	yam, cassava, beans, rice, plantain	288
	Kidney	10 (3.5%)		
	Cancer	30 (10.4%)		
	Hypertension	100 (34.7%)		
	Prostate diseases	30 (10.4%)		
	Epilepsy	–		
	Arthritis	130 (45.1%)		
	Cholesterol	–		

Table 6 shows that of the 169 respondents belonging to the advanced age range, 90 (53.3%) have been diagnosed with diabetes, 6 (3.6%) have kidney problems, 20 (11.8%) have stage 3–4 cancer, 85 (50.3%) have high blood pressure, 87 (51.5%) have prostate problems (which include cancer of the prostate), and 93 (5%) have arthritis.

Table 6 – Disease patterns and dietary trends among the respondents

Age range	Diagnosed diseases	Number of sufferers	Major food	*N*
Advanced age (56–85)	Diabetes	90 (53.3%)	pap, rice, beans, fruits, plantain, cassava	169
	Kidney	6 (3.6%)		
	Cancer	20 (11.8%)		
	Hypertension	85 (50.3%)		
	Prostate diseases	87 (51.5%)		
	Epilepsy	–		
	Arthritis	93 (55.0%)		
	Cholesterol	–		

DISCUSSION

The diet of the respondents consists mainly of carbohydrates: Cassava (garri, eba, and apu), yam (yam porridge, pounded yam), rice (mainly imported white rice), plantain, and processed foods such as spaghetti, macaroni and indomie. Some of the respondents also eat junk food bought from "fast food" joints. During the oral interviews conducted with some of the respondents, it was observed that they are not particularly interested in the issue of a balanced diet. In fact, many of them do not know what a balanced diet means. One respondent said a balanced diet means to "to chop belle-full" (to have enough to eat). Another described a balanced diet as something "to kill hunger". There is often very little variety in the diet of the studied population as the choice of foods revolves around rice, yam, beans and cassava. The data collected in this study reveals that diabetes (23%), high blood pressure (26.3%) and arthritis (16.8%), are the three most common chronic diseases among the respondents.

In a 2008 study entitled: "Glycaemic indices and glycaemic load of some Nigerian foods", Omoregie and Osagie (2008) analysed the glycaemic index and glycaemic load of ten Nigerian local foods, including cassava (starch and garri), yam (amala), rice (tuwoShinkafa), and maize (agidi). The findings of Omoregie and Osagie (2008) indicated that all of the ten local foods analysed were high in both their glycaemic index and glycaemic load. According to their study, cassava (starch and eba) has a glycaemic index of 98.60 and 82.25 respectively, while amala (yam) has a glycaemic index of 84.35, and rice (tuwoShinkafa) has a glycaemic index of 95.30.

The glycaemic index (GI) is a numerical system used to measure how much of a rise in circulating blood sugar a carbohydrate triggers – the higher the number, the greater the blood sugar response. A low GI food will cause a small rise, while a high GI food will trigger a dramatic spike (Willet and Skerrett 2005, Inzucchi et al. 2015). The glycaemic index rates carbohydrates on a scale from 0 to 100, according to their impact on blood sugar levels. The glycaemic load is the glycaemic index divided by 100 and multiplied by its available carbohydrate content in grams (i.e. carbohydrates minus fibre). Foods with a high glycaemic index increase blood glucose more than foods with a lower glycaemic index (Bella and Adetuyibi 1990). This measure does not take into account a carbohydrate's digestible content. A

newer measure called 'glycaemic load' is determined by multiplying a food's glycaemic index by the amount of carbohydrate it contains (Liu and Willet 2002). This provides a more accurate measure of a carbohydrate's impact on blood glucose. For example, watermelon has a high glycaemic index, but it is mostly water and fibre, which reduces its impact on blood glucose levels (Willet et al. 2007). The speed at which a carbohydrate is broken down into glucose determines whether it is "fast" or "slow". Fast carbohydrates break down quickly and have a glycaemic index above 70 and a glycaemic load above 20 (Liu and Willet 2002, Franz 2008).

In Omoregie and Osagie's (2008) study of the glycaemic index and glycaemic load of cassava (starch and eba), yam (amala), maize (agidi) and rice, it was reported that in two hours, these foods deliver as much glucose as free sugar (control) to the blood system. In the absence of adequate insulin delivery, these foods will certainly overwhelm the sugar metabolic system. They are thus not considered suitable or adequate meals for type II diabetes.

However, several other studies have shown a low incidence of diabetes in Africans who eat cassava regularly (Franz 2008). Some researchers (Olatunbosun et al. 1998) believe that the cyanide in cassava could cause diabetes, or that it could worsen the health of people who already suffer from diabetes. Cassava can be harmful if it is not properly prepared in a way that removes a toxic compound called hydrogen cyanide (Adeleke et al. 2010).

As yet there is no consensus among researchers and experts on whether common African food such as cassava, yam, maize and rice cause diabetes. In fact, studies by different experts have yielded conflicting results; some demonstrate that these African foods could cause diabetes and obesity, while some prove the exact opposite – namely, that these African foods protect against diabetes (Franz et al. 2010).

