KNOWLEDGE OF RISK FACTORS AND HEALTH IMPLICATIONS OF OBESITY AMONG WOMEN OF REPRODUCTIVE AGE IN IBADAN SOUTH-WEST LOCAL GOVERNMENT AREA, NIGERIA

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DEDICATION

This work is dedicated to God Almighty, the source of my strength. He is my world and my all.

ABSTRACT

Obesity is one of the non-communicable diseases (NCDs) of public health concern globally with negative impact on Reproductive Health (RH). Previous researches have shown that obesity is associated with other NCDs but there is dearth of information on the knowledge of the effect of obesity on RH among Women of Reproductive Age (WRA). This study was carried out to assess the knowledge of Risk Factors (RFs) and Health Implications (HIs) of obesity among WRA in Ibadan South-West Local Government Area.

This was a descriptive cross-sectional study. Six Focus Group Discussion (FGD) sessions were conducted among WRA. A three-stage sampling technique was used, which included stratified random sampling technique using population density as a basis for stratification to proportionately select 500 WRA from six communities. Simple random technique was used to select a cluster each from the six communities while purposive sampling was used to select respondents from each cluster. Semi-structured interviewer-administered questionnaire was used to elicit information on socio-demographic characteristics, knowledge of RFs assessed on a 12-point scale and scored low (≤7) and high (>7), also knowledge of HIs assessed on a 14-point scale and scored low (≤8) and high (>8). Obesity was assessed using Body Mass Index (BMI) and Waist-to-Hip Ratio (WHR). Respondents with BMI ≥30kg/m^2 were classified as obese while those with WHR >0.85 had truncal obesity. Pattern of high calorie food consumption was assessed using food frequency questionnaire. The FGDs were analysed using thematic approach while the quantitative data were analysed using descriptive statistics, Chi-square and logistics regression tests at 5% level of significance.

Most FGD participants disclosed that poor eating habits, heredity and being indolent could lead to obesity. Some were of the view that obesity has no HIs. Respondents' mean age was 29.9±8.7 years, 56.0% had tertiary education and 60.0% had ever given birth. Sixty-two percent had high knowledge of RFs for obesity while 13.2% had high knowledge of the associated HIs. Major RH problems associated with obesity mentioned by the respondents included infertility (34.4%) and obstructed labour (33.0%). Prevalence of obesity was 18.6% while 52.4% had truncal obesity. Frequently consumed high calorie foods include cocoa-

based drinks (24.8%), soft drinks (19.6%) and snacks (15.4%). Knowledge of RFs was not significantly associated with BMI and WHR. Significantly, more respondents with tertiary education (18.6%) had high knowledge of HIs of obesity than those with primary education (3.1%). Prevalence of obesity was higher among respondents who had ever given birth (26.0%) than those who had not (7.5%). Respondents aged 30-34 years were more likely to have higher knowledge of RFs of obesity than those aged 15-19 years (OR: 2.6; 95%CI: 1.3–5.2). Respondents aged 40-44 years were more likely to have high WHR than those aged 15-19 years (OR: 14.6; 95%CI: 4.7-44.7).

Women's knowledge of health implications of obesity was low despite their high knowledge of its risk factors. Community-based health education on health implications of obesity should be organised regularly for women of reproductive age in the study area.

Keywords: Knowledge of risk factors, Obesity, Women of reproductive age

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CERTIFICATION

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
BMI	Body Mass Index
CAD	Coronary Artery Disease
CDC	Centre for Disease and Control
DM	Diabetes mellitus
FGD	Focus group discussion
WHO	World Health Organization
WHR	Waist-to-hip ratio

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Non-communicable diseases are the biggest cause of death worldwide; besides mortality, these diseases also cause high rates of morbidity and disability (Boutayeb, Boutayeb and Boutayeb, 2013). A report by WHO (2011) revealed that non-communicable diseases are projected to increase by 15% globally between 2010 and 2020. The greatest increase will be in Africa, the Eastern Mediterranean and South-East Asia, where they will increase by over 20%. Boutayeb (2006) predicted that by 2020, non-communicable diseases will cause seven out of every ten deaths in developing countries but Sani, Wahab, Yusuf, Gbadamosi, Johnson and Gbadamosi, (2010); Oladapo, Salako, Sodiq, Shoyinka, Adedapo and Falase, (2010) reported that non-communicable diseases have overtaken communicable diseases as the leading causes of morbidity and mortality in Nigeria. The changing disease pattern has been traditionally attributed to recent advances in medicine resulting in the development of drugs and vaccines for the effective control of communicable diseases. Other factors driving this transition include changes in diet, cigarette smoking, alcohol consumption, and inadequate exercise. There is also rural to urban as well as foetal malnutrition, which predisposes individuals to development of non-communicable diseases in adulthood (Oladapo et al., 2010). Obesity is among these non-communicable diseases.

Obesity is the consequence of a long-term imbalance between energy intake and energy expenditure determined by food intake and physical activity and influenced by biological and environmental factors (Kleiser, Schaffrath, Mensink, Prinz-Langenohl, and Kurth, 2009). The term overweight means excessive body weight in relation to height, whereas obesity indicates excessive fat accumulation in adipose tissue (Lequaire, 2004).

Across the past 60 years or so, social, economic and technological changes have altered patterns of life almost everywhere on earth. In tandem, changes in diet and physical activity patterns have been central to the emergence of obesity among many of the world's

populations (Ulijaszek and Lofink, 2006). The risk factors of overweight and obesity are multi-factorial and gender specific. Hou, Jia, Bao, Lu, Jiang, Zuo, Gu and Xiang, (2008) findings support the notion that some risk factors can be used to identify individuals with high risk of overweight and obesity. These risk factors include family history of obesity, some behaviour habits (alcohol intake) and education.

As a consequence of the obesity epidemic, the proportion of severely obese women of childbearing age has increased considerably, which prompts research in the consequences for reproductive health of these women (Nohr, Timpson, Andersen, Smith, Olsen and Sorensen, 2009). It has been found that obesity has significant adverse impact on reproductive outcome. Obesity influences not only the chance of conception but also the response to fertility treatment, and increases the risk of miscarriage, congenital anomalies and pregnancy complications in addition to potential adverse effects on long term health of both mother and infant (Balen and Anderson, 2007). Overweight and obesity are significant and increasing health problems associated with increased risks of morbidity, quality of life, and metabolic and reproductive health consequences. In women, being overweight or obese is associated with impaired fertility and decreased chance of conception both in natural and assisted reproductive technology births. During pregnancy, overweight and obesity are associated with increased risk of adverse maternal and infant health outcomes (Alonan, Dodd, Nisenblat, and Norman, 2011).

There is also a general misconception in Nigeria that obesity is a sign of affluence (Ojofeitimi, Adeyeye, Fadiora, Kuteyi, Faborode, Adegbenro, Bakare, Setiloane, and Towobola, 2007). Ojofeitimi et al, (2007) found that in spite of the higher education of their subjects in a university community in Southwestern Nigeria, many of the respondents believed that being obese gives respect and that it is a sign of good living.
This study will provide the avenue to assess the level of knowledge of women of reproductive age on risk factors and health implications of obesity and also their attitudes towards obesity.

1.2 Statement of Problem

The World Health Organisation (WHO, 2011) estimates that globally 1.5 billion adults are overweight and 500 million are obese. Overweight and obesity are on the rise in Africa and might take epidemic proportions in the near future (Ziraba, Fotso, and Ochako, 2009). In Nigeria, nearly one in four women is either overweight or obese (16.0% overweight and 6.0% obese). Overweight and obesity increases by age from 7.0% among women age 15-19 to 34.0% among women age 40-49. More urban women (31.0%) than rural women (17.0%) are overweight or obese. (National Population Commission, Nigeria and ICF Macro, 2009). Obesity which was previously thought to have low prevalence in Nigeria because of its association with wealth and affluence has risen in prevalence over the last decade to levels that now constitute epidemic threat (Akpa and Maio, 2008).

Women have been suggested to be especially at risk (Monteiro, Moura, Conde, and Popkin, 2002; Kaiser-Leibovici, Atamna, and Lubin, 2007). Studies have identified that women of childbearing age are at a particularly high risk of weight gain and future obesity (Levine, Klem, and Kalarchian, 2007). Amongst this group, the highest risk has been identified in the 25-45 age range (Lombard, Deeks, Jolley, and Teede, 2009). Women are at higher risk because they are already faced with a number of health challenges that concerns their reproductive role; this will definitely be compounded when they are obese.

Casual observations among the target group for this study show high preference for excessive weight gain especially with the influence of social and cultural factors. Obesity is culturally acceptable in Nigeria and among the study population but it poses a great problem to people irrespective of their sex and age.

Women of reproductive age have a vital role to play in the family, therefore any harm to them will have a spiral effect not only on the family but also on the society at large. In view of the cultural acceptance of obesity, it is pertinent to evaluate the knowledge and attitude of women of reproductive age towards obesity. There is dearth of information on the knowledge women of reproductive age in Nigeria and in particular Oyo State has on risk factors and health implications of obesity. There is therefore the need to properly document women's knowledge and attitude towards obesity as this will provide baseline information for health promotion

and education programmes and helps policy makers in taking the right and appropriate actions on public health education.

1.3 Justification of Study

Public health education has been identified as one of the strategies that could be used to combat the increasing prevalence of obesity. Understanding the knowledge and attitude towards obesity can play an important role in guiding intervention strategies and health promotion programmes aimed at reducing the prevalence of obesity. Since man can only act on or engage in behaviour modification based on the information he has, it is therefore imperative to assess the knowledge women of reproductive age possess on obesity.

Prevention and management programmes for overweight and obesity include the availability of information about the reality of overweight and obesity among various population groups particularly women of reproductive age. Nitert, Foxcroft, Lust, Fagerno, Lawlor, O'Callaghan, Mcintyre and Callaway (2011) showed that increasing women's knowledge on the short and long term risks of obesity to their own and their offspring's health is likely to be an important first step in preventing obesity in pregnancy. It has been suggested that the readiness to make behavioural changes is preceded by knowledge about the causes and consequences of a disease.

Identifying the target for policy approaches requires some consideration. For example, prevention of obesity in children is an important element of obesity prevention (Kumanyika, Jeffery, Morabia, Ritenbaugh, and Antipatis, 2002), but targeting children without also addressing parental obesity may not be an effective or viable solution. Therefore, targeting obesity prevention policies at childbearing women could offer a dual benefit - to both the mother and the child. This is the reason why women of reproductive age are the target for this study.

There is dearth of information on the knowledge of obesity among women of reproductive age in Oyo State and Nigeria at large. Therefore, it is necessary to properly document women's knowledge and attitude towards obesity as this will provide baseline information for

health promotion and education programmes and helps policy makers in taking the right and appropriate actions on public health education.

The purpose of this study therefore, is to assess the level of knowledge and attitude of women of reproductive age on risk factors of obesity and the implications of obesity on reproductive health. The result will be useful in planning the appropriate interventions needed in public health education. It will also help policy-makers and public health planners in the mobilisation and reallocation of resources for the control of the disease

1.4 Research Questions

The research will answer the following questions:

1. What is the consumption pattern of high caloric foods among women of reproductive age?
2. What is the attitude of women of reproductive age towards obesity?
3. What is the level of knowledge of risk factors to obesity among women of reproductive age?
4. What is the level of knowledge of women of reproductive age on the implications of obesity on reproductive health?
5. What is the nutritional status of the target population using anthroponetric measurements?

1.5 Broad Objective

The broad objective of the study is to assess the knowledge and attitude of women of reproductive age on the risk factors to obesity and its implications on reproductive health.

1.6 Specific Objectives

1. To assess the consumption pattern of high caloric foods among women of reproductive age.
2. To describe the attitude of women of reproductive age towards obesity.
3. To assess the level of knowledge of women of reproductive age on risk factors to obesity.

4. To assess the level of knowledge of women of reproductive age on the implications of obesity on reproductive health
5. To assess the nutritional status of the target population using anthropometric measurements.

1.7 Hypotheses

Based on the objectives of this study, the following null hypotheses were formulated

$H_{o}1$ There is no association between age of respondents and their waist-to-hip ratio.

$H_{o}2$ There is no association between age of respondents and their level of knowledge of risk factors to obesity.

$H_{o}3$ There is no association between level of education attained by respondents and their level of knowledge of risk factors of obesity.

$H_{o}4$ There is no association between age of respondents and their level of knowledge of implications of obesity on reproductive health.

$H_{o}5$ There is no association between respondents' waist-to-hip ratio and their consumption pattern of high calorie foods.

$H_{o}6$ There is no association between respondents' knowledge and their attitude towards obesity.

1.8 Operational Definition of Term

Women of reproductive age: these are women within the age range of 15-49 years (National Population Commission and ICF Macro, 2009).

1.9 Limitation of the Study

The sample used in this study is not a true representative of the entire population of Ibadan South-West Local Government area because it does not cut across all sexes and ages. The data on consumption pattern of high calorie foods was as reported and not as observed.

CHAPTER TWO

LITERATURE REVIEW

2.1 Global Perspectives on Obesity

In many developing countries, research and investment in health have been mainly devoted to infectious diseases, despite the growing need to address chronic diseases with more effort and resources (WHO, 2005). Deaths from infectious diseases, maternal and perinatal conditions, and nutritional deficiencies combined are projected to decline by 3.0% over the next 10 years, while at the same time deaths due to chronic diseases are projected to increase by 17.0% (WHO, 2005). As a result, it is estimated that of the projected 64 million deaths worldwide in 2015, 41 million (64.0%) will result from chronic diseases, unless urgent action is taken (WHO, 2005). Obesity is a chronic disease characterized by an excess of adipose tissue. It should be considered a serious medical condition that can lead to significant morbidity and mortality rather than a character flaw or personal weakness. Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health.

Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2). BMI values are age-independent and the same for both sexes. It is the most commonly used measure for monitoring the prevalence of overweight and obesity at population level. It is also the most commonly used way of estimating whether an individual person is overweight or obese.

BMI (kg/m^2) was categorized using the World Health Organization (WHO) definitions:

- Underweight: < 18.5 kg/m^2
- Normal: 18.5-24.9 kg/m^2
- Overweight: 25-29.9 kg/m^2
- Obese: ≥30 kg/m^2

Obesity was further sub-classified into

- Grade 1 (30-34.9 kg/m^2),
- Grade 2 (35-39.9 kg/m^2) and
- Grade 3 (≥40 kg/m^2) (WHO, 2000)

Waist-to-hip ratio (WHR) is also used as a measurement of obesity, which in turn is a possible indicator of other more serious health conditions. WHR is the ratio of the circumference of the waist to that of the hips. It does not matter which units of measurement is used, as long as it is the same for each measure. Women who have WHR that is ≥0.85 are classified as having abdominal or truncal obesity.

2.2 Prevalence of Obesity

In Nigeria, although both under-nutrition and over-nutrition are common problems, obesity and its associated problems have been identified as a public health problem among rural women, men and children (Bakuri, Onyemelukwe, Sani, Hassan and Aliyu, 2007). World Health Organisation global estimates from 2008 revealed that more than 1.4 billion adults, 20 years and older, were overweight. Of these overweight adults, over 200 million men and nearly 300 million women were obese. Overall, more than 10.0% of the world's adult population was obese (WHO, 2013). Once considered a high-income country problem, overweight and obesity are now on the rise in low and middle income countries, particularly in urban settings It is now estimated that over 1 billion adults worldwide are overweight, 300 million of who are clinically obese (WHO, 2003). In 2011, more than 40 million children under the age of five were overweight. More than 30 million overweight children are living in developing countries and 10 million in developed countries (WHO, 2013). Lanigan and Power (2008) noted a high prevalence of overweight among 6-11 years old and reported that 75.0% of respondents view childhood obesity prevention as a high priority. The authors also reported that only 8.0% of parents take time to address the problem.

Based on measured weight and height, the prevalence of obesity in the United States was found to be 30.5% in a survey conducted from 1999 to 2000 while in the United Kingdom, the prevalence was 23.0% among men and 24.0% among women (Flegal, Carroll, Ogden, Johnson, 2002; British Heart Foundation, 2006). In the West African countries of Ghana and Republic of Benin, obesity was found in 13.6% and 18.0% respectively among adults (Amoah, 2003; Sodjinou, Aguey, Fayomi and Delisle, 2008) while Abubakari, Lauder, Agyemang, Jones, Kirk and Bhopal, 2008 reported a prevalence of 10.0% in the West African sub-region with the odd of being obese being 3.2 among urban women compared to men. The estimated prevalence of obesity, based on BMI, was 17.1% in women and 5.4% in men in

urban Cameroon in 2002 (Sobngwi, Mbanya, Unwin, Kengne, Fezeu, Minkoulou, Aspray and Alberti, 2002). The prevalence of obesity estimated from the CamBoD Baseline survey was particularly high in women, and increased markedly between 15–34 years and 35–44 years in both sexes. Prevalence of obesity was 5 times higher in females aged 15–34 years compared to men (Kamadjeu, Edwards, Atanga, Kiawi, Unwin, Mbanya, 2006). In South Africa, obesity in women seems to start at a young age: these data show that 10.0% of women were obese at the ages 15 to 24 years (Puoane, Steyn and Bradshaw 2002). Therefore, primary prevention of obesity must start at a young age, particularly for girls.

