DETERMINING THE RISK OF NON-COMMUNICABLE DISEASES AMONGST THE MENTALLY ILL PATIENTS ATTENDING PSYCHIATRIC OUT-PATIENT CLINIC AT THE FEDERAL NEUROPSYCHIATRIC HOSPITAL KWARE SOKOTO IN NIGERIA.

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A mini-thesis submitted in partial fulfilment of the requirements for the degree of

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Keywords

Non-communicable diseases

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Life expectancy gap

Premature death

Mortality

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Acronyms

NCD:	Non-communicable Disease
WHO:	World Health Organization
BMI:	Body Mass Index
SMI:	Severe Mental Illness
CVD:	Cardiovascular Diseases
SDMH:	Social Determinant of Mental Health
BP:	Blood Pressure
Ht:	Height
PMI	People living with mental illness
Wt:	Weight
WC:	Waist Circumference
SD:	Standard Deviation
NPC:	National Population Commission
UK:	United Kingdom
SPSS:	Statistical Package for Social Science.

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Abstract

Introduction: People with mental illness (PMI) are likely to die of chronic diseases, primarily cardiovascular, cerebrovascular and respiratory diseases at a younger age compared with the general population. The side-effects of psychotropic medications particularly weight gain and impaired glucose intolerance increase the risk of premature mortality in PMI. Behavioural risk factors for non-communicable diseases such as physical inactivity and unhealthy diet (diets high in fat and low in fruit and vegetables) are also thought to be consequences of negative symptoms of mental illness and emotional dysregulation.

Study aim: Mortality due to chronic diseases in PMI have been reported in the literature but there is a dearth of studies investigating the relationship between psychotropic medication and obesity, diabetes and metabolic syndrome among PMI. Given the growing number of comorbid diagnoses of non-communicable diseases (NCDs) with mental illness among PMI globally, it is important to investigate the relationship between psychotropic medication and non-communicable diseases among PMI. To this end, the aim of this study was to examine patterns of NCDs and associated risk factors among PMI.

Methods: A cross-sectional study design using the World Health Organization's STEPwise instrument was employed. The study population consisted of 33,000 PMI attending the outpatient clinic. Purposive and stratified sampling techniques were used to recruit the participant who met the inclusion criteria and a sample size of 336 patients was recruited for the study. Data were collected through (1) interviews; (3) direct measurements of weight, height including blood samples for random blood sugar and cholesterol level and; (3) questionnaire. The data were transferred onto the SPSS data analysis software. Univariate and

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multivariate logistic regression analysis were conducted to establish association between using psychotropic medication and chances of developing NCDs.

Results: The results showed that 3.6% of the study participants had no risk factors, while 16.5% of the participants had multiple risk factor profile with 13.9% more females having higher mean score compare to 8.4% of their male counterpart. Current daily smoking, consumption of less than 5 servings of fruits and vegetables per day and low level of physical activity were the most common risk factors. Age, female gender and low level of education were risk factors for developing NCDs.

Conclusion: It is hoped that this result will be used to formulate policy and plan interventional strategies to prevent the development of NCDs among PMI.

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Declaration

I declare that the thesis '**Determining the risk of non-communicable diseases amongst the mentally ill patients attending psychiatric out-patient clinic at the Federal Neuropsychiatric Hospital, Kware Sokoto in Nigeria'** is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references.

Tajudeen Olalekan Oladele. **November, 2019.**

Signature……

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Dr. Verona Mathews.

Witness…….

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Dedication

To God the Almighty, through whose mercies and blessings this piece of work was successfully completed. To my late parents who inspired me to be what I am today.

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CHAPTER ONE

Conceptualising the study

1.1 Introduction

The World Health Organization (WHO) estimated that 56.9 million deaths occurred worldwide in 2016 and 71% of these deaths were due to non-communicable diseases (NCDs) (WHO, 2016). The four major NCDs – cardiovascular diseases (CVD), cancer, diabetes and chronic pulmonary disease – are responsible for 82% of NCD deaths in the world (WHO, 2016). In addition, most of these NCD deaths occurred in low-and middle-income countries. WHO projected that NCD deaths will increase from 38 million in 2012 to 52 million by 2030 accounting for 44 million deaths (WHO, 2014). The greatest death toll will occur in the regions of Africa, South-East-Asia and Eastern Mediterranean, where they will increase by over 20% (WHO, 2014).

