ORIGINAL ARTICLE

Obesity in adult Nigerians: A study of its pattern and common primary co-morbidities in a rural Mission General Hospital in Imo state, south-eastern Nigeria

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Abstract

Objectives: This study was generally aimed at determining the prevalence and pattern of obesity using body mass index (BMI) criterion and specifically screening for its common primary co-morbidities among adult Nigerians attending a rural Mission General Hospital in Imo state, South-Eastern Nigeria.

Materials and Methods: A descriptive study was carried out from June 2008 to May 2009. A total of 2156 consecutive new adult patients aged 18-90 years were screened for obesity using the BMI criterion, and 129 patients had BMI ≥30 kg/m^2 and met the inclusion criteria. The data collected included age, sex, marital status, education, occupation, social class, weight, height and blood pressure, fasting blood sugar and lipid profile.

Results: The prevalence of obesity was 6.0%, with class I obesity (86.1%) being the most common pattern. Hypertension (16.3%) was the most common primary co-morbidity; others included low high-density lipoprotein—cholesterol (21.7%), high low-density lipoprotein—cholesterol (9.3%), high total cholesterol (7.8%), high triglyceridemia (4.7%) and diabetes mellitus (3.9%).

Conclusions: This study has shown that obesity and its primary co-morbidities are emerging as a serious health problem among the study population, with class I obesity being the most common pattern and hypertension being the most common primary co-morbidity. Anthropometric determination of obesity and screening for its common primary co-morbidities should be integrated as part of the clinic baseline assessment of adult Nigerians attending rural hospitals to facilitate their early detection and institutionalization of appropriate preventive and therapeutic measures.

Key words: Adult, common co-morbidities, obesity, pattern, rural hospital, Nigeria

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Introduction

Obesity is culturally and socially acceptable among Nigerians and therefore is not usually recognized as a medical problem. It is defined[1] as an excess of adipose tissue resulting in body mass index (BMI) ≥30 kg/m^2.

Obesity generally results from a chronic imbalance between energy intake and expenditure.[1] Until recently, obesity was considered the direct result of two weight-linked behaviors of physical inactivity and chronic ingestion of excess calories. Although these factors are undoubtedly the principal cause in some cases, there is

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now strong evidence of a genetic influence.[1] However, most human obesity generally develops from the interactions of multiple genes and environmental and behavioral factors.

BMI is the most popular anthropometric index used for the assessment of obesity among individual subjects, which can be compared across populations and studies,[2] and has been found to have a high correlation with body fat.[3] The validity of BMI as a measure of obesity is further supported by its association with obesity-related morbidities such as hypertension, dysglycemia (impaired fasting glycemia, impaired glucose tolerance and type II diabetes mellitus) and dyslipidemia (hyperlipemia, hypercholesterolemia, hypertriglyceridemia and low high-density lipoprotein [HDL]-cholesterol).[4]

The potential medical consequences of obesity have been documented extensively, particularly in relation to its common primary co-morbidities such as cardiovascular diseases, type II diabetes mellitus and dyslipidemia.[4,5] The presence of a medical risk of obesity is related to the location of excess fat and duration and degree of obesity. However, the medical risk of obesity is highly associated with the distribution of body fat, and abdominal fat is considered at least as important a medical risk as the total amount of body fat.[6] The BMI therefore provides guidelines on the identification, evaluation and treatment of adults who are obese. The risk of obesity co-morbidities is negligible in the normal weight range, mildly increased in overweight, moderately increased in class I obesity (mild obesity), severe in class II obesity (moderate obesity) and very severe in class III obesity (extreme obesity).

The prevalence of obesity has increased significantly during the past two decades in developed countries, and this trend is rising.[6,7] In England and Wales, there have been increases in the prevalence rates of obesity from 6% and 8%, respectively, for men and women in 1980 to 8% and 12% in 1990 and to over 21% for both in 2000[6]. In the United States of America, two national surveys have helped to improve early evaluation and management of risk factors leading to diabetes mellitus and the National Health and Nutritional Examination Surveys (NHANES) have shown that an increase in BMI is usually associated with an increase in the prevalence of diabetes mellitus, hypertension and dyslipidemia.[7] The prevalence of obesity and obesity-related morbidities in developing countries is relatively low, but is changing rapidly with urban and rural variations.[8] Ongoing demographic and epidemiologic changes in developing countries such as Nigeria, rural to urban migration, changes in lifestyle and socio-economic factors have contributed to the burden of obesity and its co-morbidities.[8]

Globally, rising trends in morbidity and mortality related to chronic non-communicable diseases have led the World Health Organization and other international and national organizations to device strategies for chronic non-communicable disease prevention and control.[8,9] In the recent years, developing nations including Nigeria have started responding to the rise in the prevalence of obesity and obesity-related diseases.[8,9] The principal aim is to identify mutable and immutable risk factors involved in these medical conditions and to formulate a suitable programme for early detection and effective control.

