DETERMINANTS OF HEALTH CARE UTILIZATION IN OBESE AND NON-OBESE PATIENTS ATTENDING THE GENERAL OUTPATIENT DEPARTMENT OF AMINU KANO TEACHING HOSPITAL, KANO.

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A DISSERTATION SUBMITTED TO THE DEPARTMENT OF COMMUNITY MEDICINE, SCHOOL OF POSTGRADUATE STUDIES, BAYERO UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE IN PUBLIC HEALTH (MSc PH)

DECEMBER, 2015

DECLARATION

I hereby declare that this work is the product of my research efforts undertaken under the supervision of Dr Abubakar Sanusi and has not been presented anywhere for the award of a degree or certificate. All sources have been duly acknowledged.

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CERTIFICATION

This is to certify that the research work for this dissertation and the subsequent write-up of "Musa Usman Umar with registration number SPS/12/MPH/00004" were carried out under my supervision.

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This dissertation has been examined and approved for the award of Masters of Public Health.

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ACKNOWLEDGMENT

I am grateful to my supervisor, Dr. Sanusi Abubakar. He has been great and very critical, but at the same time encouraging.

I remain grateful to all the staff in the Department of Psychiatry and Community Medicine, Bayero University and to Dr Amole Taiwo for their encouragement.

To Almighty Allah, I remain grateful for His blessing, love and grace.

DEDICATION

This work is dedicated to all patients in the Family Medicine Department who gave their time to be part of this study. It is also dedicated to my beloved, Naimat and my late parents.

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LISTS OF ABBREVIATIONS

ABM: Andersen Behavioural Model

AKTH: Aminu Kano Teaching Hospital

BMI: Body Mass Index

CDC: Centre for Disease Control and Prevention

CVD: Cardiovascular Disease

DALY: Disability-adjusted Life Years

DSM: Diagnostic and Statistical Manual of Mental Disorders

GDP: Gross Domestic Product

GOPD: General Outpatient Department

HRQoL: Health-related Quality of Life

OECD: Organization for Economic Cooperation and Development

MINI: Mini-International Neuropsychiatric Interview

WHO: World Health Organization

ABSTRACT

Aim and Objective: It has been shown that obese patients compared to non-obese have higher number of healthcare utilization. The World Health Organization (WHO) estimates that obesity is responsible for between 2 and 7 percent of global health-care spending. The impact of obesity on health-care utilization may be influenced by other variables like socio-demographics, medical comorbidity and depression. The aim of the study is to assess the determinants of health-care utilization among patients with obesity attending the General outpatient clinic of Family Medicine department of Aminu Kano Teaching Hospital (AKTH), Kano.

Methodology: A cross-sectional study was carried out in the General Outpatient Department of AKTH. An adopted Pattern of Health Care Utilization Questionnaire based on the Andersen Behavioural Model of health care utilization was used in the assessment of the sample (n=325). Assessment of medical comorbidity were obtained from the patients' medical records. Association were tested using t-test and Chi-square test, and the level of significance was set at 0.05. Odds ratio were calculated for variables that were determinants of increased health care utilization.

Results: The prevalence of obesity was 9.3%. Obese individuals had more outpatient hospital visits (t-test=7.125; p<0.001), diagnostic services (t-test=7.915; p<0.001), hospitalization (t-test= 2.558; p-value=0.018), and medications prescribed (t-test=3.648; <0.001) than those that were non-obese. Only depression and the presence of suicidal idea in obese individuals were predictive of increased health care utilization: odds ratio [OR]=3.03; 95% confidence interval [CI]= [1.26,7.29] and OR=2.91; 95 CI [1.24, 6.82] respectively. For non-obese individuals

having social support was predictive of increased health care utilization OR=1.11; 95% CI [1.01, 1.86].

Statement of Major Contribution to Knowledge: In our community, obesity is associated with increase burden in the area of increased utilization of health care services. Depression is a determinant of increased health care utilization in obesity, while having social support was a determinant of health care utilization in non-obese.

Recommendation: Obesity management should form part of a comprehensive assessment of individuals that are obese in all levels of health care facilities. Also prompt recognition and treatment of depression will aid in reducing the burden of increased health care utilization in obesity.

CHAPTER ONE

INTRODUCTION

Obesity is an abnormal accumulation of body fat 20% or more above an individual's ideal weight or is defined as the weight at least 20% above of the person's ideal weight based on the individuals height, gender and age (WHO, 2000). Obesity is a common condition in the population that is associated with major health implications (Mathers and Loncar, 2006). It shares a bidirectional relationship in predicting the risk to a number of conditions including depression (Luppino et al., 2010). It is also associated with increased cardiovascular diseases (Brunner et al., 2014; Celano and Huffman, 2011) and endocrine conditions (Golden et al., 2008; Knol et al., 2006; Mezuk et al., 2008). About 30% or 2.1 billion of the global population is said to be overweight or obese (Ng et al., 2014). In Nigeria the prevalence of obesity range from 8.1% to 22.2% (Chukwuonye et al., 2013).The 2014 report of the McKinsey Global Institute reported that the global impact of obesity is about 2 trillion United States dollars, or equivalent to 2.8% of global gross domestic product (GDP), affecting both developed and developing countries (Dobbs et al., 2014). Obesity has the same impact on the global economy as armed conflict, and only slightly less than smoking and globally is the third leading cause of social burden generated by human beings and 13th in Nigeria (Dobbs et al., 2014). The productivity lost from the effect of obesity using disability-adjusted life years (DALY; which measures the number of years that are lost or rendered economically unproductive due to disease) is around 71% from premature death and 29% to disability, with the latter affecting employers through lost employee productivity and health-care cost; and associated absenteeism from work, depression and frequent utilization of health-care services (Cawley et al., 2007; Dobbs et al., 2014, Finkelstein et al., 2010; Hammond and Levine, 2010; Lehnert et al., 2014; Migliore et al., 2013).

Health-care utilization is the outcome related to the interaction between health professionals and the patients (Babitsch et al., 2012). It includes the utilization of hospital resources, personal care home (PCH) resources. and physician resources. Health-care utilization stands at the end of a help-seeking organised process of varying length (help-seeking behaviour) and types of services which is generally influenced by several factors, and these factors or predictors can be explained using several frameworks or models (Ricketts and Goldsmith, 2005).

A number of theoretical models have been used to explain behaviours in relation to healthcare utilization and healthcare expenditure. These include Health Belief Model (Rosenstock et al., 1988), Transtheoretical Model (Prochaska and Velicer, 1997), Parsons' sick role (Parsons, 1951), Mechanic's general theory of help seeking (Mechanic, 1978), Suchman's stages of illness and medical care (Suchman, 1965), Andersen's health behaviour mode (Andersen, 1968) and Young's choice-making model (Young and Young-Garro, 1982). The Andersen Behavioural Model (ABM; Andersen, 1968; Andersen, 1995; Andersen and Newman, 1973) is among the most widely used model in healthcare resource utilization studies which had provided both the theoretical and organizational framework for studies that have addressed health behaviour changes (Babitch et al., 2012). The ABM focuses on the predisposing (e.g. age, sex and health beliefs), enabling (e.g. resources or socio-economic), need factors (e.g. follow-up screening to detect illness associated with the individual), and other health factors that may be associated or predict health service utilization in individuals that are either obese, depressed or both. Also factors that may influence these individuals' health services utilization will be determined.

1.2 Statement of the Problem

It has been shown that obese patients compared to non-obese have higher number of both primary care and specialty care clinics visits, use of diagnostic services, use of emergency services and hospitalization (Bertakis and Azari, 2005; Bertakis and Azari, 2006; Twells et al., 2010; Chu et al., 2010; Rosemann et al., 2008). Obesity is also associated with higher health-care cost (Alter et al., 2012) and increase in number of prescription and cost of medication for obesity-related conditions (Raebel et al., 2004). The World Health Organization (WHO) estimates that obesity as measured by Body Mass Index (BMI) is responsible for between 2 and 7 percent of global health-care spending (WHO, 2007). The impact of obesity on health-care utilization and health-care expenditure may be influenced by other variables like lifestyle behaviour and depression (Bertakis and Azari, 2006; Rosemann et al., 2008). The increase in health-care utilization and health-care costs occur in various conditions that are co-morbid with depression including diabetes (Kalsekar et al., 2006), heart failure (Moraska et al., 2013), osteoarthritis (Reosemann et al., 2008) and obesity (Bertakis and Azari, 2005). These conditions are associated with obesity (Wadden and Stunkard, 2002). Individuals with obesity that have higher utilization of health services report more depression symptoms (Green et al., 2012).

In obesity the major predictors of increase health-care services and cost are increasing BMI and more co-morbid conditions (Elmer et al., 2004; von Lengerke and Krauth, 2011).

1.3 Justification for the Study

Studies have concluded that the effectiveness, feasibility, and cost-effectiveness of obesity-related public health interventions is likely to be undermined by the huge burden associated with obesity in the population and by the many risk-factors within obese population (Cecchini et al.,

2010; Flodgren et al., 2010; Roux et al., 2008; Wang and Beydoun, 2007). Thus, by delineating high-risk factors like cardiovascular diseases, depression and other high-cost lifestyle risk-factor combinations, it may help direct, focus, and target policy lifestyle and behavioural intervention for obesity (Alter et al., 2012). Obesity is associated with poorer health status, increased utilization of health services , and increase direct cost (Janssen et al., 2009; Kuhle et al., 2011; Lehnert et al., 2014). It is also associated with significant indirect costs of burden to the individual, family and society from absenteeism from work, increased co-morbidities, disability and premature mortality (Lehnert et al., 2014; Wolfensletter, 2012). Health-Related Quality of Life (HRQoL) in individuals with obesity is reduced compared to those with normal weight (Choo et al., 2014).

Even in chronic conditions in which the rates of depression and obesity are higher than in the general population or those with the chronic condition alone, it has been showed that depression increase healthcare utilization and healthcare cost ((Snell et al., 2014). It should be noted that weight reduction either through exercise and lifestyle modification or surgery, even modest in nature, improve HRQoL (Strain et al., 2014; Blissmer et al., 2006) and decrease healthcare resource utilization *(*Morgan et al., 2014; Karim et al., 2013). Thus addressing the mental and physical healthcare needs of patients with obesity with or without co-morbidities is a good path to better health outcomes and thereby decreasing utilization of medical services (green et al., 2012; Snell et al., 2014). It should be noted that the usual assessment of disease burden by deaths or years lived with disability is a useful indicator as it may inform various methods for prevention of a condition by accounting for health loss but usually it does not generally reflect the needs or utilization of health services (Renehan and Buchan, 2014). Therefore, an alternative

indicator is to quantify the impact of the known condition's risk factors, in this case, obesity and various factors associated with it, on utilization of healthcare services.

In Nigeria, both electronic and manual searches yielded few studies on the increasing burden of disease condition on health-care utilization (Goar et al., 2012; Ogunbode et al., 2014; Taiwo et al., 2014). Most researches are on the barriers to health-care utilization (Idris et al., 2013; Moore et al., 2011; Obiechina and Ekenedo, 2013; Ononokpono et al., 2013; Uto et al., 2013;). In Nigeria the increasing burden of obesity is already established (Chukwuonye et al., 2013). It is imperative for a study in this line to assess the health-care system utilization of individuals that are obese compared to non--obese persons, as economic and utilization evidence are needed to evaluate the burden of illness and may inform health policy development (Roux and Donaldson, 2004). Therefore, this study is aim at analyzing the determinants of health-care utilization of obese individuals within the framework of Anderson Behavioural Model (ABM).

1.4 Research Questions

1. Is obesity associated with increase in health care utilization?

2. What are the predictor of increase health care utilization in obese patients if obesity is associated with increased health care utilization?

1.5 Aim and Objectives

1.5.1 Aim

The aim of the study is to assess the determinants of health-care utilization among patients that are obese and non-obese attending the General Outpatient department clinic of Aminu Kano Teaching Hospital (AKTH), Kano.

1.5.2 Objectives

The objectives of the study include:

1. To determine the prevalence of obesity in patients attending the General Outpatient Department Clinic of AKTH, Kano.

2. To assess the pattern of health care utilization amongst obese and non-obese patients attending the General Outpatient Department Clinic of AKTH, Kano.

3. To assess the determinants of health care utilization in obese and non-obese patients attending the General Outpatient Department Clinic of AKTH, Kano.

CHAPTER TWO

LITERATURE REVIEW

2.1 Literature Search Strategy

Publications related to utilization of health services among obese and/or depressed patients were searched for electronically using data bases from PUBMED, Google Scholar, PsychINFO, EMBASE, African Journals On-Line (AJOL), Global Health and JSTR. The references of published articles were also reviewed to extract additional relevant studies.

A number of search terms were used in various combinations (Box 1). Only publications in English language were used with literature search limited to 1980 to 2015. Articles before 1980s when utilized were for historical purposes.

Box 1: Literature Search Strategy

"obesity" OR "overweight" OR "severe obesity" OR "excess weight gain" OR "depression" OR major depression" OR "clinical depression" OR "mental illness" AND "depression" OR major depression" OR "clinical depression" OR "depressive symptoms" AND "utilization of health services" OR "medical services utilization" AND "factors associated" OR "determinants of" OR "determinant" OR "factors affecting" OR "factors influencing" OR "influence of" AND "cost of" OR "cost analysis of" OR "expenditure" OR "expenditure associated" OR "hospitalization rates" OR "cost-effectiveness" OR "health services cost" OR "burden of illness" AND "prevalence" OR "epidemiology" OR "sociodemographic factors" AND "quality of life" OR "disability" OR "quality of health" AND "Africa" OR "Nigeria" OR "Kano" OR " developing country"

To improve the accuracy of the literature search, combinations of terms that were listed above were used. Articles obtained were reviewed for the purpose of this literature review.