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The co-morbidity of mental illness and NCDs creates a serious problem, specifically in relation to the life expectancy of PMI (Kulkami, 2014; Joseph, 2004). PMI die from the same morbidities as the rest of the population – cancer, heart disease, stroke, pulmonary disease and diabetes (Teasdale, 2017). For example, people with schizophrenia in England and Wales have a three-fold risk of premature mortality compared with the general population and the risk of premature death due to cardiovascular disease more than double in comparison with the general population (Baxter, 2016). In the United States of America, people with major mental illness die 14 to 32 years earlier than the general population (Robert *et al*, 2017). In fact, the average life expectancy for people with major mental illness ranged from 49 to 60 years compared to the average life expectancy of 77.9 years (Robert *et al*, 2017).

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PMI experience additional risk factors related to their psychotropic medication which stimulate appetite and cause carbohydrate craving leading to obesity and diabetes (Dixon, 2000). Developing obesity and diabetes among PMI is predisposed by genetics (hereditary) predisposition, poorer overall physical health, unhealthy lifestyle and poorer healthcare and differential access to effective care (Hert *et al*., 2011; Baxter, 2016). These factors highlight mental illness as a significant risk factors for NCD (Collaborating for Health, 2014).

While obesity is associated with lifestyle factors such as sedentary and poor diet in the general population, among PMI, obesity is associated with lifestyle-related factors, illness-related conditions (negative, disorganised and depressive symptoms) and treatment-related issues (Hert *et al*, 2011). Medication induced effects such as sedation, stimulating appetite and mineralocorticoid effects are potential contributors to weight gain among PMI (Baxter, 2016; Hert *et al*., 2011).

The presence of mental illness increases the chance of suffering from one or more NCDs and be less likely to seek help and adhere to treatment due to stigma and the chronic nature of the illness (Collaborating for Health, 2014). Treatment seeking behaviour among PMI is influenced by: unequal healthcare provision due to differential access to healthcare, increasing discrimination in healthcare access and management of disease (Baxter, 2016).

In Nigeria, the increasing rural-urban drift has led to concomitant changes in the life circumstance for individuals (such changes in dietary pattern, lack of physical activities and social habits). Consequently, the prevalence of chronic non-communicable diseases has been on the rise (Tagurum, 2015). NCDs in Nigeria are estimated to account for 24% of the deaths in 2011 with a prevalence of 34% (WHO, 2014).

Following the rising incidence of mental illness from 20% in 1993 to 23% in 2003 (Gureje *et al.*, 2006), there is a concomitant rise in NCDs co-morbidity with a prevalence rate of 26.9%

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(Peltzer, 2018). In spite of the above observation, there is a dearth of information on the extent of comorbidity of NCDs and mental illness and the risk factors associated with this comorbidity. To this end, this study is aimed to investigate the prevalence of NCDs among PMI and identify possible risk factors predisposing PMI to developing NCDs.

1.2 Problem statement

PMI on average die at a younger age compared with the general population. Although, suicide is an important cause of death among those with mental illness, the majority of preventable deaths are due to chronic diseases, cardiovascular, cerebrovascular and respiratory diseases.

The extent of the comorbidity of mental disorders and NCDs is unknown in North western Nigeria and the risk factors have not been explored for this high risk and sensitive population. In the context of the rising incidence of death due to NCDs, it is important to investigate the extent and the degree of the problem of NCDs among PMI.

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1.3 Aim

To determine the pattern of NCDs and risk factors associated with NCDs among PMI using psychotropic medication in the outpatient psychiatric department of a tertiary hospital in Nigeria.

1.4 Objectives

The general objective is to access the effect of psychotropic medication in causing NCDs among psychiatric out-patients.

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- To describe the socio-demographic characteristics of the PMI.
- To describe the prevalence of NCDs among PMI.
- To identify the risk factors for NCDs among PMI.
- To determine the association between psychotropic medication usage and NCDs

1.5 Significance of study

The significant of this study is to increase awareness, improve monitoring for NCDs and obtain data for policy decision and intervention to reduce the life expectancy gap. It also serves to contribute to knowledge about psychotropic drugs and NCDs.