In Nigeria, obese patients frequently present to the general duty clinicians. The failure to diagnose obesity and obesity-related morbidities by clinicians leads to missed opportunities to counsel obese patients on lifestyle modification and also to screen them for obesity-related morbidities. The enormous and rising burden of obesity and its medical consequences in developing countries such as Nigeria has informed the decision for this study in a rural clinic setting. The early recognition of obesity by clinicians working in rural hospitals is quintessential to its management, while identifying its common primary co-morbidities avails great opportunities for prevention and control. General hospitals in rural communities are usually the first port of call for these patients in Nigeria.

This study was generally aimed at determining the prevalence and pattern of obesity and, specifically, screening for its common primary co-morbidities among adult Nigerians in a rural mission General Hospital in Imo state, South-Eastern Nigeria. This General Hospital setting usually provides first-contact hospital services to the community and its environs and may give a better picture of the prevalence and pattern of obesity and its common primary co-morbidities in the study area.

Materials and Methods

This was a clinic-based descriptive study using a primary data collection method carried out from June 2008 to May 2009. A total of 2156 consecutive new adult patients aged 18-90 years were screened for obesity (BMI ≥ 30 kg/m^2) and 129 patients who had BMI ≥ 30 kg/m^2 and met the inclusion criteria were recruited for the study at the General Outpatient Clinic of St. Vincent De Paul Hospital, Amurie-Omanze, a Catholic Hospital in Isu Local Government Area of Imo state, South-Eastern Nigeria. The 18 years and above cut-off was in tandem with the seventh report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure in adults aged 18 years and older.[10] Pregnant women, patients who had ascites and other forms of edema and patients who had physical deformities affecting the spine and/or the limbs and critically ill patients who could not stand for height and weight measurement were excluded from the study. Sample

size estimation was determined using the formula[11] for estimating minimum sample size for descriptive studies when studying proportions with an entire population of <10,000 using an estimated population size of 3000 adult patients based on the previous annual adult patients population clinic attendance of the hospital. The estimated minimum sample size using prevalence of obesity of 16.3% from a previous study[3] gave a final sample size estimate of 169 patients. However, selected the sample size of 129 adult patients was used based on the proposed and elapsed duration of the study. The clinic runs during working hours from Monday to Friday, including public holidays. The data collected for each adult patient included age, sex, marital status, education and occupation, weight (kg), height (m^2) and blood pressure, fasting blood sugar and lipid profile (total cholesterol, triglycerides, HDL-cholesterol and low-density lipoprotein [LDL]-cholesterol). The primary occupation of the patients was recorded. The social classification of patients was based on the previous five-point occupational scale by Abramson.[12] The study also assessed the obese patients on the awareness (perception) of their obese condition, sources of awareness of information on their obese condition and knowledge of lifestyle modification for obesity. On further assessment of their knowledge of lifestyle modification for obesity, appropriate questions were asked with grading of responses indicating knowledge levels (high, moderate, low). The coding of the responses was graded using a scoring system of 0-3 points developed by the authors as follows: Diet (1 point), physical activities (1 point), behavior modification such as alcohol intake (1 point) and no knowledge (0 point). Those who scored 3 points were graded as high level, 2 points as moderate level, 1 point as low level and 0 point was graded for no knowledge.