Obesity in the last two decades has increase in most part of the world and is regarded as one of the major global health problems (Dobbs et al., 2014; Finucane et al., 2011; Lim et al., 2012; Malik et al., 2012). Obesity is linked to increased health care cost (Arterburn et al., 2005; Bell et al., 2010; Finkelstein et al., 2009; Lehnert et al., 2013). In most developed countries, obesity ranks among the top three human-generated economic burdens. In the United States, obesity is second to arm conflict (military spending) in terms of social and economic impact accounting for 4.1 percent of GDP (Dobbs et al., 2014). The economic impact of obesity accounts for 3% GDP of United Kingdom's economy while the social impact of obesity in emerging economies of Brazil, Mexico, South Africa and morocco account for 2.4%, 2.5%, 3.0% and 2.8% respectively of the countries' GDP (Dobbs et al., 2014). While in other emerging markets like Nigeria, even not as significant as the other countries mentioned, the economic impact of obesity is 0.7% of the GDP, which the McKinsey report ranked as the 13th-largest economic impact.

Depression is also common (Bromet et al., 2011) and is expected that by 2030 to account for the highest level of disability accorded for any physical or mental disorder in world (WHO, 2008). It also contribute to the burden allocated to suicide and ischaemic heart disease (Ferrari et al., 2013). With the bidirectional relationship between obesity and depression (Preiss et al., 2013), this will increase the burden of the two conditions in terms of level of disability and healthcare utilization and expenditure (Migliore et al., 2013).

2.2 Obesity

Obesity is an abnormal accumulation of body fat 20% or more above an individual's ideal weight or is defined as the weight at least 20% above of the person's ideal weight based on the individuals height, gender and age (WHO, 2000). The body mass index (BMI) a function of weight and height is the most commonly used index, and is calculated as body weight in kilograms divided by height in meter squared (Keys et al., 1972). Overweight is defined as body mass index (BMI) of 25 to 29.9 kg/m^2 and obesity as a BMI of ≥30 kg/m^2 (National Heart, Lung, and Blood Institute, 1998; WHO, 2000). The relationship between BMI and morbidity and mortality is J-shaped (Berrington de Gonzalez et al., 2010; Whitlock et al., 2009). Even a low BMI is associated with increased mortality but overall there is a progressive increase in the risk of co-morbidities such as hypertension, dyslipidemia, type 2 diabetes, cardiovascular disease (CVD), gallstones, and cancers associated with an increase in BMI (Calle et al., 2003; Wormser et al., 2011). Population studies have clearly established the link between obesity defined by the BMI and comorbidities/ mortality risk, and several organizations use categories of BMI to define underweight, normal weight, overweight, and various classes of obesity and associated risk (Appendix 1).

The National Heart, Lung, and Blood Institute (NHLBI) categories of weight include: underweight (BMI of <18.5), normal weight (BMI of 18.5 to <25), overweight (BMI of 25 to <30), and obesity (BMI ≥30). Obesity is also further classified into grade 1 obesity as a BMI of 30 to less than 35; grade 2 obesity as BMI of 35 to less than 40; and grade 3 obesity with BMI pf 40 or greater.

Obesity is a complex multi-factorial chronic condition that results from interaction of the gene and the environment (NHLBI, 1998), with a significantly higher all-cause mortality compared to normal weight (Flegal et al., 2013).

2.3 Epidemiology of Obesity

Since 1980, the worldwide prevalence of obesity has double (WHO, 2015) with over 600 million being obese. About 39% of adults aged 18 years and above were overweight as at 2014 and 13% were obese (WHO, 2015). A large worldwide systematic review of surveys, reports and published studies numbering 1769 reported that the proportion of adults with overweight (defined as BMI $\geq$ 25 kg/m^2) increased between 1980 and 2013 from 28.8% to 36.9% in men, while in women from 29.8% to 38.0% (Ng et., 2013). A number of countries have their prevalence for adult population exceeding 50%; these include countries like Tonga, Kuwait, Libya, Qatar, Kiribati and Federated States of Micronesia (Ng et al., 2013). Overall from 2006, the increase in adult obesity in developed countries has slowed down, but in emerging markets and developing countries, there is a steady increase (Dobbs et al., 2014; Ng et al., 2013). In Africa and Middle East the rates are generally variable (Prentice, 2006).

In the United States of America (USA) data from the 2011 to 2012 National Health and Nutrition Examination Survey reported that 34.9% of adults aged 20 and above were obese, with significant increase in women aged 60 years and older but with no significant change from the 2003 to 2004 survey (Ogden et al., 2014). While in Canada a lower prevalence was reported at 18.3% even though there has been a steady increased from the 1985 prevalence of 6.1% (Twells et al., 2014) and the prevalence is expected to rise at a predicted rate of 4 to 5% (Sassi and Devaux, 2012). Report from the Organization for Economic Co-operation and Development

(OECD) states that the majority of individuals that are overweight and obese live in the OECD area; and across the countries 18% are obese (OECD, 2014). In England the prevalence of obesity has more than doubled in the last 25 years, and as at 2010 survey it was put at 26.1% (OECD, 2014). Australia also gives a similar picture, with 28% and 35% of the adult population being obese or overweight (Australian Bureau of Statistics, ABS, 2011-2012)

In Saudi Arabia, the prevalence of obesity is 28.7%, with higher prevalence amongst women (33.5% vs. 24.1%) and obesity was associated with physical inactivity, being married and having diabetes (Memish et al., 2013). The prevalence of obesity in Arab-speaking countries vary depending on the socio-economic measures in the state, ranging from 2% to 55% in females and 1% to 30% in males (Badran and Laher, 2011).

From South America, specifically Brazil as at 2010 about 57% of the adult male population was overweight or obese (Rtveladze et al., 2013) of which 18% are obese, which is higher than the OECD average of 15% (OECD, 2014). In China and other Far east countries, the burden of obesity is not as big as seen in Europe, Americas and Middle-East, but the problem is significant and growing (Sun et al., 2014).

2.3.1 Prevalence of Obesity in Africa and Nigeria

In Ghana, the prevalence of obesity was 13.6% (Amoah, 2003). A recent study from Ghana, reported prevalence of 27.8% for overweight and 37.1% for obesity (Benkeser et al., 2012). This prevalence is relatively high because of the only female sample of the study. Ghana's obesity shows increase trend over the years from 5.5% -13.6% in the early and mid-2000 (Amoah, 2003; Biritwum et al., 2005) to 34.8% -37.1% after mid-2000 (Benkeser et al., 2012; Duda et al., 2007). Countries in East Africa also reported similar prevalence (Turi et al., 2013). The 2011

Uganda Demographic and Health Survey showed that 19% of the population were overweight or obese (Turi et al., 2013), even though other studies reported lower level at 4.4% (Baalwa et al., 2010). Several works from South Africa report higher burden of obesity in the population (Malhotra et al., 2008; Kruger et al., 2005) with the country regarded as the "fattest sub-Saharan African nation" (Baleta and Mitchell, 2014). Nearly two third of adult women in South Africa were overweight or obese, 40% being obese while a third of adult men are overweight or obese (Baleta and Mitchell, 2014). Factors associated with this increase in obesity burden include nutritional transition in which diet with higher fat content are consumed more and lower physical activities; and a number of overweight black women may not perceive themselves as such because of the stigma associated with HIV/AIDS and thinness (Kruger et al., 2005).

A study of 300 healthy adults from the community in Katsina state reported a prevalence of 53.3 for overweight and 21% for obesity (Wahab et al., 2011). A similar prevalence of obesity was found South-Western part of Nigeria at 21.2% (Ojofeitimi et al., 2007). The prevalence in the developed countries is higher than those reported in Nigeria and other African countries. One possible explanation for the difference could be because Nigeria is going through both demographic and nutritional transition. Generally the McKinsey Global Institute report states that obesity prevalence appears to be correlated with a country's wealth (Dobbs et al., 2014), with higher prevalence correlated with increase income from rapid industrialization and urbanization.

In the North-eastern part of Nigeria the prevalence of overweight was 27.1% and obesity was 17.1%, with more obesity among females than males (Gezawa et al., 1013). Another study from central part of Nigeria, Abuja reported higher prevalence of both overweight and obesity at 38% and 26% respectively, making 64% of the participants to be either overweight or obese (Akarolo-

Anthony et al., 2014). Even though this study was conducted among both professional and non-professionals, those with more professional jobs or belonging to middle or higher socio-economic status were significantly more likely to have obesity. Another study in Abuja but a mixture of urban and rural sample reported a prevalence of 22.3% (Sola et al., 2012). The reason for the lower rate is likely that obesity is more in the urban areas compared to rural. This is in keeping to a number of Nigerian studies where the urban prevalence is higher than rural rates (Ekpenyong and Akpan, 2013; Sola et al., 2012). An exception is the work of Adienbo and colleagues (2012), among the Kalabaris in 4 communities in the Niger-Delta, that reported a high prevalence of obesity at 49.3% and those that are overweight at 22%. The high prevalence may be accounted by the 'high socio-economic activities and peculiar socio-cultural lifestyle among the indigenous residents of Kalabari communities' with majority working as traders, fishermen, civil servants/company workers with less physical activities (Adienbo et al., 2012). In Sokoto, the prevalence of obesity was 12% among staff of Usmanu Danfodiyo University Sokoto, though combined prevalence of overweight and obesity was 47% (Nkwoka et al., 2014). A study from Imo, South-East, with sample from primary care setting (family medicine clinic) reported prevalence of obesity at 20.4% (Onuoha et al., date not stated). Studies from other parts of the country revealed similar trends (Appendix 2). The increasing rates of obesity in Nigeria and other African countries has been attributed to the rapid urbanization, nutritional transition and reduced physical activities (Ekpenyong and Akpan, 2013; Oyeyemi et al., 2012).

A systematic review of Nigerian studies from 2001 to 2012 reported that the prevalence of overweight ranged from 20.3% to 35.1%, while prevalence of obesity was between 8.1% to 22.2% (Chukwuonye et al., 2013). Even though the study gave a review of research works in Nigeria on obesity only four studies were utilized because of failure to meet their inclusion

criteria. The WHO 2013 data reported that the prevalence of obesity in Nigeria was 10% (WHO, 2013). It may be difficult to quantify the increase in the prevalence of obesity over the years, since there has not been a systematic study of the subject over the years. An attempt by Abubakar and colleague (2008) with a meta-analysis of the prevalence and time trends in obesity (mainly in Nigeria and Ghana) reported that the prevalence of obesity was 10% and that over 15 years period the prevalence has more than doubled. Another multi-centre study comprising of five states in the country reported a prevalence of obesity at 17% (Okafor et al., 2014).

2.3.2 Correlates of Obesity

The increase in obesity around the world appears to be more in females (Badran and Laher, 2011; Baleta and Mitchell, 2014; Ono et al., 2005; Turi et al., 2013). Restricted lifestyle choices and reduce physical activities have been adduced as factors associated with more preponderance of obesity in female (Badran and Laher, 2011).

In the USA, non-Hispanic blacks have one of the highest prevalence of obesity at 47.8% compared to the country's 34.9% (Ogden et al., 2014). Obesity is also more among middle age individuals, aged 40 to 59 years, at 39.5% compared to those in the age range 20 to 39 years (Ogden et al., 2014). Also in keeping with what is seen in developed countries, especially among women, those with college degrees were less likely to be obese compared to less educated, and higher income women were also less at risk of developing obesity than low-income women (Ogden et al., 2014). But like the trend in developing countries, among non-Hispanic and Mexican-American men in USA, those with higher income were more likely to be obese than those with low income (Ogden et al., 2014). Other factors that influence the increase of obesity in developed countries include ethnicity, sex, age demographics, social class and rural versus

urban living (Twells et al., 2014). Data from the 2010 National Health Interview survey from USA which reported a prevalence of obesity at 27.7% showed that factors associated with obesity included working for greater than 40 hours per week, being employed in areas like health care and social assistance and public administration industries, and architecture and engineering (Luckhaupt et al., 2014). The main factors were poor diet and low level of exercise.

In Australia like in a number of developed countries the relationship between increased weight and sex is complex and may not be linear (Mannan et al., 2013), with proportion of men and women that are obese being similar while in others the rate of weight gain by women may be slightly higher than in men (ABS, 2013). Women generally tend to eat slightly healthier diets and drink alcohol, but they exercise less (ABS, 2011). Other factors include genetics (Lovejoy et al., 2008) and the impact of pregnancy and childbirth (WHO, 2008).

Factors associated with obesity in African setting include the female gender (Akarolo-Anthony et al., 2014; Biritwum et al., 2005; Malhotra et al., 2008; Morge et al., 2014), individuals engaged in less physical activities (Morge et al., 2014), increasing age (Amoah, 2003), being married, residence of urban area compared to rural (Amoah, 2003; Biritwum et al., 2005; Turi et al., 2013) and those with higher education (Turi et al., 2013).

In the study by Igezie et al. (2013), the overall prevalence of obesity was 12.2%, 10% and 20% for those in low, middle and upper income groups. Education also affects the prevalence of obesity, with those with higher education likely to be more obese: 6.3% for no formal education, 14.9% for primary, 10.5% for secondary and 17.7% for tertiary education (Igezie et al., 2013). This risk factor was more significant in women. A possible explanation could be that women that are less educated are more likely to perform higher levels of manual jobs compared to more

educated women (Puoane et al., 2002). This is also the case in the study from Nigeria among University staff, with the academic staff having more obesity compared to the less educated non-academic staff (Nkwoka et al., 2014). The relationship between education and obesity is affected by gender and economic development of the country, with an inverse relationship in developed countries while for developing and emerging markets, there is a positive association which is more significant in women (Cohen et al., 2013). But a 2012 study from Nigeria reported that obesity was more prevalent in women with less education (Sola et al., 2012).

