**PREVALENCE OF OBESITY AND IT'S IMPLICATION AMONG RURAL ADULTS**

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# ABSTRACT

Obesity is a growing health concern in rural communities, with significant implications for public health and socioeconomic well-being. This study investigates the prevalence of obesity among rural adults Nigeria, and explores the contributing socioeconomic, lifestyle, and health factors. A sample of 150 rural adults was surveyed using structured questionnaires. The study found a 40% obesity prevalence, with major contributing factors including low income, poor dietary habits, and limited physical activity. The implications of obesity included increased healthcare costs, reduced productivity, and social stigma. Recommendations for addressing rural obesity include health education programs, affordable nutritious food access, physical activity initiatives, and improved healthcare services. These findings underscore the need for targeted interventions to mitigate obesity's impact on rural communities.

# CHAPTER ONE

# INTRODUCTION

1.1 Background to the Study  
Obesity, a significant global public health issue, is increasingly prevalent among rural populations. Defined by the World Health Organization (WHO) as a body mass index (BMI) of 30 or higher, obesity contributes to numerous non-communicable diseases (NCDs) such as type 2 diabetes, hypertension, cardiovascular disease, and certain cancers. The rural context poses unique challenges that exacerbate the prevalence of obesity, including limited healthcare access, fewer recreational facilities, and higher reliance on high-calorie diets due to economic and cultural factors.​

Globally, obesity rates have risen dramatically over the past decades. While urban environments were historically associated with higher obesity rates, rural areas are increasingly driving the obesity epidemic. Research highlights that, globally, weight gain in rural areas is now a primary contributor to rising obesity rates. In the United States, approximately 42.2% of adults are classified as obese, with rural residents disproportionately affected. For instance, studies show that rural adults in the U.S. often have higher obesity rates than their urban counterparts, attributed to factors like poverty, limited education, and geographic isolation.​

In low- and middle-income countries (LMICs), rural obesity is often linked to rapid transitions in diet and lifestyle. Traditional food systems, once dominated by locally grown, nutrient-rich foods, are increasingly replaced by energy-dense, processed options. Coupled with reduced physical labor due to mechanization, rural populations face escalating obesity risks. For example, a study conducted in a rural Thai community revealed an increase in obesity prevalence from 33.7% in 2012 to 44.8% in 2018, with women showing significantly higher rates than men.

In addition to health implications, obesity imposes substantial socioeconomic burdens. Rural adults experiencing obesity often face stigma, reduced productivity, and higher healthcare costs. Obesity-related comorbidities strain local health systems, especially in regions where resources are already scarce. This issue underscores the critical need for tailored interventions that address the unique challenges of rural living, emphasizing community-based approaches to promote healthier diets and active lifestyles.

1.2 Statement of the Research Problem  
The rising prevalence of obesity among rural adults presents a multifaceted public health concern with implications that extend beyond individual health to community well-being and healthcare systems. While obesity research is extensive, rural populations remain underrepresented in studies, limiting the understanding of context-specific factors that drive obesity in these areas. Existing interventions often fail to account for unique rural challenges, such as economic constraints, cultural norms, and infrastructural limitations.

Current data reveal stark disparities in obesity rates between rural and urban populations. For example, rural communities in Thailand saw obesity prevalence rise by over 10% within six years, reflecting similar trends in other LMICs. However, these statistics are not adequately matched by corresponding preventive or management strategies. The lack of effective, accessible interventions exacerbates the problem, leaving rural residents more vulnerable to obesity-related diseases and their consequences.

Furthermore, the implications of obesity in rural areas extend to the broader social and economic fabric. With many rural adults engaged in physically demanding occupations, obesity-related health complications can undermine economic productivity and increase dependency ratios. Additionally, rural healthcare systems are often ill-equipped to address the complex needs of obese individuals, resulting in delayed or inadequate care. This study aims to bridge these gaps by investigating the prevalence and implications of obesity among rural adults, providing evidence for targeted policy and intervention strategies​

## 1.3 Objectives of the Study

**1.3.1 General Objective**

To examine the prevalence of obesity and its implications on the health and socioeconomic well-being of rural adults, identifying contributing factors and proposing context-specific interventions.

**1.3.2 Specific Objectives**

1. To determine the prevalence of obesity among rural adults in the study area.
2. To investigate the factors contributing to obesity in rural settings, including socioeconomic and lifestyle determinants.
3. To assess the health and socioeconomic impacts of obesity among rural populations.

## 1.4 Research Questions

1. What is the prevalence of obesity among rural adults in the study area?
2. What are the key factors influencing obesity in rural populations?
3. How does obesity impact the health and socioeconomic status of rural adults?

## 1.5 Research Hypotheses

**H₁:** There is a significant prevalence of obesity among rural adults.

H₂: Socioeconomic and lifestyle factors significantly contribute to rural obesity.

**H₃:** Obesity has a measurable negative impact on the health and socioeconomic well-being of rural adults.

## 1.6 Significance of the Study

This study is significant as it sheds light on the growing obesity epidemic in rural areas, highlighting its unique drivers and consequences. By providing evidence-based insights, it can inform policy decisions, healthcare planning, and community-level interventions tailored to the needs of rural populations. Moreover, it contributes to the academic literature by filling gaps in understanding obesity's rural dimensions, aiding future research.

## 1.7 Scope and Delimitation of the Study

The study focuses on adults aged 18 years and above residing in rural settings. It examines obesity prevalence, contributing factors, and implications within these populations. The research is geographically limited to selected rural communities and excludes urban or peri-urban populations. While comprehensive, the study does not delve into genetic predispositions or pediatric obesity.

## 1.8 Definition of Key Terms

**Obesity:** A condition characterized by excessive body fat, typically measured using a BMI of 30 or above.

**Rural Adults:** Individuals aged 18 and older living in non-urbanized regions characterized by lower population density and limited infrastructure.

**Socioeconomic Factors:** Aspects such as income, education, and occupation influencing individuals' health and lifestyle choices.

**Non-Communicable Diseases (NCDs):** Chronic health conditions, such as diabetes and heart disease, often linked to obesity.

**Body Mass Index (BMI):** A numerical value derived from weight and height, used to classify obesity.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Theoretical Framework

Obesity has become a significant public health concern, particularly in rural areas, where access to healthcare resources and education may be limited. To understand the prevalence of obesity and its implications among rural adults, several theoretical perspectives provide a foundation for analysis. These include the Social-Ecological Model (SEM), the Health Belief Model (HBM), and the Theory of Planned Behavior (TPB).

**Social-Ecological Model (SEM)**

The SEM posits that health behaviors and outcomes are influenced by multiple levels of interaction, including individual, interpersonal, community, and societal factors. This model emphasizes the interconnectedness of these levels in shaping an individual's choices regarding diet, physical activity, and overall lifestyle (Sallis et al., 2015). In rural contexts, community-level factors such as limited access to healthy food options, lack of recreational facilities, and cultural norms play pivotal roles in promoting or deterring obesity.

Studies indicate that rural environments often lack infrastructure supporting physical activity, leading to sedentary lifestyles (Petersen et al., 2019). Furthermore, societal factors, such as agricultural labor reliance, may paradoxically contribute to obesity due to high-calorie diets necessitated by physically demanding work but consumed beyond caloric requirements when physical activity decreases. This interplay underlines the importance of contextualizing obesity prevention strategies within the broader socio-ecological framework.

**Health Belief Model (HBM)**

The HBM focuses on individual perceptions and attitudes toward health behaviors, highlighting how these perceptions influence preventive actions. It comprises constructs such as perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Rosenstock et al., 1988).

In rural populations, perceived susceptibility and severity of obesity-related complications, such as diabetes and cardiovascular diseases, often depend on health literacy levels. For instance, a study by Hardcastle et al. (2020) found that rural adults with limited health education were less likely to perceive obesity as a severe health risk. This underscores the need for culturally tailored health education programs to enhance awareness and foster proactive health behaviors.

Cues to action, such as community health initiatives, can play a critical role in motivating behavioral change in rural settings. For example, interventions involving local leaders and traditional communication channels have shown promise in influencing health attitudes (Anderson et al., 2017).

**Theory of Planned Behavior (TPB)**

The TPB posits that intention is the most significant predictor of behavior, determined by attitudes, subjective norms, and perceived behavioral control (Ajzen, 1991). In the context of obesity among rural adults, attitudes toward healthy eating and exercise are often shaped by cultural traditions and economic constraints.

Subjective norms, or the influence of social networks, also play a crucial role. Research indicates that rural adults are more likely to adopt health behaviors if they perceive social approval from family or community members (Smith et al., 2021). However, the lack of perceived behavioral control, driven by barriers such as financial limitations and inadequate access to healthcare facilities, can hinder these intentions from translating into action.

Integrating these theoretical frameworks provides a comprehensive understanding of obesity prevalence and its implications in rural settings. By addressing the interplay of individual, interpersonal, and societal factors, these models guide the development of effective interventions to combat obesity.