The weight was measured in kilograms, with patients standing bare feet in their minimal clothing and with their pockets free of objects that might add to their weights such as mobile phones, wallets, keys, rings, etc. using a bathroom weighing scale (Hamson, China), which was validated daily using a known 10 kg weighted mass and measured to the nearest 0.1 kg. The weighing scale was checked for zero error after each measurement. The patients' heights were taken from a measuring scale drawn against the wall of the consulting clinic. In measuring the height, the patient who was barefooted and without head-gear or cap stood against the marked wall with the Achilles, gluteus and occiput touching it. A pointer was firmly pressed against the scalp and the measurement was read off on the wall scale in meters. The BMI was estimated by dividing the measured weight in kilograms by the height in meters squared. The BMI of ≥30 kg/m^2 was taken as the operational definition[1,3] of obesity with the following categorization: Class I obesity (mild obesity) = BMI of 30-34.9, class II obesity (moderate obesity) = BMI of 35-39.9 and class III obesity (severe obesity) = BMI of ≥ 40.

Investigations were carried out for the specific primary co-morbidities of obesity, such as hypertension, diabetes mellitus and dyslipidemia. The blood pressure was measured using the auscultatory method with a standard mercury in glass Accuson sphygmomanometer. Prior to the measurement, the patient was seated and rested for 5 min[13] in a sitting position on a chair that supported the back comfortably. The left arm muscles were relaxed and the forearm was supported with the cubital fossa at the heart level. A cuff of suitable size was applied evenly to the exposed arm. The cuff was rapidly inflated until the manometer reading was about 30 mmHg above the level at which the pulse disappeared and then slowly deflected. During this time, the Korotkoff sounds were monitored using a Litman stethoscope placed over the brachial artery. The systolic blood pressure was noted at the pressure at which the first heart sounds were heard (Korotkoff phase I). The diastolic blood pressure was taken as the pressure at the point when the heart sounds disappeared (Korotkoff phase V). The blood pressure was also measured in the right arm as described for the left arm in order to rule out a significant interarm blood pressure difference, and the arm that gave the higher reading was subsequently used.[13] The systolic and diastolic blood pressures were measured twice separated by an interval of 2 min.[13] The three readings were recorded and the mean value was calculated. Hypertension is defined[12] as systolic and/or diastolic blood pressures ≥140/90 mmHg.

Diabetes mellitus was defined[14] by venous plasma fasting blood sugar ≥126 mg/dl (7.0 mmol/l) after an overnight fast, which was confirmed by a repeat test on the second clinic visit. Dyslipidemia was defined[15] as serum total cholesterol ≥200 mg/dl (5.17 mmol/l), triglyceride ≥150 mg/dl (1.7 mmol/l), LDL-cholesterol ≥100 mg/dl (2.58 mmol/l) and HDH-cholesterol <40 mg/dl (1.03 mmol/l).

Statistics

The results generated were analyzed using software SPSS version 13.0, Inc. Chicago, IL, USA version 13.0 (Chicago, IL, USA) for the calculation of proportions, mean, frequencies and percentages.

Table 1: Prevalence of obesity (BMI ≥ 30 kg/m^2) and BMI categories of obese patients

Prevalence	
Status	**Number (%)**
BMI ≥ 30 kg/m^2	129 (6.0)
BMI < 30 kg/m^2	2027 (94.0)
Total	2156 (100.0)
Bmi ≥ 30 kg/m^2 categories	
Class II obesity (BMI 30-34.9)	111 (86.1)
Class II obesity (BMI 35–39.9)	15 (11.6)
Class III obesity (BMI ≥ 40)	3 (2.3)
Total	129 (100.0)

Results

One hundred and twenty-nine (6.0%) out of a total of 2156 new adult patients screened were obese (i. e., had BMI ≥ 30 kg/m^2), with 111 (86.1%) having class I obesity (i. e., BMI 30-34.9), 15 (11.6%) had class II obesity (i. e., BMI 35-39.9) and three (2.3%) had class III obesity (i. e., BMI ≥ 40) [Table 1].

The age of the obese patients ranged from 18 to 90 years, with a mean age of 42.6 ± 11.3 years. The majority of the obese patients were middle-aged adults (40-64 years) (43.4%), followed by the elderly (≥65 years) (32.6%) and the young adult (18-39 years) (24.0%). There were 35 (27.1%) males and 94 (72.9%) females, with a male to female ratio of 1:2.7. The majority of the obese patients were married (60.5%), had primary education (51.9%), were peasant farmers (43.4%) and belonged to social class V (47.3%) [Table 2].