Obesity is becoming increasingly more prevalent in many African and other developing countries with nutritional transition as a result of urbanization, adoption of western lifestyles and demographic transition being implicated for the upsurge (Ojofeitimi et al., 2007; Levitt, 2008). It is currently estimated that as much as 20.0 – 50.0% of urban populations in Africa are classified as either overweight or obese (Kamadjeu et al., 2006; Sodjinou et al., 2008), and that by 2025 three quarters of the obese population worldwide will be in non-industrialized countries (WHO, 2005). In Nigeria, a 2008 WHO report puts the prevalence of overweight and obesity at 26.8% and 6.5% respectively (WHO, 2011). Amodu, Aliu and Lawson (2005) reported alarming prevalence rates of 71.0% in females and 50.5% in males in a population of hypertensive patients in Abuja, Nigeria. In another population based study of Type 2 diabetes, 83.0% were overweight or obese (Fadupin, Joseph, and Keshinro, 2004).

A study by a team of the Olabisi Onabanjo University Teaching Hospital (OOUTH), Shagamu in 2008, showed that the number of overweight Nigerians is growing at geometric proportion. The OOUTH team screened 512 volunteers and found that about two-thirds were either overweight or obese (Onche, 2008). In a cross-sectional study in southwestern Nigeria, Ojofeitimi et al., 2007 found that 21.2% of their respondents were obese. Wahab et al., 2011 found the prevalence of overweight (BMI $\geq 25 kg/m^2$) to be 53.3% with a statistically higher prevalence among females compared to males (62.0% vs. 41.9%). For obesity, the overall prevalence was 21.0% with a male to female ratio of approximately 1:3. Also, grades 1 and 2 obesity were significantly higher among females compared to males while the only seven subjects with grade 3 obesity were females. The report also revealed that results of

multivariate analysis showed that women are at about 6.1 folds higher risk of being obese compared to men. This finding is also quite similar to what has been documented in other parts of Africa (Amoah, 2003; Sodjinou et al., 2008; Manorell, Khan, Hughes, Grunimer-Strawn, 2004). The prevalence of obesity in semi-urban dwelling adolescents in Nigeria is as high as 13.2% (Ejike, Ugwu and Ezeanyika, 2010) and this does not bode well for any developing country, especially since obesity tracks into adult life with its co-morbid conditions (Nader, O'Brien, Houts, Bradley, Belsky, Crosnoe, Friedman, Mei and Susman, 2006) and affects productivity negatively.

As a consequence of the obesity epidemic, the proportion of severely obese women of childbearing age has increased considerably, which prompts research in the consequences for reproductive health of these women (Nohr et al., 2009). Gender plays an important role in influencing the rates of overweight and obesity between men and women in that woman are generally more overweight than men. According to the national survey of 1998 undertaken in all population groups in South Africa, one third of men and more than one half women were overweight and obese (Puoane et al., 2002).

2.3 Risk Factors of Obesity

While the causes of the obesity epidemic are simple in principle i.e. an imbalance between energy consumption (diet) and energy expenditure (physical activity), in reality the problem is complex and the result of an interaction between genetic, lifestyle, and environmental factors (Booth, Pinkston, and Poston, 2005). Physiologically, obesity can only develop if food consumption is high and/or energy expenditure is low, resulting in positive energy balance across months or years. However, there are many pathways to obesity (Kopelman, Jebb, Butland, 2007), all of which involve the interaction of the biological with the social. The major risk factor or cause of overweight and obesity is a positive energy imbalance in which energy intake exceeds energy expenditure (Caballo, DeBruyne, and Whitney, 2003). The positive imbalance between energy intake and energy expenditure can be attributed to a number of factors including: socio-demographic and socio-economic factors (Moreno, Tomas, Gonzalez-Gross, Bueno, Perez-Gonzalez, and Bueno, 2004), eating practices and nutritional

knowledge (Steyn, Myburgh, and Nel. 2003; Kruger, Venter, Vorster, and Margetts. 2002) and decreased physical activity (Steyn et al., 2003; Kruger et al., 2002). Socio-demographic factors that may contribute to overweight and obesity include gender, ethnicity, age, education level, place of residence and socio-economic status (Kruger et al., 2002). Socio demographic factors may also contribute to inadequate physical activity, including a sedentary lifestyle which often leads to overweight and obesity (Moreno et al., 2004; Kruger et al., 2002).

Family history of obesity is shown to be a main predictor for obesity (Bouchard, Tremblay, Bouchard and Perusse, 2007; Wu, Hong, Sun, Sunk, Rao and Chu, 2003; Magnusson and Rasmussen 2002). It represents not only genetic susceptibility, shared environment, and common lifestyles, but also the interactions among them. The genes inherited from one's parents have strong effects on one's weight. If parents are enduring from obesity, then their children have more chances to become obese. Genes support obesity and it may become family problem for most of the families.

The factors leading to this widespread increase in obesity have been suggested to include economic growth, modernization, westernization of lifestyles (including foods higher in fats and decrease in exercise levels), and the globalisation of food markets (Haddad, Al-Na'Aitah, and Umlouf, 1999; Popkin, Lu, and Zhai, 2002; Kerkadadi, 2003; Hawkes, 2005; Hawkes, 2006). Increasing rates of obesity across the world have been broadly attributed to environments which are obesogenic (French, Story, Jeffrey, 2001; Brownell, 2002; Hill, Wyatt, Reed, Peters, 2003). The major contributing factor is the obesogenic environment where with increased urbanization fatty foods become increasingly accessible and physical activity decreases (Simkhada, Poobalan, Simkhada, Arnairaj, Aucott, 2009). Low levels of physical activity are associated with an increased risk of obesity (Erlichman, Kerbey and James, 2002), obesity being uncommon among occupational groups that undertake high levels of physical activity during working hours. Obesogenic environments not only discourage physical activity but also encourage inactivity both occupationally and during leisure time (Brownell, 2002; Hill and Wyatt, 2005). There has been a great decline in occupationally related activity since the turn of the 20th century (Popkin, Duffey and Gordon-Larsen, 2005).

The widespread ownership of televisions, computers and cars, and the supermarket system of food retail all facilitate obesogenic behaviour. The increased use of automobiles and public transportation systems encourage inactivity, while increased time spent watching television, playing electronic games, and/or using computers has increased sedentary obesogenic behaviour of both adults and children (Brownell, 2002). The high prevalence of a sedentary lifestyle, resulting from the proliferation of labour-saving machinery and contrivances, is a major environmental factor contributing to the development and maintenance of obesity in western societies.

There are many complex behavioural and societal factors that combine to contribute to the causes of obesity. Butland, Jebb, Kopelman, McPherson, Thomas, Mardell and Parry (2007) referred to a "complex web of societal and biological factors that have, in recent decades, exposed our inherent human vulnerability to weight gain". For simplicity the Foresight obesity map designed by Butland et al., 2007 has been divided into 7 cross-cutting predominant themes which represents the major factors contributing to obesity, they include:

- Physiology/Biology: contains a mix of biological variables e.g. genetic predisposition to obesity, level of satiety and resting metabolic rate. It is an individual's staring point i.e. the influence of genetics and ill health.
- Individual activity: consists of variables such as an individual's level of recreational, domestic, occupational and transport activity, parental modeling of activity and learned activity patterns. It involves the type, frequency and intensity of activities an individual carries out, such as cycling vigorously to work every day.
- Physical activity environment: includes variables that may facilitate or obstruct physical activity such as cost of physical exercise and perceived danger in the environment. It is the influence of the environment on an individual's activity behavior. For example, a decision to cycle to work may be influenced by road safety, air pollution or provision of a cycle shelter and showers.
- Societal influences/social psychology: captures variables that have influence at the societal level, such as education, media availability and consumption and television watching. It also includes variables related to societal attitudes to weight such as social

acceptability of fatness and importance of ideal body-size image. It is the impact of society, for example the influence of the media, education, peer pressure or culture.

- Individual psychology: contains variables that describe a number of psychological attributes from self-esteem and stress to demand for indulgence and level of food literacy. It also contains variables related to the kind of parenting style prevalent in families with children, level of parental control and level of children's control of diet. For example a person's individual psychological drive for particular foods and consumption patterns, or physical activity patterns or preferences.
- Food production: includes many drivers of the food industry such as pressure for growth and profitability, market price of food, cost of ingredients and effort to increase efficiency of production. It also includes variables reflecting the wider social and economic situation, such as purchasing power and societal pressure to consume. It is the influence of the food environment on an individual's food choices; for example a decision to eat more fruit and vegetables may be influenced by the availability and quality of fruit and vegetables near home.
- Food consumption: includes many characteristics of the food market in which consumers operate and reflects the health characteristics of food products, such as the level of food abundance and variety, the nutritional quality of food and drink, the energy density of food, and portion size. It entails the quality, quantity (portion sizes) and frequency (snacking patterns) of an individual's diet.

Outside the circle of public health advocacy discussions, scientists widely and readily acknowledge that multiple factors contribute to obesity including but not necessarily limited to genetic, dietary, economic, psychosocial, reproductive, and pharmacologic factors (McAllister, Dhurandhar, Keith, Aronne, Barger, Baskin, Benca, Biggio, Boggiano, Eisenmann, Elobeid, Fontaine, Gluckman, Hanlon, Katzmarzyk, Pietrobelli, Redden, Ruden, Wang, Waterland, Wright and Allison, 2009). Age is another factor which contributes to increase in weight gain. As age increases, metabolic rate decreases, it is therefore required to take lesser food because when a person has lesser metabolic rate and he eats too much, the result is overweight/obesity.

2.4 Implications of Obesity on Reproductive Health

Overweight and obesity are the fifth leading risk for global deaths. At least 2.8 million adults die each year as a result of being overweight or obese. In addition, 44.0% of the diabetes burden, 23.0% of the ischaemic heart disease burden and between 7.0% and 41.0% of certain cancer burdens are attributable to overweight and obesity (WHO, 2013). Approximately 2.5 million deaths globally are attributable to obesity, of which one third occurs in developing countries (Boutayeb, 2005). Overweight and obesity are linked to more deaths worldwide than underweight. For example, 65.0% of the world's population live in countries where overweight and obesity kill more people than underweight (this includes all high income and most middle income countries) (WHO, 2013).

Epidemiologic studies have revealed a clear association between obesity and the risks for cardiovascular disease, non-insulin dependent diabetes mellitus, certain forms of cancer, gallstones, some respiratory disorders, osteoarthritis, and an increase in overall mortality (Pi-Sunyer, 1993). It is also linked to higher rates of certain types of cancer (Sturm and Wells, 2001). Studies have reported that overweight and obese adults are at an increasing risk for high blood pressure, high blood cholesterol, cardiovascular disease, diabetes, breast cancer, gall bladder disease, depression, joint disease, and other related problems (Niswender, Clegg, Morrison, Morton and Benoit, 2004; Satcher, 2002). Weight reduction helps to reduce the risk and severity of most of the conditions that are associated with obesity, requiring as little as 5.0% to 10.0% weight loss (CDC, 2003).

The risk of diabetes mellitus (DM) increases with the degree and duration of being overweight or obese and with a more central or visceral distribution of body fat. Increased visceral fat enhances the degree of insulin resistance associated with obesity (Bray, 2003). The Nurses' Health Study followed 84,000 female nurses for 16 years and found that being overweight or obese was the single most important predictor of DM (Maggio and Pi-Sunyer, 2003). An increased risk of DM was seen in women with BMI values >24 and a waist-to-hip ratio >0.76 (Carey, Walters and Colditz, 1997). Obesity is an independent risk factor for the development of coronary artery disease (CAD) in women and is an important modifiable risk factor for prevention of CAD. Abdominal obesity may be more harmful in women than BMI or weight alone. Waist circumference is an independent risk factor for developing CAD in

both normal-weight women and overweight women (Weiss, 2009). The Interheart global case-control study of 6787 women from 52 countries found that abdominal obesity was more predictive of myocardial infarction than was BMI alone (Anand, Islam and Rosengren, 2008).

Obesity and overweight are common conditions that have consequences not only on general health but also to a great extent on reproductive health. The impact of obesity on reproduction starts at a young age. Obese girls frequently experience the onset of puberty at a younger age than their normal-weight peers (Lash and Armstrong, 2009). In addition, obesity may alter the quality of oocytes and embryos (Robker, 2008). Some studies demonstrate increased female sexual dysfunction in obese patients, whether caused by the physical or psychological impacts of obesity on female sexuality (Shah, 2009). Obesity contributes to anovulation and menstrual irregularities, reduced conception rate and a reduced response to fertility treatment. Obesity is frequently associated with disturbances in the menstrual cycle. Cross-sectional studies indicate that 30.0% to 47.0% of overweight and obese women have irregular menses (The Practice Committee of American Society for Reproductive Medicine, 2008).

Weight loss can improve the fertility of obese women by the return of spontaneous ovulation, thus leading to the recommendation of implementing weight-loss interventions (diet, exercise, medication, treatment) as initial management of infertile overweight and obese women (Norman, Noakes, Wu, Davies, Moran, and Wang, 2004). Obesity also increases miscarriage and contributes to maternal and perinatal complication (Zain and Norman, 2008). Compared with normal-weight patients, obese women patients have a higher prevalence of infertility. They have higher rate of early miscarriage and congenital anomalies, including neural tube defects. Besides the coexistence of pre-existing diabetes mellitus and chronic hypertension, obese women are more likely to have pregnancy-induced hypertension, gestational diabetes, thrombo-embolism, macrosomia, and spontaneous intrauterine death in the latter half of pregnancy (Satpathy, Fleming, Frey, Barsoom, Satpathy and Khandalavala, 2008).

Obesity is greatly linked to reproductive health especially in women. Maternal obesity is related to a significantly higher risk for complications during pregnancy, including a higher rate of delivery and surgical difficulties, hypertension, thromboembolism, and gestational

diabetes which also contribute to foetal complications such as congenital malformations, macrosomia, and antepartum stillbirth (Robinson, O'Connell, Joseph, and McLeod, 2005; Yu, Teoh, and Robinson, 2006). Obesity is associated with an increased risk of maternal mortality, gestational diabetes mellitus, thromboembolism, pre-eclampsia and postpartum haemorrhage. Obesity also complicates operative delivery; it makes operative delivery more difficult, increases complications and paradoxically increases the need for operative delivery (Norman and Reynolds, 2011). A large body of data already links pre-pregnancy obesity with a number of foetal and maternal complications, including sub-fertility, preeclampsia, gestational diabetes, foetal death, macrosomia and complicated deliveries (Bacten, Bukusi and Lambe, 2001; Bolumar, Olsen, Rebagliato, Saez-Lloret and Biasnu, 2000; Sebire, Jolly, Harris, Wadsworth, Joffe and Beard, 2001). Obesity has become a major health problem across the world. In women, it is known to cause anovulation, subfecundity, increased risk of foetal anomalies and miscarriage rates. The majority of studies have described an increased risk for gestational hypertension, preeclampsia, and gestational diabetes associated with obesity (Lu, Rouse, DuBard, Cliver, Kimberlin and Hauth, 2001; Kieffer, 2000, Sebire et al., 2001). An increased risk of foetal macrosomia and large-for-gestational age neonates has been observed with maternal obesity (Lu et al., 2001, Kieffer, 2000, Sebire et al., 2001). Weiss, Malone, Emig, Ball, Nyberg, Comstock, Saade, Egglerman, Carter, Craigo, Carr and D'Alton (2004) found that both obese and morbidly obese patients have a significantly increased risk for birth weight greater than 4500g

In pregnancy, the cost of prenatal care is 5 times higher for overweight women. An Australian study reported that 34.0% of the total samples of pregnant women in that study were overweight or obese and they had increased adverse maternal and neonatal outcomes, resulting in increased costs of obstetric care (Callaway, Prins, Chang and McIntyre, 2006). After birth, obese women have higher postpartum weight retention than other women (Gunderson, Abrams and Selvin, 2001); they are less likely to succeed breastfeeding (Donath and Amir, 2008). Obesity is found to be strongly associated with both failures to initiate and sustain full breastfeeding, especially in the heaviest women (Li, Jewell and Grummer-Strawn, 2003; Baker, Michaelsen, Sorensen and Rasmussen, 2007; Manios, Grammatikaki, Kondaki, Ioannou and Anastasiadou, 2009; Nohr et al., 2009). Maternal obesity is associated with a

decreased intention to breastfeed, decreased initiation of breastfeeding, and decreased duration of breastfeeding (Hilson, Rasmussen and Kjolhede. 2004).

Obese women are also less likely to breastfeed for mechanical as well as physiological reasons, removing a fundamental safeguard against long-term weight gain for themselves and their children (Jevitt, Hernandez, and Groer. 2007). These early life factors among many others, make it more likely that the children of obese mothers will themselves be overweight or obese, or at greater risk of becoming overweight or obese adolescents and adults (Perez-Pastor, Metcalf, Hosking, Jeffery, Voss, and Wilkin, 2009). Obese women are at greater risk of a delay in milk production, which may be related to decreased rates of breastfeeding initiation. One study found that obese women had lower prolactin responses to suckling in the first week compared with normal weight women (Baker et al., 2007). There is also evidence that excess body fat may impair mammary gland development before conception and during pregnancy by hormonal and metabolic effects (Liu, Smith, Dobre and Ferguson, 2010).

The finding of (Kieffer, 2000; Lu et al., 2001; Schiff et al., 2001) showed that increased caesarean delivery rate for obese and morbidly obese nulliparous patients has implications for their intra-operative and postoperative complications. Operative complications for obese and morbidly obese patients include excessive operative blood loss greater than 1000ml, an increased operative time, and increased incidence of postoperative wound infection. The effect of this increased risk of caesarean delivery on pregnancy outcome in obese patients may therefore be compounded by the associated surgical complications (Weiss et al., 2004).
There is a high prevalence of obese women in the infertile population and numerous studies have highlighted the link between obesity and infertility. In women going for assisted reproduction the effects of obesity on egg quality, embryo quality, clinical pregnancy, live birth rates are controversial (Sathya, Balsubramanyam, Gupta and Verma, 2010). Fedorcsak, Storeng, Dale, Tanbo and Abyholm (2000) showed that obesity, independent from hyperinsulinaemia, was related to lower oocyte recovery on in-vitro fertilization (IVF) and increased total follicle stimulating hormone (FSH) requirements for stimulation.