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CHAPTER TWO

Literature review

2.1 Introduction

The literature review describes the growing incidence of NCDs among the mentally ill, such as obesity, metabolic syndrome, diabetes mellitus and CVDs, as well as factors contributing to their physical ill health.

2.2 Non-communicable diseases and mental illness

This section provides an overview of the different NCDs commonly found among PMI highlighting their increased risk to having NCDs compared to the general population.

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2.2.2 Obesity

Mental illness and obesity are interrelated; both are public health problems and chronic diseases (McElroy, 2009). PMI are at increased risk of obesity, overweight and abdominal obesity compared to the general population (McElroy, 2006; Gracious *et al*., 2010). Among PMI as in the general population, obesity is associated with lifestyle factors (physical inactivity, unhealthy diet). Additional factors peculiar to PMI include, illness-related symptoms (negative, psychotic and depressive symptoms) and treatment related factors, which include weight gain effect of medication (McElroy, 2009; Wildes *et al.*, 2006; Holt & Peveler, 2009).

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Weight gain during the treatment of PMI is a well-established side-effect of antipsychotics (Newcomer, 2009; Holt & Peveler, 2009; Maina *et al*., 2008). The risk of causing weight gain differs across the antipsychotic's spectrum with Haloperidol a conventional antipsychotics having the least risk in the same group, newer generation of antipsychotics e.g. Olanzapine are more obesogenic than the conventional antipsychotics (Newcomer, 2009; Newcomer, 2006; Bray & Greenway, 2007). All antipsychotics, regardless of the group they belong, exert some modest weight gain of about 7% and all antipsychotics have been found to cause significant weight gain in antipsychotic naïve patients (Alvarez-Jimenez *et al.*, 2008; Saddichha *et al.*, 2007). Similarly, antidepressants (Fava *et al*., 2000) and mood stabilizers (Vanina *et al.*, 2002; Bowden *et al*., 2000) have all been associated with weight gain.

2.2.3 Metabolic syndrome

The prevalence of metabolic syndrome differs across countries, gender, ethnicity and age groups. Countries in North and South America reported a relatively higher prevalence than other countries like India, China, and West Africa, (Li & Ford, 2009). The prevalence of metabolic syndrome among patients treated for schizophrenia ranges from 19.4% to 68% depending on the criteria used, gender, ethnicity, country, age group and antipsychotic treatment (De Hert *et al*., 2006; Cohn *et al*., 2004). The major characteristic of this syndrome includes central obesity, hypertension, dyslipidemia, glucose intolerance or insulin resistance (McElroy, 2009; Li & Ford, 2009). The association of obesity with metabolic syndrome increases the risk of developing Type 2 Diabetes Mellitus and mortality from coronary heart disease (Li & Ford, 2006).

It is pertinent to note that, antipsychotic medication, lifestyle factors and behavioural patterns play a major role in the prevalence of metabolic syndrome among PMI (Fagiolini *et al*., 2008;

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Meyer & Stahl, 2009). Despite these reported prevalence, metabolic syndrome remains widely under diagnosed and under treated among PMI (Hert *et al*., 2011).

2.2.4 Diabetes mellitus

There are known biological and behavioural risk factors for Type 2 Diabetes Mellitus (Whiting *et al*., 2010). The most important of these are overweight and obesity (Qin *et al*., 2010). The diagnosis of Type 2 diabetes increases the risk for comorbid mental health conditions by two- to three-folds, in particular, depression, anxiety disorders, eating disorders and diabetes distress (de Groot, 2014). More so mental health challenges confront people and families with Type 2 diabetes, irrespective of age, educational level, or socioeconomic status. These mental health challenges are associated with poor adherence to treatment (Fisher *et al*., 2014) and poor glycaemic control (Polonsky *et al*., 2015), thus increasing the risk for serious short- and long-term physical complications.