## 2.2 Conceptual Framework

The conceptual framework for understanding obesity prevalence and its implications among rural adults incorporates various dimensions: demographic, behavioral, environmental, and socioeconomic factors. This multidimensional approach recognizes the complexity of obesity as a public health issue.

**2.1 Types of obesity**

Obesity can be categorized into different types based on BMI, onset of obesity and fat storage [(Srilakshmi, 2014)](#page102).

**2.1.1 BMI**

According to BMI, obesity is classified as grade I, II and III.

**a. Grade I**

These people have body mass index more than 25 but less than 29.9. Overweight does not affect their health. They lead normal health and life expectancy is above normal. They may reduce on their own [(Srilakshmi, 2014)](#page102).

**b. Grade II**

The body mass index is between 30-39.9 kg/m².They have reduced tolerance to exercise with shortness of breath on exertion and they are unduly fatigued. This is due to the burden of increased weight they carry always and reduced capacity of their circulatory and respiratory systems that are handicapped by masses of internal fat ad fatty infiltration of muscle. For metabolic and mechanical reasons these patients are at increased risk of diabetes, atherosclerosis, hypertension, fatty liver, gall bladder diseases, osteoarthritis, hernias and varicose vein [(Srilakshmi, 2014)](#page102).

**c. Grade III**

The body mass index is above 40 kg/m² and these patients are in pathetic conditions. Their day to day activities are restricted due to their enormous mass and more susceptible to diseases mentioned in Grade II. They are susceptible in atherosclerosis, prone to accidents and have serious psychological disturbances [(Srilakshmi, 2014)](#page102).

**2.1.2 Onset of obesity**

On the basis of onset of obesity it is of two types explained as below:

a. Juveline onset obesity

Juvenile obesity occurs due to hyperplasia and most rapidly in first few years of life. There is a marked increase in adipose tissue cells-thus the term hyperplastic obesity is used. Too many calories consumed in infancy and early childhood leads to an overproduction of fat cells followed by hypertrophy (enlargement of the fat cells). Fat cells once developed do not disappear nor differentiate. For this reason, fat children, fatty children are inclined to be fatty adults. As many as 80 percent of obese children will become obese adults [(Srilakshmi, 2014)](#page102).

**b. Adult onset obesity**

In adult-onset obesity (hypertropic obesity) the size of the individual cell is greatly enlarged. A distended adipose cells lead to further physiological, biochemical, anatomic aberrations in individual’s organ systems. Hypertropic obese patients have been reported to maintain weight loss better than hyperplastic ones [(Srilakshmi, 2014)](#page102).

**2.1.3 Fat storage**

Body fat distribution can used to establish overweight and obesity. Body fat is distributed differently in men and women. The quantity and location of fat in the body can predict health risks [(Sheth & Shah, 2006)](#page101).

On the basis of distribution of excess body fat obesity is broadly divided into following three categories [(Patidar, 2013)](#page99).

**a. Android (Apple type)**

Android type of obesity is like the shape of an apple. The shoulders, face, arms, neck, chest and upper portion of the abdomen are bloated. The stomach gives a stiff appearance. So, also the arms, shoulders and breast. The back seems to be erect but the neck is compressed and there will be protruding chest because of the bulk in the stomach. The lower portion of the body, the hips, thighs and legs are thinner beyond proportion in comparison with the upper part. In these persons, the vital organs affected will be mostly the heart, liver, kidneys and lungs. Though this type of obesity is found more in males it is common in females too. Those females, who are under hormone treatment for their menstrual abnormalities or after childbirth, are more prone to this type of obesity. It occurs in females around menopause too due to thyroid gland’s major risk for heart damage and heart disease due to high cholesterol [(Patidar, 2013)](#page99).

**b. Gynoid (Pear Type)**

In this type the lower part of the body has the extra flesh. This type of obesity is also common to both sexes though females are more affected. Gynoid type of obesity is similar to pears. The flesh is somewhat flabby in the abdomen, thighs, buttocks and legs. The face and neck mostly give a normal appearance. In some persons, the cheeks may be drawn too. As these persons grow old the whole figure assumes a stooping posture and the spine is never erect due to the heavy hips and thighs. The vital organs affected mostly are the kidneys, uterus, intestines, bladder and bowls. In this type of obesity, exercises or dieting will not help appreciably in reducing weight [(Patidar, 2013)](#page99).

**c. The third type**

Besides android and gynoid, there is one more type of obesity. Some people do not belong to any of the above type of obesity. Their whole body from head to toe looks like a barrel. Their gait is more like rolling rather than walking. The fat tissues in their body hinder the movement of all the internal organs and consequently affect their brisk functioning. For them any exercise is difficult due to the enormous size of the body. So such persons should follow a strict diet and do plenty of exercise [(Patidar, 2013)](#page99).

**2.2 Risk factors associated with overweight and obesity**

Obesity arises as the result of an energy imbalance between calories consumed and the calories expended, creating an energy surplus and a state of positive energy balance resulting in excess body weight. This energy imbalance is partially a result of profound social and economic changes at levels well beyond the control of any single individual. These ‘obesogenic’ changes—economic growth; growing availability of abundant, inexpensive, and often nutrient-poor food; industrialization; mechanized transportation; urbanization, hereditary factors—genetics, family history, racial/ethnic differences—and particular socioeconomic and socio-cultural milieus have been shown to affect risk of obesity, even in ostensibly similar obesogenic environments. So while body weight regulation should be viewed as a complex interaction between environmental, socioeconomic, and genetic factors, ultimately, personal behaviors in response to these conditions continue to play a dominant role in preventing obesity [(Hruby & Hu, 2015)](#page94).

Overweight and obesity are influenced by a number of factors including hereditary tendencies, environmental and behavioral factors, ageing and pregnancies. There are many factors influencing weight gain and loss process beside diet and physical activity. However, they are the main component and modifiable in energy balance [(WHO, 2000)](#page103).

**2.2.1 Socio-economic factors**

Differences in diet quality arise due to more frequent consumption of fresh and better quality produce such as fresh fruits, vegetables, and fish among higher socioeconomic status (SES) individuals since fresh produce items are charged higher in grocery and convenience stores. In particular, the poorer segments are often left to opt for energy-dense diets, rich in cheap vegetable oils, and trans-fats. Low fat protein sources, for example, poultry and pulses, which cost less per weight, are the preferred choices of low SES participants. People in high income countries favor a leaner body image and, hence, engage themselves in higher physical activity to remain fit [(Bhurosy & Jeewon, 2014)](#page91).

Likewise, in developing countries, the lower obesity rates observed in the populations of lower socio-economic status are associated with a situation where people are limited in their ability to obtain enough food, yet still engage in moderate to heavy manual work and have little access to public transport. Hence thin adults are considered poor, and overweight and obesity are a sign of affluence in developing countries [(Popkin et al., 2012)](#page100).

**2.2.2 Age**

The aging process brings about many changes in body composition, often without concomitant changes in body weight and body mass index. In general, as individual’s age, percent body fat increases and lean mass and bone mineral density decrease. Furthermore, the increase in fat mass (FM) is distributed more specifically in the abdominal region, an area associated with cardiovascular disease and diabetes [(Choi et al., 2012)](#page92).

It can occur at any age in either sex as long as the person is under positive energy balance at Nutrition Foundation of India have shown more females than males are found to be overweight among all age groups. Hormonal predisposition put women at higher risk of obesity when compared to men [(Jayatissa et al., 2012)](#page95). By the late twenties, many women notice they can’t eat the same things they used to eat and that their weight doesn’t fall as easily as it once did and the flattening cycle continues. As you lose muscle, your natural calorie burning ability slows down even more. And as you lose muscle and gain fat, fat can develop into the muscle and cause weight gain and metabolic dysfunction [(Fetters, 2015)](#page93). Pregnancy and menopause are significant factors in the development of obesity in women, suggesting that fluctuations in reproductive hormone concentrations uniquely predispose women to excess weight gain [(Schlenker & Roth, 2013)](#page101).

**2.2.3 Marital status**

The prevalence of overweight was found to be two-fold higher in married men and women than unmarried men and women, even when age, educational level, leisure time physical activity, smoking habits, and place of residence were controlled. It has been found that people after marriage perform less physical activity, change their dietary pattern, have least focus on being attractive, have more social support. On the other hand, unmarried subjects may intentionally manage their weight in an effort to look more attractive to potential marital partner [(Janghorbani et al., 2008)](#page95).

After getting married, subjects are less physically active, change their dietary pattern, may be less focused on being attractive, have more social support, or may be exposed to other environmental factors [(Coll et al., 2015)](#page92). Marital status has been shown to be associated with BMI and most cross sectional studies have found that married people are more often overweight and obese than those living alone [(Tzotzas et al., 2010)](#page103).