Twenty-one (16.3%) of the obese patients were hypertensive (blood pressure ≥140/90 mmHg). Eighty-two (63.6%) were normotensives, 26 (20.2%) were pre-hypertensives, 14 (10.8%) had stage I hypertension while seven (5.4%) had stage II hypertension [Table 3].

Five (3.9%) of the obese patients were diabetic while 124 (96.1%) had plasma fasting blood sugar <126 mg/dl [Table 3]. The lipid profile showed that 10 (7.8%) had raised total cholesterol ≥200 mg/dl, six (4.7%) had raised triglyceride ≥150 mg/dl, 12 (9.3%) had raised LDL cholesterol and 28 (21.7%) had low-HDL cholesterol [Table 3].

Table 2: Demographic characteristics of the obese patients

Parameter	Number (%)
Age (years)	
18-39	31 (24.0)
40-64	56 (43.4)
≥65	42 (32.6)
Total	129 (100.0)
Gender	
Male	35 (27.1)
Female	94 (72.9)
Total	129 (100.0)
Marital status	
Single	17 (13.2)
Married	78 (60.5)
Widowed	26 (20.1)
Separated	8 (6.2)
Total	129 (100.0)
Education	
No formal education	23 (17.8)
Primary	67 (51.9)
Secondary	31 (24.1)
Post-secondary	8 (6.2)
Total	129 (100.0)
Occupation	
Unemployed	9 (7.0)
Student/apprentice	13 (10.1)
Public/civil servants	10 (7.8)
Farming	56 (43.4)
Trading	23 (17.8)
Driving	7 (5.4)
Artisans	11 (8.5)
Total	129 (100.0)
Social class	
Class I	0 (0.0)
Class II	3 (2.3)
Class III	25 (19.4)
Class IV	40 (31.0)
Class V	61 (47.3)
Total	129 (100.0)

Table 3: Primary co-morbidities of the obese patients

Parameter	Number (%)
Hypertension (SBP/DBP ≥ 140/90 mmHg)	
Yes	21 (16.3)
No	108 (83.7)
Total	129 (100.0)
Blood pressure categories	
Normal	82 (63.6)
Pre-hypertension	26 (20.2)
Stage I hypertension	14 (10.8)
Stage II hypertension	7 (5.4)
Total	129 (100.0)
Fasting blood sugar (plasma)	
<126 mg/dl	124 (96.1)
Diabetes mellitus	5 (3.9)
Total	129 (100.0)
Lipid profile	
Total cholesterol	
<200 mg/dl	119 (92.2)
≥200 mg/dl	10 (7.8)
Total	129 (100.0)
Triglyceride	
<150 mg/dl	123 (95.3)
≥150 mg/dl	6 (4.7)
Total	129 (100.0)
Low-density lipoprotein-cholesterol	
<100 mg/dl	117 (90.7)
≥100 mg/dl	12 (9.3)
Total	129 (100.0)
High-density lipoprotein-cholesterol	
<40 mg/dl	28 (21.7)
≥40 mg/dl	101 (78.3)
Total	129 (100.0)

On the assessment of the awareness of their obese condition, only 21 (16.3%) admitted that they were aware of their obese condition while 108 (83.7%) were not aware of their obese condition. The majority, 15 (36.6%), of those who were aware of their obese condition were informed of their obese condition by healthcare workers. Other sources of awareness of information on their obese condition were self-awareness (26.8%), relatives (22.0%) and friends/peers (14.6%). On the knowledge of lifestyle modification for those who were aware of their obese condition, eight (38.1%) had knowledge of lifestyle modification while 13 (61.9%) had no knowledge of any form of lifestyle modification. On further assessment of their level of knowledge of lifestyle modification for obesity, the majority, six (50.0%), of those who had knowledge of lifestyle modification exhibited a low level of knowledge, one (25.0%) showed a moderate knowledge level while one (25.0%) demonstrated a high knowledge of lifestyle modification.