Most studies in Africa report significantly higher rates of obesity in females compared to males (Monteriro et al., 2004; Onyechi et al., 2008; Wahab et al., 2011). A recent study in Nigeria of both professionals and skilled labour workers in a construction site showed that overall women were nearly three times obese compared to men (42% vs. 15%), though men were more overweight than women ((42% vs. 32%) (Akarolo-Anthony et al., 2014). Another study from Abuja, with both the urban and rural population as the sample, reported that women significantly had more obesity than men (36.2% versus 8.0%, $\chi 2 = 26.37$, $p<0.001$) (Sola et al., 2012). The study from Sokoto, of university staff, reported contrary finding, with more men having obesity than women (8.8% vs. 3.3%) (Nkwoka et al., 2014). This could be explained by the fact that the sample consisted of mainly males (92%) and this may have skewed the findings towards the male sample. But most studies from Nigeria show preponderance of obesity towards female (Appendix 3) and a meta-analysis of studies from West Africa reported that the odd of being obese was 3.2 times among urban women compared to men (Abubakar et al., 2008). This gender difference of obesity being more in females than males in developing countries, is however the reverse in developed countries (Butland et al., 2007; Howe et al., 2010). It has been suggested that even though women eat healthier foods, they consume more sugar-containing foods than

men (Kanter and Cabellero, 2012). The burden of obesity has tripled in urban African women (Godwin, 2006), with rural women having lower BMI score than urban women, and the latter reported ingestion of less fat, had lower household incomes and higher physical activities (Kruger et al., 2002). other factors include that in middle-aged women during menopause, the protective effect of oestrogen is lost and thereby predisposing to weight gain and decrease in basal metabolism (Handgraaf et al., 2013). And generally compared to men, women have low levels of physical activity (Amole et al., 2011; Puoane et al., 2002) and have more prevalence of depression which is associated with obesity (Blaine, 2008; Lupino et al., 2010).

In a number of African countries and Nigeria, individuals in the higher socio-economic range are more obese than those in the lower social groups (Adienbo et al., 2012; Akarolo-Anthony et al., 2014; Nkwoka et al., 2014). This is contrary to the inverse relationship seen with socio-economic status (SES) and obesity in developed countries (Cohen et al., 2013). Even in developing countries Mbada and colleagues argued that in Nigeria individuals with lower SES have higher mean BMI: obesity of 12.9%, 5.65% and 4.86% for those in lower, middle and higher socio-economic strata respectively (Mbada et al., 2009).

Low levels of physical activity is a major predictor of obesity in Africa and Nigeria (Amole et al., 2011; Oyeyemi and Adeyemi, 2013; Puoane et al., 2002). In a recent study of the relationship of physical activity and cardiovascular risk factors, individuals especially women that are less physically active are more likely to be obese (Oyeyemi and Adeyemi, 2013). Using the International Physical Activity Questionnaire (IPAQ), the authors reported that those thatbare highly active and moderately active have BMI between 23.7 to 25.7 while those that are moderately to highly sedentary have mean BMI of between 26.1 to 30.6.

2.4 Aetiology and Mechanism of Obesity

Body weight is the function of the interaction of all components of energy balance including energy intake and expenditure (Rosenbaum et al., 2008). The body maintains energy balance and body weight through various negative feedback mechanisms involving hormones that function to increase hunger (ghrelin), inhibit food intake for short duration (amylin, cholecyctokinin, oxyntomodulin) or in the long term (leptin, insulin), and increase metabolic rate and energy expenditure through triiodothyronine (Cummings and Overduin, 2007; Sumithran et al., 2011). Excess calories are stored in fat cells called adipocytes, leading to greater cell size (hypertrophy) and/or increased numbers of adipocytes (hyperplasia) (de Ferranti and Mozaffarian, 2008). Apart from their function in energy storage and thermal regulation, the adipose tissue secretes several major hormones (listed above) and signaling factors that include adipokines, inflammatory cells, and free fatty acids (Bastard, et al., 2006; Kriketos, et al., 2004; Krug & Ehrhart-Bornstein, 2005). Food consumption is regulated by the brain's ability modulate appetite through the brain-gut axis that is sensitive to increase in adiposity (Cummings and Overduin, 2007). Several neuropeptides (adipokines) like leptin function to regulate appetite and energy intake (Markward et al., 2009). Higher levels of several of these circulating adipokines and inflammatory mediators (like interleukin-6, tumour necrosis factor- alpha) are related to adverse health outcomes, including type 2 diabetes, obesity, metabolic syndrome and atherosclerosis (Bastard et al., 2006; de Ferranti and Mozaffarian, 2008) and depression (Luppino et al., 2010).

Other biological factors include altered levels and secretion of growth hormone (Makimura et al., 2008), chronic activation of the endocannabinoid system (Di Marzo, 2008; Scheen, 2009), and

hypothalamo-pituitary-adrenal axis dysregulation like Cushing's syndrome (Peeke and Chrousos, 1995).

2.5 Theories and Models of Health Service Utilization

To facilitate the review on the utilization of healthcare services for individuals with obesity and depression, a review of the theories and models of healthcare utilization will be done. Health-care utilization is the outcome related to the interaction among the patients, health professionals and the healthcare systems (Babitsch et al., 2012). It includes the utilization of hospital resources, personal care home (PCH) resources and physician resources. Health-care utilization stands at the end of a help-seeking organised process of varying length (help-seeking behaviour) and types of services which is generally influenced by several factors, and these determinants or predictors can be explained using several frameworks or models (Ricketts and Goldsmith, 2005).

Healthcare utilization is the actual use of health services known as realized access (Andersen, 1995) as oppose to access to healthcare, which describes the extent to which individuals have the potential ability to approach and receive medical services (RAND, 2010). Numerous theories and models have been developed to fully understand and identify predictors of healthcare utilization (Ricketts and Goldsmith, 2005). Briefly, these theories and models described are Parsons' sick role (Parsons, 1951), Mechanic's general theory of help seeking (Mechanic, 1978), Suchman's stages of illness and medical care (Suchman, 1965), Rosenstock's health belief model (Rosenstock et al., 1994), Andersen's health behaviour mode (Andersen, 1968) and Young's choice-making model (Young and Young-Garro, 1982). Others include models from Donabedian (1972), attachment theory (Ciechanowski et al., 2002), concept of fit between clients and the

system (Penchansky and Thomas, 1981), Network-episode model (Pescosolido, 1991; 2011), and Access Monitoring Project (Millman, 1993).

Parson's *Sick Role* (1951) is one the oldest theories of healthcare utilization. For this theory, when an individual is sick, he/she adopts a role of being ill, i.e. the sick role. The sick role has four main parts: the individual is not made responsible for their illness and is not expected to recover without help; there is recognition that being sick is undesirable state; the individual is excused from performing normal roles and tasks; and the individual is expected to seek for medical help and comply with medical treatment. Though groundbreaking, the theory of sick role does not account for variability in illness behaviour in terms of assumption that the individual voluntarily accepts the sick role, not considering the 'lay referral system', and that sometimes individuals are held responsible for their illness and the theory does not fit chronic and permanent illness. Other criticism include the fact that the doctor-patient relationship influences the direction of action by the sick individual in the sick role (Roden, 2004); and other variables like demographic and personality characteristics influences the individuals acceptance of being sick and the diagnosis which will help in recovery from the illness (Champion and Skinner, 2008).

The *General Theory of Help Seeking* by Mechanic (1978) proposes a psychological approach to health care utilization. It sees healthcare utilization as an adaptive form of coping (Mechanic, 1982) or the behaviour involved in actively seeking help from other people (Rickwood et al., 2005). The theory has ten components or decision points that determine illness behaviour. These include: the salience of deviant signs and symptoms; the individual's perception of symptoms severity; the disruption of the daily life of the individual as caused by the illness; the frequency and persistence of the symptoms; tolerance of the symptoms by the individual; knowledge and

cultural perception of the illness by the individual; denial of the illness from issues associated with basic human needs; whether or not the response of the individual to the illness disrupts his/her needs; presence of alternative interpretations of symptom expression; and availability of treatment through location, costs, psychological (in terms of stigma, humility etc), and treatment resources. This model also allows for illness response to be influenced by a another person who makes decisions for the individual and is useful in predicting decisions made by individuals about seeking for help or not but does not explain the later stages of health behaviour (Wolinsky. 1988).

In *Suchman's Stages of Illness and Medical Care* (Suchman, 1965) there are five stages of the individual's decision process that helps to determine the utilization of healthcare services (Appendix 5). This models helps in monitoring of all stages of illness. These include: the symptoms experience by the individual in the form of awareness of physical changes (e.g. pain) assessment of change related to severity of illness and the form of emotional reaction that is associated with the assessment. In this stage, the individual reacts by either denial or acceptance of the symptoms and then entering into next stage. The second stage involves the individuals assumption of the sick role. During this second stage, the individuals decides on adaptation to the sick role, and illness then becomes a social phenomenon with exploration of the lay referral system[1] for validation and seeking for treatment options. The medical care contact is the third stage, during which the individual seeks to utilize professional healthcare system but is dependent on the person's social networks[2]. Depending on the social network, it will either delay

[1] **Lay referral** describes a system of non-professional persons, like family members or friends, who help an individual that is ill to interpret their symptoms and identify treatment options (Cockerham, 1982).

[2] The Network can be Parochial or cosmopolitan. **Parochial networks** are those defined within a close and traditional relationship who are reluctant to incorporate new information and are likely to utilize lay referral system (Wolinsky, 1988). **Cosmopolitan networks** are social relationships that are said to be individual in nature, open to new information, and are likely to utilize a scientific approach to medical care (Wolinsky, 1988).

medical contact or reduced the time. Confirmation of illness by the physician leads to the next stage of dependent-patient role, or if physician denies confirmation of request for sick role, the individual may accept or refuse (leading to 'shopping' phenomenon). In the dependent-patient role, the ill individual, now a patient, makes decision on illness treatment: either patient resistance to treatment regimen (or non-compliant patient), dependent patient who strives insufficiently for recovery or patient and physician working harmoniously on recovery. The fifth stage is the recovery and rehabilitation stage. The individual recovers after leaving the role of patient and accepts normal activities. This stage could also be gradual (recovery), or the recovery process may be take long as in chronic patients and malingerers.

The Rosenstok's *Health Belief Model* (Rosenstock et al., 1994) assess health behaviour of persons through the avenue of perception and attitudes toward disease and negative outcomes of certain actions. the variables in the health belief model include: the individual's perceived susceptibility to disease and its severity; and therefore makes an individual to recognize that there may be enough reason to make health concern relevant towards seeking for treatment or preventive services. The next variable is the individual's rational perception of the benefit versus costs. Therefore, the will not take action unless he realize that behaviour change can be of benefit to him/her and the benefit of the change outweighs any costs of doing so (i.e. the perceived benefits and barriers). Lastly the individuals cue to action, largely from the media, friends, family, well known citizen or celebrities. The absence of cues to action may reduce the possibility of prevention or treatment. One drawback for this model is that networks are generally in a continuum and hardly dichotomous (i.e. parochial vs. cosmopolitan), and individuals are likely to consider both, though some may choose one more than the other.

The *Choice-making Model* proposed by Young (1981) is based on ethnographic studies of healthcare utilization in Mexico. The model has four components in helping an individual's healthcare choice. These include: perception of gravity of the illness. This involves both the individual's perception and their social network's consideration of illness severity. and assumes that the person's culture grades illnesses by the level of severity. The second component is the knowledge of a home treatment. In this stage, if an individual is knowledgeable about a home remedy that is effective, they are most likely to use it before utilizing a professional healthcare system. The lay referral system affect the use of home remedy. The faith in remedy is the third component. This involves the individual's belief of the efficacy of treatment for the illness, so that he/she may not utilize the remedy if they do not believe the treatment is effective. Lastly, accessibility of treatment. The cost of healthcare services and its availability are evaluated in this stage. Access to healthcare services may be the most component in this model (Wolinsky, 1988). This model does not adequately explain the effect of the individual's past experience of illness since prior experience of illness may influence perception of severity and not only the network's perception of severity (Wolinsky, 1988).

Apart from Young and Andersen model (discussed in the next section), the models discussed do not adequately look into the type of healthcare service used, thus leaving alternative medicine. And it has been shown that even in developed countries the healthcare utilization through alternative routes surpasses the conventional methods (Esinberg et al., 1993).

The *Network-episode Model* (NEM) is a recent model proposed by the sociologist Bernice Pescosolido (1991; 2011). The NEM incorporates the influence of the community networks, like size, density, proximity, associations and relationships, and interactions, on the process of decision making when obtaining health care (Pescosolido, 2011). The model (Appendix6)

postulates that health care decisions are made within the context of interpersonal interactions within an individual's social network, and that such interactions involve the interplay between social network structure (configuration of network ties in the form of gender, marital status, income) and content (beliefs and attitudes of network members). The model has been used to study utilization of health services by persons with mental illness (Vera et al., 1998) and women's health (Edmonds et al., 2012).

2.6 Theoretical Framework for Analysis of Healthcare Utilization: The Andersen Behavioural Model of Health Service Use

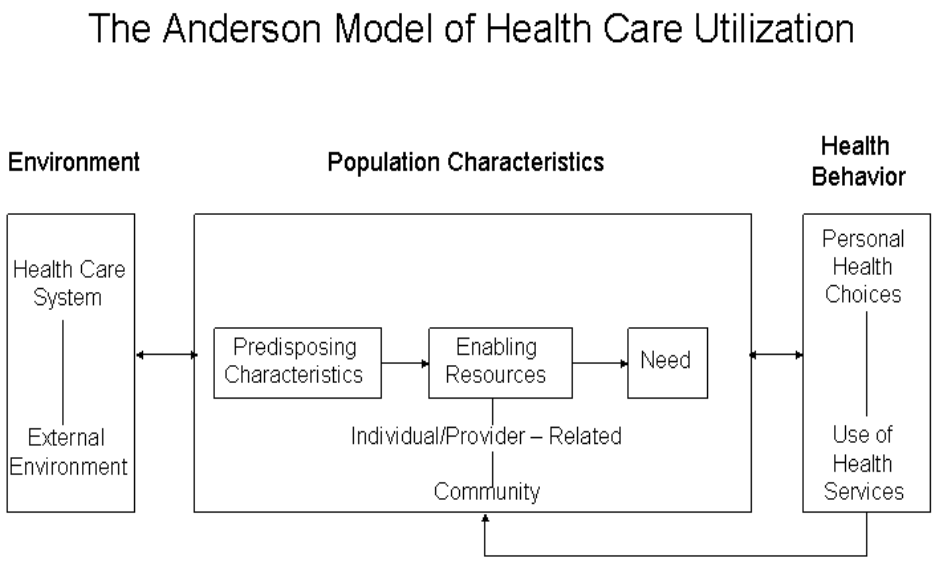
One of the most frequently used tool for identifying factors associated with healthcare utilization is the Andersen Behavioural Model of Health Service Use (Andersen, 1995). The model developed in the 1960s, has since been modified several times over the years (Andersen, 1995; Andersen, 2008; Andersen and Aday, 1978; Andersen and Newman, 1973; Derose et al., 2009; Linden et al., 1997). The model takes into consideration the order in which healthcare utilization is made available within an integrated framework (Heider et al., 2014). This model sees the utilization of healthcare services as the dependable variable or health outcome. This variable measures the type of services the individual is seeking, site at which the service was given, purpose of the consultation, and time interval since the last visit (Andersen, 1995).