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Factors increasing risk of diabetes mellitus among PMI include familiar predisposition, lifestyle factors, the disease and the treatment specific effects of antipsychotic medication in causing weight gain (De Hert *et al.*, 2009). Antipsychotic medications have stronger diabetogenic risk, being 1.3-fold higher in people with schizophrenia taking atypical antipsychotics compared with those taking conventional antipsychotics (Smith *et al*., 2008).

2.2.5 Cardiovascular diseases

The association between bipolar disorders and CVDs is less recognised due to fragmentary and contradictory data (Goldstein *et al*., 2015). Although comprehensive meta-analysis of CVD

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risk in people with severe mental illness did not find an increased risk of coronary heart diseases in people with bipolar disorder, it however reported a significant association with CVD in longitudinal studies (Correll *et al*., 2017). People with depression have a greater risk of CVD because of comorbid hypertension (Mental & Physical Health Platform, 2008), and other studies (Correll *et al*., 2017; Fiedorowicz, 2014; Seligman, 2015; Wu, 2016; Scott, 2014; Gan *et al*., 2014) have shown that depression constitutes an independent risk factor for coronary heart diseases (Whooley & Wong, 2013; Williams, 2012; Kim *et al*., 2014). The etiology of CVD is multifactorial and includes; genetics and lifestyle factors as well as disease specific and treatment effects (De Hert *et al*., 2009).

PMI have higher rates of modifiable risk factors than controls, they are more likely to be overweight, have diabetes mellitus, hypertension, dyslipidemia and smoke (Hamadeh *et al*., 2016; Paños-Martínez, 2016; O' Neil *et al*., 2015). The high CVD mortality rates observed among PMI is widely attributed to the modifiable risk factors compared to the general population (Hert *et al*., 2011). The risk of cerebrovascular accident is higher in patients with schizophrenia and bipolar disorder (Kisely *et al*., 2009; Kislely *et al*., 2007; Citrome *et al*., 2007). Obesity, diabetes mellitus, as well as depressive symptoms are recognized risk factors for cerebrovascular accident (Lin *et al*., 2007; Everson *et al*., 2008).

2.3 Factors contributing to physical ill health of people with mental illness

Several factors contribute to the ill-health of PMI. Social determinants of health precipitate mental health disorders and shape the social-economic and physical environments in which people live. Social inequalities are associated with increased risk of many common mental disorders and research evidence has shown that psycho-social adversity in early childhood predispose individuals to mental disorders (SDMH, 2014). Social determinants of health such

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as; income, housing, stress, early childhood experiences, social exclusion, occupation, education level, sanitation, social support, discrimination and lack of access to resources can cause and influence mental health and mental illness (Manderscheid, 2010). While social determinants are prevalent in the general population, their impact on PMI is significantly greater (Parks, 2006; Maj, 2009).

Indeed, the potency of social determinants of health is likely to be multiplicative as they interact to increase the risk of mental illness in individuals. An individual's susceptibility to a particular risk factor, and its magnitude of effect on disease progression, will also differ according to their risk factor profile and the weighting of each risk factor (Emdin *et al*., 2016).

The high co-morbidity between NCDs and mental illness provide a clear need for the implementation of a shared framework for the prevention and treatment of NCDs and mental disorders (Oreski *et al*., 2012).

Firstly, unhealthy lifestyles, which include physical inactivity and diets that are low in vegetables and fruits, and high in fat, affect the health of PMI (Baxter, 2016). These behavioural factors may be consequences of negative symptoms of mental illness and poor emotional regulation (Baxter, 2016).

Smoking is one of the behavioural risk factors, which invariably leads to metabolic risk factors such as obesity, hypertension, raised glucose and cholesterol (WHO, 2010). For example, while smoking may be an independent risk factor for mentally ill patients (Moylan *et al*., 2013), its effects are likely to be pronounced in those pre-disposed to mental illness by genetic or other environmental factors. Smoking is twice as common among PMI compared to the general population especially those with severe mental illness (Royal College of Psychiatrists, 2013). This study reported that one in three of all cigarettes smoked is smoked by a person with a mental disorder. While smoking in the general population has fallen by 25% in the past two

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decades, there has been no similar decrease among people with mental disorders. People with severe mental health problems who wish to quit smoking are more likely to fail than the general population. Thus, smoking is more prevalent among people with mental disorders than the general population (Hamadeh *et al*., 2016). The 16 - 25 years age group is likely to smoke and have a history of long-standing mental disorder such as schizophrenia (Royal College of Physicians and Psychiatrists, 2013). Tobacco remains one of the leading risk factors for NCDs both as a result of tobacco use and due to exposure to second-hand smoke. It is responsible for over seven million deaths around the world each year and this number is likely to increase to more than eight million if current trends continue (WHO, 2017).