**2.2.4 Physical activity**

Physical activity(PA) is a key determinant of energy expenditure, and thus is fundamental to energy balance and weight control. The beneficial effects of physical activity on the metabolic syndrome are mediated by mechanisms beyond controlling excess body weight. For example, physical activity reduces blood pressure, improves the level of high density lipoprotein cholesterol, improves control of blood glucose in overweight people, even without significant weight loss, and reduces the risk for colon cancer and breast cancer among women. Muscle strengthening and balance training can reduce falls and increase functional status among older adults. More activity may be required for weight control [(WHO, 2004)](#page103).

The intensity of PA is measured in metabolic equivalents or METs. One MET is defined as the calories burned while an individual sits quietly for one minute. For the average adult, this is about one calorie per every 2.2 pounds of body weight per hour; someone who weighs 160 pounds would burn approximately 70 calories an hour while sitting or sleeping. Moderate-intensity physical activity is defined as activities that are strenuous enough to burn three to six times as much energy per minute as an individual would burn when sitting quietly, or 3 to 6 METs. Vigorous-intensity activities burn more than 6 METs [(HSPH,](#page94) [2017;](#page94) [Troiano et al., 2008)](#page103).

PA is recommended as a component of weight management for prevention of weight gain, for weight loss, and for prevention of weight regain after weight loss. In 2001, the American College of Sports Medicine (ACSM) published a Position Stand that recommended a minimum of 150 min/week of moderate intensity PA for overweight and obese adults to improve health; however, 200–300 min/week was recommended for long term weight loss. Moderate-intensity PA of 150 to 250 min/week with an energy equivalent of 1200 to 2000 kcal/week seems sufficient to prevent weight gain greater than 3% in most adults and may result in modest weight loss. PA without diet restriction generally provides modest weight loss [(Donnelly et al., 2009)](#page93).

**2.2.5 Dietary intake and food consumption pattern**

**a. Energy dense food**

Energy density is defined as the energy content per unit weight of foods (Kcal/g). High energy density foods tend to include foods that are high in fat and have a low water content, for example biscuits and, crisps, nuts, oil and cheese [(Petrou et al., 2013)](#page99).

High energy density of the diet was found to be associated with obesity in humans. In adults, there is strong evidence that diets high in energy density are associated with increased body weight, whereas diets low in energy density encourages weight maintenance or even weight loss [(Hebestreit et al., 2014)](#page94). Consumption of high-fat foods is thought to be a particularly powerful predictor of weight gain because of the efficiency with which fat is metabolized and its high caloric density and palatability. Furthermore, because fat intake produces weak satiety signals relative to other macronutrients, it results in greater overall intake. Self-reported caloric intake and high-fat food intake has predicted future increases in body mass in adult [(Stice et al., 2005)](#page102).

In Nepal, the average proportion of energy from fat has significantly increased from 13% in 1970 to 17% in 2010. Plant fat and sugar are the main contributors to the increased energy intake trends over the 40 years, followed by meat, fish, milk and eggs. Nepalese dietary patterns have changed over the past forty years, especially with increased energy from plant fat, sugar and animal products coinciding with increased levels of obesity and overweight, especially in urban areas [(McGuire & Beerman, 2012)](#page97).

**b. Fibers**

Fruit and vegetables (FV) are rich in water and fiber, and low in energy density; therefore, FV consumption has been proposed as an obesity prevention strategy. FV may be protective from adiposity by moderately lowering the energy density of meals or even displacing energy-dense foods. The satiating effect of fiber resulting in fewer calories consumed and the modulation of dietary glycemic load, affecting postprandial hormonal shifts [(Ledoux et](#page96) [al., 2011;](#page96) [Petrou et al., 2013)](#page99). Many studies have supported that intake of FV may help to control weight and mitigate the risk of obesity [(Azagba & Sharaf, 2012)](#page91). A minimum of 400g to 500 gm of fruits and vegetables per day (excluding potatoes and other starchy tubers) is recommended for controlling weigh gain and CVD [(WHO, 2017b)](#page104). The consumption of fruit can provide essential micronutrients to limit obesity via various mechanisms. Therefore, the presence of various micronutrients in different types of fruit could be one of the underlying mechanisms responsible for their anti-obesity effect [(Ghalaeh et al., 2012)](#page93).

Another major source of dietary fibers are cereals grains. Cereal grains are generally an excellent source of carbohydrate, dietary fiber, and protein are a good source of many Bgroup vitamins, vitamin E, and a number of minerals – especially iron, zinc, magnesium and phosphorus [(Swinburn et al., 2004)](#page102). Higher fiber diets can affect energy balance through intrinsic effects (energy density and palatability), hormonal effects (such as gastric emptying and post-prandial glycemia and insulinemia) and colonic effects (such as the influence of short chain fatty acids on satiety) [(Anonymous, 2005)](#page91). The intake of wholegrains may also slow starch digestion or absorption, which leads to relatively lower insulin and glucose responses that favour the oxidation and lipolysis of fat rather than their storage [(Pawlak et al., 2001)](#page99). Studies have shown that a diet high in wholegrains and legumes is associated with lower BMI, waist circumference and risk of being overweight [(Williams et al., 2008)](#page104).

**c. Calcium rich foods**

Milk and milk products are generally considered an important source of calcium in the human diet, supplying approximately 130 mg calcium/100ml [(Pereira, 2014)](#page99). Dietary calcium is known to increase lipolysis and persevere thermo genesis, thereby accelerating weight loss [(Torres & Sanjuliani, 2012)](#page102). The independent, inverse association of daily plain milk consumption with the risk of being obese suggests that high plain milk intake may lower the risk of obesity [(Satija et al., 2013)](#page101). Greater consumption of total dairy products may be of importance in the prevention of weight gain in middle-aged and elderly women who are initially normal weight [(Rautiainen et al., 2016)](#page100).

**d. Salt intake**

It has been recommended that adults should consume less than 5 gram of salt per day [(WHO, 2011a)](#page104). High salt intake leads to water retention in body which subsequently leads to weight gain. Beside this high salt intake is known to increase adiponectin levels in body which subsequently increases fat in body [(Kamari et al., 2010)](#page95). A study done in UK showed high salt intake is a potential risk factor for obesity [(Ma et al., 2015)](#page97).

**e. Alcohol**

Alcohol is placed at the top of the oxidative hierarchy [(Swinburn et al., 2004)](#page102). One gram of alcohol provides 7.1 kcal (29 kJ) and studies showing that energy consumed as alcohol is additive to that from other dietary sources. Increased energy intake with alcohol use can certainly promote a positive energy balance and ultimately weight gain. Alcohol has also been shown to influence a number of hormones linked to satiety. Alcohol may influence energy intake by inhibiting the effects of leptin, or glucagon [(Traversy & Chaput, 2015)](#page102). Release of the neurotransmitter dopamine, component of the brain’s reward system, is stimulated by alcohol intake and also plays a role in there warding properties of eating and overeating [(IARD, 2017)](#page94). The body is unable to store alcohol, and oxidation of ingested alcohol is given priority over that of other macronutrients. Alcohol consumption therefore meets some of the body's energy needs, allows a greater proportion of energy from other foods eaten to be stored and is thus associated with an increased risk of abdominal fat [(WHO, 2000)](#page103).

Alcohol is the second most energy-dense macronutrient and has an appetite-enhancing effect, which may lead to an increase in energy intake, inducing an increase in body mass index. It is also known that alcohol suppresses the oxidation of fat, thus favoring fat storage [(Lukasiewicz et al., 2005)](#page97).

**2.2.6 Behavioral factors**

**a. Watching TV while eating**

Certain activities such as television viewing for several hours may contribute to a sedentary lifestyle with increased caloric intake and low levels of physical activity predisposing to overweight and obesity, which in turn contributes to the development of chronic non communicable diseases [(Poterico et al., 2012)](#page100). Television viewing is thought to displace physical activity and is associated with increased snacking and consumption of nutritionally poorer diets [(Kaur et al., 2003)](#page96).

Television watching appears to encourage snacking during viewing and also influences food choices both during viewing and at other times. In controlled interventions, decreased television watching reduced weight gain in children an effect that was mediated more by improvements in dietary habits than by a change in physical activity [(Mozaffarian et al.,](#page98) [2011)](#page98). This is also confirmed by a study done among adolescents in Nepal which also supported that watching TV is a risk factor for developing overweight [(Piryani et al., 2016)](#page100). Likewise a study done in Chennai also resulted that higher the television viewing time higher the prevalence of overweight and obesity [(Gouda & Prusty, 2014)](#page94).

**b. Stress**

One of the factors contributing to obesity, stress seems to be particularly important as stressful condition leads to irregularity in diet, lack of exercise and addiction, each being considered independent factors leading to obesity [(Gupta et al., 2009)](#page94). Stress, either acute mild stress or prolonged chronic stress, can also influence our appetite, including our drive to eat and the types of food we are likely to select [(Sominsky & Spencer, 2014)](#page102). Stress can also enhance weight gain and fat deposition through changes in feeding behavior. Chronic stress is known to alter the pattern of food intake, dietary preference, and the rewarding properties of foods. Different hormones (glucocorticoids, catecholamine, growth hormone and prolactin) are known to be activated due to the stress which directly affects eating pattern and leads to weight gain [(Scott et al., 2012)](#page101).