The Andersen model (Figure 2.1) consider the individual's ability to access and utilize to be a function of three categories of determinants: the predisposing characteristics, enabling factors and need based characteristics. The three factors act together to influence the person's decision to seek for health care, the choices of the type of services to be accessed, and the costs of serviced to be used.

The predisposing or individual factors are the socio-cultural characteristics of the particular individual that existed prior to their illness. These include social structure in the form of educational attainment, family size, occupation, ethnicity, religion; social networks, marital status, residential mobility, social interactions and culture (Andersen and Newman, 1973); health beliefs of the person in areas of attitudes, values, and knowledge that people have concerning and also towards the healthcare system as a whole; and the demographic of the individual (age and gender). Therefore. an individual, according to this model, who believes healthcare services are useful for treatment will likely use those services; and demographics like age and gender could serve as risk factors for some types of healthcare utilization behaviour (Andersen, 1995).

The enabling factors are the logistics involved in obtaining healthcare services (Andersen, 1995). This category includes both the family and community resources. the family or personal resources are means and know how in the process of access to health services, income, health insurance, travel, extent and quality of social relationships and regular source of care. While the community resources include the availability of healthcare personnel and facilities, and waiting time needed to access care. Genetic factors and psychological characteristics has also been added to the enabling factors.

Figure 2.1



RM Anderson. Revisiting the behavioral model and access to medical care: does it matter? J Health Social Behavior 1995;36:1-10.

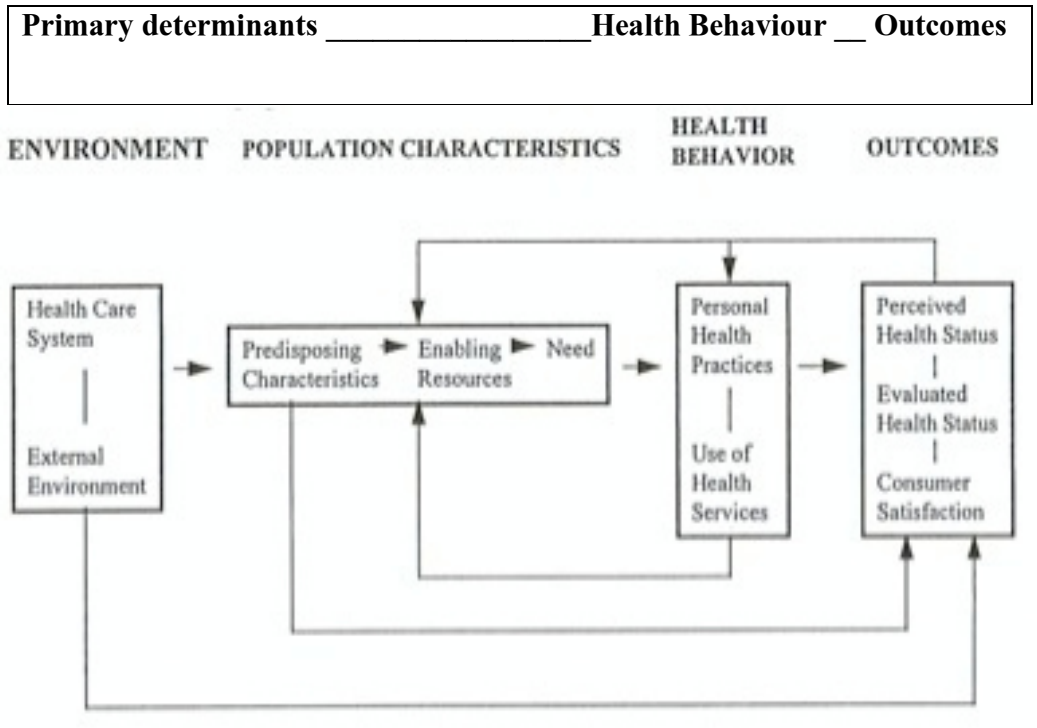
The need based characteristics include the perception of the need for healthcare services which can be individual in nature, social or clinically based (Wolinsky, 1988). "Perceived need will better help to understand care-seeking and adherence to a medical regimen, while evaluated need will be more closely related to the kind and amount of treatment that will be provided after a patient has presented to a medical care provider" (Andersen, 1995). Perceived need is "how people view their own general health and functional state, as well as how they experience symptoms of illness, pain, and worries about their health and whether or not they judge their problems to be of sufficient importance and magnitude to seek professional help." (Andersen, 1995), evaluated need "represents professional judgment about people's health status and their need for medical care" (Andersen, 1995).

The Andersen model was later expanded to include the health care system (Figure 2.2) which includes health policy, resources and organization (Andersen and Aday, 1973). The resources are

the volume and distribution of both labour and capital, including education of health care personnel and availability of equipment. Organization describes how a health care system manages its resources, which will eventually affect access to and the overall structure of health services. Closely linked to the health care system is the external environment which include political, physical and economic determinants of healthcare utilization (Andersen, 1995). In this category, environmental (external environment and health care system), other studies have included the number of specialist physicians, general practitioners, health centres, and number of hospital beds (Berdahl et al., 2007).

In later version of the model (Figure 2.3), the health outcome variable added consumer satisfaction or the "explicit outcome of health services utilization" (Andersen, 2008). Based on several revisions an Andersen's Phase-3 Model of Health Services Utilization has been proposed (Figure 2.3). The three component have linear relationship and include: primary determinants, health behaviours, and health outcomes. Primary determinants are the direct cause of health behaviours and they include characteristics of the population (i.e., demographics), the health care system (i.e., resources and organization), and the external environment (i.e., political, physical, and economic influences of utilization). In addition, Andersen's model explains that health behaviours determine health outcomes. Health behaviours include personal health practices (i.e., lifestyle factors like smoking, drinking alcohol, diet and exercise) and the use of health services. Finally, the model indicates that health behaviours are the direct cause of health outcomes. Health outcomes include perceived health status, evaluated health status, and consumer satisfaction (Andersen, 1995).

Figure 2.2 Andersen Phase-3 Model of Health Services Utilization



An advantage of the Andersen's model (together with Young's choice making model) is that model takes into consideration the type of health care used with the alternative medicine being inclusive. It is a multilevel model that takes care of both the individual and contextual predictors of health services utilization (Babitsch et al., 2012).

A review of the use of Andersen model show that the most frequently researched predisposing characteristics were age, marital status, gender, education, occupation and employment status and ethnicity (Babitch et al., 2012). The enabling factors include income, health insurance, having a steady source of care or family doctor, and availability of medical services/inpatient and outpatient care facilities. While need factors include health status (mental and/or physical), self-reported or perceived health and co-morbid conditions like hypertension, diabetes heart disease,

depression, and aggregate number of prior medical/chronic conditions, and daily activities/ limitation or disability in daily activities.

The Andersen model has been used to study a number of conditions, health care settings and population including chronically ill individuals (de Boer et al., 1997), psychiatric conditions (Dhingra et al., 2010), immigrants (Chen et al., 2008), emergency department (McCusker et al., 2003); obesity and osteoarthritis (Rosemann et al., 2008), obesity (Bertakis and Azari, 2005), obesity and lifestyle factors like alcohol abuse and smoking (Bertakis and Azari, 2006).

It has been noted that Andersen's model did not include genetic and psychological components, with underestimation of the relationships between the different variables, and did not take into consideration broader social contexts like community networks in which individuals may decide to seek for medical help (Pescosolido, 1992; Wolinsky, 1978). But the model has its strength in that it is useful in conventional survey and quantitative analysis due to its easily understandable divisions and variables that can be put into use. Also compared to other models, the Andersen model put emphasis on the care delivery system, i.e. it takes into cognizance not only individual need but also national health policy and institutional organization of healthcare are very important determinants of health resource utilization. And as Andersen (1995) said the measures of healthcare utilization do "inform national health policy, global measures provide needed comprehensive indicators of the overall effect of policy change". This model will be used since it takes into consideration most of the determinant of health-care service utilization and is the most widely used model for studying health-care utilization (Babitsch et al., 2012).

2.7 Importance of Understanding Healthcare Utilization

The increase in the use of health care services worldwide is challenging as a number of people tend to use multiple health care services (Eisenberg et al., 1993). Understanding why people utilize services and the predisposition of a conditions to causing the utilization of several health care services will help in increasing health care utility and efficacy. It is in this regard that the determinants of healthcare utilization in obese individuals with or without depression is being studied since previous studies have reported increase utilization of health services and costs in this population (Bertakis and Azari, 2005; Migliore et al., 2013; Tran et al., 2013; Twells et al., 2010).

It has been shown that management of obesity reduced health care utilization in a cost effective way (Craig and Tseng, 2002; Morgan et al., 2014; Karim et al., 2013). The retrospective study of Karim et al. (2013) had shown that after bariatric surgery for obese individuals, the outpatient clinic visits were reduced 13.8%, the number of hospital admission per year were reduced by 40.2%, the total length of stay in hospital was reduced by 52% and regular medication reduced by 26%. This reduction in health services utilization was from patients weight reduction and improvement in other metabolic disorders. Hospitalization rates for all-cause obesity-related co-morbidity usually reduces after weight reduction in obese individuals (Morgan et al., 2014). For individuals with severe obesity with BMI $\geq$ 40 kg/m^2, the reductions seen in median survival are similar to those found for smoking (Hammond and Levine, 2010; McGee, 2005).

2.8 Obesity and Increase Utilization of Health Care Services

The burden of obesity is high on the health-care system (Compsten et al., 2014; Del Re et al., 2013; Withdrow and Alter, 2011). This can be illustrated by a very large study (Million Women

Study) in the UK in which around 1 in 8 hospital admissions was attributable to overweight or obesity, which translate to around 420, 000 extra hospital admission, and 2 million extra days spent in hospital annually (Reeves et al., 2014). Withdrow and Alter (2011) estimated that obesity accounts for between 0.7% to 2.8% of the world's countries total health expenditure. In a number of countries, studies suggest that the growth in health care expenditure that is attributable to obesity, may surpass cigarette smoking and become a leading public health problem (Stewart et al., 2009). This was confirmed in the 2014 McKinsey Global Institute report (Dobbs et al., 2014). Obesity is responsible for about 55 of all global deaths and the economic impact resulting from obesity is nearly $2.0 trillion, or 2.8% of the global GDP and roughly equivalent to the global impact associated with smoking or armed violence, war and terror-related events (Dobbs et al., 2014).

In the developed countries, the impact of obesity is between 2% to 7% of all health-care spending; and may be as high as 20% if cost of treating obesity-related diseases or co-morbidities (Dobbs et al., 2014). In emerging markets, the economic toll of obesity varies. In Mexico obesity has a large social impact at 2.55 of GDP, Morocco at 2.8%, South Africa at 3.0% and Brazil at 2.4%. Other emerging markets like Nigeria have low burden of about 0.7% but it is increasing and ranks as the 13th-largest economic burden (Dobbs et al., 2014).

It is estimated that the number of DALYs lost to obesity 71% are from premature death and 29% to disability (Dobbs et al., 2014). The 29% disability burden is derived from health care costs and lost employee productivity (Finkelstein et al., 2010). The pattern of this burden even though more in developed countries, the gap is narrowing with emerging markets; e.g. in South Africa the DALYs lost to obesity was 1,577 in 1990 and 2,659 in 2010, thus an increase of 69%. (Dobbs et al., 2014).

In obese women with fracture, the median length of stay was higher than for non-obese, with also physical functioning and health-related quality of life (HRQoL) being worse in obese than in non-obese ((Compsten et al., 2014). Even though the study found increase utilization of services as a whole, the authors reported that the use of medication (for osteoporosis) was significantly lower in obese than in non-obese (Compsten et al., 2014).

In an Australian study severely obese individuals the subjects has significantly more health services annually compared to the general population which translated to two-fold higher annual costs (Keating et al., 2012). The excess cost were derived from consultations with general practitioners, psychiatrist and other specialist and investigations. The severely obese were also given more prescribed medications annually, with the excess costs related to diabetes drugs, psychotropics, lipid-modifying agents, immunosuppressants and obstructive airway disease drugs (Keating et al., 2012). Even expensive weight reduction method like bariatric surgery can within a short period, 2 to 4 years, offset the cost (Crémieux et al., 2008).

In a study examining the barriers and facilitators to weight programme for USA veterans, high service utilization of the programme were in those individuals with higher BMI, female, unmarried, younger, from minority group, and those with psychiatric or obesity-related co-morbidity (Del Re et al., 2013).

2.8.1 Socio-demographic Determinants of Health Care Utilization in Obesity

2.8.1.1 Age

In an observational study of 19, 142 women and 18,335 men in Denmark, the increase in healthcare utilization was more significant for individuals aged 45-64 years, but weaker for those aged 20-44 and 65 years and above (Wildenschild et al., 2011). In another study, the age groups

30-39 and 40-49 years had higher hospitalization rates and those above 70 years have less (Migliore et al., 2013). A similar trend was reported from the Canadian Community Health Survey, where obese individuals in the age range of 40 to 59 years had higher cost (Tarride et al., 2012)

2.8.1.2 Gender

A study that used data from Denmark's National Institute of Public health spanning 1987 to 2005, reported that increase in healthcare utilization was more in men compared to women (Wildenschild et al., 2011). Probable reason for higher healthcare utilization among male obese individuals could be the increasing awareness of healthy living that promotes health and therefore increasing the use of healthcare services. Cost of hospitalization was also higher in males in the study by Migliore and colleagues (2013). In this study, the major difference between sexes was in the age group 30-39 years. This is contrary to a Canadian Community Health Survey which reported no difference between the total costs of obese and normal weight men but the difference was statistically significant in women (Tarride et al. 2012). This study explained that women had significantly higher physician visits, day procedure and costs of hospitalization than men; and also women had higher risk of being admitted or undergoing a day procedure than men. A cross-sectional study of 3030 elderly in Spain reported that as compared to men, women had higher percentage of visit to medical practitioner, received home medical visits, hospitalization and took more medications (Redondo-Sendino et al., 2006). The study showed the factor that explained gender differences in healthcare utilization was the number of chronic diseases and health-related quality of life (Redondo-Sendino et al., 2006).