Thus, excess weight appears to have a major impact on reproductive performance and obesity can compromise reproductive outcome in a variety of ways.

1. Menstruation: increased risk for amenorrhea, oligomenorrhea, and menorrhagia due to ovulatory dysfunction.
2. Infertility: increased risk for infertility and anovulation; poor response to fertility drugs.
3. Miscarriage: increased risk for miscarriage, both spontaneously and after infertility treatment.
4. Pregnancy and labour: increased prevalence of pregnancy-induced hypertension, gestational diabetes, thromboembolism, urinary tract infections, induction of labour, instrumental delivery, caesarean section, anesthetic and postoperative complications including uterine infections.
5. Neonatal morbidity/mortality: increased risk to the foetus of macrosomia, potentially leading to birth trauma; increased risk of neonatal admission to the intensive care unit; increased risk of neonatal death.
6. Congenital anomalies: increased risk for the fetus of neural tube defects and heart defects. (Ogbuji, 2010)

Obesity may have several short-term consequences (e.g. social discrimination, lower quality of life, increased cardiovascular risk factors, diseases like asthma) (Reilly, Methven, McDowell, Hacking, Alexander, Stewart and Kelnar, 2003) and long-term consequences (e.g. persistence of obesity, increased morbidity, a higher prevalence of cardiovascular risk factors in adulthood) and causes an important economic burden (Wang and Dietz, 2002)

Obesity also carries serious implications for psychosocial health, mainly due to societal prejudice against fatness (Jay, Kalet, Ark, McMacken, Jo Messito, Richter, Schlair and Sherman, 2009). The impact of obesity on social functioning and economic well-being can be as devastating as the medical consequences. Men who are obese are less likely to be married. Obese women not only marry less, but also complete fewer years of schooling and have lower incomes (and more have incomes below the poverty level) (Gortmaker, Must and Perrin, 1993). Emotional suffering may be among the most painful aspects of obesity. American society emphasizes physical appearance and often equates attractiveness with slimness, especially for women. Many think that obese individuals are gluttonous, lazy, or both, even

though this is not true. As a result, obese people often face prejudice or discrimination in the job market, at school, and in social situations. Feelings of rejection, shame, or depression are common (Wellman and Friedberg, 2002).

While various strategies for weight reduction, including diet, exercise, pharmacological and surgical intervention exist, lifestyle modification continues to be of paramount importance (Zain and Norman, 2008). Dietary modifications included changes in food service preparation, delivery and promotion by limiting the amount of total and saturated fat and cholesterol within the meals served (Coleman, Tiller and Sanchez, 2005). As accurate risk perception of the health impacts of obesity motivates behavioral change, we need to have a greater understanding of risk perception as well as other motivators and enablers to improved health-related behaviors that will lead to a reduction in obesity (Teede et al., 2010).

2.5 Women's Knowledge and Attitude towards Obesity

An attitude is "a relatively enduring organization of beliefs, feelings and behavioural tendencies towards socially significant objects, groups, events or symbols" (Hogg and Vaughan, 2005). Fabrigar, Petty, Smith and Crites (2006) reported that when confronted with a behavioural choice, people sometimes engage in inference processes regarding how informative their attitude are for the behavior in question. This inferential process is said to be influenced by properties of attitude relevant knowledge. It was supported by the fact that attitude exerted a stronger impact on behavioural intentions when knowledge underlying attitude was of high-behavioural relevance than when it was of low-behavioural relevance.

Faber and Kruger (2005) reported that nearly all the participants (96.0%) in their study conducted in a rural South African village agreed that overweight was caused by a biological disorder, 30.0% agreed that overweight was caused by poor eating habits, and only 9.0% agreed that eating too much food caused it. The study also revealed that only a few participants believed that obesity is caused by behavioural factors such as eating too much food or a lack of exercise, factors that they had no control over were seen as the biggest cause of obesity. Nitert et al., (2011) reported that 57.0% of the women in their study knew that being very obese prior to pregnancy increased the overall risk of pregnancy and birth

complications. Over 75.0% of their respondents identified that obese women have an increased risk of overall complications, including gestational diabetes and hypertensive disorders of pregnancy compared to women of normal weight. More than 60.0% of the women asserted that obesity would increase the risk of caesarean section and less than half identified an increased risk of adverse neonatal outcomes.

Kruger and van Aardt (1998) reported in their study conducted in South Africa that knowledge of obese black women of the causes of obesity, the relationship between obesity and health, and ways of combating obesity was reasonably extensive. All participants in Shoneye, Johnson, Steptoe and Wardle (2011) study carried out in the UK had fairly good knowledge of the causes, consequences and treatment of being overweight. Across all groups, the women believed that overweight was both portrayed and perceived as 'unattractive'. White women also associated overweight with negative character traits and poor quality of life. When asked about the causes of being overweight, all groups described features of an obesogenic environment: using car, all the food available on the high street and home comforts designed to make people sit down. Majority of the respondents in the study conducted by Huda, Yousif and Israa (2012) revealed that obesity is a major health problem in Iraq.

Shene-Pin, Tzu-Yin, Sung-Ling and Yi-Wen (2007) showed that obese women considered obesity to be more unattractive and that it leads to more difficulty in finding a job than did the normal weight women. About 62.0% - 84.0% of both groups (normal weight and obese women) strongly agreed/agreed that obese women are clumsy, lazy and unhealthy. This agrees with that of Laura (1995). Neumark-Sztainer, Story, and Harris (1999) also showed that approximately one-fifth of their respondents viewed obese persons as more emotional, less tidy, less likely to succeed at work, and as having different personalities than non-obese persons. Puoane et al., (2002) mentioned that overweight and obesity in women in the Black population is thought to reflect on a husband's ability to care for his wife and family. The finding that 45.0% of the participants in Faber and Kruger (2005) study agreed with the statement that fat women are well cared-for by the their husbands is similar to that of an earlier study by Kruger and Van Aardt (1998), which showed that 40.0% of obese women stated that fat women are well cared-for by their husbands.

A further complexity to the possible prevention and management of obesity in Africans relates to their traditional and cultural perceptions concerning body size. Mvo, Dick and Steyn (1999) have shown that being overweight has many positive connotations in the African community in South Africa. This qualitative research identified that being obese is perceived to reflect affluence and happiness in many sectors of the African population. In addition, with the explosive increase in prevalence of African people with full-blown AIDS, obesity is seen to reflect persons who are healthy and without Human Immunodeficiency Virus/AIDS (Clark, Niccohu, Kissinger, Peterson and Bouvier, 1999). Dawkins, McMickens, Findlay and Pace (2010) reported that Community leaders exhibited very good knowledge on the general questions relating to obesity. Majority (93.3%) of their respondents reported that the problem of obesity is a combination of genetic, metabolic, behavioural, environmental and socioeconomic factors while 94.4% indicated that overweight and obesity result from an imbalance of excessive caloric consumption. Almost 100.0% of community leaders reported that high blood pressure, diabetes, and heart disease are all associated with overweight and obesity. Approximately 21.0% saw no association between obesity and cancer.

2.6 Nutritional Status and Anthropometric Measurement

Anthropometry is the study and technique of taking body measurements, especially for use in a comparison or classification basis. Anthropometry is a widely used, inexpensive and non-invasive measure of the general nutritional status of an individual or a population group. The four building blocks or measures used to undertake anthropometric assessment are age, sex, height and weight. Each of these variables provides one piece of information about a person. When they are used together they can provide important information about a person's nutritional status. Adult anthropometrics have not been standardized in terms of reference data or choice of indicators for risk and response assessment as they have been for children. As noted in various sources, there is no recommended indicator or assessment approach for adult nutritional status (Cogill, 2001).

The evaluation of fatty mass and definitions of overweight and obesity use a range of approaches, some of which are complex or invasive, and are inapplicable outside of

specialized clinical practice to identify candidates for weight management (Ribeiro-Filho, Faria, Azjen, Zanella and Ferreira, 2003; Stolk, Wink, Zelissen, Meijer, van Gils and Grobbee, 2001; Yoshizumi, Nakamura, Yamane, Islam, Menju, Yamasaki, Arai, Kotani, Funahashi, Yamashita and Matsuzawa, 1999). In routine clinical practice and epidemiological studies the most commonly used measure to define overweight and obesity is the Body Mass Index.

2.7 Consumption Pattern of High Caloric Foods

Food consumption pattern has been observed to be influenced by socio-economic factors including sex, income, and occupation, type of house and source of cooking energy. In order to maintain healthful diets, Jama (2002) asserted that a variety and balance of foods from all food groups and moderate consumption of all food items is very important. Variety in the diet implied choosing a number of different foods within any given food group, rather than eating the "same old thing" day after day.

It is generally accepted to characterize fast food as that which is designed for ready availability, use or consumption, and is easily reached and or in nearby locations (DGAC, 2010). This type of food is often offered in establishments that have drive-through windows, a limited menu, no formal wait staff, the food preparation process is highly mechanized, and offerings are prepared prior to ordering (Jeffery, Baxter, McGuire and Linde, 2006). Ebbeling, Sinclair, Pereira, Garcia-Lago, Feldman and Ludwig (2004) revealed that fast food is correlated with obesity, it is important to note the characteristics of many of the offerings at fast food establishments include oversized portions, high energy density, highly processed, high fat content, and large amounts of refined starch and added sugars. Obesity is positively associated with dietary factors such as increased fat intake, low fibre consumption, increased hidden sugars in prepared food, reduced amount of unrefined sugars and inadequate fruit and vegetable intake. The daily eating pattern also seems to be associated with weight change especially high caloric diet (Chantel, Everitt, Birtwistle and Stevenson 2002). According to Troches and Giugliani (2005), food and nutrient intake is related to weight gain, not only in terms of the volume of the food ingested, but also in terms of the composition and quality of the diet. Harnack, Stang and Story (1999) reported that soft drink consumption may be

replacing more nutritious beverages such as milk and possibly fruit juices among adolescents, their study also revealed that high soft drink consumption was positively associated with higher energy intakes, which may have contributed to childhood obesity. Jeffery and French (1998) revealed that estimated frequency of fast-food meals was positively associated with energy intake in women. The frequency of consuming restaurant food was positively associated with increased body fatness in adults (McCrory, Fuss and McCallum, 1999).

Mattes (1996) reported that when humans ingest energy-containing beverages, energy compensation is less precise than when solid foods are ingested. In another study in humans, DiMeglio and Mattes (2000) found that when 15 healthy men and women were given a carbohydrate load of 1880 kJ/d (450 kcal/d) as a calorically sweetened soda for 4 weeks, they gained significantly more weight than when the same carbohydrate load was given in a solid form as jelly beans. In South Africa, Kruger et al. (2002) found that high fat and energy intakes may be among the contributing factors to a high prevalence of obesity seen in black South African women living in urban areas. Another study in South Africa showed that urban women consumed more sugar and fewer legumes than rural women and the prevalence of overweight and obesity was also higher among urban women compared to the rural women (Steyn, Senekal, Brits and Nel, 2000). Tricles and Giugliani (2005) reported that not eating breakfast in the morning as well as a low frequency of milk, fruit and vegetable consumption, were practices associated with increased body weight and obesity among primary school children. Food consumption patterns of the mother prior to conception, during pregnancy and lactation affects the reproductive cycle and health of the newborn infant. A mother with poor food consumption patterns have the risk of delivering a baby that is physically and mentally handicapped (Ajala and Meludu, 2006).

2.8 Conceptual Framework

The conceptual framework used in this study is the Ecological Model (McLeroy, Bibeau, Steckler and Glanz, 1988).

Ecological models for health education focus attention on the individual and the social environmental factors as the targets for any interventions. An ecological outlook suggests a "reciprocal causation" between the individual and the environment. The ecological model has

5 levels which include: individual, interpersonal, organizational, community and public policy.

Individual: this level identifies the biological characteristics and personal factors that inform compliance with certain behavioural norms and also influence the likelihood of gaining excess weight and becoming obese. Individual factors which influence obesity include knowledge, attitudes, behaviours, beliefs, perceived barriers, disabilities or injuries, age, level of education, socioeconomic status and occupation.

Interpersonal: this level examines relationships that may increase the risk of becoming obese. It includes formal and informal factors (family, peers, social networks, associations) that influence knowledge on obesity among women. Relationships with family, friends, neighbours, co-workers and acquaintances are important influences on the health behaviour of individuals An individual can belong to one or more social networks that contribute to their range of experiences.

Organizational: this focuses on the policies, rules, regulations, and informal structures (worksites, schools, and religious groups), practices and physical environment of healthcare facilities and other organizations that could influence decisions of women.

Community: this fourth level addresses the norms operating within the society, it explores settings in which social relationship occurs and seeks to identify the characteristics of these settings that are associated with becoming obese. It focuses on the factors, beliefs and efforts of community members that influence the choice of unhealthy weight gain.

Public policy: This refers to legislation, regulatory or policy making actions that have the potential to affect obesity. These are often formal legal actions taken by local, state or federal governments but also can be informal local policies or rules in settings such as schools or workplaces. Policy includes urban planning policies, active transport policies, education policies and health policies. It deals with developing and enforcing policies at all levels of governance and laws that regulate or support healthy actions. It also involves public awareness and advocacy for change.

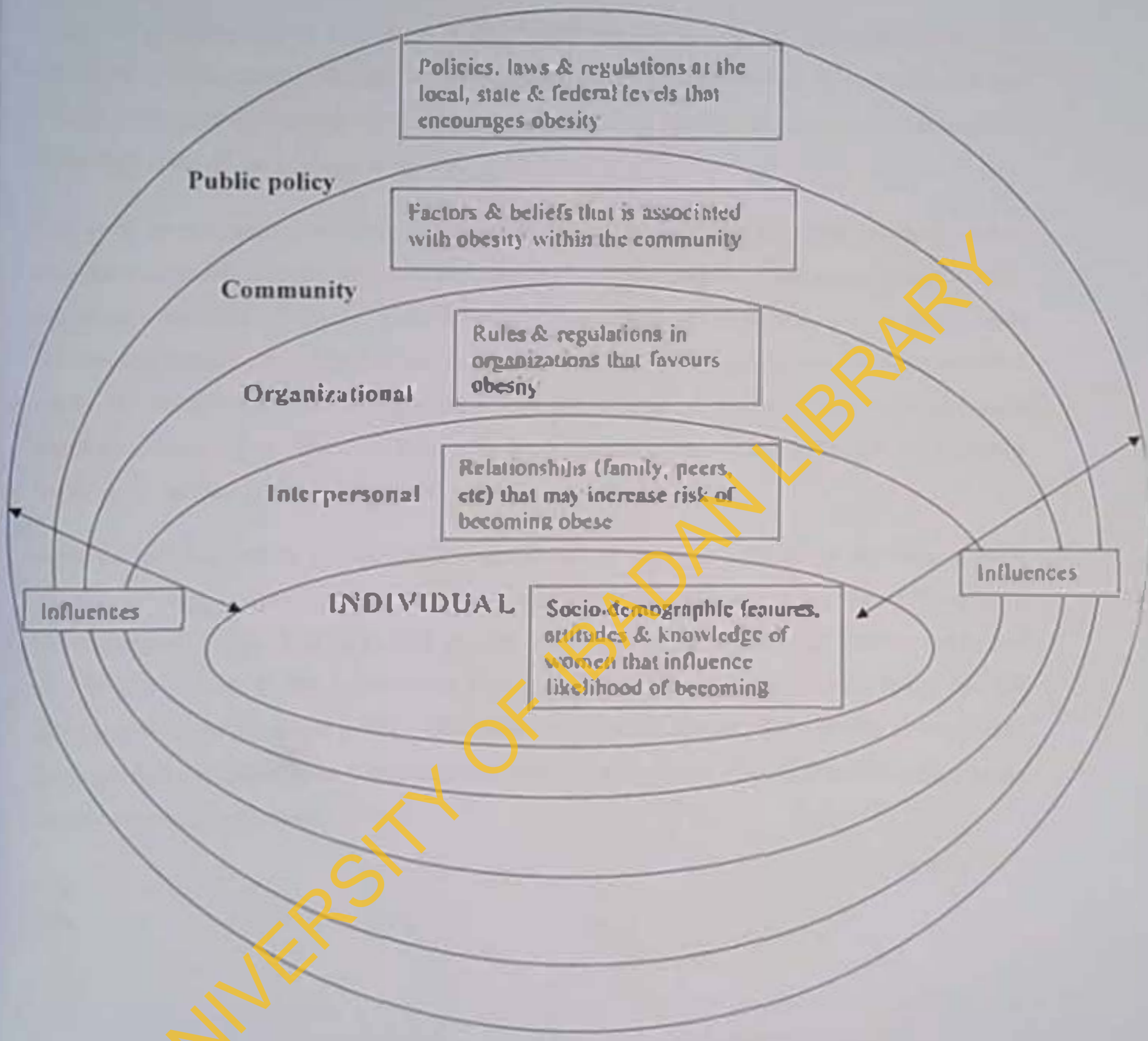

Figure 2.1: Framework of ecological model (adapted and modified). McLeroy et al., 1988

2.9 Application of the Framework to the Study

Only the individual level was used in this study. The scope of this study lies within the influence of intrapersonal factors on knowledge and attitude of women of reproductive age. The development of research instruments and formulation of hypotheses was done around the individual level of the ecological model.