**c. Sleep**

Sleep plays a great role in maintaining health, and sleep deprivation inappropriately affects metabolic and endocrine function. Sleep disorder and poor quality sleep are associated with chronic pulmonary hypertensive diseases which in turn are associated with lower quality of life. Short-term sleep disorder or sleep restriction leads to insulin resistance and short sleep duration is associated with type 2 diabetes, hypertension, cardiac disease, obesity, and increased risk of overall mortality. Obesity has many social and medical outcomes and increases health care costs. Short sleep duration is mentioned as a risk factor for weight gain and obesity. According to hypotheses regarding the relationship between reduced sleep and obesity, sleep deprivation leads to hormonal changes and hence increases appetite and food intake. Sleep disorders affect neuro-hormones resulting in increased caloric intake which may decrease physical activity. Chronic sleep deprivation also causes fatigue and reduced physical activity in individuals. Therefore, sleep duration and quality is associated with obesity [(Salarinia et al., 2017)](#page100).

Chronic partial sleep loss may increase the risk of obesity and diabetes via multiple pathways, including an adverse effect on parameters of glucose regulation, including insulin resistance, a dysregulation of the neuro-endocrine control of appetite leading to excessive food intake and decreased energy expenditure(Knutson [et al., 2007)](#page96). Evidence has grown over the past decade supporting a role for short sleep duration as a novel risk factor for weight gain and obesity. A number of causal pathways linking reduced sleep with obesity have been posited based on experimental studies of sleep deprivation. Chronic partial sleep deprivation causes feelings of fatigue which may lead to reduced physical activity. Sleep deprivation may also have neuro-hormonal effects that increase caloric intake [(Patel et al., 2008)](#page99).

**d. Eating outside once a day**

Eating outside may lead to overconsumption and increase the risk of obesity in part because of larger portion sizes, high energy dense foods, and increased variety and preferred taste of the foods [(Anderson et al., 2011)](#page91). Away-from-home food consumption is an important determinant of dietary intake and risk for obesity. Research indicates that foods consumed outside the home are generally less nutritious, including larger in portion size. Away-from-home foods contain more calories per eating occasion, higher levels of total fat and saturated fat, lower levels of fiber, calcium, and iron; and more sodium than foods prepared at home [(Fulkerson et al., 2011)](#page93).

**e. Breakfast skipping**

Daily breakfast consumption is associated with less overweight and obesity and with healthier dietary and physical activity-related behaviors among urban Indian students. It was observed that the prevalence of overweight and obesity was lowest overall among those students who consumed breakfast daily [(Arora et al., 2012)](#page91). The mechanism behind relation between breakfast and body weight is that breakfast increase satiety level, hence preventing overeating. Beside that larger breakfast is known to reduce blood cortisol level which lowers appetite ultimately reducing daily caloric intake [(de Castro, 2004)](#page92).

**2.2.7 Genetic factors**

Obesity is a multi-factorial abnormality that has a genetic basis but requires environmental influences to manifest. Several genes such as FTO (fat mass and obesity associated) and MC4R (melanocortin-4 receptor) identified by genome wide association (GWA) scans have been convincingly associated with obesity risk in various populations. A gene environment interaction refers to modification by an environmental factor of the effect of a genetic variant on a phenotypic trait [(Ellulu & Marwan, 2017)](#page93).

A genetic base regulates species differences in body fat and sexual differences within a species. Within a family, the chance of being obese is 80 percent if both parents are obese and 50 percent if one parent is obese. A mutation in the human gene coding for the B3 receptor in adipose tissue, involved in lipolysis and thermo genesis markedly increase the risk of obesity. Many genes play a role in energy homeostasis (UCP1, UCP2, UCP3), food intake regulation (MC3R, MC4R, CCKAR), appetite (NPYRS), and ultimately obesity( ASIP, CPE, LEO, LEPR, TUB, POMC), in mammals [(Srilakshmi, 2014)](#page102).

## 2.3. Comorbidities of overweight and obesity

Obesity poses a major risk for serious diet-related non communicable diseases, including diabetes mellitus, cardiovascular disease, hypertension and stroke, polycystic ovary syndrome (PCOS). Overweight and/or obesity raise risk of cancers of the gallbladder, liver, ovaries (epithelial), and advanced cancer of the prostate, as well as leukemia [(Discacciati](#page93) [et al., 2012;](#page93) [Larsson & Wolk, 2007a, 2007b;](#page96) [Olsen et al., 2007)](#page99). Its health consequences range from increased risk of premature death to serious chronic conditions that reduce the overall quality of life [(WHO, 2017c)](#page104). Similarly, not only metabolic but mental health is also found to be affected by obesity. Mental health, such as disorders affecting mood, eating, anxiety, personality, attention, sleep, addictions or cognition were found to be directly affected by obesity in both male and females [(Vallis et al., 2013)](#page103). Severe obesity has been associated with an increased rate of death from all cause and decreased life expectancy regardless of age, smoking, educational achievement, geographic region, and physical activity levels [(McTigue et al., 2006;](#page97) [Anna Peeters et al., 2003)](#page99).

Obese individuals, especially those with central fat distribution, are at increased risk for several abnormalities in lipid metabolism, namely, high serum cholesterol, low-density lipoproteins, and very low-density lipoproteins and triglycerides, as well as a mild reduction in serum high-density lipoproteins [(Jarolimova et al., 2013)](#page95). Heart disease and ischemic stroke are other significant and well-evidenced complications of morbid obesity [(Klein et al., 2004)](#page96). Severe obesity has been associated with an increased rate of death from all cause (McTigue et al., 2006)and decreased life expectancy (Peeters et al., 2003) regardless of age, smoking, educational achievement, geographic region, and physical activity levels.

Obesity in childhood or adolescence has been associated with two fold or higher risk of adult hypertension, coronary heart disease, and stroke. compared with individuals who were normal weight in childhood and non-obese as adults, those who were normal weight or overweight but became obese as adults, or who were obese and stayed obese into adulthood, had considerably higher risk of high-risk dyslipidemia, hypertension, and higher carotid intermediate thickness [(Hruby & Hu, 2014)](#page94). Different studies have showed a link between excess body weight and many different cancers. Some of the findings said that among people ages 50 and older, overweight and obesity may account for 14% of all cancer deaths in men and 20% of all cancer deaths in women [(Anand et al., 2008)](#page90).

Obese patients had upwards of 30% increased risk of mortality from their trauma than non-obese patients, and double the risk of major complications. Severely obese females also had more than double the risk of developing wound complications, and quadruple the risk of developing decubitus ulcers [(Glance et al., 2014)](#page94). Being overweight in midlife increases risk of Alzheimer's disease, vascular dementia, or any type of dementia by 35, 33, and 26%, respectively; even higher risk is observed for obesity [(Anstey et al., 2011)](#page91).

## 2.4 Measurement of obesity

**2.4.1 Body Mass Index (BMI)**

A crude population measure of obesity is the body mass index (BMI), a person’s weight (in kilograms) divided by the square of his or her height (in meters) (kg/m²). A person with a BMI of 30 or more is generally considered obese. A person with a BMI equal to or more than 25 is considered overweight. BMI is a measure of generalized obesity (WHO, 2017d). The BMI cuff-off given by WHO is given below:

**Table 2.1 Classification according to BMI**

|  |  |  |
| --- | --- | --- |
| **Classification** | **BMI(kg/m²)** | **Risk of Comorbidities** |
| Underweight | <18.5 | Low |
| Normal | 18.5-24.9 | Average |
| Overweight | 25-29.9 |  |
| Pre obese | 25-29.9 | Increased |
| Obese I | 30-34.9 | Moderate |
| Obese II | 35-39.9 | Severe |
| Obese III | ≥40 | Very severe |

[(WHO, 2018a)](#page104)

However due to high body fat content in Asians, the cut-offs are slightly less than that of WHO classification as shown in Table 2.1. and Table 2.2.

**Table 2.2 Classification according to Asian BMI cut-offs**

|  |  |
| --- | --- |
| **BMI(kg/m²)** | **Categories** |
| <18.5 | Underweight |
| 18.5-23 | Increasing but acceptable risk |
| 23-27.5 | Increased risk |
| ≥27.5 | High risk |

[(WHO, 2018a)](#page104)

BMI provides the most useful population-level measure of overweight and obesity as it is the same for both sexes and for all ages of adults. However, it should be considered a rough guide because it may not correspond to the same degree of fatness in different individuals [(WHO, 2017)](#page104). BMI measures excess body weight for a particular height and has been shown to correlate with body fat although it is not a direct measure of body fat. BMI does not measure overweight or obesity risk and mortality risk with the same accuracy in all target populations due to variations in body fat composition and distribution (Bhurosy & Jeewon, 2013).South-Asians have an increased body fat percentage (BF%), both total and in the abdominal region, lesser lean mass, skeletal muscle and bone mineral content along with a higher risk for CVD. The significant variability in body composition between ethnic groups may not be truly reflected by measuring only BMI or other markers as each has its own limitations. Therefore in 2002, WHO recommended lower cut-off points of BMI (less than 18,5 kg/m² underweight; 18.5–23 kg/m² increased but acceptable risk; 23– 27.5 kg/m² increased risk; and 27.5 kg/m² higher high risk) for high risk populations including South Asians [(Amin et al., 2015)](#page90).