Secondly, the side-effects of psychotropic medications, particularly weight gain is greatest with clozapine and olanzapine (Leucht *et al*., 2007; Bobes *et al*., 2003) while quetiapine and risperidone have an intermediate risk. This increases the risk of excess mortality in PMI directly through obesity and diabetes (Hert, 2012). There is increased risk of weight gain with anti-psychotics that has been confirmed in different studies (Allison, 1999; Citrome, 2007; Daumit *et al*., 2008; Coccurello, 2010). The high inter individual variability in medication-induced weight gain suggests that genetic (hereditary) factors influence the risk to gain weight (Holt & Peveler, 2009; Reynolds & Kirk, 2010). Mood stabilisers especially valproate have been associated with an elevated risk of developing insulin resistance (Verroti *et al*., 2009; Pylvanen *et al*., 2006), conferring a risk for diabetes mellitus which is possibly related to weight gain (Masuccio *et al*., 2010), and fatty liver infiltration (Luef *et al*., 2004). In addition to weight gain and obesity related mechanisms, there appears to be a direct effect of anti-psychotics that contributes to the worsening of CVDs risk among PMI (Correll *et al*., 2017; Sileshi, 2018).

Lastly, in addition to the risk factors of the general population, PMI experience the following additional risk factors due to mental illness and poor clinical management of mental disorders

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(Baxter, 2016). Poor management of physical illness by clinician contributes to the excess mortality amongst PMI (Lawrence, 2010). Mental illness tends to be chronic with associated poorer clinical outcome (Baxter, 2016). Presentation for treatment is often delayed because of the associated stigma and discrimination, and physical complaints are likely to be attributed to psychological factors (Bailey, 2013). However, the cost of care for non-mental health conditions among patients with co-occurring psychiatric disorders and endocrinal disorders is two-fold or even higher (depending on the treatment setting) than the population without co-occurring psychiatric disorders (Centorrino, 2012). Thus, delayed diagnosis/treatment results in prolonged exposure to raised blood glucose levels, which can, among other things, cause visual impairment and blindness, damage to kidneys with the potential consequences of renal failures, and nerve damage or eventual mortality if not diagnosed early and properly managed (Department of Health U.K, 2011).

Barriers to the provision of care are responsible for the under diagnosis and treatment of physical disorders among PMI (Crump, 2013). However, mental health clinicians prefer primary care physician to screen and manage physical illness in mentally ill patients whereas PMI prefer physical health screening by their mental health providers (Wright *et al*., 2006). More so, the excessive specialisation of health care providers and lack of consensus over who should take responsibility for the general health care needs of PMI has also resulted in a continuing failure to provide appropriate services (Hert, 2009; WHO, 2008).

A review of the methodological approach in studying NCDs, preferred cross-sectional study designs. For instance, Tagurum *et al*. (2015) conducted a cross-sectional population-based study using multi-stage sampling techniques in a rural setting. The authors found the prevalence of hypertension, diabetes and obesity among PMI were 40.2%, 9.7% and 27.2% respectively. A hospital-based cross-sectional study was also conducted in a district setting

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looking at co-morbidities of psychiatric disorders with NCDs (Kulkami *et al*., 2014). They found that psychiatric illness is negatively associated with factors such as education, marital status, age and duration of illness. However, only marital status and duration of illness correlated with depression and anxiety.

Finally, Kruse *et al*. (2013) conducted a cross-sectional study in a community setting and reported that diabetics are likely to meet criteria for one mental disorder than non-diabetics. Khuwaja *et al*. (2003) conducted a cross-sectional study design using the WHO STEPwise protocol to estimate the prevalence of CVDs among currently enrolled school boys of age 14-18 suffering from mental illness. Students were interviewed about their lifestyles, family history of cardiovascular disease and its risk factors. They were also assessed for height, weight and blood pressure. They concluded that physical inactivity, intake of unhealthy food, overweight, and smoking are important risk factors for CVDs.