The socio-demographic characteristics used in this study include age, marital status, level of education attained, religion, ethnicity and occupation among others. Selected (age and level of education attained) of these characteristics were used as independent variables when formulating hypotheses. The knowledge and attitude of the target group are also variables under the intrapersonal or individual level of the ecological model. These variables were assessed separately in order to have a better understanding of the influence of women's knowledge and attitude on their likelihood of becoming obese.

Another variable which may influence likelihood of becoming obese is the consumption pattern of high caloric foods. This was assessed with the aid of a Food Frequency Questionnaire (FFQ). This is to find out the consumption pattern of high caloric foods and also to test if there is any relationship between consumption of high caloric foods and the BMI and WHR of the target group. The nutritional status of the target group was also assessed by using some anthropometric measurements; this was to document the prevalence of obesity among women of reproductive age.

CHAPTER THREE
METHODOLOGY

3.1 Study Design

This study was a descriptive cross sectional survey among women of reproductive age in Ibadan South West Local Government Area, Ibadan.

3.2 Study Area

The study area was Ibadan South West Local Government Area (LGA) of Oyo State. This Local Government was carved out of the defunct Ibadan municipal government on 27th August, 1991. It has a land mass of about 244.55 km² and it comprises of 12 political wards. Females account for 50.7% of the total population of 283,098 at the 2006 census. Its administrative headquarter is at Oluyole Estate within the office complex of the former Ibadan Metropolitan Planning Authority along M.K.O Abiola Way, Ibadan. The LGA is bounded by Ibadan North West and Ido LGA in the north, Oluyole LGA in the south, Ido LGA in the west and by Ibadan North and Ibadan South East LGA in the east. The Yorubas are the major ethnic people residing in the LGA, with a large population of Igbo traders and some Hausa people too. Most of the inhabitants of this area are in the middle class with some belonging to the upper and lower classes. Major occupations of residents in the LGA include civil servants, artisans, traders, self-employed and teachers.

3.3 Study Population

The study population for this research consisted of women of reproductive age ranging from 15-49 years according to National Population Commission and ICF Macro, 2009. All women who fall between the age brackets stated above either married or not were included in the study while men and women with ages outside the stated age brackets were excluded from the research.

3.4 Determination of Sample Size

The sample size for the study was determined by using Leslie Kish (1965) formula

$$n = \frac{z^2 pq}{d^2}$$

Where

- n = sample size,
- z = standard normal deviate set at 1.96 which correspond to 95% confidence interval,
- p = prevalence rate of obesity among women of reproductive age in urban Nigeria set at 9.5% (National Population Commission and ICF Macro, 2009)
- q = 1.0 –p,
- d = degree of accuracy set at 0.03

Sample size (n) = $\frac{1.96^2 \times 0.095 \times 0.905}{0.03^2}$

= 367

In order to adjust for non-response and also to increase the sample size, 36% of the sample size (133) was added

n = 133+367

= 500

3.5 Sampling Procedure

A three-stage sampling technique was used to select participants for this study.

Stage I: this involved using stratified random sampling technique to select 500 respondents from the LGA. The following procedures were taken under this stage

- Procedure 1: the communities in the LGA were stratified into three (high, medium and low) using population densities from National Population Commission as a basis for stratification.
- Procedure 2: proportionate sampling was used to select communities from each stratum.

- Procedure 3: random sampling was used to select the allocated communities from each stratum.
- Procedure 4: proportionate sampling method was then used in determining the number of respondents selected from each density stratum and communities within the stratum.

Stage 2: simple random technique was used to select a cluster each from the communities.

Stage 3: purposive sampling was then used in selecting women resident in the clusters who were willing to participate in the study.

3.6 Instruments for Data Collection

Focus group discussion (FGD) guide and semi structured questionnaires were used for qualitative and quantitative data collection respectively.

The FGD guide (Appendix 1) was used for preliminary data collection and also to obtain information that could be included in the quantitative data collection tool (questionnaire)

The semi structured questionnaire (Appendix 2) had six sections; section A addressed the socio demographic characteristics of respondents while section B documented the pattern of consumption of high calorie foods among respondents. Section C assessed the attitude of women towards obesity, with an 11 item attitude scale using a 5-point likert scale with 22 points. Nutritional status of respondents was assessed in section D using anthropometric measurements. Section E focused on knowledge of risk factors to obesity, it had a 6-item knowledge scale of 12 points. Section F assessed level of knowledge of respondents on implications of obesity on reproductive health. It contained a 7-item knowledge scale of 14 points

3.7 Method of Data Collection

Research assistants (4) were recruited to help in the process of data collection. The assistants were trained for two days in order to enable them have a good understanding of the aim of the study and the research instruments. They were also trained on adhering to all ethical provisions guiding the study. The research assistants underwent several role plays, demonstrations and return-demonstrations to assess their preparedness for the use of research

instruments, as the questionnaire is interviewer administered. They were also involved in the pretest study.

Six focus group discussions were done among women of reproductive age in the study area. Three in high density population areas (Agbokojo, Beere and Odo ona), two in medium density population areas (Oke ado and Orita challenge) and one in low density population area (Oluyole estate). One trained moderator and one note-taker conducted the discussions. Each FGD session was tape-recorded with permission of the participants; this was later transcribed and the information used to support the report generated by the note-taker. The questionnaire was administered over a period of two weeks. A maximum of ten questionnaires were completed by each research assistant daily. At the end of each day, the questionnaires were reviewed for completeness in completion by the investigator.

Anthropometric measurements included weight, height, waist and hip circumference. Body weight was measured in kilogram using Harson scales (Model 1189 black). Individuals wore light clothing, no shoes and stood in the middle of the scale, without touching anything, with their body equally distributed on both feet. Before each participant was weighed, the scale was zeroed, this act contributed to validity of the technique used and consequently assured reliable results. Height was measured in metres using portable locally manufactured stadiometers. Respondents stood upright on a flat surface without shoes, with their heels together, arms to the side, legs straight, shoulders relaxed, and eyes looking straight ahead. The respondents placed their heels, buttocks, scapulae and the back of the head against the vertical board of the stadiometer while headboard was lowered with pressure to compress the hair upon the highest point of the head. Body mass index (BMI) was calculated as weight in kilograms divided by the square of the height in meters. Waist circumference was taken at approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest (WHO, 2008) while the hip circumference was taken at the widest portion of the buttocks and measured to the nearest centimetre using a flexible tape. Waist-to-hip ratio was calculated by dividing the waist circumference by the hip circumference.

3.8 Validity of Instrument

Validity of the instrument was done by consulting relevant literatures, adapting relevant questionnaires and subjecting the instrument to critical review by Public Health Lecturers. It was further validated by translation of instrument into Yoruba language and back into English language in order to ensure the appropriate meaning and interpretation of the question items. A pretest was done among women of reproductive age in Ibadan North LGA because it shares similar characteristics with the study area. The Focus Group Discussion guide was pretested to assess the understanding of the questions. Information obtained from the discussions was used to review the quantitative instrument.

3.9 Reliability of Instrument

Reliability was ensured through the use of Cronbach Alpha statistical test on the pretest survey. The pretest assessed the reliability of the instrument and the ability of women to understand the questions in the questionnaire. It was also done to evaluate the adequacy of the instrument in measuring the aims and objectives of the study. The pretested questionnaires were subjected to measures of internal consistency with the use of Cronbach Alpha co-efficient analysis to determine its reliability. A result showing correlation coefficient greater than 0.50 is said to be reliable and the pretest reliability co-efficient was 0.75.

3.10 Data Management and Analysis

In order to ensure adequate data management, the questionnaires were serially numbered for control and recall purposes. Each answered questionnaire was immediately and carefully cleaned. This involved manual editing to ensure completeness, consistency, accuracy and uniformity.

A good coding guide was developed and used for coding the answered questionnaires. Consumption pattern of food items was categorized according to level of risk and on a scale of 0-56. Respondents with scores that fall within 0-28 had low risk pattern and were coded as 1 while >28 had high risk and were coded as 2. Respondents' attitude towards obesity was analyzed on a scale of 0-22. The coding for the score distribution on attitude towards obesity included code 1 (Positive) for 0-11 marks and code 2 (Negative) for >11-22 marks. Coding for the score distribution on knowledge of risk factors to obesity was classified such that scores between 0-7 were classified as poor and coded 1 while scores between 7-12 were

classified as good and coded 2. The scores on knowledge of implications of obesity on reproductive health were also classified as poor (0-8 marks) and good (>8-14 marks)

The data generated were carefully entered and analyzed by using the Statistical Package for Social Sciences (SPSS). The data was analyzed by using descriptive and inferential (Chi square and logistic regression model) statistics. The focus group discussions were recorded on audio tapes, transcribed and analyzed using thematic approach. The results were presented in appropriate graphical illustrations, diagrams and tables.

3.11 Ethical Consideration

The study was conducted in accordance to the stipulated ethical norms concerning the use of human participants in research. The following steps were taken to ensure ethical conduct of this research.

Ethical approval was obtained from Oyo State Research Ethical Review Committee, Ministry of Health. The approval was obtained before starting the research.

Adequate information about the study was given to the respondents before administering the instruments. Informed consent was then obtained from respondents who were willing to participate in the study.

All information supplied by respondents were treated as confidential and used for this study only. Participants were informed that their names were not required and that their responses would be kept secret. The collected data were protected to prevent loss and unauthorized access to them.

CHAPTER FOUR

RESULTS

4.1 Socio-demographic Characteristics of Respondents

About a quarter (22.2%) of the respondents was aged 25-29 years while respondents aged 40-44 and 45-49 years were 6.6% and 9.2% respectively. Respondents who were married were 50.6% while 41.4% were single. Majority of the respondents were Christian (79.0%) and Yoruba (84.0%). More than half (60.0%) of the respondents had biological children, 40.0% did not have biological children while 52.8% and 6.2% were in a monogamous and polygamous marriage respectively. The respondents' husband's occupations were Artisans (12.8%), Traders (18.2%), Civil servants (12.8%), Professionals (10.8%), Students (0.2%) and 0.2% were not working. Details of the socio-demogmphic characteristics of the respondents are presented on Table 4.1.

4.2 Respondents' Consumption Pattern of High Caloric Foods

Risky pattern of high calorie food consumed by the respondents are soups (11.8%), snacks (15.4%), fried food (15.2%), cocoa-based drinks/beverages (24.8%), soft drinks (19.6%), fatty meat (8.0%), confectionaries (16.6%) and nuts (11.8%). Details of the consumption pattern of highlighted high calorie food items are presented on Table 4.2. Majority (88.6%) of the respondents had an overall low risk pattern of consumption of high calorie foods while 11.4% had a high risk pattern of consumption. The mean score for consumption of high caloric foods was 19.9 ± 7.0

Responses from the Focus Group Discussions revealed varied pattern in the consumption of high calorie food items. Majority of the discussants however submitted that they consume soft drinks than other food items that could predispose one to excess weight gain. Below are some of the responses from the discussions:

"I don't like soft drinks and may not drink it at all in a week. I eat the other food items once in a while".

"I can take soft drinks 4 times in a week. I love all these food items and I eat them always".

"I don't eat fresh fish but I love ice cream and soft drinks. I do not even know the number of times I take soft drinks in a week".

"I eat these food items once in a while".

Table 4.1: Socio-Demographic Characteristics of Respondent (N=500)

Variables	No.	%
Age group		
15-19	54	10.8
20-24	95	19.0
25-29	111	22.2
30-34	97	19.4
35-39	64	12.8
40-44	33	6.6
45-49	46	9.2
Marital status		
Single	207	41.4
Married	253	50.6
Divorced	2	0.4
Widow	16	3.2
Separated	5	1.0
Co-habited	17	3.4
Level of education attained		
Primary	32	6.4
Secondary	177	35.4
Tertiary	280	56.0
Apprenticeship	11	2.2
Religion		
Christianity	395	79.0
Islam	104	20.8
Traditional	1	0.2
Ethnicity		
Yoruba	420	84.0
Igbo	42	8.4
Hausa	2	0.4
Minority group	33	6.6
Non national	3	0.6
Respondent's occupation		
Artisans	82	16.4
Traders	197	39.4
Civil servants	78	15.6
Professionals	26	5.2
Students	100	20.0
Not working	17	3.4

Table 4.2: Respondents' Consumption Pattern of High Calorie Food Items According to Level of Risk (N=500)

Variables	No.	%
Soup		
Very risky	1	0.2
Risky	59	11.8
Moderately risky	278	55.6
No risk	162	32.4
Snacks		
Very risky	28	5.6
Ricky	77	15.4
Moderately risky	201	40.2
No risk	194	38.8
Fried food		
Very risky	18	3.6
Risky	76	15.2
Moderately risky	210	42.0
No risk	196	39.2
Cocoa-based drinks/Beverages		
Very risky	70	14.0
Risky	124	24.8
Moderately risky	196	39.2
No risk	110	22.0
Soft drinks		
Very risky	57	11.4
Risky	98	19.6
Moderately risky	195	39.0
No risk	150	30.0
Fatty meat		
Very risky	12	2.4
Risky	40	8.0
Moderately risky	151	30.2
No risk	297	59.4
Confectionaries		
Very risky	43	8.6
Risky	83	16.6
Moderately risky	206	41.2
No risk	168	33.6
Nuts		
Very risky	8	1.6
Risky	59	11.8
Moderately risky	166	33.2
No risk	267	53.4

- Code 1 (Very risky) Daily: 7 times/week
- Code 2 (Risky) Often: 4-6 times/week
- Code 3 (Moderately risky) Occasionally: 2-3 times/week
- Code 4 (No risk) Rarely: once/week

4.3 Attitude of Respondents towards Obesity

The respondents who strongly agreed that obesity is not a symbol of richness and good living were 46.6%, 0.8% strongly disagreed while 2.4% were undecided. Majority (48.8%) of the respondents agreed that obese people are lazier than normal weight people while 41.2% agreed that obese people are very untidy. About a quarter (22.0%) of the respondents strongly disagreed that they like obese people than slim ones while 54.4% agreed that they were comfortable associating with obese people (details on Table 4.3).

The mean score of respondents on attitude towards obesity was 7.1 ± 3.4. Majority (90.4%) of the respondents had positive attitude i.e was favourably disposed towards obesity while only 9.6% had negative attitude towards obesity.

The result of the FGDs showed that majority of the discussants had negative attitude towards obesity unlike the result of the questionnaire. The discussants were particular about obese women being dirty and lazy. Responses to buttress this point are listed below:

"Everybody has body odour but for the obese people theirs is too much. They find it difficult to bathe".

"They are lazy and very untidy".

"I agree that they are dirty. They sweat profusely and this makes people around them uncomfortable".

"It all depends on the individual, some are lazy while some are not".

Some of the discussants also had divergent attitude when it comes to associating with obese people:

"How can I associate with a dirty person? I can't have them as friend".

"I can associate with them in order to correct them".

"They don't get married easily because they are not smart and they don't like themselves".

Other attitudes identified from the FGDs included lack of intelligence in obese people, snoring habit, sluggishness, etc.

"I have observed that they always snore and they get tired easily".

"Some of them can be smart. I once have a neighbour, who is very fat, but she usually packages herself well and she is very smart. Some obese women can be disorganised and they also look older than their age".

"They are not intelligent because fat has taken over their intelligence"

4.4 Knowledge of Respondents on Risk Factors to Obesity

The major risk factors/causes of obesity identified by the respondents were bad eating habit (71.2%), genetic predisposition (48.2%) and inactivity (24.6%); side effects of family planning methods (2.8%) and residual fat after child delivery (3.2%) were among the least identified causes of obesity while 5.6% did not know the causes of obesity (Figure 4.1).

Respondents identified that exercising (87.1%), good diet and eating habit (65.5%), depression (13.7%), not being sedentary (13.5%) and usage of drugs (11.4%) were factors that could not result into obesity (Figure 4.2). Majority (66.2%) accepted that high socioeconomic status could not result into becoming obese while 30.6% and 3.2% did not accept and did not know respectively. When asked if "constant exposure to adverts and marketing of high calorie foods may predispose to obesity if consumption is influenced by these", the responses were: Yes (71.8%), No (24.2%) and I do not know (4.0%).

Respondents who accepted that becoming obese is associated with one's lifestyle were 64.2% while 2.4% and 33.4% did not know and did not accept respectively. The common lifestyles identified by the respondents to be associated with obesity are presented in Figure 4.3.
The mean knowledge score on risk factors to obesity was 8.3 ± 2.5. Respondents with good knowledge were 62.0% while those with poor knowledge score were 38.0%.