Discussion

Obesity is generally regarded as a pandemic with potentially disastrous consequences for human health.[16] The prevalence rate (6.0%) of obesity in this study is lower than that reported from Okrika, Rivers state(16.3%)[3] and in other countries such as the rural area of Cameroon (17.1%).[17] However, the prevalence of obesity in this study is higher than that reported from the rural area of Maidiguri (2.0%).[18] The relative disparities between the prevalence of obesity in this study and other similar studies were probably due to the methodological approach and epidemiological characteristics of the study population. However, these reports from rural studies and other reports from urban studies in PortHarcourt[3] and the urban area of Cameroon[17] have shown that obesity is an issue of phenomenal medical and public health importance in both rural and urban communities of the developing world. Furthermore, studies from developed countries have reported a rising trend of obesity.[5,6] This report and other reports from developing nations have buttressed the observation that the prevalence rates of obesity in developing countries are relatively low but are changing rapidly with urban and rural variations.[8] However, the prevalence of obesity has been reported to be higher in urban than in rural communities.[6-8,17] This urban-rural variation is attributed to the observation that the urban population is usually associated with modernization of lifestyle, which is largely characterized by a change in the dietary pattern and lower physical activity, including personal, instrumental and domestic activities of daily living, when compared with the rural population. The lower prevalence rate of obesity in this study is probably explained by the predominantly agrarian occupation of the rural populace, which largely is manual labor-intensive peasant farming as the primary occupation and source of living for the majority of the people as well as secondary occupation for most people as a means to augment low/poor wage earnings.

The pattern of obesity in this study with the highest prevalence of class I obesity (86.1%) among the study population is similar to the pattern of obesity reported previously in Nigeria.[3] This pattern is supported by the observation that body build at the level of class I obesity is culturally and socially desirable and acceptable in Nigeria, and not usually regarded as a pathological condition.[3]

The finding in this study of a higher prevalence (43.4%) of obesity among middle-aged adult patients is similar to the reports from Okirika, Rivers state,[3] rural areas of Maiduguri[18] and Cameroon.[17] According to these reports, the prevalence of obesity as defined by the BMI parameter increases with age.[4] However, it has also been reported that anthropometric determination of obesity using the BMI criterion could be a less-valid indicator of obesity among the elderly who tend to have a shift of fat from the peripheral to the central sites, with progressive redistribution of the fat stores more to the intra-abdominal/visceral region.[3] More so, aging is associated with a relative reduction in the fat-free mass, especially muscle mass, with a relative increase in the fat mass.[19] Furthermore, obesity increases with advancing age as physical activities diminish and central obesity arises as peripheral fat is diverted to the central sites. For such a population, the waist index (waist circumference, waist-hip ratio), a measure of central obesity, is preferred.[3]

This study observed a higher prevalence of obesity among females (4.4%) compared with males (1.6%). This finding is similar to previous reports from Okrika, Rivers state,[3] Maiduguri[18] and other countries such as Cameroon[17] and Ghana.[20] The higher prevalence of obesity among the female gender may be attributed to the observation that females are generally less physically active than males. However, apart from changes in the energy density of diets and physical inactivity, genetic differences between the sexes may be contributory.[1,2]

In this study, hypertension was the most common primary co-morbidity among the study population. The prevalence rate of hypertension in this study is higher than that reported from Maiduguri (15.2%),[18] but lower than that reported from Edo state (Udo) (20.2%).[21] The finding in this study may be a reflection of the burden of hypertension among the study population, and corroborates the report that the prevalence of hypertension is on the rise even in Nigeria.[8,21] According to these reports from Nigeria, hypertension is the most common non-communicable disease in Nigeria,[8,21,22] and hypertension has become a public health problem worldwide, especially in sub-Saharan Africa, where it is increasing in importance as a component of non-communicable disease burden and a major cause of cardiovascular morbidity and mortality. This finding of prevalence rate of hypertension that is less than the extrapolated 20% from the1997 non-communicable disease survey in Nigeria may be a reflection of the rural conduct and nature of the study population. In Nigeria, the

prevalence of hypertension is reportedly higher in the urban than in the rural communities.[8] Among the possible factors for this urban-rural variation are that the urban population is usually characterized by adoption of a western-style diet, reduced activities of daily living and physical inactivity. In addition, work place-related stress and distress have been found to increase the blood pressure of some workers.[23]

The prevalence of diabetes mellitus of 3.9% in this study is within the prevalence rates of 2-4% reported in Nigeria by Akinkugbe.[8] However, this finding is higher than the prevalence rates reported in Maiduguri (3.0%)[18] and lower than the prevalence rates reported in Port Harcourt (6.8%).[24] This finding is in keeping with the reports that the prevalence of diabetes mellitus depends on the population group under study, with rural and urban variations, and has reportedly increased over the past two decades in both the developed and the developing countries.[7,24] This increase is presumed to be due to diet style, population aging, physical inactivity and increasing prevalence of obesity.