2.8.1.3 Education

In terms of education, obese individuals, especially in developed countries, are less likely to have tertiary education compared to normal weight individuals (Tarride et al., 2012).

2.8.1.4 Socio-economic Factors

Overweight and obese individuals have higher personal and household incomes when compared to those with normal weight (Tarride et al., 2012).

2.8.2 Effects of Co-morbidities on Healthcare Utilization among Patients with Obesity

The presence of co-morbidities significantly increases annual costs of hospitalization (Migliore et al., 2013). Obesity-related co-morbidities increases the rate of utilization of healthcare services in obese individual with psychiatric disorders (Del Re et al., 2013).

For hospitalization cost, co-morbid conditions respiratory diseases, hypertensive diseases, malignant neoplasm and connective tissue disorders were said to be predictive to higher annual costs (Migliore et al., 2013). This study also showed that cardiovascular diseases were relevant cost determinant only for males, with 24% increase in annual costs of hospitalization, but costs increased by 16% with presence of mental disorder in females only. A prospective U.S. study of quality of life, depression and health resource utilization among patients with diabetes, hypertension and obesity showed that individuals with diabetes, hypertension and obesity had significantly more health resource utilization in terms of physician visits and emergency room visits than individuals with only diabetes alone (Green et al., 2012); and these individuals also had more symptoms of depression. The authors conclusion for the study was that there are a group of patients with co-morbidities (diabetes, hypertension and obesity) whose frequent healthcare visits to physician and lower quality of life and depression should provide the

physician an opportunity for disease management that will eventually lead to better health outcome (Green et al., 2012). Another study in the U.S. analyzed the Medicare claims data of individuals with diabetes and/or heart failure and found that those with depression had higher total healthcare costs than those without depression as $20,046 vs. $11,956 (Unutzer et al., 2009). To illustrate the effect of comorbid condition on health resource utilization, the study of Nichols and colleagues (2007) reported that individuals with diabetes with versus without depression were given more prescriptions and had more ambulatory care visits in an unadjusted analysis but on adjusted analysis, depression was not associated with increased healthcare utilization or costs. It was noted that increased number of comorbid conditions were associated with healthcare utilization and increased expenditure for prescription and ambulatory services (Nichols et al., 2007). This was also the case in a study among individuals with connective tissue disease and depression, where depression was not associated with increase healthcare utilization in terms of rates of treatment of mental health condition and frequency of primary care physician visits (Knight et al., 2014).

In the study by Migliore and colleagues (2013), diabetes was not a significant determinant of hospitalization cost. In this line, a novel study from Denmark that examine whether the associations changed over time, the association of obesity and increase healthcare utilization was independent of co-morbid conditions like hypertension, diabetes and back problems; i.e. the co-morbid condition did not fully predict utilization of health services in obese individuals (Wildenschild et al., 2011). Other studies have also reported that the association between obesity and increase healthcare utilization can only be partly attributed to obesity- related co-morbidities like diabetes, arthritis, hypertension and CVDs (Peytremann-Bridevaux and Santos-Eggimann, 2007).

Individuals with both obesity and diabetes are 5 to 8 times more likely to utilize outpatient care (Ahn et al., 2012). Also patients with diabetes that are obese do utilize more outpatient hospital visits, have more prescription medication fills and have higher health care costs than non-obese patients with diabetes (Chuang et al., 2013).

Patients with medical conditions like diabetics, hypertension, cystic fibrosis in the presence of depression have increased healthcare utilization and healthcare cost (Lee et al., 2014; Snell et al., 2014). It has also been reported from a Korean study that the odds of using healthcare services were greater among older people with both depressive symptoms and chronic medical illness than depressive symptoms alone (Kim et al., 2011). Depression and a Charlson-Deyo score ≥3 (presence of comorbid physical conditions) is associated with high healthcare utilization (Clark et al., 2013).

On the contrary, a study of health care utilization among Family Medicine patients in Boston, U.S., reported that chronic medical conditions even though were associated with depression but they (chronic medical conditions) were not associated with higher healthcare utilization (Fogarty et al., 2008). Also, a Canadian study found that obesity as an isolated risk is not associated with significantly higher healthcare costs as compared with individuals with normal weights; i.e. Canadian $ 8294.67 vs. $ 7323.59; $p = 0.27$ (Alter et al., 2012). In regards to individuals with chronic illness and depression there is significantly greater healthcare utilization, increase functional disability and work absence compared to the presence of chronic physical illness without depression (Bourgeois et al., 2005).

Some studies have reported that even in chronic conditions like cystic fibrosis depression is associated with BMI, and that depression is significantly associated with greater healthcare

utilization and healthcare costs (Snell et al., 2014). In this study individuals with depression were hospitalized three times the rate of non-depressed patients, and healthcare costs were more than four times higher. Other studies have also showed that compared to non-depressed patients, health resource utilization increased in individuals with depression with increasing number of co-morbidities (Bock et al., 2014; Lacruz et al., 2011). The study of Himelhoch and colleagues (2004) showed that for an elder patient with at least 1 chronic medical condition, the presence of a depressive disorder increased the odds of emergency medical use. They concluded that improvement in the clinical management, access to mental health services and coordination of medical and mental health services could reduce utilization of healthcare services.

Bock et al. (2014) tried to explain that depression in the presence of co-morbidity may not be the cause of increased health care utilization and costs. The authors explained that individuals with physical conditions utilize care, especially those provided by family members, which may create a family role imbalance and possible guilt may manifest as depression. Thus, depression may not be the condition that lead to higher health resource utilization but the high use of informal care causing depression.

Notwithstanding the above study, in the investigation of comorbid physical conditions and depression, factors that have been found to be associated with increased utilization of services and expenditure include age, sex, education, race/ethnicity, income, having a usual source of care, insurance, increasing number of co-morbidities, and physical and mental health status of the individuals (Nichols et al., 2007).

2.9 Cost of Obesity

There is a positive association between excess weight and health care expenditure (Cawley and Meyerhoefer, 2012; Finkelstein et al., 2009; Tsai et al., 2011; Withrow and Alter, 2010). Withrow and Alter (2010) reviewed studies on the direct costs of obesity worldwide and reported that obese individuals with BMI greater than 30kg/m^2 have around 30% higher medical costs than those without obesity. Another review of direct medical costs of overweight and obesity in the USA reported that the incremental per capita cost for overweight was 9.9% greater, and for those with obesity it was 42.7% greater than the cost for individuals with normal weight (Tsai et al., 2011). The review asserted that the relationship between overweight and costs was slightly j-shaped in a number of studies, i.e. overweight was not associated with higher costs, when compared with normal weight (Cawley and Meyerhoefer, 2012; Müller-Riemenschneider et al., 2008; Thompson and Wolf, 2002; Tsai et al., 2011), the majority of the studies found increasing costs over the whole excess-weight range (Arterburn et al., 2005; Thompson and Wolf, 2002; Tsai et al., 2011; von Lengerke and Krauth, 2011). The severity of obesity also influence the cost of the condition, with the largest increases in cost from BMI ≥ 35kg/m^2 (Arterburn et al., 2005; Lim et al., 2012). In a study of adults in US that examined the effect of obesity on health expenditure the authors reported that when compared to individuals with normal weight, expenditure were 10% greater for overweight, and 23%, 45%, and 81% greater for persons with class I, II, III obesity respectively (Arterburn et al., 2005). It is estimated that health care cost for severe obesity as 65 to 113% higher compared with individuals normal weight (Keating et al., 2012).

CHAPTER THREE

METHODOLOGY

3.1 LOCATION OF STUDY

This study was conducted at the General Outpatient Department of Aminu Kano Teaching Hospital (AKTH). The teaching hospital was established in the year 1988 from the then Aminu Kano Cottage Hospital (AKTH; www.akth.info). The hospital is a 500-bed tertiary teaching hospital that was established to serve the needs of Kano State, North-West region and other neighboring states (AKTH; www.akth.info). AKTH is located in Tarauni local government area in Kano metropolis. The hospital provides specialist, general medical, and community services to patients.

The general outpatient department of department (GOPD) of Family Medicine is located at a very accessible part of the hospital near the Hospital Road gate. It has 15 consulting rooms, offices hosting the head of department, records, pharmacy, billing office and 4 waiting areas. It opens between the hours of 8:00am to 9:00pm from Mondays to Fridays and 8:00am to 2:00pm on Saturdays and Sundays. The general outpatient attends to nearly 340 new and 1320 follow-up cases of adult patients every week (AKTH Annual Report, 2012). That is an average of 190 patients per day with 130 being seen in the morning session. The department is the first point of contact for non-emergency cases within the hospital (AKTH Annual Report, 2012). Pattern of health care utilization is high especially among individuals assessing the National Health Insurance Scheme in the Family medicine clinic of AKTH (Michael et al., 2015).

3.2 STUDY POPULATION

The study population consisted of obese and non-obese individuals attending the general outpatient department of AKTH during the period of study.

3.2.1 Inclusion criteria

1. Patients aged 16 years and above.
2. Individuals must have been registered with the hospital for at least 12 months.
3. Patients must have had consultation and recorded in their case files for at least 2 visits to allow for meaning record of activity.

3.2.1 Exclusion Criteria

1. Patients whose case notes could not be assessed within the last 12 months after at least 3 attempts.

2. Females that were pregnant as pregnancy is associated with increase fluid retention , and that might affect the weight.

3. All new patients as they may not have had objectively recorded healthcare utilization in their hospital folders.

3.3 STUDY DESIGN

This was a descriptive cross-sectional study.

3.4 SAMPLE SIZE DETERMINATION

Using the prevalence rate of obesity of 21% from a study in Katsina state (Wahab et al., 2011) at a confidence interval of 95%, the estimated minimum sample size was calculated as:

$$\mathbf{n = z^2pq/d^2}$$

Where:

n= the desired sample size (when population is greater than 10,000).

Z= the standard normal deviate, usually set at 1.96 which corresponds to the 95% confidence level.

P= the proportion in the target population estimated to have a particular characteristics, taken to be 21% (i.e., 0.21).

Q= 1.0-p

D=degree of accuracy desired, usually set at 0.05.

$n = 1.96^2 \times 0.21 \times 0.79 / 0.05^2$

n = 0.6372/0.0025

n = 254.9

In order to compensate for possible non-response, an adjustment was made to the calculated sample size using the formula (Araoye, 2003):

ns =n/ar

Where:

ns = the compensated sample size

n = the calculated sample size (255)

ar = anticipated response rate, set at 80% (0.8) [Gezawa et al., 2014].

Thus, ns=255/0.8

= 319.

The data of 339 of patients were obtained for which 14 were excluded because their hospital number was mistakenly not recorded on their questionnaire and thereby confirmation of other health care utilization was not possible.

3.5 SAMPLING METHOD

The study was initially billed to use a systematic sampling technique but when data collection started there was strike in the hospital. Therefore, the study's sampling method was changed to purposive sampling technique for the patients on follow-up attending the general outpatient clinic who met inclusion criteria and gave consent to take part in the study. On each day, for a period of 12 weeks, all the patients on follow-up were triaged based on their BMI into normal weight, overweight and obese. On each day, after a patient with obesity was selected the next consecutive patients with overweight and then normal weight were selected. Patients that were obese, overweight and normal weight were recruited until the estimated sample size was obtained. To take care of the first objective of the study, the total number of patients seen during the study period was obtained from the records with their BMI records. A total of 2037 patients were seen during this period in the clinic but 130 did not have BMI recorded in their medical record. Therefore, the BMI the record of 1907 patients were collected from the GOPD during the 3 months period of sample collection.

3.6 STUDY INSTRUMENTS

Data was collected using the following tools:

1. Socio-demographic and Healthcare utilization Questionnaire.

2. Anthropometric Measurement.

3.6.1 Socio-demographic and Healthcare Utilization Questionnaire.

The socio-demographic questionnaire is devised to assess the socio-demographic data of each patients. The demographic characteristics include age, sex, religion, marital status, socio-economic status and highest educational level. The healthcare utilization part of the questionnaire consist of the determinants and need factors of health resource utilization in the context of Andersen Behavioural Model. All assessment of the content of this questionnaire was through interview. Healthcare Utilization Questionnaire is an adopted tool based on the Andersen Behavioural Model.

3.6.2 Anthropometric Measurement.

The Body Mass Index (kg/m^2) is categorized using the World Health Organization (WHO) definitions: BMI of 18.5-24.9 kg/m^2 is used as the reference (normal BMI), 25-29.9 kg/m^2 is define as overweight while $\geq$30 kg/m^2 will be used for definition of obesity. Obesity was further sub-classified into class 1 (30-34.9 kg/m^2), class 2 (35-39.9 kg/m^2) and class 3 ($\geq$40 kg/m) WHO, 2000). Anthropometric measurement was done by taking weight to the nearest 0.1 kilogramme using a weighing scale while for measurement of height, a stadiometer was used used. A SECA weighing machine (**seca 700)** with an inbuilt stadiometer was be used. It has a maximum weight capacity of 220kg, minimum capacity of 2kg and precision error of 0.1kg, while the measuring rod or stadiometer range from 24 to 78 inch (www.seca.com/en_us.html). Body mass index (BMI) was then calculated as weight (in kg) divided by a square of the height (in meters).

3.7 TRAINING OF RESEARCH ASSISTANTS

Two research assistants, male and female, were trained for the purpose of collecting data. The research assistants had three hours, one-day training on anthropometric measurement and the administration of the sociodemographic and healthcare utilization questionnaire. This was accomplished by using 10 patients from the GOPD who eventually did not form part of the study.