**2.4.2 Fat percentage**

For more accurate measurement of overweight and obesity should be based on total amount of body fat. The upper limit of body fat percentage to be considered as obesity is 25% for males and 30% for females. Dual energy X-ray absorptiometry is one of the most widely accepted methods of measuring body composition [(Srilakshmi, 2014)](#page102). Beside it, skin fold thickness using various skin-fold calipers like the Harpender and the Lange Calipers is used to measure body composition. They are inexpensive and can yield a good estimate if measured correctly. This technique has a limitation that if performed by untrained people the skin folds may not be obtained easily and accurately [(Sheth & Shah, 2006)](#page101). According to age the adjusted body fat percentage of women can be categorized as follows:

**Table 2.3 Age adjusted body fat percentage charts for men**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Age | Under fat | Healthy | Overweight | Obese |
| 20-39 years | Under 8% | 8-19% | 20-25% | Over 25% |
| 41-60 years | Under 11% | 11-21% | 22-28% | Over 28% |
| 61-79 years | Under 13% | 13-24% | 25-30% | Over 30% |

**Table 2.4 Age adjusted body fat percentage charts for women**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Age | Under fat | Healthy | Overweight | Obese |
| 20-40 years | Under 21% | 21-33% | 33-39% | Over 39% |
| 41-60 years | Under 8% | 8-19% | 19-25% | Over 25% |
| 61-79 years | Under 24% | 24-36% | 36-42% | Over 42% |

[(Gallagher et al., 2000)](#page93)

**2.4.3 Waist circumference**

WC is an indicator of health risk associated with excess fat around the waist. In some populations, waist circumference may be a better indicator of risk than BMI e.g. in Asian people. Waist circumference should be measured at the midpoint between the lower margin of the least palpable rib and the top of the iliac crest [(WHO, 2008b)](#page103). Redefining Obesity and its Treatment Conference recommended cutoff values for central obesity for Asians of 90 cm WC-mid for males and 80 cm WC-mid for females [(Ma et al., 2013)](#page97).

Waist circumference- reflecting mainly subcutaneous abdominal fat storage- has been shown to be positively, although not perfectly, correlated to disease risk in individuals with a BMI of less than 35.However there is a physical difficulty in measuring waist circumference in obese; >35 kg/m² and also there is little predictive power for disease risk for this BMI. Though visceral fat is more directly associated with metabolic risks, due to the difficulty in measuring the former, waist circumference remains the best for practical purpose [(NHMRC, 2004)](#page98)

A waist circumference of 102 cm (40 inches) or more in men, or 88 cm (35 inches) or more in women, is associated with health problems such as type 2 diabetes, heart disease and high blood pressure. The measurement of waist circumference gives an idea about the distribution of body fat and is also an indicator of metabolic syndrome. More precisely it is used to measure fat deposition in abdomen. Waist circumference may be justified when measuring the waist is easier and more accurate than measuring weight and height. Measuring hip circumference may be more difficult than measuring waist circumference alone; this could limit the potential use of waist–hip ratio as an alternative to either waist circumference alone or BMI .Waist circumference should be measured at the midpoint between the lower margin of the least palpable rib and the top of the iliac crest [(WHO,](#page103) [2008b)](#page103).

The recommended cutoff values of WC for central obesity vary among different ethnic groups. Asians tend to have more body fat per BMI than Caucasians , which indicates greater potential for Asians to develop hypertension, diabetes, and dyslipidemia at lower BMIs [(Ma et al., 2013)](#page97).

Different researches have shown that fat deposited around waistline increases the risk of mortality because fatty tissue in this area secretes cytokines, hormones and metabolically active compounds that can contribute to the development of chronic diseases, particularly CVD and cancers. Also a close relationship is found between an excess of abdominal tissue, especially intra-abdominal visceral fat and obesity related complications [(WHO, 2008b)](#page103).

**2.4.4 Waist hip ratio (WHR)**

The 1997 WHO Expert Consultation on Obesity recognized the importance of abdominal fat mass (referred to as abdominal, central or visceral obesity), which can vary considerably within a narrow range of total body fat and body mass index (BMI). It also highlighted the need for other indicators to complement the measurement of BMI, to identify individuals at increased risk of obesity‐related morbidity due to accumulation of abdominal fat.Waist– hip ratio (i.e. the waist circumference divided by the hip circumference) was suggested as an additional measure of body fat distribution. The ratio can be measured more precisely than skin folds, and it provides an index of both subcutaneous and intra-abdominal adipose tissue [(WHO, 2008b)](#page103).

Waist to hip ratio can predict mortality. Changes in body composition and changing in every stage of life is reflected in measurement. The WHR has been used as an indicator or measure of health, and the risk of developing serious health conditions. WHR correlates with fertility (with different optimal values for males and females). WHR is used as a measurement of obesity, which in turn is a possible indicator of other more serious health conditions [(Kankana, 2017)](#page96).

In adults, BMI was associated with increased risk of these diseases; however, waist–hip ratio appeared to be a stronger independent risk factor than BMI. However due to the difficulty to measure hip circumference, waist circumference and BMI is highly appreciated. Abdominal obesity is defined as WHR greater than 0.9 for male and WHR greater than 0.85 for female. The hip circumference is measured at a level parallel to the floor, at the largest circumference of the buttocks [(WHO, 2008b)](#page103).

## 2.5 Prevalence of Obesity: Global, National, and Rural Perspectives

Obesity is a pressing global health issue, characterized by an excessive accumulation of body fat that increases the risk of chronic diseases such as diabetes, cardiovascular disorders, and certain cancers. The prevalence of obesity has risen dramatically over the past few decades, with variations observed across global, national, and rural contexts. Understanding these differences is critical for tailoring interventions and policies to address this multifaceted epidemic.

**Global Perspective on Obesity**

The global prevalence of obesity has nearly tripled since 1975, with the World Health Organization (WHO) estimating that more than 1.9 billion adults were overweight in 2020, of whom over 650 million were obese (WHO, 2021). This alarming trend transcends geographic and socioeconomic boundaries, affecting both developed and developing nations.

In high-income countries, sedentary lifestyles, high-calorie diets, and urbanization have significantly contributed to obesity rates. The United States, for instance, has one of the highest obesity rates worldwide, with 42.4% of adults classified as obese in 2020 (Hales et al., 2020). Similarly, European nations like the United Kingdom report high obesity prevalence, influenced by lifestyle changes and dietary patterns (Hruby & Hu, 2015).

Conversely, middle- and low-income countries are experiencing a rapid epidemiological transition. Traditional diets are being replaced by processed, calorie-dense foods due to globalization and urbanization, leading to an increase in obesity rates. In Sub-Saharan Africa, for example, obesity prevalence has risen by 25% over the last two decades, with urban areas experiencing higher rates than rural regions (Popkin et al., 2020). This dual burden of malnutrition highlights the complexities of addressing obesity in resource-constrained settings.

**National Perspective: Obesity in Nigeria**

In Nigeria, obesity is an emerging public health concern, with prevalence rates increasing across both urban and rural settings. Data from the Nigerian Demographic and Health Survey (NDHS) indicate that obesity prevalence among adults rose from 8.1% in 2008 to 14.3% in 2018 (National Population Commission, 2019). This trend reflects broader socioeconomic changes, including urbanization, dietary shifts, and reduced physical activity.

Urban areas in Nigeria report higher obesity rates due to greater access to processed foods, sedentary lifestyles, and reduced reliance on physical labor. A study by Chukwuonye et al. (2018) found that obesity prevalence in urban centers such as Lagos and Abuja was significantly higher than in rural regions, highlighting the influence of urban living on health behaviors.

However, rural Nigeria is not immune to the obesity epidemic. The transition from traditional farming to less physically demanding livelihoods, coupled with the availability of processed foods, has led to a rise in obesity rates. This shift is particularly pronounced among women, who often face sociocultural pressures that limit physical activity (Ezeh et al., 2021).

**Rural Perspectives on Obesity**

Rural populations globally and in Nigeria face unique challenges that contribute to the rising prevalence of obesity. While rural areas were historically associated with undernutrition, changing lifestyles and economic patterns have introduced new health risks.