Table 4.3: Attitude of Respondents towards Obesity. (N=500)

Variable	SA n(%)	A n(%)	U n(%)	D n(%)	SD n(%)
I do not consider obesity as a symbol of richness and good living	233(46.6)	237(47.4)	12(2.4)	14(2.8)	4(0.8)
I expect obese people to live normal lives	20(4.0)	216(43.2)	60(12.0)	179(35.8)	25(5.0)
I picture obese people as being lazier than normal weight people	93(18.6)	244(48.8)	72(14.4)	83(16.6)	8(1.6)
I see obese people as very untidy	71(14.2)	206(41.2)	111(22.2)	97(19.4)	15(3.0)
I like obese people than slim ones	10(2.0)	38(7.6)	86(17.2)	256(51.2)	110(22.0)
I see obesity as the worst thing that can happen to anybody	42(8.4)	152(30.4)	54(10.8)	218(43.6)	34(6.8)
I consider obese persons as confident as other people	13(2.6)	168(33.6)	106(21.2)	196(39.2)	17(3.4)
I consider obese people as not being healthy as non obese people	42(8.4)	271(54.2)	50(10.0)	128(25.6)	9(1.8)
I support that obese workers can be as successful as other workers	28(5.6)	235(47.0)	116(23.2)	112(22.4)	9(1.8)
I am comfortable associating with obese people	20(4.0)	272(54.4)	45(9.0)	142(28.4)	21(4.2)
I am sure that obese people are as happy as non obese people	18(3.6)	148(29.6)	140(28.0)	172(34.4)	22(4.4)

- SA: Strongly Agree
- A: Agree
- U: Undecided
- D: Disagree
- SD: Strongly Disagree

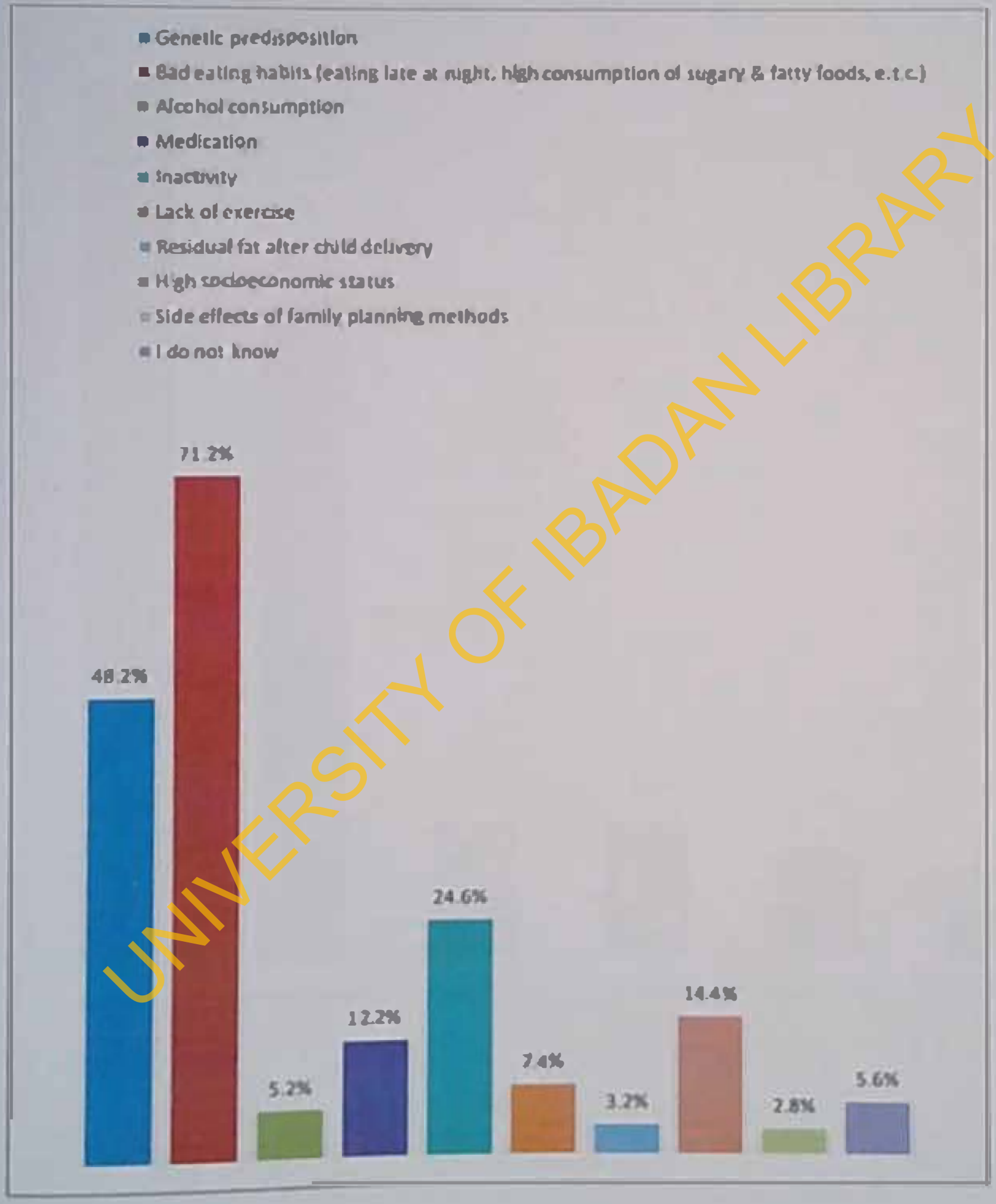

Figure 4.1: Perceived risk factors to obesity

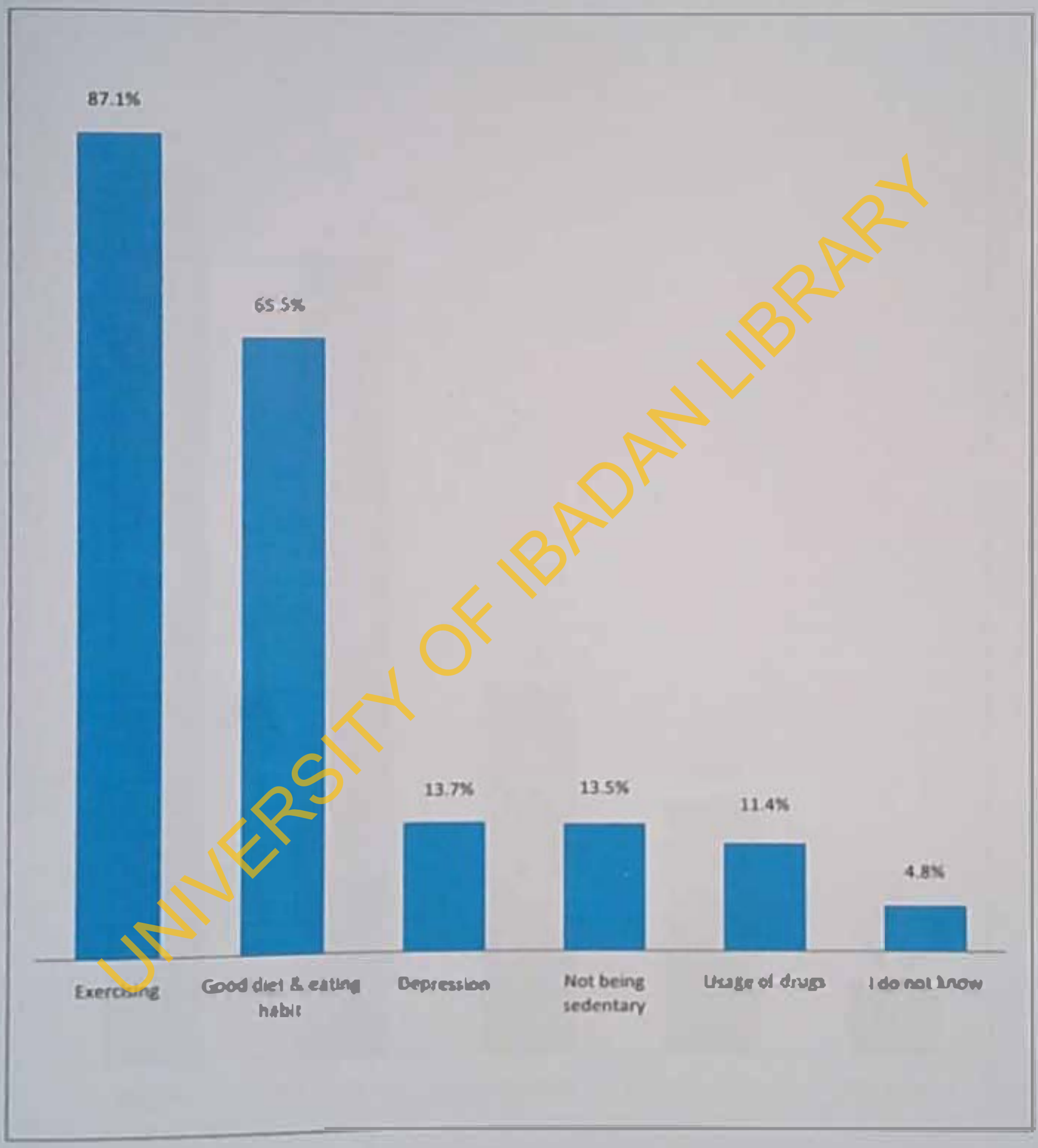

Figure 4.2: Perceived factors that could not result into obesity

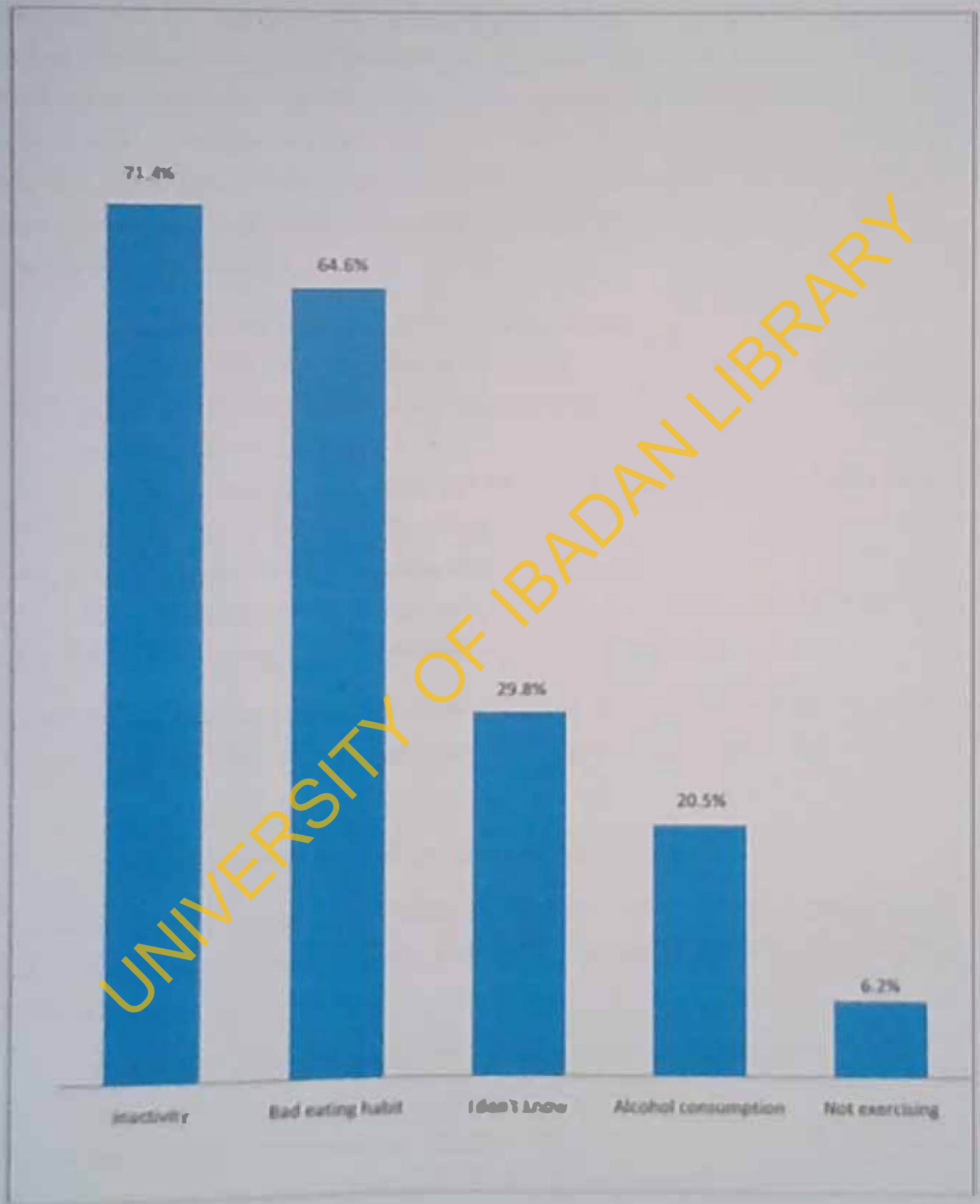

Figure 4.3: Perceived lifestyles identified to be associated with obesity

Responses from the focus group discussions (FGDs) revealed that majority of the discussants had good knowledge on the risk factors/causes of obesity which is in consonance with the results of the quantitative instrument. Most of the discussants agreed that bad eating habits such as high consumption of fatty and sugary foods and eating large portions of food especially late at night is a major cause of obesity. Others causes jointly agreed on included genetic inclination and high socioeconomic status. Some of the responses on causes of obesity among the discussants were:

"In my own perspective, you can become obese when you eat too much of meat because meat has fat, also when you eat without control or regulation. Some people may not eat too much but are obese because it is their nature. If nature is not included, overeating can cause obesity".

"Overeating causes obesity. If you eat too much, the body will make use of what it needs and the rest will be stored in the body as fat".

"Rest of mind and comfort is what makes one gain weight".

"Some people say obesity can be inherited but I don't believe that. No matter the family trait, if we exercise and eat well the body will be normal".

A few of the discussants also had different opinion about the contribution of sexual intercourse and side effects of drugs and family planning methods towards obesity.

"Constant sexual intercourse can also cause it".

"Family planning can cause obesity for those who are married".

Most of the discussants revealed that certain lifestyles were associated with becoming obese. Inactivity, laziness, promiscuity and bad eating habits were the common lifestyles identified by discussants.

"Bad diet like eating once and drinking many bottles of soft drinks".

"Eating always, not engaging in any activity except sleeping".

"Laziness and lack of activity are lifestyles that can make a woman become obese".

"Women who are promiscuous could also be exposed to becoming obese".

However, one of the discussants in group 5 said becoming obese is not influenced by one's lifestyle

> *"No lifestyle can make one to be obese, it is nature that determines whether you will be fat or not"*.

4.5 Knowledge of Respondents on Implications of Obesity on Reproductive Health

The leading reproductive health problems stated by respondents included infertility (54.4%), obstructed labour (33.0%) and delivery by caesarean section (26.0%) while fibroid (4.0%) and menstrual disorder (3.0%) were among the least identified reproductive health problem. A few (12.1%) of the respondents stated that there were no reproductive health problems associated with obesity while 49.5% do not know the reproductive health problems associated with obesity (Figure 4.4).

Respondents who indicated that they did not know the effects of obesity on menstrual cycle were 47.6% while 44.3% stated that obesity does not have effects on menstrual cycle. Some of the identified effects of obesity on menstrual cycle included excessive flow (13.4%), cessation of menses (5.9%) and offensive odour (3.0%). The identified effects of obesity on child delivery ranged from neonatal abnormalities (1.8%) to obstructed labour (50.7%); details are presented on Table 4.4. About half (52.8%) of the respondents did not agree that obesity may be associated with failure to initiate and sustain exclusive breastfeeding while 29.0% and 18.2% agree and did not know respectively. Few respondents (19.6%) indicated that obesity is not associated with increased risk of cancer, 44.0% did not know while 36.4% stated that obesity is associated with increased cancer risk. Effects of obesity on mother's health during pregnancy indicated by the respondents were fatigue (45.8%), eclampsia (42.2%), fever (19.8%) and gestational diabetes (8.2%). Some of the responses (16.3%) revealed that there was no effect while 46.4% did not know the effects of obesity on women's health in pregnancy (Figure 4.5).

The mean score of respondents on implications of obesity on reproductive health was 4.8 ± 3.0. Majority of the respondents (86.8%) had poor knowledge while just 13.2% had good knowledge on the implications of obesity on reproductive health.

However, one of the discussants in group 5 said becoming obese is not influenced by one's lifestyle.

"No lifestyle can make one to be obese, it is nature that determines whether you will be fat or not".