Hosey *et al*. (2014) conducted a community-based cross-sectional study to explore the relationship between socio-economic and demographic variables with the modifiable risk factors of cardiovascular disease among PMI residing in Pohnpei between the ages of 25 – 64. They reported that socio-economic and demographic determinants play an important role in the prevalence of risk factors of cardiovascular disease. Cross-sectional analytical design is the common research approach to investigate this type of research problem. It would be the best design for my study as I want to determine similar outcomes.

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CHAPTER THREE

Methodology

3.1 Introduction

This chapter describes the study setting and the rationale for its selection, the research design employed, and the sampling techniques used. Tools of data collection and methods of data analysis are outlined, as well as a description of the pilot study. The protocol observed to ensure ethical considerations is also stated.

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3.2 Study design

A descriptive cross-sectional analytical design was used to conduct the study to determine the prevalence, determine the risk factors and describe any association between psychotropic medication and NCDs. A WHO STEPwise instrument (WHO, 2005) was employed as questionnaire to collect data.

3.3 Study setting

Nigeria has 36 states, 774 local governments and the Federal Capital Territory. Each of the states has its constituent local government areas that makes up the state. Sokoto state has a population of 3,702,676 and 23 local government areas (LGA) and Kware Local Government area is one of them (NPC, 2006). The research setting Federal Neuropsychiatric Hospital Kware Sokoto is a 220-bedded hospital offering specialised psychiatric care to the inhabitants of the North-West of Nigeria and was chosen because the researcher is an employee of the hospital. There are about 11 specialist Psychiatric hospitals, 12 Departments of Mental Health

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(or Psychiatry) located in University Teaching Hospitals, 8 psychiatric wards in State Hospitals, and 1 community-based service in Nigeria (Morakinyo, 2002).

3.4 Study population

The study population consists of stable patients on medication attending the out-patient clinic of the Federal Neuropsychiatric Hospital Kware Sokoto. The yearly attendance at the out-patient department in Federal Neuropsychiatric Hospital Kware Sokoto was estimated at 33,000 patients in 2017.

3.5 Sample size

The sample size was calculated using Epi-Info Version 7. The targeted population of the study was 33,000 (Total population of attendees at the clinic in the year 2017). Based on a study conducted by Tagurum *et al*. (2015) the attendance frequency is 33% at a confidence limit of 5% with design effect of 1.0 and cluster size of 1. The estimated sample size for this study was 336 patients at 95% confidence level. Three hundred and thirty-six participants were recruited for this study using purposive and stratified random sampling. Purposive sampling was to allow the recruitment of those on medication who met study criteria and stratified random sampling was to allow equal sex representation and reduce bias in the selection process.

3.6 Sampling procedure

In this research study, the sampling frame is the list of patients on the appointment schedule for follow up in the register. The list was generated using a computer printout from the record

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department. The first sampling procedure was purposive sampling using the following inclusion and exclusion criteria to select mentally stable patients. For instance, patients that are free of psychiatric symptoms and functioning socially and occupationally as assessed by a psychiatrist from the sampling frame.

Inclusion Criteria

- Antipsychotics drug usage for ≥ 2yrs (duration to cause its side effect of weight gain)
- Adults diagnosed with psychosis, depression or manic illness
- Must have been prescribed and currently using psychotropic drug (antipsychotics, mood stabilisers and antidepressant).

Exclusion Criteria

- Patients with chronic schizophrenia (there is usually negative symptoms like alogia, paucity of speech and social withdrawal, thus they will not be able to participate)
- Children under 18 years because they need third party for consent

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The purposive sampling was followed by the second sampling procedure, which was stratified sampling where the list of patients purposively selected through the inclusion and exclusion criteria were stratified according to their gender/sex. Thus, a new list of males and females were created in preparation for the final sampling procedure.