The prevalence and pattern of dyslipidemia in this study is similar to the pattern described in a previous study with low-HDL-cholesterol being the most frequent lipid abnormality.[25] According to the report, dyslipidamia is becoming an important medical problem in both developed and developing countries, and is associated with obesity in a clustering of medical conditions and/or risk factors that lead to dysmetabolic syndrome.[15] However, the prevalence rates of dyslipidemia in these reports vary with its operational definitions for the study population.

The finding of low awareness (16.3%) of their obese condition among the study population are patient- and health personnel-related factors in healthcare delivery. With the paucity of healthcare personnel and time constraint, healthcare personnel sometimes fail to assess for obesity and explain to the obese patients in sufficient detail the health consequences of obesity. This lack of information is not limited to the health consequences of obesity but also the benefit of lifestyle modification. Information is power, while there is a need to increase the knowledge of the healthcare personnel on obesity and its health consequences. This knowledge needs to be passed on to the ultimate consumers-the patients. If the general patients are aware of their obese condition, health consequences of obesity as well as modifiable predisposing factors of obesity, then it may be easier to educate them on lifestyle modification, especially healthy diet, physical activity and behavior modification.

Study implications

The results of this study obviously have great implications for clinical practice and public health. The findings of this study have corroborated previous reports on an emerging incidence and prevalence of obesity and its primary co-morbidities in Nigeria.[8] Hence, there is a stronger need, more than ever before, to reinforce the importance of screening for obesity and obesity-related co-morbidities in primary, secondary and tertiary care and mounting of an aggressive facility-based and country-wide health information, education and communication campaign to promote the culture of healthy diet, physical activity, behavior modification and appropriate management of obesity and obesity-related primary co-morbidities in the country. As Nigeria continues to combat communicable diseases such as human immunodeficiency virus/acquired immunodeficiency syndrome, malaria and tuberculosis, there are also looming epidemics of obesity and its primary co-morbidities in the country.

Limitations of the study

The researchers had certain constraints that imposed some degree of limitations to the absolute generalization of the findings. The unreliability of height measurements make BMI a fairly accurate index of obesity, especially in older persons.[3] Although the ideal measurement of obesity should consider both the amount and the site of deposition of the adipose tissues, the waist indices (waist circumference, waist-hip ratio, Rohrer's index, Ponderal index) were not used for the definition of obesity in this study. However, many studies and literature reviews have documented a strong correlation between Quatelet index and waist circumference and that Quatelet index provides a simple clinical estimate of generalized adiposity that can be compared across studies and populations.[2,3] This is supported by its significant associations with obesity-related risk factors such as dyslipidemia, dysglycemia and hypertension.[4,7] More so, waist circumference measures regional adiposity (amount of fat in the abdomen).[2,3] Furthermore, the limitations imposed by the descriptive nature of the study, small sample size and duration of the study are recognized. Moreover, this study stimulates the need for analytical and longitudinal studies in this area. This would enable a quasi cause-effect relationship to be drawn and also for a reliable and valid conclusion to be ascertained. However, this study corroborates with previous studies in varying proportions.[3,4,7] More so, the findings of this study gave some useful insight into the pattern and magnitude of obesity and its primary co-morbidities among the study population. This study therefore provides useful baseline information on which subsequent interventions in the study area could be based and evaluated.

Conclusions

This study has shown that obesity is emerging as a serious health problem among the study population, with class I obesity being the most common pattern and hypertension being the most common primary co-morbidity. It is recommended that anthropometric determination of obesity and screening for its common primary co-

morbidities be integrated as part of the baseline assessment of adult Nigerians attending the rural health facilities to facilitate their early detection and institutionalization of appropriate preventive and therapeutic measures. Identification and implementation of primary and secondary intervention programmes that are timely, safe, effective, efficient, inexpensive, widely practicable, culturally acceptable and patient- and family-centered are advocated. These interventional measures should also be considered by health planners and policy makers in their formulation of policies and designing of programmes geared toward reducing the burden of non-communicable diseases in rural Nigerians who are living in a resource-poor and depressed economy.

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