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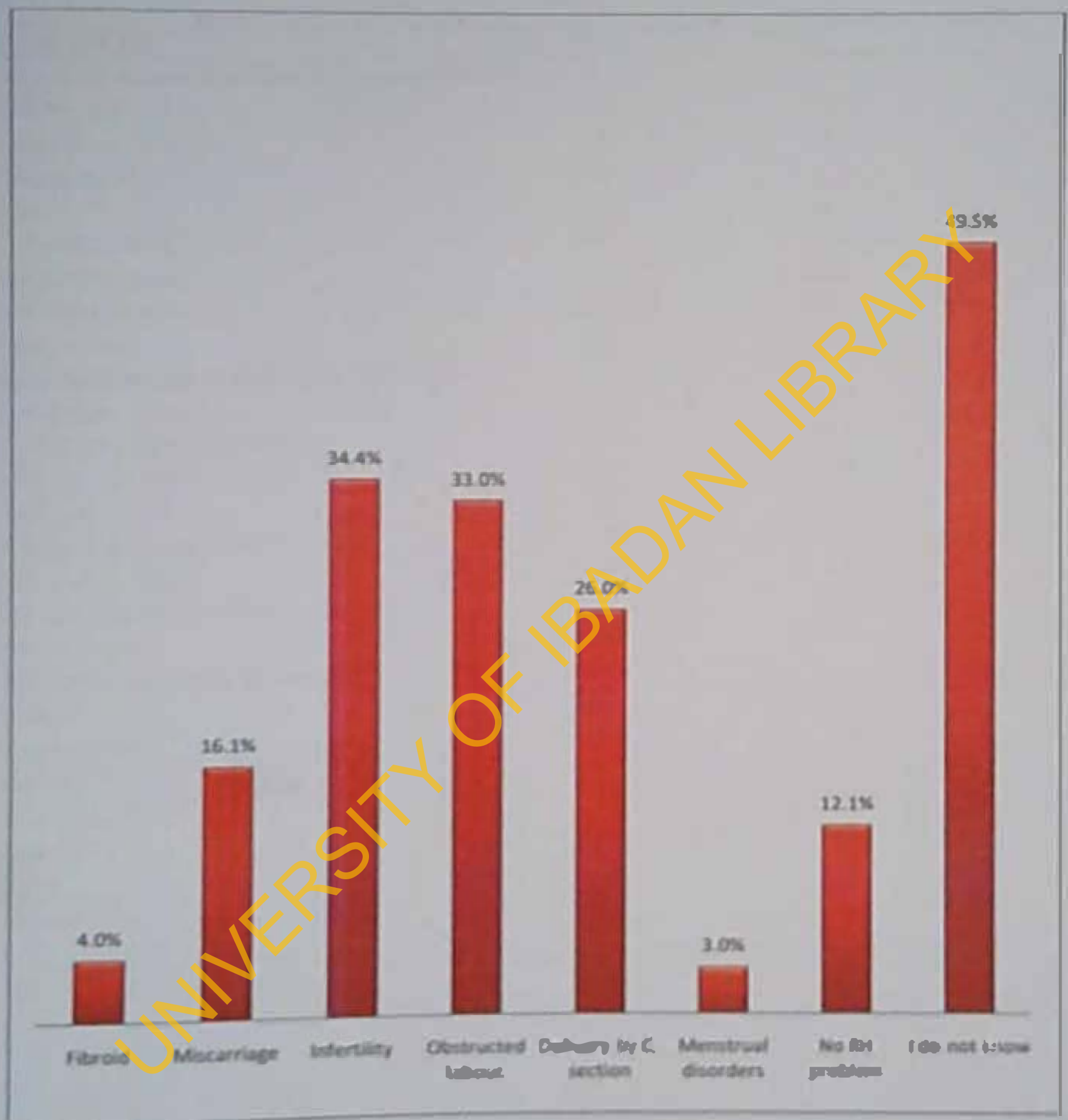

Figure 4.4: Reproductive health problems identified to be associated with obesity

Table 4.4: Knowledge of Respondents on Implications of Obesity on Reproductive Health

VARIABLES	n	%
Identified effects of obesity on menstrual cycle		
Excessive flow*	66	13.4
Cessation of menses*	29	5.9
Scanty flow*	15	3.0
Pain	21	4.3
Offensive odour	15	3.0
Irregular menses*	79	16.1
No effect on menses	218	44.3
I don't know	234	47.6
Identified effects of obesity on child delivery		
Obstructed labour*	251	50.7
Delivery by caesarean section*	229	46.3
Macrosomic baby*	14	2.8
Stillbirth	37	7.5
Neonatal abnormalities*	9	1.8
Microsomic baby	24	4.8
No effect on child delivery	82	16.6
I don't know	237	47.9
Identified examples of cancer		
Breast*	153	84.1
Endometrial*	16	8.8
Cervix*	34	18.7
Intestinal/colon*	12	6.6
Kidney*	27	14.8
Lung	13	7.1
Stomach	12	6.6
I don't know	95	52.2

NB: Multiple responses

* - Correct responses

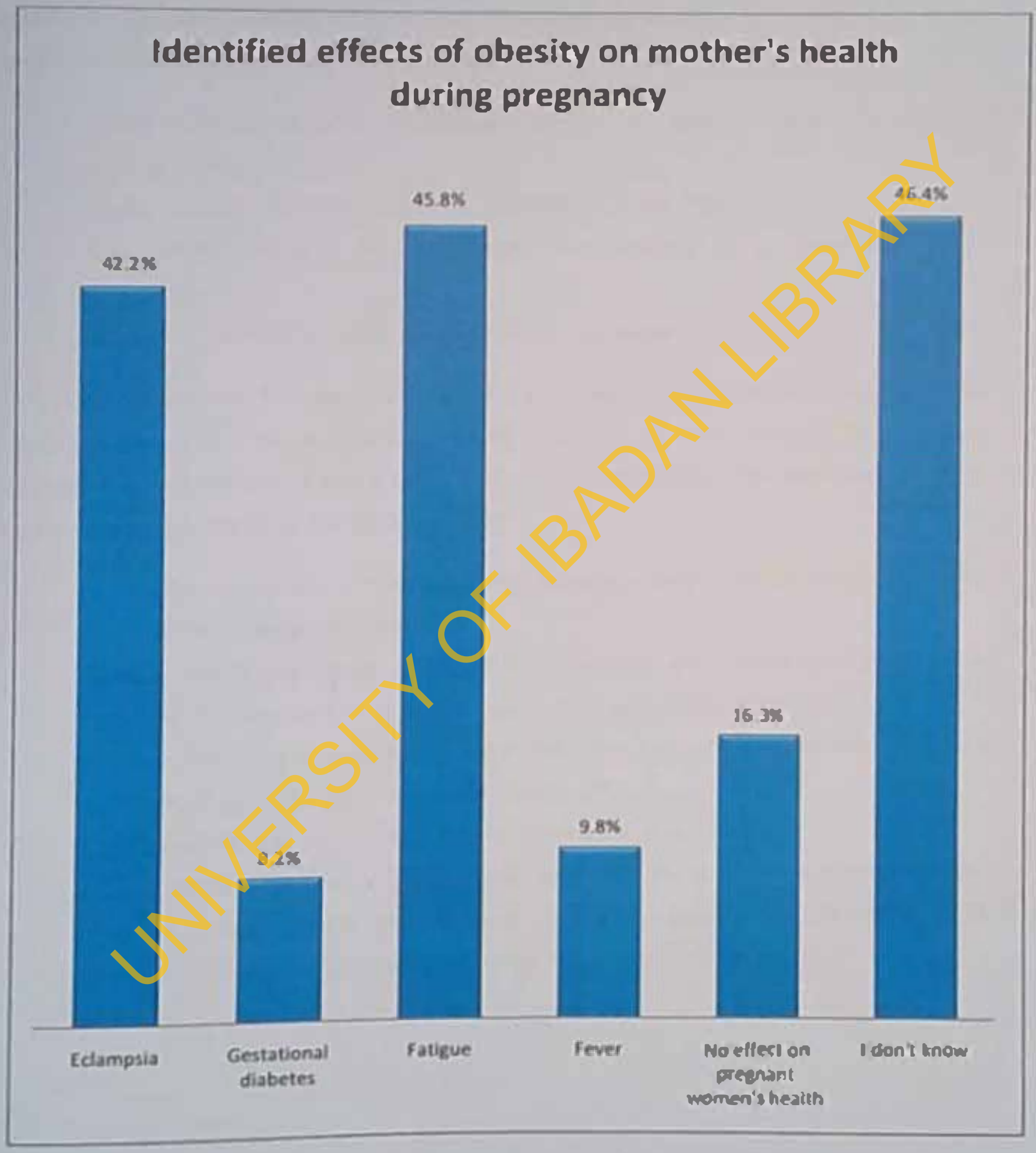

Figure 4.5. Identified effects of obesity on mother's health during pregnancy

The results from the FGDs indicated that all respondents unanimously agreed that there are no advantages in being obese. However, the respondents had different views on the side effects of obesity on women's health. Some of the respondents said obesity does not have negative effects on reproductive health while some did not know the negative implications. Below are some of the responses from the group discussions.

"There is no advantage at all because they can't do anything without sweating and gasping for breath".

"There is no advantage in being obese because they are useless".

"God is the controller of such things. obese women get pregnant and deliver normally".

"I have not heard of any side effects of obesity on menses".

However, different side effects were mentioned by the discussants that were sure obesity has negative implications on reproductive health. Majority of these respondents agreed on obstructed labour, infertility and a few on neonatal abnormalities and menstrual disorders. Some of the responses from the FGDs included:

"It can make a woman to have her period twice in a month and also cause big clots of blood to come out during menses".

"Excess weight gain causes too much fat in the body which leads to delay in getting pregnant. It is not good for a woman who has not given birth to be obese".

"Some obese women sleep on the baby while they are pregnant and this can lead to deformity in the baby when it is finally delivered".

"In most cases they give birth by operation because of too much fat".

"Obese women don't have energy to push and when the baby is about to be delivered their laps usually prevent the baby from coming out. Some babies die because of the stress, some are deformed while some may be lucky to be alive".

4.6 Respondents' Nutritional Status

The mean weight and height was 63.7 ± 13.0kg and 1.6 ± 0.1m respectively while the mean BMI was 25.0 ± 5.0kg/m^2. About half (49.6%) of the respondents were of normal weight, 4.4% were underweight while 27.4% and 18.6% were overweight and obese respectively (Figure 4.6).

The respondents' mean waist circumference was 83.9 ± 42.5cm while the mean hip circumference was 95.3 ± 10.2cm. The mean WHR was 0.9 ± 0.1.

Respondents who had low Waist-to-hip ratio (WHR) were 47.6% while 52.4% had high WHR

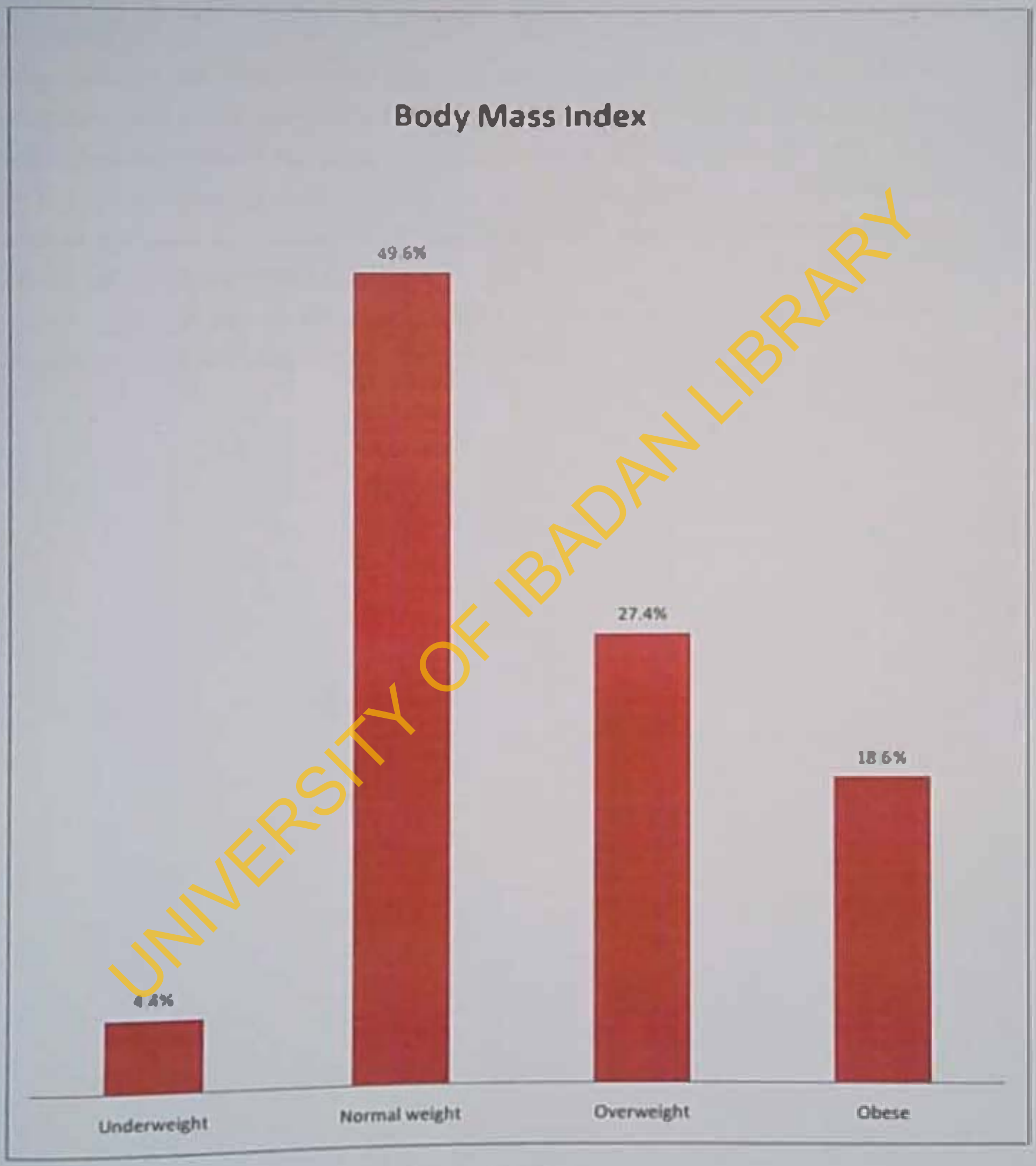

Figure 4.6: Respondents' body mass index distribution

4.7 Test of Hypotheses

4.7.1 Hypothesis One: There is no association between age group of respondents and their waist-to-hip ratio

When age group and WHR of respondents were cross-tabulated, result showed that 71.9% of respondents aged 35-39 years had high WHR as compared with 28.1% who had low WHR. This is consistent with the age group 45-49 years where 84.8% had high WHR while 15.2% had low WHR. Since the p-value is 0.00, we can therefore reject the null hypothesis and conclude that there is significant association between age group and waist-to-hip ratio of respondents (details on Table 4.5).

Logistic regression analysis (at 95%CI) further showed the level of association between respondents' WHR and age group (details on Table 4.6).

Table 4.5: Relationship between Age Group and WHR of respondents

Variable	WHR CATEGORY Low n(%)	High n(%)	Total	χ^2	df	p-value
Age group in years						
15-19	39(72.2)	15(27.8)	54(100.0)	74.7	6	0.00
20-24	63(66.3)	32(33.7)	95(100.0)			
25-29	64(57.7)	47(42.3)	111(100.0)			
30-34	42(43.3)	55(56.7)	97(100.0)			
35-39	18(28.1)	46(71.9)	64(100.0)			
40-44	5(15.2)	28(84.8)	33(100.0)			
45-49	7(15.2)	39(84.8)	46(100.0)			

Table 4.6: Level of Relationship between Age Group and WHR of respondents

Variable	p-value	OR(95% CI)
Age group (15-19 years as Indicator)		
20-24 years	0.46	1.32(0.64 - 2.75)
25-29 years	0.07	1.91(0.94 - 3.86)
30-34 years	0.00	3.4(1.7 - 6.9)
35-39 years	0.00	6.6(2.9 - 14.9)
40-44 years	0.00	14.6(4.7 - 44.7)
45-49 years	0.00	14.5(5.3 - 39.4)

4.7.2 Hypothesis Two: There is no association between age group of respondents and their level of knowledge of risk factors to obesity

Table 4.7 has the details on the Chi-square statistical analysis that showed there is an association between age group of respondents and their knowledge on risk factors of obesity ($p<0.05$); proving that we can reject the null hypothesis. When further subjected to Logistics regression, respondents aged 30-34 years were 2.6 times more likely to have higher knowledge on risk factors to obesity than those aged 15-19 years (OR 2.6, 95%CI: 1.3 - 5.2) and those aged 45-49 years were also 2.8 times more likely to have higher knowledge on risk factor to obesity than those aged 15-19 years (OR 2.8, 95%CI: 1.2 - 6.6) (details on Table 4.8).

Table 4.7: Relationship between Age Group and Knowledge on Risk Factors to Obesity

Variable	Knowledge category on risk factors of obesity			χ^2	Df	p-value
	Poor n(%)	Good n(%)	Total n(%)			
Age group in years						
15-19	27(50.0)	27(50.0)	54(100.0)	14.6	6	0.02
20-24	43(45.3)	52(54.7)	95(100.0)			
25-29	39(35.1)	72(64.9)	111(100.0)			
30-34	27(27.8)	70(72.2)	97(100.0)			
35-39	26(40.6)	38(59.4)	64(100.0)			
40-44	16(48.5)	17(51.5)	33(100.0)			
45-49	12(26.1)	34(73.9)	46(100.0)			

Table 4.8: Level of Relationship between Age Group and Knowledge on Risk Factors to Obesity

Variable	p-value	OR(95% CI)
Age group (15-19 years as indicator)		
20-24 years	0.58	1.21(0.62 - 2.36)
25-29 years	0.07	1.85(0.95 - 3.57)
30-34 years	0.00	2.59(1.30 – 5.19)
35-39 years	0.31	1.46(0.70 – 3.03)
40-44 years	0.89	1.06(0.45 – 2.53)
45-49 years	0.02	2.83(1.21 – 6.61)

4.7.3 Hypothesis Three: There is no association between level of education attained by respondents and their level of knowledge of risk factors of obesity

When the level of education attained by respondents and knowledge on risk factors to obesity was cross-tabulated, result revealed that 67.1% of respondents with tertiary education had good knowledge on risk factors to obesity as compared to 57.6% among those who had secondary education (details on Table 4.9). Therefore, there is also significant association between level of education attained by respondents and their knowledge on risk factors to obesity, this leads to the rejection of the null hypothesis.

Table 4.9: Relationship between Respondents' Level of Education and Knowledge on Risk Factors to Obesity

Variable	Knowledge category on risk factors of obesity			χ^2	Df	p-value
	Poor n(%)	Good n(%)	Total n(%)			
Level of education attained						
Primary	17(53.1)	15(46.9)	32(100.0)	8.9	3	0.03
Secondary	75(42.4)	102(57.6)	177(100.0)			
Tertiary	92(32.9)	188(67.1)	280(100.0)			
Apprenticeship	6(54.5)	5(45.5)	11(100.0)			

4.7.4 **Hypothesis Four:** There is no association between age group of respondents and their level of knowledge of implications of obesity on reproductive health

With p-value set at <0.05, there is no association between age group and level of knowledge of respondents on implications of obesity on reproductive health; we can therefore accept the null hypothesis (details on Table 4.10).