3.8 PRE-TESTING OF TOOL

The Sociodemographic and Health Care Utilization Questionnaire were pre-tested among 10 patients in the GOPD of AKTH. This was to help in identify any ambiguous question and ensure cultural acceptability and duration needed to assess an average patient. A number of questions had to be modified. Example, the question on social support: does the patient have social support? A number of individuals preferred to give a number of affirmative response to the questions even though in their records there were mentioned difficulty with social support. Therefore, a standardized scale, the Oslo Social Support Scale, which was validated in Nigeria was adopted (see appendix).

3.9 STUDY PROCEDURE

The procedure involved taking of patients' anthropometric measurement after consent had been obtained on each day to determine those that had normal weight, overweight and obesity. Thereafter, the socio-demographic and health care utilization questionnaire was administered through interview. This stage of assessment was done by the researcher and two trained assistants. The researcher assessed the presence of depression, went through the patients case records to confirm the responses given on the sociodemographic and healthcare utilization, and

also determine, from the folder, the other pattern of health care utilization like duration of hospitalization. In the next stage, all the obese patients, those with overweight and obesity were administered the depression module of the Mini-International Neuropsychiatric Interview to diagnose depression and its severity. This was followed by interviewing the corresponding next individual with normal weight. To obtain the information on comorbidity, each patient's medical recorded was assessed and any comorbid condition that the patient was being managed for the past 12 months was recorded.

The healthcare utilization variables was assessed from the patients through interviewer administered questionnaire. The healthcare utilization variables included information related to the type and number of medications, type and number of investigations, number of recorded consultations with a primary care physician and specialist services, number of admission, utilization of emergency services in the past 12 months etc.

3.10 LIMITATIONS

1. The collection of data was affected by the strike and could have made only those that were more ill/or with more complications to attend the clinics.

2. The cross-sectional nature of this study limits generalization that obesity causes increased health care utilization.

3. This study was done in a hospital population, and therefore, cannot be generalized to the wider population.

4. Hospital-based study are inherently more likely to have more obesity-related comorbidities which may have influence the increased utilization of healthcare among obese individuals.

3.11 ANALYSIS OF DATA

Data was entered into Excel Spread Sheets. Data analysis was done using the SPSS Version 16. The results is presented using charts and tables. Means, standard deviation and descriptive analysis was done as appropriate for quantitative variables.

Prevalence of obesity, psychosocial and demographic determinants of healthcare utilization were assessed using descriptive statistical tools, such as means, standard deviation and frequency tables as appropriate. The relationship and significance of association between obesity and the patterns of health care utilization were tested using the student's *t*-test. To assessed for increased health care utilization the quantitative data were transformed as follows. The variables in the pattern of health care utilization for this sample were put into percentile. Those that had percentile of greater than 50^{th} were regarded as having increased healthcare utilization for that variable (IHCU). Those that are at the 50^{th} percentile and below were regarded as not having increased health care utilization for that variable (NHCU). Thereafter an un-weighted score of 1 and 0 were assigned for each pattern of IHCU and NHCU respectively (L□pez-Cevallos and Chi, 2010). A score of 0 to 4 was regarded as NHCU and 5 to 9 as IHCU (Table 3.1).

The relationship of the possible predictors or determinants of increased health care utilization including depression, severity of depression, suicidal idea, medical comorbidity and sociodemographic factors and increased health care utilization (IHCU) were tested using the Chi-square test. A value of $p<0.05$ was used as the level of signi□cance for statistical tests. For the variables that were statistically significant they were put into a multiple logistic regression.

3.12 ETHICAL CLEARANCE

Ethical clearance and approval was obtained from the Ethics Committee of Aminu Kano Teaching Hospital Kano (Appendix 7). Thereafter, approval was gotten from the head,

department of family medicine of AKTH (Appendix 8). A written informed consent was also obtained from the patients prior to the interview after explaining the aims and objectives of the study. There was no envisaged risk to the participant, and those with obesity and depression were appropriately advised through further management or referral to either endocrinology or psychiatry department in conjunction with family medicine department (see appendix 9 and 10 for full ethical consideration and consent form).

Table 3.1 Showing the Criteria for Increased Healthcare Utilization

Healthcare Utilization Variables	**Presence or Absence of Increased Healthcare Utilization**	
	Increased Healthcare Utilization (>50 Percentile of the sample)*	**No Increase in Healthcare Utilization** (≤50th Percentile of the Sample)**
Number of Primary Care Visits	>6	≤6
Number of Specialist Care Clinic Visits	>2	≤2
Total Diagnostic Tests	>4	≤4
Number of Hospitalization	>1	1
Total Number of Days Hospitalized	>8	≤8
Number of Emergency Department Visits	>1	1
Number of Filled Prescription	>6	≤6
Number of Medications Prescribed	>16	≤16
Number of Use of Alternative Services	>2	≤1

***: Score of 1, **: Score of 0**

Total Score: 0 to 4: Moderate or NHCU

Total Score: 5 to 9: Increased Health Care Utilization.

CHAPTER 4

RESULTS

4.1 SOCIODEMOGRAPHIC CHARACTERISTICS OF THE POPULATION

4.1.1 Age and Sex

A total of 325 participants were studies and the age range was between 16 to 70 years. The mean age was 40.3 (standard deviation, SD ±11.62) years. The mean age for males was 40.5 (SD ±11.6), while that of females was 40.2 (SD ±11.65) years. The data was made up of a total of 105 (32.3%) males and 220 (67.7) females.

4.1.2 Marital Status, Education, and Social Support

The majority of the study participants were married (83.4%) while 11.1 were single (Table 4.1). In terms of education, 55% had tertiary education, 13.2% having no formal education (Table 4.1). Also the majority of the study population reported having social support (74.2%).

4.1.3 Employment, Health Insurance and Income Level

On the employment status of the population, 54.8% were employed. Half of the population (51.4%) in this study had health insurance. The income level of the study population was nearly divided equally among the four categorized income levels (Table 1.2).

4.2 Prevalence of Obesity

The prevalence of obesity in the study population was 9.3%, while those that were overweight was 17.9%. The BMI distribution of the study population was as follows: obesity at 33.5%, overweight at 30.5% and normal weight at 36%.

Table 4.1 Sociodemographic Characteristics

Sociodemographic Variables n=325	Frequency (%)
Sex	
Male	105 (32.3)
Female	220 (67.7)
Marital Status	
Single	36 (11.1)
Married	271(83.4)
Divorced	5 (1.5)
Widow	13 (4.0)
Education	
None	43 (13.2)
Primary	22 (6.8)
Secondary	81 (24.9)
Tertiary	179 (55.1)
Employment	
Employed	178 (54.8)
Non-employed	147 (45.2)
Social Support	
Yes	241 (74.2)
No	84 (25.8)
Health Insurance	
Yes	167 (51.4)
No	158 (48.6)

Table 4.2 BMI Distribution of the Study Participant

BMI n=325	**Frequency(%)**
Normal Weight	109 (33.5)
Overweight	99 (30.5)
Obesity	117 (36.0)

4.3 Pattern of Healthcare Utilization in Obese and Non-obese Individuals

4.3.1 Level of Healthcare Utilization

Table 4.3 presents the different patterns of healthcare utilization in individuals that are obese in terms of the various levels of health care utilized. The mean number of primary care physician visits for obese individuals was 7.31 (SD=3.44) visits, while those that are non-obese was 5.27 (SD=3.09) visits; and this difference was statistically significant (t-test=5.474; $p<0.001$). The mean of the number of specialist clinic visits was higher in those that are obese, 1.91 (SD=3.25) visits compared to non-obese at 0.68 (SD=1.76) visits, and the difference was statistically significant (t-test= $p<0.001$). The visits to secondary care facilities had a mean of 3.1 (SD=3.36) for obese individuals which was higher than 1.66 (SD=3.00) for the non-obese. The difference was statistically significant (t-test=4.064; $p<0.001$). For the total number of hospital visits (taking the total all types of hospital visits), those that are obese had a mean of 12.43 (6.95) visits higher than 7.46 (5.46) visits for individuals that are not obese. This difference was also statistically significant (t-test=7.125; $p<0.001$).

4.3.2 Diagnostic Services

For diagnostic services (Table 4.3), the mean of the number of laboratory tests for obese participant in the past 12 months was 5.10 (SD=3.11) tests much higher than those in the non-obese group at 2.81 (2.55) tests. This difference was statistically significant (t test=7.168; $p<0.001$). The mean of the number for radiological tests for those that are obese was 1.61 (SD=1.31) tests, nearly double that of non-obese at 0.86 (1.00), and the difference was also statistically significant (t-test=5.800; $p<0.001$). The mean of the total number of diagnostic tests

was also higher for obese at 6.79 (SD=3.98) tests compared to non-obese, 3.64 (SD=3.09) tests and this was statistically significant (t-test=7.915; p<0.001).

4.3.3 Types of Health Care

Table 4.3 also shows that pattern of health care obtained during the past 12 months. These services included hospitalization, number of days hospitalized and emergency services. The mean of the number of hospital admissions was 2.82 (SD=1.47) times for obese individuals, which was higher compared to non-obese at 1.46 (SD=1.13)times, and the difference was statistically significant (t-test=2.558; p=0.018). Also the mean of the number of days hospitalized for obese was higher for the non-obese: 22.73 (SD=13.602) days vs. 11.23 (SD=22.993) days but the difference was not statically significant (t-test=1.454; p=0.160). For the number of emergency visits for the past 12 months, those that were obese had a higher mean emergency visits of 2.02 (SD=1.64) compared to 1.50 (SD=0.66) and the difference in the emergency visits was statistically significant (t-test=1.798; p=0.076).

4.3.4 Prescription Pattern

In the past 12 months, participants in the study that were obese had a higher mean number of filled prescription, 7.46 (SD=3.69) times compared to non-obese, 5.48 (SD=3.50) times (Table 4.3). The difference was statistically significant (t-test=4.807; <0.001). Also for the total number of medications prescribed for the past 12 months, obese individuals had higher mean of 24.88 (SD=12.15) drugs as against 18.38 (SD=16.97) drugs, and the difference was statistically significant (t-test=3.648; <0.001).

4.3.5 Non-medical Hospital Services

For non-medical hospital services including physiotherapy, dental and dietetic services, the mean number of the services received in the last 12 months was slightly higher obese individuals compared to non-obese: 1.07 (SD=5.91) vs. 0.25 (SD=1.38) times (Table 4.3). This difference was not statistically significant (t-test=1.897; 0.059).

4.3.6 Alternative and Complimentary Services

Obese participants in the study reported using more alternative/complimentary services (like 'Islamic medicine' traditional healing, Rukiyya) with a mean of 2.64 (SD=5.22) times compared to 0.75 (SD=2.09) times for the non-obese (Table 4.3). This difference was statistically significant (t-test=4.620; <0.001).

Table 4.3 Pattern of Health care Utilization in Obese and Non-obese

Variables	**BMI Grade**		t-test	p-value
	Obese	**Non-obese**		
	Means (SD)	Means (SD)		
Level of Health Care Utilized				
Primary Care Physician Visits (n=325)	7.31 (3.44)	5.27 (3.09)	5.474	<0.001
Specialist Clinic Visits (n= 325)	1.91 (3.25)	0.68 (1.75)	4.456	<0.001
Secondary Care Facilities (n=325)	3.14 (3.36)	1.66 (3.00)	4.064	<0.001
Total Hospital Visits (n=325)	12.43 (6.95)	7.46 (5.46)	7.125	<0.001
Diagnostic Services				
Laboratory Services (n=325)	5.10 (3.11)	2.81 (2.55)	7.168	<0.001
Radiological Services (n=325)	1.61 (1.31)	0.86 (1.00)	5.800	<0.001
Total Diagnostic Tests (n=325)	6.79 (3.98)	3.64 (3.09)	7.915	<0.001
Types of Health Care				
Hospital Admissions (n=24)	2.82 (1.47)	1.46(1.13)	2.558	0.018
Days Hospitalized (n=24)	22.73 (13.60)	11.23 (22.99)	1.454	0.160
Emergency Visits (n=82)	2.02 (1.64)	1.50 (0.66)	1.798	0.076
Prescription Pattern				
Number of Filled Prescription (n=325)	7.46 (3.69)	5.48 (3.50)	4.807	<0.001
Medications Prescribed (n=325)	24.88 (12.15)	18.38 (16.97)	3.648	<0.001
Non-medical Health Services* (n=)	1.07 (5.91)	0.25 (1.38)	1.897	0.059
Use of Alternative/Complimentary Services (n=)	2.64 (5.22)	0.75 (2.09)	4.620	<0.001

*Other services like physiotherapy, dental procedure, dietetic services.

4.4 Determinants of Increased Healthcare Utilizations in Individuals with Obesity.

4.4.1 Age, Sex and Marital Status

Obese individuals that were 40 years and above had 54.1% of the increased health care utilization compared to those aged 40 years and below at 44.7% (Table 4.4). This difference was not statistically significant (χ^2=0.942; p=0.332). Obese females had more increase health care utilization (53.3%) while obese males had 48.0% of increased health care utilization (Table 4.4). This difference was also not statistically significant (χ^2=0.218; p=0.641). Obese participants that were married were less likely to have increased health care utilization (51.1%) compared to those that were not married at 56.5% (Table 4.4). This difference was not statistically significant (χ^2=0.221; p=0.639).

4.4.2 Educational Level, Employment, Social Support, Health Insurance and Income Level

Obese individuals with increased health care utilization that had either tertiary education or less than tertiary education had nearly the same percentage of increase use of health services: 52.9% vs.51.9%. The difference was not statistically significant (χ^2=0.042; p=0.837). In this study, obese individuals that were employed were slightly more likely to have increased health care utilization compared to those that are not employed: 52.4% vs. 51.9% (Table 4.4). The difference was not statistically significant (χ^2=0.003; p=0.954). Not having social support was associated with use of more health care services in obese participant at 65.6% compared to 47.1 for individuals with social support (Table 4.4). Those with health insurance had less increased in health care utilization compared to those without health insurance: 47.9% vs. 55.1% (Table 4.4). The difference was not statistically significant (χ^2=0.581; p=0.446).