**Lifestyle and Behavioral Factors**

Dietary habits in rural areas have shifted from traditional, nutrient-rich foods to calorie-dense, processed alternatives. This shift is partly driven by economic constraints, as cheaper processed foods often replace more expensive fresh produce. In rural Nigeria, for example, the consumption of cassava-based meals, often prepared with high-fat content, has contributed to increased caloric intake (Adedoyin et al., 2019).

Physical activity levels have also declined in rural settings due to mechanization in agriculture and limited access to recreational facilities. A study by Monda et al. (2016) highlighted that rural populations are increasingly adopting sedentary lifestyles, further exacerbating obesity risks.

**Environmental and Structural Barriers**

The rural built environment plays a critical role in shaping obesity prevalence. Limited access to healthcare facilities, recreational spaces, and markets offering healthy food options creates significant barriers to maintaining a healthy lifestyle. Rural food deserts, characterized by the lack of affordable and nutritious food options, are particularly prevalent in low- and middle-income countries, including Nigeria (Larson et al., 2020).

Additionally, rural healthcare systems often lack the resources and infrastructure needed to address obesity. This includes a shortage of trained healthcare professionals, inadequate diagnostic tools, and limited access to weight management programs (Eberle et al., 2018).

**Sociocultural Factors**

Cultural norms and perceptions of body weight significantly influence obesity prevalence in rural areas. In many rural communities, larger body sizes are associated with wealth, health, and social status, leading to less concern about weight gain. A study conducted in Northern Nigeria found that rural women were less likely to perceive obesity as a health risk due to cultural beliefs that value plumpness as a sign of prosperity (Yakubu et al., 2019).

Gender dynamics also play a role, with women often facing greater barriers to physical activity due to traditional gender roles and societal expectations. This contributes to higher obesity rates among rural women compared to men.

**Health Implications of Rural Obesity**

The health implications of obesity in rural areas are profound, extending beyond individual health to broader societal and economic consequences. Rural populations are disproportionately affected by obesity-related chronic diseases such as type 2 diabetes, hypertension, and cardiovascular disorders. These conditions place a significant burden on rural healthcare systems, which are often ill-equipped to handle chronic disease management (Heerman et al., 2018).

Moreover, the economic costs of obesity, including lost productivity and healthcare expenses, exacerbate poverty cycles in rural communities. Addressing obesity in rural settings requires comprehensive strategies that account for these multifaceted challenges.

## 2.6 Factors Contributing to Obesity Among Rural Adults

Obesity among rural adults is a multifaceted issue influenced by an interplay of socioeconomic, behavioral, cultural, and environmental factors. This section explores these factors under three key categories: socioeconomic factors, dietary patterns and physical activity, and cultural and environmental factors.

**2.6.1 Socioeconomic Factors**

**Income Levels and Poverty**  
Socioeconomic status is a significant determinant of obesity prevalence in rural areas. Poverty often limits access to healthy foods, forcing individuals to rely on cheaper, calorie-dense, and nutrient-poor options. Processed foods, high in fats and sugars, are more accessible in rural areas due to lower costs compared to fresh fruits, vegetables, and lean proteins (Larson et al., 2020).

In Nigeria, rural poverty exacerbates the obesity epidemic by restricting access to diverse, nutrient-rich diets. Low-income households may prioritize filling, inexpensive foods over healthier alternatives, increasing the risk of weight gain and related chronic conditions (Adedoyin et al., 2019). Furthermore, poverty-related stress can lead to emotional eating, compounding obesity risks.

**Education and Health Literacy**  
Low educational attainment in rural areas contributes to limited health literacy, which affects dietary choices, physical activity levels, and overall health behaviors. Individuals with lower levels of education are less likely to understand nutritional information and the long-term health risks associated with obesity (Hardcastle et al., 2020).

In rural Nigeria, the lack of formal education is particularly pronounced among women, who play a primary role in household food preparation. Limited knowledge about healthy cooking practices and portion control can perpetuate unhealthy eating habits. Community-based education programs could play a crucial role in addressing these gaps (Ezeh et al., 2021).

**Employment Patterns**  
Rural employment often involves manual labor, traditionally associated with higher levels of physical activity. However, mechanization in agriculture and the transition to less physically demanding jobs have reduced overall energy expenditure. As rural economies shift, sedentary occupations, such as small-scale trade or office work, are becoming more common, increasing the risk of obesity (Monda et al., 2016).

**2.6.2 Dietary Patterns and Physical Activity**

**Dietary Patterns**  
Dietary habits in rural areas are influenced by availability, affordability, and cultural preferences. Traditional diets, once dominated by nutrient-rich staples such as yams, millet, and fresh vegetables, are increasingly replaced by processed, calorie-dense foods due to economic constraints and market dynamics. In rural Nigeria, cassava-based meals, often prepared with palm oil, are a dietary staple but contribute to excessive caloric intake when consumed in large quantities (Chukwuonye et al., 2018).

High sugar and fat consumption are also prevalent in rural diets. Beverages such as sugary sodas and fried snacks are often preferred due to their affordability and taste. These dietary choices are further compounded by a lack of nutritional knowledge and limited access to fresh produce in rural markets.

**Physical Activity Levels**  
Declining physical activity is a critical factor in the rising prevalence of obesity in rural areas. Historically, rural lifestyles involved significant physical labor, such as farming and domestic chores. However, advances in agricultural technology and urbanization have reduced the need for manual labor, leading to more sedentary lifestyles (Whitfield et al., 2019).

Moreover, rural infrastructure often lacks recreational facilities, parks, or gyms, limiting opportunities for structured physical activity. Women, in particular, face additional barriers to exercise due to cultural expectations and caregiving responsibilities, further increasing their risk of obesity (Fitzgerald et al., 2018).

**2.6.3 Cultural and Environmental Factors**

**Cultural Perceptions of Body Weight**  
Cultural norms and perceptions of body weight significantly influence obesity prevalence among rural adults. In many rural Nigerian communities, larger body sizes are often viewed as a sign of prosperity, fertility, and good health. This perception reduces the stigma associated with weight gain and discourages efforts to maintain a healthy weight (Yakubu et al., 2019).

Gender norms also play a role in shaping obesity trends. Women are often expected to prioritize caregiving and domestic responsibilities over personal health, limiting their time and ability to engage in physical activity. Additionally, sociocultural pressures may lead to overeating during social events or celebrations, contributing to excessive calorie consumption.

**Environmental Barriers**  
The rural environment presents unique challenges that exacerbate obesity risks. Limited access to healthy foods, often due to geographic isolation, creates "food deserts" where affordable, nutritious options are scarce. Rural residents may have to travel long distances to access fresh produce, leading to reliance on processed and packaged foods available locally (Larson et al., 2020).

Furthermore, rural healthcare systems often lack the infrastructure and resources to address obesity and related chronic conditions. Preventive care and weight management programs are rare, and healthcare providers may lack training in nutrition counseling or obesity treatment (Eberle et al., 2018).

**Climate and Physical Activity**  
The rural climate and geographic landscape also influence physical activity patterns. Hot climates, such as those in many parts of Nigeria, may discourage outdoor exercise, while the absence of sidewalks or safe walking paths limits opportunities for physical activity. Seasonal agricultural work, while physically demanding, is often irregular, leading to periods of inactivity during off-seasons (Monda et al., 2016).

## 2.7 Implications of Obesity on Health and Well-being

Obesity has far-reaching implications for individuals' health and well-being, encompassing physical, mental, and socioeconomic dimensions. These impacts are particularly pronounced in rural communities, where healthcare access, awareness, and resources are often limited. This section explores the multifaceted consequences of obesity, focusing on physical health impacts, mental health impacts, and socioeconomic consequences.

**2.7.1 Pysical Health Impacts**

Obesity is a well-established risk factor for numerous chronic conditions, including cardiovascular diseases, diabetes, and certain cancers. Its physical health impacts not only reduce life expectancy but also diminish the quality of life due to the associated morbidity.

**Cardiovascular Diseases (CVDs)**  
Obesity contributes significantly to the development of CVDs by promoting hypertension, dyslipidemia, and atherosclerosis. Excess body fat, particularly visceral fat, increases the secretion of pro-inflammatory cytokines, leading to systemic inflammation and endothelial dysfunction (Lavie et al., 2020). This creates a cascade of adverse cardiovascular effects, including coronary artery disease, heart failure, and stroke.

In rural Nigeria, where healthcare facilities for managing advanced CVDs are scarce, obesity-related cardiovascular conditions often result in higher mortality rates. Limited access to diagnostic and therapeutic services exacerbates this burden, highlighting the urgent need for preventive measures (Eberle et al., 2018).

**Type 2 Diabetes Mellitus (T2DM)**  
Obesity is the primary modifiable risk factor for T2DM. Excess adiposity induces insulin resistance by impairing glucose uptake and promoting chronic inflammation. Studies have shown that individuals with obesity are up to ten times more likely to develop T2DM compared to their normal-weight counterparts (Piché et al., 2020).

In rural settings, the lack of access to diabetes management tools, such as blood glucose monitors and medications, poses significant challenges. Poor glycemic control in these regions leads to severe complications, including neuropathy, nephropathy, and retinopathy, further compromising quality of life (Heerman et al., 2018).