Table 4.10: Relationship between Age Group of Respondents and Knowledge on Implications of Obesity on Reproductive Health

Variable	Knowledge category on implications of obesity			χ^2	Df	p-value
	Poor n(%)	Good n(%)	Total n(%)			
Age group						
15-19	48(88.9)	6(11.1)	54(100.0)	11.9	6	0.07
20-24	89(93.7)	6(6.3)	95(100.0)			
25-29	90(81.1)	21(18.9)	111(100.0)			
30-34	84(86.6)	13(13.4)	97(100.0)			
35-39	53(82.8)	11(17.2)	64(100.0)			
40-44	32(97.0)	1(3.0)	33(100.0)			
45-49	38(82.6)	8(17.14)	46(100.0)			

4.7.5 Hypothesis Five: There is no association between respondents' waist-to-hip ratio and their consumption pattern of high caloric food.

When the waist-to-hip ratio of respondents and their consumption pattern of high caloric food were cross-tabulated, result showed that 89.5% of respondents with low WHR had a low risk consumption pattern of high caloric foods as compared with 87.8% who had high WHR (details on Table 4.11). With the p-value of 0.55, we can conclude that there is no association between WHR of respondents and their consumption pattern of high caloric food; and therefore accept the null hypothesis.

Table 4.11: Relationship between Waist-to-Hip Ratio of Respondents and Consumption Pattern of High Caloric Food

Variable	Risk category on consumption of high caloric food			χ^2	Df	p-value
	Low n(%)	High n(%)	Total n(%)			
WHR						
Low	213(89.5)	25(10.5)	238(100.0)	0.36	1	0.55
High	230(87.8)	32(12.2)	262(100.0)			

4.7.6 Hypothesis Six: There is no association between respondents' knowledge and their attitude towards obesity.

Table 4.12 has details on the Chi-square statistical analysis that showed there is no association between knowledge of respondents and their attitude towards obesity ($p=0.10$), proving that we can accept the null hypothesis.

Table 4.12: Relationship between Knowledge of Respondents and Attitude towards Obesity

Variable	Knowledge category on obesity			χ^2	DF	p-value
	Poor n(%)	Good n(%)	Total n(%)			
Attitude towards obesity						
Positive	177(39.2)	275(60.8)	452(100.0)	2.67	1	0.10
Negative	13(27.1)	35(72.9)	48(100.0)			

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This chapter focuses on the discussion of the key findings, conclusions and recommendations.

5.1 Socio-demographic Characteristics of Respondents

The study was carried out among women of reproductive age (15-49 years) as previous studies (Levine et al., 2007, Lombard et al., 2009) has shown that this group are at a particularly high risk of weight gain.

5.2 Consumption Pattern of High Calorie Food

Consumption pattern of high calorie food was documented with the aid of a food frequency questionnaire. The result showed that respondents had a very risky consumption pattern for beverages/cocoa-based drinks, soft drinks, snacks and fried foods. Forslund, Togerson, Sjostron and Lindross (2005) revealed from their study that women were more frequent snackers than men. This is also similar to the findings of Olumakaiye, Atinmo, and Olubayo-Fabiregun (2010) that showed that about 33.0% of their respondents consumed snacks daily but to a varying degree. Other research has suggested that because diets high in refined grains, added sugars, and added fats generally cost less than healthful diets composed of lean meats and fresh fruits and vegetables: consuming excessive amounts of these food items may result in overweight and obesity (Drewnowski, 2004; Richards and Smith, 2006; Hendrickson, Smith, and Eikenberry, 2006).

This study also revealed that majority (88.6%) of respondents consumed high caloric food items at a low risk. This shows that that consumption pattern of high caloric food among women of reproductive age in the study area is low but we cannot conclude that they consume healthy diet because the instrument used in documenting their feeding pattern as not standardized to make that conclusion. This study also reveals that there is also no relationship between the consumption pattern of respondents and their BMI or WHR. This is at variance with the findings of Prabhat and Begum (2012) which revealed that prevalence of central obesity was a common phenomenon in the majority of the selected women regardless of their

dietary practices. Duvigneaud, Wijndaele, Manon, Philip-paerts, Lefevre and Thomis (2007) and Vilela, Sichieri, Pereira, Cunha, Rodrigues, Gonçalves-Silva, Ferreira (2014) in their separate studies conducted among adult males and females showed that there is positive association between a high intake of fat and central adiposity (increased waist circumference and WHR)

5.3 Attitude of Respondents towards Obesity

Respondents (94.0%) did consider obesity as a symbol of richness and good living. They also tended to be comfortable associating with obese people with 54.4% agreeing with the statement that "I am comfortable associating with obese people". Respondents expressed the attitude that obese people are very untidy with 41.2% agreeing with the statement that "I see obese people as very untidy" while 16.6% disagree with the statement that "I picture obese people as being lazier than normal weight people".

Respondents tended to view obese persons as being healthy as non-obese persons with 25.6% disagreeing with the statement that "I consider obese people as not being healthy as non-obese people". This finding is at variance with Neumark-Sztainer et al., (1999) study that showed that school teachers tended to view obese persons as less healthy than non-obese persons. This study also showed that 30.4% of the respondents agreed with the statement that "I see obesity as the worst thing that can happen to anybody" which is similar to the findings of Neumark-Sztainer et al., (1999). Neumark-Sztainer et al., (1999) also submitted that 57.0% of their respondents agreed with the statement that "most obese people feel that they are not as good as other people" which is similar to what this study revealed with 39.2% of respondents disagreeing with the statement that "I consider obese persons as confident as other people". Few (29.6%) of the respondents in this study agreed that obese people are as happy as non obese people which differs from the findings of Kruger and Van Aardt (1998) study where 63.3% of their respondents agreed that obese people feel more unhappy than others.

This study revealed that majority (90.4%) of the respondents had positive attitude while only 9.6% had negative attitude towards obesity. This implies that majority of women of

reproductive age are favourably disposed to obesity. The acceptance of overweight and obesity can hinder the effectiveness of weight control programs.

5.4 Respondents' Knowledge on Risk Factors to Obesity

Results from the study revealed that bad eating habits, genetic predisposition, alcohol consumption, medication, inactivity, lack of exercise, residual fat after child delivery, high socioeconomic status and side effects of family planning were the factors that could result into obesity.

Butland et al., (2007) showed that obesity is caused by a complex web of societal and biological factors; this is supported by other studies (Kopelman et al., 2007; and Wijaszek, 2007). Majority (71.2%) of the respondents knew that bad eating habits is a major risk factor of obesity and this is supported by Simkhada et al., 2009 which showed that increased urbanization of fatty food and decreased physical activity are major contributory factors to obesity. Popkin et al., 2002 agreed that diets have shifted from traditional foods to a Western diet that includes processed foods, sugar, and highly saturated fats. Nutrition transition is seen as increased consumption of energy dense foods, as global food supply is becoming increasingly abundant, less expensive and more aggressively marketed, which, along with concomitant declines in physical activity (Ehlichman et al., 2002), is leading to higher prevalence of obesity (Nielsen et al., 2002, Drewnowski and Darmon, 2005).

Majority (87.1%) of the respondents agreed that engaging in regular exercise could help prevent excessive weight gain while 65.5% agreed that eating good diet could not result into obesity. When asked if one's lifestyle is associated with becoming obese, most respondents (64.2%) answered affirmatively. This is at variance with the report of Faber and Kruger (2005) that showed that only a few participants believed that obesity is caused by behavioural factors such as eating too much food or a lack of exercise. The lifestyles associated with becoming obese mentioned by respondents included alcohol consumption, indolence, not exercising and bad eating habit. This is in agreement with the findings of Wilding (2006), who reported that behavioural factors which may cause obesity included consumption of fast food, high fat diets, snacking, alcohol consumption, etc. McAllister et al., (2009)

acknowledged that multiple factors contribute to obesity including but not necessarily limited to genetic, dietary, economic, psychosocial, reproductive, and pharmacologic factors.

Most (62.0%) of the respondents had high knowledge of risk factors to obesity indicating that few people are unaware of the causes of obesity. This is supported by the finding of Kruger and van Aardt (1998) which revealed that knowledge of obese black women on the causes of obesity, the relationship between obesity and health, and ways of combating obesity was reasonably extensive. Arturo, Yolanda, Castillo-Ruiz, Gonzalez-Ramirez and Bacard (2012) also revealed that low income Mexican women had reasonably good knowledge on the causes of obesity. This study also revealed that there is an association between some selected socio-demographic variables (age and level of education) and knowledge of risk factors of obesity. It implies that the older and more educated a woman is, the higher the knowledge she possess on causes of obesity. Several studies (Arturo et al. 2012; Covic, Rouseil and Dziurawiec, 2007; Kersey, Lipton, Quinn, and Lantos, 2010) have also affirmed that being older than 30 years, living with a spouse and having more than six years of education were predictors of better knowledge about the causes and consequences of obesity.

5.5 Knowledge of Respondents on Implications of Obesity on Reproductive Health

Findings from this study revealed that the perceived reproductive health problems associated with obesity are fibroid, miscarriage, infertility, obstructed labour, delivery by caesarean section and menstrual disorder. Zain and Norman (2008) also submitted that obesity contributes to anovulation, menstrual irregularities, reduced conception rate, reduced response to fertility treatment, and increased miscarriage, maternal and perinatal complications

This study also showed that the effects of obesity on menstrual cycle were excessive flow, cessation of menses, scanty flow, menstrual pain, offensive odour and irregular menses. This is supported by report of Ogbuji (2010) that identified the reproductive outcome of obesity to include amenorrhea, oligomenorrhea and menorrhagia. The effects of obesity on mothers' health during pregnancy mentioned by participants in this study included fatigue (45.8%), eclampsia (42.2%), fever (9.8%) and gestational diabetes (8.2%). A large body of data already links prepregnancy obesity with a number of foetal and maternal complications, including

sub-fertility, preeclampsia, gestational diabetes, foetal death, macrosomia and complicated deliveries (Baeten et al., 2001; Bolumar et al., 2000; Sebire et al., 2001).

The results from this study also revealed that obstructed labour (50.7%), delivery by caesarean section (46.3%), stillbirth (7.5%) and macrosomic babies (2.8%) were effects of obesity on child delivery. This is supported by the findings of Ogbuji (2010) which highlighted the outcome of obesity on pregnancy and labour to include increased prevalence of pregnancy-induced hypertension, gestational diabetes, thromboembolism, urinary tract infections, induction of labour, instrumental delivery, caesarean section, anesthetic and postoperative complications including uterine infections. It also increases risk to the foetus of macrosomia, potentially leading to birth trauma; increased risk of neonatal admission to the intensive care unit; increased risk of neonatal death, increased risk for the foetus of neural tube defects and heart defects.

The findings from a study conducted by Huda et al., (2012) showed that in terms of diseases provoked by obesity, most of family physicians were aware that obesity provokes Bahgets disease (78.4%), osteoarthritis (90.0%), cancer of colon (88.2%) and hypertension (100.0%). Nitert et al., (2011) reported that 57.0% of the women in their study knew that being very obese prior to pregnancy increased the overall risk of pregnancy and birth complications. Over 75.0% of their respondents identified that obese women have an increased risk of overall complications, including gestational diabetes and hypertensive disorders of pregnancy compared to women of normal weight. More than 60.0% of women asserted that obesity would increase the risk of caesarean section and less than half identified an increased risk of adverse neonatal outcomes. The result from this study also showed that 36.4% knew that obesity is associated with increased risk of cancer while 44.0% did not know if there is an association between the two medical conditions. This is supported by the findings of Soriano, Ponce de León , García, García-García and Méndez, (2012) which revealed that there was a gap in knowledge regarding the risk obesity poses for the development of breast and colon cancer.

Majority (86.8%) of the respondents had low knowledge of implications of obesity on reproductive health. The study revealed that 49.5% of respondents did not know the reproductive health problems associated with obesity while 47.6%, 46.4% and 47.9% did not know the effects of obesity on menstrual cycle, mothers' health during pregnancy and child delivery respectively. This implies that women who participated in this study had high knowledge of the risk factors of obesity but had a very low knowledge on the implications of obesity on reproductive health. This calls for intensive public health education on obesity especially its effect on women's health. This will also help in reducing the increasing prevalence of obesity since they will be knowledgeable about the implications of this non communicable disease on their health.

5.6 Nutritional Status of Respondents

Nutritional status of respondents was assessed by using BMI and WHR Using BMI, the prevalence of underweight, overweight and obesity among the respondents was 4.4%, 27.4% and 18.6% respectively. In Nigeria, a WHO report puts the prevalence of overweight and obesity at 26.8% and 6.5% respectively (WHO, 2011). When compared to the findings from other African countries, the prevalence of obesity obtained in this study is similar to the 18.0% that was reported in a study among urban dwellers in the Republic of Benin (Sodjinou et al., 2008) but higher than the 13.6% reported in Ghana (Amoah 2003). An earlier cross-sectional study in the southwestern part of Nigeria also found obesity to be present in 21.2% of the subjects (Ojofeitimi et al., 2007). The WHR assessment of participants in this study revealed that more than half (52.4%) had truncal obesity.

5.7 Implications for Health Education

It is glaring from the findings of this study that there are health promotion and education implications which call for multiple interventions directed at tackling the increasing prevalence of overweight and obesity. Health education principles, strategies and methods such as health talks, lecture, dramas and advocacy should be employed to address the negative findings identified in this study.

Majority of the participants in this study were favourably disposed towards obesity, this implies that there is urgent need to change their attitude and perception. This can be achieved

by embarking on public and community health programmes that is focused on increasing the knowledge of implications of obesity. Informed and increased knowledge will go a long way in influencing change of attitude. Findings from this study also showed that there is no association between knowledge of risk factors to obesity and BMI of respondents, health education strategies should also be directed towards encouraging putting into practice the good information women have on healthy diets and positive lifestyles

The study revealed the degree of knowledge and the range of attitude regarding obesity among this peculiar age group. The results from this study provided information that can be used to influence the planning, development, and implementation of programmes for obesity prevention and reduction

Finally, informing policy makers about the study findings would increase their commitments to reducing the prevalence of overweight and obesity. Potential focus for future interventions must include public health policy to support promotion of adequate diet, regular exercise and increase public awareness on the fatal consequences of not adhering to healthy lifestyles and behaviours.

5.8 Conclusion

This research focused on assessing the level of knowledge of women of reproductive age on the risk factors to obesity and its implication on their reproductive health. Findings from the study revealed that the participants had high knowledge of the risk factors of obesity but their knowledge of health implications was very low. The participants were also favourably disposed towards obesity and the prevalence of obesity was 18.6%.

This study provides insights that can be useful for planning and implementing programmes on obesity prevention and reduction. From the results of this study, it could be postulated that there is an urgent need to mount an intensive public health education with the aim of reducing the present unacceptably high prevalence of overweight and obesity in the study population. Healthy living in terms of consumption of fruits and vegetables, regular aerobic exercises and discouragement of consumption of calorie-dense diets are some of the issues that should be addressed in educating the populace on this avoidable epidemic.

5.9 Recommendations

In the light of the findings of this study, Federal and State Ministries of Health, Non-Governmental Organizations and other relevant Government agencies including Ministry of Education should design and implement wellness programmes for all women. Such programmes should include health education campaigns aimed at upgrading women's knowledge on obesity especially its implications on reproductive health and emphasis on good nutrition. The programmes should also implement behavioural change communication intervention and lifestyle modifications aimed at reducing excessive weight gain, dispelling fears and misconceptions which makes women to be favourably disposed towards obesity.

The following recommendations are suggested and appropriate actions need to be taken by relevant and concerned agencies:

- Promote from early age the knowledge of food and nutrition, healthy diets and lifestyles.
- Improve labeling of food products; limit and regulate advertising of processed food to children.
- Promote from the early age the importance of physical activity on health.
- Provide adequate sport and activity facilities in schools and work places.
- Embark on in-depth public enlightenment campaign on the implications of excess weight gain on health, especially reproductive health

5.10 Suggestion for Further Study

There is a need to carry out a similar study among the general population in the study area to allow for a comparison of findings.

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APPENDIX 1

FOCUS GROUP DISCUSSION GUIDE

KNOWLEDGE OF RISK FACTORS AND HEALTH IMPLICATIONS OF OBESITY AMONG WOMEN OF REPRODUCTIVE AGE IN IBADAN SOUTH-WEST LOCAL GOVERNMENT AREA, OYO STATE

I am a postgraduate student in the University of Ibadan presently conducting a study on knowledge of risk factors and health implications of obesity among women of reproductive age in Ibadan South-West LGA, Oyo state.

I would appreciate your cooperation in discussing the issues outlined below so that we can jointly contribute to reducing the problem. I also want you to allow me to use this tape recorder so that I will be able to bring out all the important points you make which I may not be able to remember for record purposes.

I want you to know that everyone has a right to her own opinion, so there is no right or wrong answer. I assure you that all the statements made will not be used against you in any way.

Thank you.

Can we please introduce ourselves?

Questions

1. How many of you have ever measured your weight on a weighing scale?
2. Why did you measure your weight?
3. Where do you usually measure your weight?
4. How do you know if someone is overweight or obese?
5. Please, point to the body size you want to look like on the picture you are holding.
6. How will you feel if you are overweight or obese (number 5 to 9 on the picture)?
7. What are the things that can make someone gain excess weight?