However, these researchers think that the matter may be more easily resolved if more attention is paid not only to the food in its raw state but to the finished products and how they are consumed. For example, if the cyanide levels in cassava are greatly reduced through soaking and other processing techniques, the glycaemic index and glycaemic load are likely to fall within the normal limits. The difference could be in the method of preparing their cassava, and in what it was eaten with. For example, does yam peeled before being boiled have the same glycaemic index and glycaemic load as yam boiled before being peeled? It has been established that polished rice has a high glycaemic load, while unpolished rice (like Nigeria's local rice called "ofada") has a low glycaemic load (Mennen et al. 2000).

Yam provides around 110 calories per 100 grams. It is high in vitamin C and B_6, potassium, manganese and dietary fibre. It is low in saturated fat and sodium. A product that is high in potassium and low in sodium is likely to produce a good potassium-sodium balance in the human body, and so protects against osteoporosis and heart disease. Yam is rich in phenylalanine and threonine, but limited in the sulphur amino acids, cysteine, methionine and tryptophan. Experts emphasize the need to supplement a yam-based diet with more protein-rich foods in order to support active and healthy growth in infants. Except for its potassium, vitamin B6 and vitamin C, yam is a food with a low nutrient density (Kinnear 1963).

It is now a well-documented fact that diet and nutrition have a direct impact on health and well-being. Studies conducted in different continents over the last twenty years lend credence to this fact. The conclusions all point in the same direction; namely, that natural foods, fruits and vegetables are good for health, while processed refined foods are unhealthy. Through an avalanche of data, laboratory research, social research, epidemiological surveys and fieldwork, scientists, biologists, sociologists and anthropologists have been able to show how diet affects health (Hunt Peters 2006, Escott 2011).

Rice and yam provide the required amount of carbohydrates. One important fact often overlooked is that the respondents use lots of nutritious soups and stews to consume their food. For example, in many of the families visited, the food was consumed with okra soups, vegetable soups and mushroom soups, with a lot of local spices such as garlic, onions, cayenne, and xylopia aethiopica. These nutritious soups make up for the low protein contents of food such as rice, yam and cassava. Therefore, while there is little difference in the nutritional quality of foods such as

rice, yam cassava and plantain, there are high nutritional qualities in common local soups such as okra soup, black soup, vegetable soup, mushroom soup and "banga" soup, to mention just a few. These soups are prepared based on local recipes with no processing, which makes them more nutritious.

Of course, more processing means more profits, but it typically makes the food less healthy, too. Obviously, minimally processed foods such as fresh fruits and vegetables are not where food companies look for profits. The big bucks come from turning government--subsidized commodity crops – mainly corn, wheat, and soybeans – into fast foods, snacks, and beverages. High-profit products derived from these commodity crops are generally high in calories and low in nutritional value (Abioye-Kuteyi et al. 2005).

Foods that are less processed are generally more satiating than their highly processed counterparts. Fresh apples have an abundance of fibre and nutrients that are lost when they are processed into apple sauce. The added sugar or other sweeteners increases the number of calories without necessarily making the apple sauce any more filling. Apple juice, which is even more processed, has had almost all of its fibre and nutrients removed. The same happens with highly refined white bread when it is compared with stone-ground whole wheat bread. Many supposedly healthy replacement foods are not much healthier than the foods they replace.

The importance of physical activities cannot be overemphasized. Surely, dieting and proper nutrition alone are not enough to keep people healthy. Health education also needs to emphasize physical activity, a healthy lifestyle, and a positive mental outlook. Equal emphasis should be placed on the different aspects of healthy living. An over-emphasis on physical activity, which downplays the importance of proper diet, could lead to poor health. According to Malhotra et al. (2015), it is an illusion to think that one can outrun a bad diet.

CONCLUSION

This study has revealed the important role of education in the dietary habits of a population. The more educated one is, the more likely he or she is to have access to useful health information. People with little or no education may lack access to useful health tips and vital health information. Yet there is a difference between having information and possessing knowledge. A higher education gives access to useful health information, but without the will to act on this information, it is of no help. In fact, it has been observed that highly educated people often indulge in unhealthy habits such as smoking, sedentary living and drinking alcohol, even though they are aware of the health implications. It seems therefore, that academic knowledge is not enough for a person to make the right choice in terms of diet and nutrition. What is required is a general health information system that is available to all.

The study revealed that family history should not be taken for granted when discussing chronic diseases. Some people are genetically prone to diabetes, while others are prone to high blood pressure or kidney problem. Knowing which disease one may be prone to will help in taking the right precautions in terms of diet and lifestyle. In the course of this study, it was observed that many people did not know their blood group or genotype, and had to be persuaded about the importance of this information.

The study suggested that a preventive approach to health-care is a better policy than the cure-oriented approach (which is currently prevalent in the world). There is a need for people to be encouraged to take charge of their own lives and take responsibility for their own health and wellbeing, rather than shifting this responsibility onto medical practitioners.

This study recommends a holistic approach to the issue of diet and nutrition to ensure a more holistic understanding of health and illness behaviour globally.

CONFLICT OF INTERESTS

The authors have no conflict of interests to disclose.

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