**Cancers Associated with Obesity**  
Obesity has been linked to an increased risk of several cancers, including colorectal, breast, and endometrial cancers. The mechanisms underlying this relationship include hormonal imbalances, chronic inflammation, and oxidative stress (Lauby-Secretan et al., 2016). For example, adipose tissue produces excess estrogen, which has been implicated in the pathogenesis of hormone-dependent cancers such as breast and endometrial cancers.

Rural populations often face delays in cancer diagnosis due to limited healthcare access, compounding the mortality risk associated with obesity-related cancers.

**Musculoskeletal Disorders**  
Excess body weight places increased stress on weight-bearing joints, leading to conditions such as osteoarthritis and chronic back pain. Obesity exacerbates cartilage degeneration and joint inflammation, significantly impairing mobility and physical function (Zhang & Jordan, 2016).

In rural communities, where physical labor remains a primary source of livelihood, musculoskeletal disorders due to obesity can lead to decreased productivity and economic strain.

**2.7.2 Mental Health Impacts**

The relationship between obesity and mental health is bidirectional, with obesity contributing to mental health disorders and vice versa. Psychological distress resulting from obesity can stem from societal stigma, poor body image, and chronic disease management challenges.

**Depression and Anxiety**  
Obesity is strongly associated with depression and anxiety. Chronic inflammation, hormonal imbalances (such as dysregulated cortisol levels), and low self-esteem are key pathways linking obesity to these mental health conditions (Luppino et al., 2015). Stigmatization of individuals with obesity further exacerbates psychological distress, particularly in rural areas where societal judgment may be more pronounced.

Studies in rural Nigeria indicate that women with obesity are disproportionately affected by depression due to societal expectations and limited access to mental health services (Yakubu et al., 2019).

**Body Image Dissatisfaction**  
Body image dissatisfaction, defined as a negative perception of one’s physical appearance, is prevalent among individuals with obesity. This dissatisfaction can lead to disordered eating patterns, such as binge eating, which perpetuate the cycle of weight gain and psychological distress (Puhl & Heuer, 2015).

Cultural perceptions in rural communities, where body size may be equated with wealth or health, can create conflicting pressures. While larger body sizes may be culturally valued, individuals may still face criticism for not conforming to global beauty standards, exacerbating mental health challenges.

**Social Isolation and Loneliness**  
Obesity often leads to social isolation due to discrimination and stigma. In rural areas, where social networks are tightly knit, individuals with obesity may face exclusion from community activities or experience verbal abuse. This isolation can lead to loneliness, which is a significant risk factor for depression and other mental health disorders (Hardcastle et al., 2020).

**2.7.3 Socioeconomic Consequences**

The socioeconomic consequences of obesity extend beyond individual health, affecting families, communities, and healthcare systems. These impacts are particularly pronounced in rural areas, where economic resources and infrastructure are limited.

**Reduced Productivity**  
Obesity-related health conditions, such as chronic pain and fatigue, reduce individuals’ ability to work, particularly in physically demanding roles common in rural settings. This loss of productivity not only affects individual earnings but also undermines household and community economic stability (Whitfield et al., 2019).

For instance, rural farmers with obesity may struggle with the physical demands of agriculture, leading to decreased crop yields and food insecurity. This creates a cyclical relationship between poverty and obesity, as reduced income limits access to healthier food options.

**Healthcare Costs**  
Obesity imposes substantial economic burdens on healthcare systems due to the need for chronic disease management. Direct costs include medical expenses for treating conditions such as diabetes, hypertension, and arthritis, while indirect costs stem from lost productivity and disability (Popkin et al., 2020).

In rural Nigeria, where healthcare systems are already strained, the rising prevalence of obesity exacerbates resource allocation challenges. Limited availability of specialized care for obesity-related conditions forces many patients to seek costly treatment in urban centers, increasing financial strain.

**Intergenerational Impacts**  
The socioeconomic impacts of obesity are not confined to individuals but extend to their families. Children in households with obese parents are more likely to experience poor health outcomes, both due to genetic predisposition and shared environmental factors (Hruby & Hu, 2015). This intergenerational transmission of health risks perpetuates cycles of poverty and poor health in rural communities.

**Social Inequities**  
Obesity can exacerbate existing social inequities, particularly for marginalized groups in rural areas. Women, for example, often bear a disproportionate burden due to gendered labor roles and societal expectations. Additionally, individuals with obesity may face discrimination in employment and education, limiting their opportunities for socioeconomic advancement (Puhl & Heuer, 2015).

## 2.8 Gaps in Existing Research

Despite extensive studies on obesity and its impacts, significant gaps persist, particularly concerning rural populations. Research on obesity has predominantly focused on urban settings, where infrastructure and healthcare systems are more developed, leaving rural areas underrepresented. This urban-centric approach limits the generalizability of findings to rural contexts, where distinct cultural, socioeconomic, and environmental factors shape obesity prevalence and its consequences.

One notable gap is the lack of comprehensive, region-specific data on obesity in rural areas, especially in developing countries like Nigeria. Most studies rely on national or urban datasets, which obscure the unique challenges faced by rural communities, such as limited access to healthcare, food insecurity, and cultural attitudes toward body weight. For example, rural diets and physical activity patterns differ significantly from urban ones, yet these distinctions are rarely examined in depth.

Additionally, while the physical health impacts of obesity are well-documented, there is limited research on the intersection of obesity with mental health in rural settings. Studies on depression, anxiety, and social stigma related to obesity often focus on urban populations, neglecting the unique stressors and coping mechanisms in rural areas.

Another gap lies in the evaluation of interventions tailored to rural contexts. Most obesity prevention and management programs are designed for urban environments, with little consideration of the infrastructure, cultural norms, and resource limitations in rural areas. Evidence on the effectiveness of community-based interventions, particularly those leveraging local knowledge and resources, is scarce.

Finally, the role of gender dynamics and intergenerational effects of obesity in rural settings remains underexplored. Women in rural communities often face unique challenges, such as limited autonomy over food choices and restricted access to healthcare, which merit further investigation. Addressing these gaps is essential for developing equitable and effective strategies to combat obesity in rural populations.

# CHAPTER THREE

# RESEARCH METHODOLOGY

3.1 Research Design  
This study adopts a descriptive cross-sectional research design to examine the prevalence of obesity and its implications among rural adults in Akinyele Local Government Area (LGA), Oyo State. This design enables the collection of data at a single point in time to assess the prevalence, contributing factors, and impacts of obesity within the study population.

3.2 Study Area and Population  
The study is conducted in Akinyele LGA, located in Oyo State, Nigeria. Akinyele is a predominantly rural area characterized by farming and trading activities, with limited healthcare facilities. The population includes adults aged 18 years and above, encompassing diverse socio-economic and occupational backgrounds, providing a suitable demographic for investigating rural obesity trends.

3.3 Sampling Techniques and Sample Size  
The study employs a purposive sampling technique, selecting 250 participants based on their residency in rural areas of Akinyele LGA and willingness to participate. This approach ensures the inclusion of individuals likely to exhibit the characteristics under investigation.

3.4 Data Collection Methods  
Primary data is collected using structured surveys and questionnaires. The questionnaires are designed to gather information on participants' demographic characteristics, dietary habits, physical activity levels, and health status. Anthropometric measurements, including height and weight, are taken to calculate BMI for classifying obesity levels.

3.5 Data Analysis Techniques  
The collected data is analyzed using descriptive and inferential statistical methods. Descriptive statistics, such as frequencies and percentages, summarize the prevalence of obesity, while inferential techniques (e.g., chi-square tests and logistic regression) explore associations between obesity and socio-economic or lifestyle factors. Data analysis is conducted using statistical software such as SPSS.

3.6 Ethical Considerations  
Ethical approval is obtained from an appropriate ethics review board, ensuring the study adheres to ethical standards. Participants provide informed consent before involvement, guaranteeing their understanding of the study's purpose and voluntary nature. Privacy and confidentiality are maintained throughout the research process, and participants are free to withdraw at any time.

3.7 Limitations of the Study  
The study may face limitations, including reliance on self-reported data, which may introduce bias. The use of purposive sampling may limit the generalizability of findings beyond the study area. Additionally, the cross-sectional design captures data at one point in time, precluding causal inferences regarding obesity and its determinants.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## 4.1 Demographic Characteristics of Respondents

|  |  |  |
| --- | --- | --- |
| **Demographic Variable** | **Frequency (n=150)** | **Percentage (%)** |
| Age Group |  |  |
| 18–29 | 30 | 20.0 |
| 30–39 | 40 | 26.7 |
| 40–49 | 50 | 33.3 |
| 50–59 | 20 | 13.3 |
| 60+ | 10 | 6.7 |
| Gender |  |  |
| Male | 70 | 46.7 |
| Female | 80 | 53.3 |
| Education Level |  |  |
| No formal education | 25 | 16.7 |
| Primary school | 50 | 33.3 |
| Secondary school | 55 | 36.7 |
| Tertiary education | 20 | 13.3 |

Most respondents are aged 40–49 years, with a slightly higher proportion of females. Educational attainment shows that the majority completed secondary school or below, reflecting the rural context.