8. What are the things we do to increase our chances of becoming obese? Probe for antecedent behaviors and lifestyles.
9. What are the benefits and disadvantages of obesity on our health? Probe for effects on reproductive health.
10. What are your attitudes about obese people?
11. What are the common foods that can lead to excess weight gain?
12. How often do you eat these food items in a week?
13. What can a woman do not to become overweight or obese?

APPENDIX II: QUESTIONNAIRE

KNOWLEDGE OF RISK FACTORS AND HEALTH IMPLICATIONS OF OBESITY AMONG WOMEN OF REPRODUCTIVE AGE IN IBADAN SOUTH-WEST LOCAL GOVERNMENT AREA, OYO STATE

I am a postgraduate student of the University of Ibadan presently conducting a study on knowledge of risk factors and health implications of obesity among women of reproductive age in Ibadan South-West LGA of Oyo State. I will be grateful if you could take a few minutes to fill out this questionnaire. You do not have to write your name and identification, so the result is anonymous, confidential and for this study only.

Thanks.

Date: .....

Section A: Socio-demographic Characteristics

1. Age as at last birthday (in years) .....
2. Marital status: (1)Single ☐ (2)Married ☐ (3)Divorced ☐ (4) ☐ (5)Sep ☐ (6)Co-l ☐
3. Level of education attained: (1)Primary ☐ (2)Secondary ☐ (3)Tertiary ☐ (4) None ☐ (5) Apprenticeship ☐ (3)Traditional ☐
4. Religion: (1)Christianity ☐ (2)Is ☐
5. Do you have biological children? (1) Yes ☐ (2)No ☐
6. Ethnicity: (1) Yoruba ☐ (2) Igbo ☐ (3) Hausa ☐ (4) Others (please specify) .....
7. Occupation (please specify) .....
8. Husband's occupation (please specify) .....
9. Type of marriage: (1)Monogamy ☐ (2)Polygamy ☐
10. The respondent is able to identify obese person (1) Yes ☐ (2)No ☐

Section B: Food Consumption Pattern Using Food Frequency Questionnaire

For each food item, indicate the category that best describes the frequency with which you usually eat that particular food item in the last 7 days

1x: once
2x: twice
3x: thrice
4x: 4 times
5x: 5 times
6x: 6 times
7x: 7 times

APPENDIX II: QUESTIONNAIRE

KNOWLEDGE OF RISK FACTORS AND HEALTH IMPLICATIONS OF OBESITY AMONG WOMEN OF REPRODUCTIVE AGE IN IBADAN SOUTH-WEST LOCAL GOVERNMENT AREA, OYO STATE

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3. Level of education attained: (1)Primary ☐ (2)Secondary ☐ (3)Tertiary ☐ (4) None ☐ (5) Apprenticeship ☐
4. Religion: (1)Christianity ☐ (2)Islam ☐ (3)Traditional ☐
5. Do you have biological children? (1) Yes ☐ (2)No ☐
6. Ethnicity: (1) Yoruba ☐ (2) Igbo ☐ (3) Hausa ☐ (4) Others (please specify).....
7. Occupation (please specify).....
8. Husband's occupation (please specify).....
9. Type of marriage: (1)Monogamy ☐ (2)Polygamy ☐
10. The respondent is able to identify obese person. (1) Yes ☐ (2)No ☐

Section B: Food Consumption Pattern Using Food Frequency Questionnaire

For each food item, indicate the category that best describes the frequency with which you usually eat that particular food item in the last 7 days

1x: once
2x: twice
3x: thrice
4x: 4 times
5x: 5 times
6x: 6 times
7x: 7 times

S/N	Food item	1x	2x	3x	4x	5x	6x	7x
11	High calorie soups (ogbono, egusi, beans soup)							
12	Snacks (egg rolls, buns, burger etc)							
13	Fried foods							
14	Beverages (bournvita, milo, etc)							
15	Alcoholic and soft drinks							
16	Fatty meat (udder, cow tail, tongue)							
17	Confectionaries (biscuit, sweet)							
18	Nuts (groundnuts, cashew nuts)							

Daily: 7 times/week. (Very risky – code 1)
Often: 4-6 times/week. (Risky – code 2)
Occasionally: 2-3 times/week. (Moderately risky – code 3)
Rarely: once/week. (No risk – code 4)

Section C: Attitude towards Obesity

S/N	Question	Coding categories				
		Strongly agree	Agree	Undecided	Disagree	Strongly disagree
19	I do not consider obesity as a symbol of richness and good living					
20	I expect obese people to live normal lives					
21	I picture obese people as being lazier than normal weight people					
22	I see obese people as very untidy					
23	I like obese people than slim ones					
24	I see obesity as the worst thing that can happen to anybody					
25	I consider obese persons as confident as other people					
26	I consider obese people as not being healthy as non obese people					
27	I support that obese workers can be as successful as other workers					
28	I am comfortable associating with obese people					
29	I am sure that obese people are as happy as non obese people					

	Total Score	
30	Score Obtained	
31	Code	

Section D: Nutritional status using anthropometric measures

S/N	Question	
32	Weight (Kg)	
33	Height (m^2)	
34	BMI (Kg/m^2)	
35	Waist circumference(cm)	
36	Hip circumference(cm)	
37	WHR	

Section E: Knowledge of Risk Factors to Obesity

38. Mention 2 causes of obesity

39. State 2 factors that cannot cause obesity

40. Is becoming obese associated with one's lifestyle? (1) Yes ☐ (2) No ☐ (3) I don't ☐ know

41. If yes, state 2 lifestyles that can increase the chance of becoming obese

42. High socioeconomic status can result into becoming obese (1) Yes ☐ (2) ☐ No (3) ☐ don't know

43. Constant exposure to adverts and marketing of high calorie foods may predispose to obesity if consumption is influenced by these (1) Yes ☐ (2) No ☐ (3) I don't ☐ know

	Total Score	
44	Score Obtained	
45	Code	

Section F: Knowledge of Implications of Obesity on Reproductive Health

46. List 2 reproductive health problems associated with obesity

_____

_____

47. Mention 2 ways in which obesity affect menstrual cycle.

_____

_____

48. State 2 effects of obesity on mothers' health during pregnancy.

_____

_____

49. List 2 effects of obesity on child delivery.

_____

_____

50. Obesity ~~may sometimes be~~ associated with failure to sustain exclusive breastfeeding

(1) Yes ☐ (2) No ☐ (3) I don't know ☐

51. Is obesity associated with increased risk of cancer? (1) Yes ☐ (2) No ☐

(3) I don ☐ w

52. If yes, state 2 types of cancer associated with obesity.

_____

_____

	Total Score	
53	Score Obtained	
54	Code	

APPENDIX III: IWE IBEERE

IMO NIPA O KUNIA ATIIPA TI ISANRA JU NKO LORI ILERA LAARIN AWON OBINRIN O MIDAN,ABILEKO ATI ADELEBO NI IJOBA IBILE GUSU IWO ORUN IBADAN NI IPINLE OYO

Mo je omo ile iwe oni pele keji ni yunifasiti Ibadan ti o n se iwadi lori Imo nipa okunfa ati ipa ti isanra ju nko lori ilera laarin awon obinrin omidan, abileko, ati adelebo ni ijoba ibile Guusu Iwoorun Ibadan ni ipinle Oyo. Inu mi yio dun ti e ba le fi aye iseju die sile lati ban i dahun awon ibeere yi. Ko nilo lati ko oruko tabi fun mi ni idanimo yin. nitori naa e fi okan bale wi pe mo fe mo esi idahun yin fun iwadi nikan ni.

A dupe.

Oga.....

Ipin Kini: Igbe aye Oludahun.

1. E ti to eni odun melo bayii? .....
2. Ipo nimu eto igbeyawo: (1) omidan ☐ (2)Abileko ☐ (3)E ti ko ara yin ☐ sile ☐ po (5)E ko lo ☐ mo (6) Iha gbepo lai ☐ igbeyawo
3. Iwe melo ni e ka? (1) Iwe Meefa ☐ (2) Iwe meewa ☐ (3)Ile iwe giga ☐ (4) Mi ☐ we (5)Mo ti ☐ wo
4. Esin: (1)Igbagbo ☐ (2)Musulumi ☐ (3)Ibile ☐
5. Se e ti bi omo?(1)Beeni ☐ (2)Beeko ☐
6. Eya wo ni e ti wa: (1) Yoruba ☐ (2) Igbo ☐ (3) Hausa ☐ (4)E ya miran (e daruko).....
7. Iru ise wo ni e n se? (e so/ko ni pato).....
8. Iru ise wo ni oko yin n se? (e so/ko ni pato).....
9. Iyawo melo ni oko yin ni? (1) Okan ☐ (2) Mo loorogun ☐
10. Oludadun da eni ti o sonra ju mo (1) Beeni ☐ (2) Beeko ☐

Ipin Keji: Awose bi a ti n jeun si nipa iwe ibeere Ounje Igbakuuhia

Jun ounje kookon. fi amin si ipele ti o n sakawe bi e ti se je ounje naa si laanu ojo meje seyin.

S/N	Ounje	E kan	E meji	E meta	E merin	E marun	E meefa	E meeje
11	Obe ti o ni okun bupo (ogbono/ agoon. egusi, gbegiri)							
12	Ipanu (egg roll s. buns, bufter,etc)							
13	Ounje ti a din ninu epo labi ororo							

14	Ohun mimu (bournvita, milo, etc.)							
15	Oti lile ati oti elerin dodo							
16	Eran olora (omu eran, iru maaluu, ahon, ilun eran)							
17	Nkan aladun (bisiki, suuti)							
18	Ipaanu bi epa tabi koro cashew							

Ojoojumo: E meje laarin ose kan. (olewu jupo - ipele Kinni)

Nigba kugba: E merin si mefa laarin ose kan. (olewu – ipele Keeji)

Lekookan: E meji si meta laarin ose kan. (olewu die - ipele Keeta)

Kowopo. Ekan laarin ose kan. (ko lewu – ipele keerin)

Ipin Keta: Ki lo bi ara si Isanra ju

Mo fara mo gan –SA. Mo fara mo-A. Mi o mo-U.
Mi o fara mo-D. Mi o fara mo gan- SD.

S/N	Ibeere	SA	A	U	D	SD
19	Mi o ri sisanra ju gege bi ami ola ati igbe aye ti o dara					
20	Mo gbagbo pe eniti o ba sanraju le gbe aye ti o rorun					
21	Mo ri eni ti o ba sanra ju bi ole ju eni ti ko sanra lo					
22	Mo ri awon ti o ba sanra ju bi onidoti tabi eniyan wuru-wuru					
23	Mo feran eniyan ti o ba sanra gan ju eni ti ko sanra lo					
24	Mo ri ara sisan ju bi nkan ti ko dara ki o sele si eniyan					
25	Mo ka eni ti o sanra ju kun eni ti o da ara re loju bi eniyan yoku					
26	Mo ri eni ti o sanra ju bi eni ti ilera re ko pe bi ti eni ti ko sanra					
27	Mo mo wipe osise ti o ba sanra ju le se aseyori bii awon osise yoku					
28	Mo le ni eni ti o ba sanra ju ti ore laisi wahala					
29	O da mi loju pe ara sisan ju ko na idunnu eniyan laara					

	Aropo gbogbo maaki	
30	Maaki ti o gba	
31	Ipele	

Ipin Kerin: Ghedeke ohun ti o n fun ni Inkun nipa wi won

S/N	Iheere	
32	Iwon(Kg)	
33	Giga(m^2)	
34	BMI(Kg/m^2)	
35	Igbaroko (cm)	
36	Ibadi(cm)	
37	WHR	

Ipin Karun: Imo nipa nhun ti o n se okunfa sisanra ju.

38. I; so/ko ohun meji ti o le fa ki eniyan sanra ju

_____

_____

39. E so/ko ohun meji ti ko le fa aro sisan lafoju

_____

_____

40. Se isanra ju ni se pelu iwuwasi/igbe aye eniyan? (1) Beeni☐ (2)Beeko☐
(3)Aimo☐

41. Ti idahun yin ba je beeni si ibeere kejila, e so ko inu iwa nieji ti o le je ki eniyan sanra ju.

_____

_____

42. Ipo ola le se okunfa ara sisan ju. (1)Beeni☐ (2)Beeko☐ (3)Mi o mo☐

43. Ipolowo ati ikede ounje ti o ni ora pupo ni igbagbogbo le se okunfa sisanra ju ti o ba je pe ipolowo naa ni ipa lori ounje ti a n je. (1)Bee☐ (2)Eko☐ (3) Aimo☐

	Aropo gbogbo maaki	
44	Maaki ti o gba	
45	Ipele	

Ipin Kefa: Imo lori Ipa ti sisanra ju nko lori Ilera lasiko Ibisi

46. E sọ́kọ isoro meji ti o ni se pelu ibisi ti sisanra ju lee fa

_____

_____

47. E daruko ona meji ti sisanra ju fi le ni ipa lori nkan osu obinrin

_____

_____

48. E salaye ona meji ti sisanra ju fi le ni ipa lori ilera oloyun.

_____

_____

49. E sọ́kọ olun meji ti sisanra ju fi ni ipa lasiko ibimọ

_____

_____

50. Se sisanraju ni ipa lori lifun omo ni ọyan nikan fun osu mẹẹfa akọkọ lai las pelu omi tabi ounje miran. (1)[ ]hi (2)[ ]ọ (3)[ ]no

51. Se sisanraju nise pelu awon ti o ro nipọ ni ni aarun jejere? (1)Beeni[ ]
(2)Beekọ[ ] (3)Aifi o mọ[ ]

52. Ti e ba dahun beeni si ibeere kẹtalelogun, e sọ́kọ aarun jejere meji ti eniyan ti o ba sanra ju le ni

_____

_____

	Aropo gbogbo maaki	
53	Maaki ti o gba	
54	Ipele	

IWE ITONISONA FUN IFOROWERO LAARIN AKOJOPO ENIYAN.

IMO NIPA OKUNFA ATI IPA TI ISANRAJU NKO LORI ILERA LAARIN AWON OBINRIN OMIDAN, AHILEKO ATI ADELEBO NI IJOBA IBILE GUSU IWOORUN IHADAN NI IPINLE OYO

Mo je omo ile iwe oni pele keji ni yunifasiti Ibadan ti o n se iwadi lori Imo nipa okunfa ati ipa ti isanra ju nko lori ilera laarin awon obinrin omidan, ahileko ati adelebo ni Ijoba Ibile Gusu Iwonron Ibadan ni Ipinle Oyo.

Emi yio dupe fun ilowosowopo yin lati fi oro we oro lori awon koko ti a ti ko sile wonyi. ki a le jumo gbogin ti isoro naa. Mo tun fe ki e gba mi laaye lati lo ero ti maa n ka ohun sile yi ki n le ni anfaani lati mu gbogbo koko pataki ti e ba so ti n ko ni le ranti tan

Mo fe ki emo wipe olukuluku yin ni o ni eto si ero re, nitori naa ko si idahun ti a si tabi ti a gbo. Mo fi da yin loju pe n ko ni lo oro ti e ba so nibi yi losi si yin ni ona kona

Mo dupe.

Eje ki a fi ara wa han

Ibere:

1. Eyin melo ni e ti ye iwon yin wo ri?
2. Nibo ni e ti maa n won iwon yin?
3. Kini iwulo iwonti e maa won?
4. Bawo ni e se maa mo ti eniyan bo sanra tabi sanra ju?
5. Eyin melo ni e fe sanra ju?
6. Bawo ni o se maa lara yin ti e ba sanra ju?
7. Awon nkan wo lo le se okunfa ki eniyan sanra ju?
8. Kini awon nkan ti a maa n se ti o le je ki a tete sanra ju? Wadi fun awon iwa to ti nio ni lara.
9. Kini awon anfaani ati ewu ti isanra ju le ni lori ilera yin? Wadi fun ipa lori ilera nipa ibisi.
10. Kini awon akiyesi yin nipa eniyan to ba sanra ju?
11. Kini awon ounje ti a maa nje ti o le fa ara sanra ju?
12. Eemelo ni a maa n je awon ounje wonyi lose kan?
13. Bawo ni obinrin ti ko ba sanra ju se le lesiwaju lati maa won iwon ti o ni ilere pipe?

APPENDIX IV

TELEGRAMS..... TELEPHONE.....

MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5017, OYO STATE OF NIGERIA

Your Ref. No. .....

All communications should be addressed to

the Honourable Commissioner quoting

Our Ref. No. AD 13/ 479/ 264. 8th August, 2012

The Principal Investigator,
Department of Health Promotion & Education,
Faculty of Public Health,
University of Ibadan,
Ibadan.

Attention: Ajayi Yewande Pat

Ethical Approval for the Implementation of your Research Proposal in Oyo State

1. This acknowledges the receipt of the corrected version of your Research Proposal titled: "Knowledge of causes and Perceived Health Implication of Obesity among Women of Reprodnctive Age in Ibadan South West Local Government Area.

2. The committee has noted your compliance with all the ethical concerns raised in the initial review of the proposal. In the light of this, I am pleased to convey, to you, the approval of committee for the implementation of the Research Proposal in Oyo State. Nigeria.

3. Please note that the committee will monitor, closely, and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of the findings as this will help in policy making in the health sector.

4. Wishing you all the best,

OYO STATE RESEARCH ETHICAL REVIEW COMMITTEE
Signature & Date

V. A. Adepoju
Director, Research & Statistics
Secretary, Oyo State, Research Ethical Review Committee