4.4.3 Medical and Psychiatric Comorbidities

Obese participants with medical comorbidity were more likely to be associated with increased health care utilization at 54.6% compared to those without medical comorbidity at 40.0% (Table 4.4). This difference was not statistically significant (χ^2=1.424; p=0.233). Those with depression were more likely to have increased health care utilization at 63.4% compared to non-depressed at 34.8% (Table 4.4). This difference was statistically significant (χ^2=9.148; p=0.002). Also obese individuals that reported having suicidal ideas had more increased health care utilization at 64.2% compared to 36.0% for those that did not report suicidal idea (Table 4.4). This difference was statistically significant (χ^2=9.111; p=0.003). On the other hand, the severity of depression was not associated with increased health care utilization: 64.5% vs. 60.0% for those with moderate to severe depression and mild depression respectively (Table 4.4). This difference was statistically not significant (χ^2=0.076; 0.783).

4.4.4 Logistic Regression Analysis for Significant Variables for Obese Individuals

When the two variables that were statistically significant, depression and suicidal idea, (in Table 4.4) were entered into logistic regression analysis they remained statistically significant with odds ratio (OR) of 3.03 (95% CI[1.26,7.29]) and 2.91 (95% CI[1.24, 6.82]) respectively (Table 4.5).

Table 4.4 Showing the Determinants of Increased Health Care Utilization

Determinants	Increased Health Care Utilization		χ^2	p-value
	Yes	No		
Age (years)				
≥40 (n=61)	33 (54.1)	28 (45.9)	0.942	0.332
<40 (n=47)	21 (44.7)	26 (55.3)		
Sex				
Male (n=25)	12 (48.0)	13 (52.0)	0.218	0.641
Female (n=92)	49 (53.3)	43 (46.7)		
Marital Status				
Married (n=94)	48 (51.1)	46 (48.9)	0.221	0.639
Not Married (n=23)	13 (56.5)	10 (43.5)		
Education Level				
Tertiary (n=68)	36 (52.9)	32 (47.1)	0.042	0.837
<Tertiary (n=49)	25 (51.0)	24 (49.0)		
Employment				
Yes (n=63)	33 (52.4)	30 (47.6)	0.003	0.954
No (n=54)	28 (51.9)	26 48.1)		
Social Support				
Yes (n=85)	40 (47.1)	45 (52.9)	3.211	0.073
No (n=32)	21 (65.6)	11		
Health Insurance				
Yes (n=48)	23 (47.9)	25 (52.1)	0.581	0.446
No (n=69)	38 (55.1)	31 (44.9)		
Income Level (Naira)				
>50 000(n=60)	31 (51.7)	29 (48.3)	0.011	0.917
≤ 50 000(n=57)	30 (52.6)	27 (47.4)		

Cont. Table 4.4 Showing the Determinants of Increased Health Care Utilization in Obese Individuals

Determinants	Increased Health Care Utilization		χ^2	p-value
	Yes	No		
Depression				
Yes (n=71)	45 (63.4)	26 (36.6)	9.148	**0.002**
No (n=46)	16 (34.8)	30 (65.2)		
Severity of Depression				
Moderate to Severe (n=62)	40 (64.5)	22 (35.5)	0.076	0.783
Mild (n=10)	6 (60.0)	4 (40.0)		
Medical Comorbidity				
Yes (n=97)	53 (54.6)	44 (45.4)	1.424	0.233
No (n=20)	8 (40.0)	12 (60.0)		
Suicide Ideation				
Yes (n=67)	43 (64.2)	24 (35.8)	9.111	**0.003**
No (n=50)	18 (36.0)	32 (64.0)		

df=1

Table 4.5 Regression Analysis for Determinants of Increased Health Care Utilization In Obese Individuals

Determinant*	Wald Estimate	Odds Ratio	p-value	95% Confidence Interval	
				Upper	Lower
Depression	6.145	3.031	0.013	1.26	7.29
Suicide Ideation	6.047	2.911	0.014	1.24	6.82
Constant	1.008		0.315		

df=1
*:variables entered into the equation include depression and suicidal ideation

4.5 Determinants of Increased Healthcare Utilizations in Non-obese Individuals

4.5.1 Age, Sex and Marital Status

For the non-obese group, those that were aged 40 and above were more likely to have increased health care utilization at 13.6% compared to 3.9% for those that were less than 40 years (Table 4.6). The difference was statistically significant (χ^2=6.477; p=0.011). Even though females did utilized more health care services at 10.2% compared to 3.8% for females, the difference was not statistically significant (χ^2=2.845; p=0.092). Non-obese individuals that were married had slightly more increased health care utilization compared to persons that were not married, 7.9% vs. 6.7% (Table 4.6). The difference was not statistically significant (χ^2=0.054; p=0.817).

4.5.2 Educational Level, Employment, Social Support, Health Insurance and Income Level

Non-obese individuals that had less than tertiary education reported more increased health care utilization at 12.4% compared to 3.6% for those with tertiary level of education (Table 4.6). This difference was statistically significant (Fisher Exact Test=5.769; p=0.016). On social support, those that had social support were more likely to have increased health care utilization at 9.6% compared to those without it at 1.9% (Table 4.6). This difference was statistically significant (Fisher Exact Test=4.168; p=0.041). Those that had less than ₦50 000 as monthly income were more likely to have increased health care utilization compared to those that their income was more than ₦50 000 (Table 4.6). This difference was statistically significant (Fisher Exact Test= 4.815; p=0.028). Even though those without health insurance had more increased health care utilization at 10.1% compared to those without health insurance at 5.9%, the difference was not statistically significant (χ^2=1.283; p=0.257).

4.5.3 Medical and Psychiatric Comorbidities

In individuals that were non-obese, those with medical comorbidity had more increased health care utilization at 11.3% compared to those without medical comorbidity at 2.4% (Table 4.6). This difference was statistically significant (Fisher Exact Test=6.482; p=0.011). Those with depression had slightly more increased health care utilization compared to individuals that were not depressed, 9% vs. 6.7%, the difference was not statistically significant (χ^2=0.368; p=0.544).

4.5.4 Logistic Regression Analysis for Significant Variables for Non-obese Individuals

The five variables that were statistically significant were entered into logistic regression analysis (Table 4.7). These were age greater than 40 years, having less than tertiary level of education, having social support, monthly income level below 50 000 and presence of medical comorbidity (Table 4.6). Only presence of social support was statistically significant with OR of 1.11 (95% CI [1.01, 1.862]).

Table 4.6 Showing the Determinants of Increased Health Care Utilization Among Non-obese Individuals

Determinants	Increased Health Care Utilization		χ^2	p-value
	YES	No		
Age (years)				
≥40 (n=81)	11 (13.6)	70 (86.4)	6.477	0.011
<40 (n=127)				
Sex				
Male (n=80)	3 (3.8)	77 (96.2)	2.845	0.092
Female (128)	13 (10.2)	115 (89.8)		
Marital Status				
Married (n=178)	14 (7.9)	164 (92.1)	0.054	0.817
Not married (n=30)	2 (6.7)	28 (93.3)		
Educational Level				
Tertiary (n=111)	4 (3.6)	107 (96.4)	5.769*	0.016
<Tertiary (n=97)	12 (12.4)	85 (87.6)		
Employment				
Yes (n=115)	8 (7.0)	107 (93.0)	0.196	0.658
No (n=103)	8 (8.6)	85 (91.4)		
Social Support				
Yes (n=156)	15 (9.6)	141 (90.4)	4.168*	0.041
No (n=52)	1 (1.9)	51 (98.1)		
Health Insurance				
Yes (n=119)	7 (5.9)	112 (94.1)	1.283	0.257
No (n=89)	9 (10.1)	80 (89.9)		

Cont. Table 4.6 Showing the Determinants of Increased Health Care Utilization Among Non-obese Individuals

Income Level (Naira)				
>50 000 (n=91)	3 (3.3)	88 (96.7)	4.815*	0.028
≤50 000 (n=117)	13 (11.1)	104 (88.9)		
Depression				
Yes (n=89)	8 (9.0)	81 (91.0)	0.368	0.544
No (n=119)	8 (6.7)	111 (93.3)		
Medical Comorbidity				
Yes (n=124)	14 (11.3)	110 (88.7)	6.482*	0.011
No (n=84)	2 (2.4)	82 (97.6)		
Suicide Ideation				
Yes (n=62)	4 (6.4)	58 (93.5)	0.198*	0.657
No (n=146)	12 (8.2)	134 (91.8)		

df=1; *: Fisher Exact Test

Table 4.7 Regression Analysis for Determinants of Increased Health Care Utilization among Non-obese Individuals

Determinants*	Wald Estimate	Odds Ratio	p-value	95% Confidence Interval	
				Upper	Lower
Age >40 years	3.131	2.90	0.077	0.89	9.40
<Tertiary Education	1.764	2.90	0.184	0.60	13.98
Social Support	4.403	1.11	0.036	1.01	1.86
Income ≤ 50 000	0.543	1.90	0.461	0.35	10.41
Medical Comorbidity	2.837	0.26	0.092	0.53	1.25
Constant	1.479	0.08	0.224		

*Variables entered into the equation included Age, Educational level, Social support, Income level, and Medical comorbidity

CHAPTER 5

DISCUSSION

5.1 Prevalence of Obesity

The prevalence of obesity in this study was 9.3%. This prevalence is similar to the study conducted in Sokoto where the authors reported a prevalence of 12% (Nwoka et al., 2014). The prevalence in this study falls within the range of 8.1% to 22.2% of the systematic review of Nigerian Studies from 2001 to 2012 (Chukwuonye et al., 2013). On the other hand, compared to other studies in Nigeria the prevalence is low (Ojofeitimi et al., 2007; Gezawa et al., 2013; Wahab et al., 2011; Akarolo-Anthony et al., 2014; Sola et al., 2012). A study of 300 healthy adults from the community in Katsina State, same region as this study, reported a prevalence of 21% for obesity (Wahab et al., 2011), while in Maiduguri, North-East Nigeria the prevalence of obesity was 17.1% (Gezawa et al., 2013). Another study from a primary care setting in Imo State, South-East Nigeria reported a higher prevalence of 20.4% which was above the prevalence in this study(Onuoha et al,. 2011). In the South-West, North-Central and South-South the prevalence was 48.1% in Oyo (Ogunbode et al., 2014), 26% in Abuja (Akarolo-Anthony et al., 2014), and 49.3% in Rivers State (Adienbo et al., 2012), respectively. The trend of the prevalence of obesity seems to be higher in other regions of the country compared to North-West. This was the case from a multicenter study by Okafor and colleagues (2014) which reported that there was regional disparity in the prevalence of obesity, with higher prevalence in the Southern part of the country than the North (34.5% vs. 12.2% respectively). The prevalence of obesity in this study is similar to the WHO 2013 data that reported the prevalence of 10% in Nigeria (WHO, 2013). Some of the reason given for this lower prevalence could be that the population from the North are generally slender and taller in stature, "occupational differences such as the nomadic lifestyle of the northerners, which in turn impacts on level of physical

activity" (Okafor et al., 2014), the cultural attitudes regarding to affluence (Okafor et al., 2014), and desire for weight gain, especially among females for marital purposes and beauty (Adienbo et al., 2012).

The prevalence of 9.3% is slightly lower than those from African countries like Ghana with 13.6% (Amoah, 2003), Uganda at 19% (Turi et al., 2013), and South Africa with nearly two-third of the population of women being overweight or obese and men nearly 40% (Baleta and Mitchell, 2014). Factors associated with this increase in obesity in this countries include nutritional transition in which diet with higher fat content are consumed more and lower physical activities (Kruger et al., 2005).

Compared to international data, the prevalence in this study is close to the 2015 WHO report that the global prevalence of obesity is 13% (WHO, 2015). In Canada the prevalence of obesity is 18.3% higher than in this study (Twells et al., 2014). Also in the United States, the prevalence is put at 34.9% of adults aged 20 and above (Ogden et al., 2014), in Australia at 28% (Autralian Bureau of Statistics, ABS, 2011-2012), and in England the prevalence is 26.1% (OECD, 2014). The burden of obesity is definitely more in the developed countries than emerging economies like Nigeria, though the former's prevalence is stabilizing or even reducing while the latter is increasing because of rapid industrialization and urbanization (Dobbs et al., 2014; Ng et al., 2014).

5.2 Pattern of Healthcare Utilization in Obese and Non-Obese Individuals

In this study, obese individuals had higher visits to the hospital in terms of more visits to the primary care physician, specialist care clinic and visits to secondary care facilities hospitals. A similar study in Australia found that obese individuals, especially severely obese had

significantly used more health services annually compared to the general population.[329] This was also the case from the work of Compsten et al. (2014) who reported increase health care utilization in terms of general hospital visits by obese individuals compared to non-obese. Several other studies have reported similar findings (Bertakis and Azari, 2005; Bertakis and Azari, 2006; Migliore et al., 2013; Wildenschild et al., 2011; Tarride et al., 2012; Redondo-Sendino et al., 2006).

This study has also shown that obese individuals significantly had higher mean number of diagnostic services in the past 12 months, both laboratory and radiological, than non-obese groups. This is in keeping with a study from a university medical center in Canada that reported that obese patients had significantly higher mean number of diagnostic services(Bertakis and Azari, 2005). Other studies reported the same findings (Chu et al., 2010; Rosemann et al., 2008; Twells et al. 2010).

The mean of the number of hospitalization, number of days hospitalized and the number of emergency department visits was higher in obese patients compared to non-obese. This is similar to a number of studies that reported increase in the mean of healthcare utilization in terms of hospital admission, number of days admitted and emergency visits (Rosemann et al., 2008; Migliore et al., 2013; Compsten et al., 2014; Wildenschild et al., 2011).

Similarly, this study like in other studies (Redondo-Sendino et al., 2006, Alter et al., 2012), reported higher mean of medication use in terms of number of filled prescription and total number of medications prescribed. Quite a number of these studies are influenced by both sociodemographic and clinical variables (Redondo-Sendino et al., 2006; Alter et al., 2012; Tarride et al., 2013).