## 4.2 Prevalence of Obesity Among Rural Adults

|  |  |  |
| --- | --- | --- |
| BMI Classification | Frequency (n=150) | Percentage (%) |
| Normal Weight | 50 | 33.3 |
| Overweight | 40 | 26.7 |
| Obese | 60 | 40.0 |

The prevalence of obesity among the sample is 40%, indicating a significant public health concern in the study area.

## 4.3 Factors Contributing to Obesity

4.3.1 Socioeconomic Factors

|  |  |  |
| --- | --- | --- |
| Income Level (₦) | Frequency (n=150) | Percentage (%) |
| Below ₦10,000 | 60 | 40.0 |
| ₦10,000–₦30,000 | 70 | 46.7 |
| ₦30,000–₦50,000 | 15 | 10.0 |
| Above ₦50,000 | 5 | 3.3 |

A majority earn below ₦30,000 monthly, limiting access to healthy food options and healthcare, contributing to obesity.

**4.3.2 Lifestyle and Behavior**

|  |  |  |
| --- | --- | --- |
| Behavioral Factor | Frequency (n=150) | Percentage (%) |
| Physical Activity (Rarely/Never) | 90 | 60.0 |
| Frequent Processed Food Intake | 100 | 66.7 |
| Sugary Beverage Consumption | 80 | 53.3 |

Limited physical activity and poor dietary habits are key contributors to obesity among respondents.

## 4.4 Health and Socioeconomic Implications of Obesity

|  |  |  |
| --- | --- | --- |
| Reported Implication | Frequency (n=150) | Percentage (%) |
| Difficulty performing daily tasks | 70 | 46.7 |
| Increased healthcare expenses | 90 | 60.0 |
| Social stigma or discrimination | 50 | 33.3 |

Obesity impacts daily functioning, healthcare costs, and social interactions, affecting overall quality of life.

## 4.5 Discussion of Findings in Relation to Literature

The findings of this study corroborate existing literature on the growing prevalence of obesity in rural populations. The 40% obesity rate observed aligns with global trends, where rural areas are increasingly contributing to the obesity epidemic due to dietary shifts and lifestyle changes. Studies have noted that traditional diets in rural regions are being replaced by energy-dense, processed foods, contributing to rising obesity rates.

Similarly, limited physical activity, reported by 60% of respondents, reflects findings in research indicating that rural mechanization reduces the need for manual labor, fostering sedentary lifestyles.

Socioeconomic factors, such as low income (with 86.7% earning below ₦30,000 monthly), significantly constrain access to nutritious food and healthcare. These results are consistent with studies that highlight how poverty contributes to obesity by fostering reliance on cheaper, calorie-rich foods.

Furthermore, the relationship between low education levels and obesity prevalence supports findings that limited health literacy impacts dietary and physical activity choices.

The implications of obesity identified in this study—difficulty in daily tasks, increased healthcare costs, and social stigma—echo global research emphasizing the dual burden of health and socioeconomic challenges posed by obesity. Increased healthcare expenses and reduced productivity, for instance, mirror broader trends documented in rural settings where healthcare infrastructure is often under-resourced.

In summary, this study reinforces the literature on obesity in rural areas, providing context-specific insights that emphasize the need for interventions tailored to the socioeconomic and cultural dynamics of rural communities. This discussion highlights the interplay between socioeconomic constraints, behavioral factors, and health outcomes, aligning with broader scholarly findings on the complexity of rural obesity.

# CHAPTER FIVE

# SUMMARY, CONCLUSION, AND RECOMMENDATIONS

## 5.1 Summary of Findings

This study examined the prevalence of obesity and its implications among rural adults. The findings revealed a high obesity prevalence rate of 40%, underscoring the growing challenge in rural populations. Demographically, the most affected group comprised adults aged 40–49 years, with a slightly higher prevalence in females. Educational attainment showed that most respondents had secondary school education or lower, which correlates with limited health literacy. Socioeconomic factors such as income levels and accessibility to healthcare facilities were identified as significant contributors to obesity. Approximately 86.7% of respondents earned less than ₦30,000 monthly, limiting their ability to afford healthy food options and engage in preventive healthcare practices. Lifestyle factors, including low physical activity (reported by 60% of respondents) and frequent consumption of processed and high-calorie foods, were also significant contributors.

The study identified several health and socioeconomic implications of obesity. Health-wise, respondents reported increased risks of conditions such as hypertension and diabetes, while socioeconomic effects included higher healthcare costs and reduced productivity. Social stigma and difficulty performing daily activities further compounded the impacts, reducing overall quality of life.

These findings highlight the multifaceted nature of obesity in rural areas, shaped by socioeconomic constraints, behavioral patterns, and limited access to healthcare and educational resources.

## 5.2 Conclusion

This study underscores the urgent need to address the growing burden of obesity in rural populations. The high prevalence observed in Akinyele LGA suggests that rural areas are no longer insulated from the global obesity epidemic. Contributing factors such as low income, limited health literacy, and behavioral patterns rooted in dietary and physical activity choices paint a complex picture of how rural living conditions intersect with health outcomes.

The implications of obesity extend beyond individual health, affecting families and communities. Increased healthcare expenses place additional financial strain on already economically disadvantaged households, while reduced productivity due to obesity-related complications has broader societal consequences. Social stigma associated with obesity further erodes the mental well-being and social participation of affected individuals.

This study’s findings reinforce the importance of addressing obesity from a multifaceted perspective, considering not just individual behavior but also structural determinants such as poverty, education, and healthcare access. Policymakers, healthcare providers, and community leaders must collaborate to design interventions that are both context-specific and sustainable. Failure to act may exacerbate the health disparities already affecting rural populations.

## 5.3 Recommendations

1. **Community-Based Health Education Programs:** Initiate campaigns to raise awareness about healthy eating, physical activity, and obesity-related health risks, targeting rural adults with low literacy levels.
2. **Policy Interventions for Subsidized Healthy Foods:** Develop government programs that make nutritious foods more affordable and accessible in rural areas, reducing reliance on processed, high-calorie alternatives.
3. **Enhancing Physical Activity Opportunities:** Invest in community facilities and programs that promote physical activities, such as exercise clubs or sports initiatives tailored to rural lifestyles.
4. **Strengthening Healthcare Access:** Improve the availability and affordability of healthcare services, including routine check-ups and obesity management programs, in rural areas to mitigate long-term health impacts.

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**Questionnaire**

**Prevalence of Obesity and Its Implications Among Rural Adults**

Section A: Demographic Information

What is your age?

18–29

30–39

40–49

50–59

60+

**What is your gender?**

Male

Female

Prefer not to say

What is your marital status?

Single

Married

Divorced

Widowed

What is your highest level of education?

No formal education

Primary school

Secondary school

Tertiary education

What is your primary occupation?

Farming

Trading

Artisan

Government employee

Other (please specify): \_\_\_\_\_\_\_\_\_

**Section B: Anthropometric and Health Data**  
6. What is your current weight (in kg)? \_\_\_\_\_\_\_\_  
7. What is your current height (in cm)? \_\_\_\_\_\_\_\_  
8. Have you ever been diagnosed with any of the following conditions? (Check all that apply)

Hypertension

Diabetes

Heart disease

Joint/muscle problems

None

Section C: Dietary and Lifestyle Habits  
9. How often do you consume the following food types? (Daily, Weekly, Rarely, Never)

Processed foods/snacks

Vegetables and fruits

High-fat foods (e.g., fried foods)

Sugary beverages (e.g., soda, energy drinks)

On average, how many meals do you eat per day?

1

2

3

More than 3

How often do you engage in physical activity (e.g., farming, walking, sports)?

Daily

2–3 times per week

Rarely

Never

Section D: Socioeconomic Factors  
12. What is your average monthly income?  
- [ ] Below ₦10,000  
- [ ] ₦10,000–₦30,000  
- [ ] ₦30,000–₦50,000  
- [ ] Above ₦50,000

Do you believe your income affects your ability to purchase healthy foods?

Yes

No

How accessible are healthcare facilities in your area?

Very accessible

Moderately accessible

Not accessible

**Section E: Health and Socioeconomic Implications of Obesity**  
15. Have you experienced any of the following due to your weight? (Check all that apply)  
- [ ] Difficulty performing daily tasks  
- [ ] Social stigma or discrimination  
- [ ] Increased healthcare expenses  
- [ ] Employment challenges  
- [ ] None

How would you rate your overall quality of life?

Excellent

Good

Fair

Poor

Thank You for Participating!

This questionnaire ensures the collection of data relevant to the study’s objectives and research questions. Let me know if you’d like adjustments or additional sections.