On the contrary, Alter et al. (2012) in a longitudinal study from National Population Health Survey in Canada with 9398 participants reported that obesity as an isolated risk-factor was not associated with significantly higher healthcare utilization as compared with individuals with normal weight. This study showed that obesity when comorbid with other life-style risk factors like depression, physical inactivity and/or smoking increased significantly the healthcare utilization of obesity (Alter et al., 2012). Also, obese individuals with multiple lifestyle factors had increased risk of developing diabetes and hypertension and this was associated with higher healthcare utilization. It could be that previous studies may have spuriously attributed both the utilization and costs of other risk factors of obesity, other lifestyle behaviours associated with obesity and other chronic disease to obesity and therefore overestimating obesity-related healthcare utilization and expenditure (Alter et al., 2012 Flegal et al., 2014).

5.3 Determinants of Increased Health Care Utilization

In this study increase in health care utilization was not significantly associated with age, unlike other studies. In the study by Wildenschild et al. (2011) in Denmark, health care utilization was more significant for individuals aged 45 to 64 years, but not statistically significant for those aged 20 to 44 and 65 and above. In another study, the age groups 30-39 and 40-49 years had higher hospitalization rates and those above 70 years have less (Migliore et al., 2013). A similar trend was reported from the Canadian Community Health Survey using data maintained by the Canadian Institute for Health Information, where obese individuals in the age range of 40 to 59 years had higher cost (Tarride et al., 2012).

Sex in this study was not associated with increased health care utilization. This is similar to the study from a Canadian Community Survey which reported that no difference between the pattern

of health care utilization between males and females (Tarride et al., 2012). However, cross-sectional study of 509 adults from a university medical center in Canada reported that as compared to men, women had significantly higher mean visit to their primary care clinic and diagnostic services (Bertakis et al., 2000). The gender differences in healthcare utilization can be explained by the poorer health status in females (Bertakis et al., 2000) and the greater number of chronic diseases and health-related quality of life in women (Redondo-Sendino et al., 2006). In this study the presence of comorbidity was not associated with increase in health care utilization, and this could explain the finding in this study. Still other studies reported more increase in health care utilization among males compared to females (Wildenschild et al., 2011; Migliore et al., 2013). A study that used data from Denmark's National Institute of Public health spanning 1987 to 2005, reported that increase in healthcare utilization was more in men compared to women (Wildenschild et al., 2011). Another probable reason why there was no significant difference in the utilization of health care services in this study could be the increasing awareness of healthy living that promotes health and therefore increasing the use of healthcare services to near that of women (Wildenschild et al., 2011). Another study in China had suggested that the difference may be less or more health care utilization for males because the difference could be explained in part by social power in the male- female relationship (Song and Bian, 2014).

In terms of the level of education, this study also did not show more significant use of health care services among the more educated obese patients compared to non-obese. This is contrary to the work of Tarride et al. (2012), that reported that in obese individuals that had tertiary education, especially in developed countries are more likely to use more health care services than those with college education.

In this study, the presence of obesity- related medical comorbidities, like hypertension and diabetes mellitus, was not associated with increase in health care utilization. This is similar to the study by Fogarty et al. (2008) from the work on of health care utilization among Family Medicine patients in Boston, U.S., who reported that chronic medical conditions even though were associated with depression but they (chronic medical conditions) were not associated with higher healthcare utilization (Fogarty et al., 2008). In another study by Migliore and colleagues (2013), diabetes was not a significant determinant of hospitalization cost. In this line, a novel study from Denmark that examine whether the associations changed over time, the association of obesity and increase healthcare utilization was independent of co-morbid conditions like hypertension, diabetes and back problems; i.e. the co-morbid condition did not fully predict utilization of health services in obese individuals (Wildenschild et al., 2011). Other studies have also reported that the association between obesity and increase healthcare utilization can only be partly attributed to obesity- related co-morbidities like diabetes, arthritis, hypertension and CVDs (Peytremann-Bridevaux and Santos-Eggimann, 2007).

Finally, a prospective U.S. study of quality of life, depression and health resource utilization among patients with diabetes, hypertension and obesity showed that individuals with diabetes, hypertension and obesity had significantly more health resource utilization in terms of physician visits and emergency room visits than individuals with only diabetes alone (Green et al., 2012); and these individuals also had more symptoms of depression. The authors conclusion for the study was that there are a group of patients with co-morbidities (diabetes, hypertension and obesity) whose frequent healthcare visits to physician and lower quality of life and depression should provide the physician an opportunity for disease management that should include obesity management that will eventually lead to better health outcome (Green et al., 2012).

For the non-obese individuals age greater than 40 years, those that were less educated, having social support, lower income level and the presence of medical comorbidity were associated with increased health care utilization. These are in keeping with a number of studies.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

In conclusion the prevalence of obesity is high. Obesity is associated with increase in the pattern of health care utilization. Depression and suicidal ideas were found to be determinants of increased health care utilization in obesity, while having social support was a determinant of increased health care utilization in non-obese individuals.

Finally, it is recommended that the:

1. Management of obesity should be optimized with the aim of reducing weight even at the primary care facilities. This should also be continued in specialized clinics.

2. There should be a mechanism for the prompt diagnosis and management of patients with depression in individuals with obesity from the first point of hospital visit.

3. A prospective longitudinal work is recommended in the future to assess the pattern of health care utilization of normal weight individuals who later become obese.

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APPENDIX

APPENDIX 1

High Risk Classification according to Body Mass Index*

CLASSIFICATION	BMI (kg/m^2)	RISK OF DEVELOPING HEALTH PROBLEM
Underweight	< 18.5	Increased
Normal weight	18.5 - 24.9	Least
Overweight	25.0 - 29.9	Increased
Class I	30.0 - 34.9	High
Class II	35.0 - 39.9	Very high
Class III	≥40.0	Extremely high

*From World Health Organization (WHO). Obesity: preventing and managing the global epidemic: report of a WHO consultation. *World Health Organ Technical Report Service* 2000; 894:i-xii, 1-253

APPENDIX 2

Criteria for Diagnosis of Major Depression

A. Five (or more) of the following symptoms have been present during the same 2- week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.
Note: Do not include symptoms that are clearly due to a general medical condition, or mood-incongruent delusions or hallucinations.

- Depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g., feels sad or empty) or observation made by others (e.g., appears tearful). Note: In children and adolescents, can be irritable mood.
- Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation made by others).
- Significant weight loss when not dieting or weight gain (e.g., a change of more than 5 percent of body weight in a month), or decrease or increase in appetite nearly every day. Note: In children, consider failure to make expected weight gains.
- Insomnia or hypersomnia nearly every day.
- Psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down).
- Fatigue or loss of energy nearly every day.
- Feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick).
- Diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others).
- Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.

B. The symptoms cause clinically significant distress or impairment in social, occupational or other important areas of functioning.

C. The symptoms are not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition (e.g., hypothyroidism).

From *Diagnostic and Statistical Manual of Mental Disorder*, Fifth Edition, APA, 2013.

APPENDIX 3

Prevalence and Gender Distribution of Obesity in Nigeria

Author(s)	**Location**	**Population Studied**	**Prevalence of Overweight** (%)	**Prevalence of Obesity** (%)	**Gender Prevalence of Obesity** (%) **F** **M**
Akarolo-Anthony et al., 2014	Abuja	Workers and Visitors at Federal secretariat	27.2	33.8	42 15
Iloh et al., 2011	Imo	Clinic-based, rural area		6.0	
Adienbo et al., 2012	Rivers	Four rural communities	22.0	47.3	30.5 16.8
Amole et al., 2014	Oyo	Semi-urban area		14.8	19.5 8.9
Ogunjimi et al., 2010	Akwa Ibom	Female nurses		62.2	
Sola et al., 2012	Abuja	Urban and rural		22.3	36.2 8.0
Nkwoka et al., 2014	Sokoto	University staff	35	12.0	3.3 8.8
Onyechi and Okolo, 2008	Enugu	Undergraduates	16.9	21.0	13.1 8.1
Desalu et al., 2008	Kwara	Urban Ilorin	35.1	9.8	7.4 2.4
Utoo and Okpara, 2013	Benue	University staff and students	26.2	9.1	
Wahab et al., 2011	Katsina	Urban area	53.3	21.0	29.8 9.3
Emerole et al., 2014	Imo	Undergraduate students	28.0	11.3	
Okafor et al., 2014	Multi-centre	Urban areas	31.0	17.0	22.0 13.4
Ogunbode et al., 2010	Oyo	Women in Primary Care Clinic		41.8	

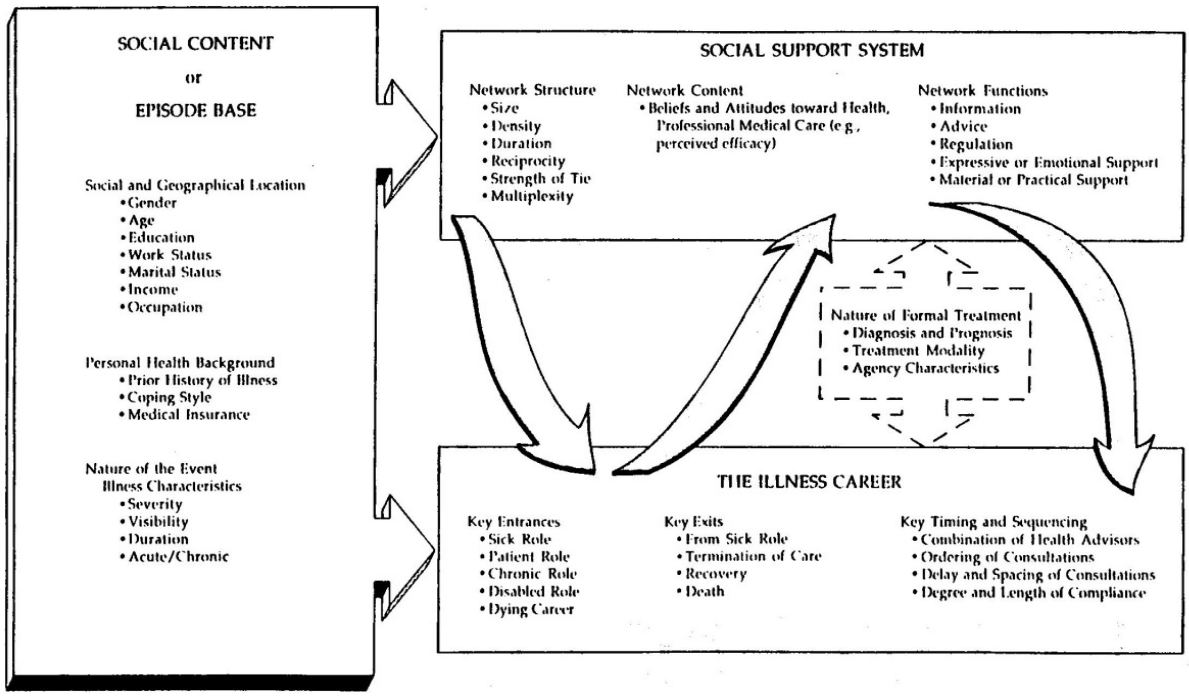
APPENDIX 4

Suchman's Stages of illness Model

	1.	2.	3.	4.	5.
What happens	Symptom experience	Assumption of the sick role	Medical care contact	Dependent patient role	Recovery & rehabilitation
What is feeling	Something is wrong	Relinquish roles	Seek professional help	Accept professional help	Relinquish sick-role
What to do	Application of folk medicine, self-medication	Request provisional validation for sick-role from members of lay referral system Continue folk medication	Seek authoritative legitimation of sick-role and negotiate treatment procedures	Undergo treatment procedures for illness Follow regimens	Resume normal roles
When feel better	Denial ← Delay → Acceptance	Denial ← Acceptance	Denial ← Shopping → Confirmation	Rejection ← Secondary gain → Acceptance	Referral ← Malingering → Acceptance

APPENDIX 5

Network-episode Model



SOCIO-DEMOGRAPHIC AND HEALTHCARE UTILIZATION QUESTIONNAIRE

The purpose of this study is to assess the determinants of healthcare utilization in patients that have obesity, and the influence of depression on the healthcare utilization of obese patients. All questions asked will be kept confidential.

Hospital no _____ Name of patient _____ Date of Assessment _____

SOCIO-DEMOGRAPHIC CHARACTERISTICS

1. How old is the patient? _____

2. What is the gender of the patient? ■Male ____ ■Female ____

3. Marital status of the patient? ■Single ____ ■Married ____ ■Divorced, separated ____ ■Widowed ____

4. Highest educational qualification? ■None ____ ■Primary ____ ■Secondary ____ ■Tertiary ____ ■Others (specify) ____

5. Is the patient employed? ■Yes ____ ■No ____

6.Does the patient have social support score? ■Yes ____ ■No ____

7. Does the patient have health insurance? ■Yes ____ ■No ____

8. Income level (in Naira) ? ■Less than 18, 000 ____ ■18, 000 to 50, 000____ ■51, 000 to 100, 000 ____ ■ 100, 000 ____

CLINICAL FEATURES

9. Does the patient have depression? ■Yes ____ ■No ____

If Yes, what is the severity? _____

10***. What are the co-morbid conditions in the patient?***

_____

_____

_____

_____

11 What is the smoking status of patient? ■Smoker ____ ■Non-smoker (none + 15 years abstinence)____

PATIENT HEALTHCARE UTILIZATION PROFILE

During the last 12 months, indicate the:

12. Number of visits to primary care physician (PCP) _____

13. Number of visits to specialty care clinics _____

If ≥ 1, specify the specialty services visited _____

14. Number of total diagnostic services _____

15. Number of laboratory tests _____

16. Number of imaging tests (x-ray, scan etc)_____

17. Number of hospitalization _____

18. Total number of days hospitalized (for those with ≥ 1 hospitalization) _____

19. Number of other hospitals visited _____

20. Number of visits to emergency services or department _____

21. Number of days given excused duty or inability to go to work (for those employed) _____

22. Number of days unable to carry out household chores (for those that are unemployed) _____

22. Number of times given excused duty _____

23. **Number of filled prescriptions** _____

24**. Number of medications prescribed** _____

24. Number of other services (e.g. physiotherapy etc) _____

25. Number of use of alternative or complementary services (e.g. Islamic medicine, Ruqiyya, herbs) _____

ANTHROPOMETRIC MEASUREMENT

26. Weight (kg):_____

27. Height (m): _____

28. BMI: _____