The final sampling procedure was random sampling per stratum to obtain equal number of sexes. The simple random sampling of the attendees at the stratum level was done by listing their names and assigning a number to their names. The recruiter randomly selected a number from a bowl (one for each sex) after shaking the bowl. Eight participants/subjects were selected

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per stratum per day till equal number of sexes was obtained from each stratum. One hundred and sixty-eight participants were selected from both strata using this method, to make the sample size of 336 participants.

3.7 Data collection process

The WHO STEPwise Instrument for NCD Risk factors (WHO, 2006) was the instrument used for data collection. It is a validated tool with open ended questions on: demographic information, behavioural measurement, physical measurement, and biochemical measurement. The antipsychotic treatment and psychiatric diagnosis were added to questionnaire.

The researcher was the only data collector for this investigation. A member of the hospital ethical committee was present during the interview to observe the process to reduce the authority and power relationship, so the right of the participants was not abused (Ahmed, 2013). The data collected required measurement such as height, weight, blood pressure and venepuncture for serum cholesterol and random blood sugar, which were done by the researcher. The NCD parameters selected for investigations are; weight, height and waist circumference for obesity, blood pressure for hypertension, cholesterol and random blood sugar.

Blood was collected by tying a tourniquet above the wrist, the back of the hand was cleaned with cotton wool soaked in methylated spirit to prevent contamination and a hypodermic needle was inserted into a visible vein to collect 2 – 3mls of blood. The tourniquet was removed and a dry cotton wool was pressed against the entrance of the needle while removing the needle at the same time. The patient was asked to use his hand to maintain pressure at the entrance of the needle for about a minute after which the cotton wool was discarded. The blood was emptied

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into a dry plain bottle identified by hospital number and then transported using test tube rack to the laboratory.

To measure random blood glucose using the glucose oxidase method, the blood was allowed for 5 –10 minutes to clot. Then, it was centrifuged to get a clear serum, which was then mixed with 1000 micro/L of reagent incubated at 10 minutes and then read off in the spectrophotometer to get value in mmol/L. Cholesterol was measured by enzymatic colorimetric method. Enzyme solution was prepared by dissolving the enzyme reagent to 100 mL in cholesterol buffer solution, which was later placed in a water bath at 37 ^{0}C for five minutes after mixing with sample. The reaction was measured in spectrophotometer to the nearest reading in mmol/L. To ensure correct measurements, periodic calibration of scales for anthropometric measurement such as Blood pressure (BP), Height (Ht) and Weight (wt) were done to prevent influence by precision practice.

To ensure consistency, the questionnaire was translated into Hausa and back translated into English by a different translator. The tool was tested by conducting a pilot study with 10 participants, and results were not included in the study. The essence of the pilot study is to gauge the time needed to complete the questionnaire, acceptability and if necessary remove ambiguous questions. However, it was observed that the questionnaire took 30 – 40 minutes to complete and there were no ambiguity.

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3.8 Data analysis

Datum was captured using the Statistical Package for Social Science (SPSS) version 18 (2011) by the researcher. The data analysis includes summarising the data into proportions (%) for categorical data and means ± standard deviation (SD) for continuous data in tables. To describe

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the variables, the socio-demographic characteristics of the participants were described using frequencies and percentages. The Chi square test was used to test the degree of association between categorical variables and NCDs (dependent variable). Univariate analysis was used to test the association between potential risk factors and NCDs using contingency table with 95% confidence intervals.

Multivariate logistic regression was done to establish association between using psychotropic medication and development of NCDs (i.e. Obesity, Diabetes and Hypertension). A p-value of < 0.05 was considered as statistically significant. The researcher used a biostatistician for the data analysis in the SPSS software package.

3.9 Validity and reliability

The WHO STEPwise instrument for NCDs risk factor is an internationally validated instrument for collecting data on risk factors (WHO, 2006). It is a valid and reliable instrument that countries are advised to use in developing their questionnaire for national surveys of NCDs risk factors. Previously, the questionnaire had been validated in Nigeria (Olawuyi and Adeoye, 2018). It was translated into other languages and as advised in the introductory part of the instructions on how to use the instrument, in this research study the questionnaire was translated to Hausa and back translated to ensure face, content and construct validity.

The anthropometric measurements were tested for reliability and re-tested in a pilot study before the main study to check reliability. The reliability testing outcome was satisfactory, since repeated measurements by the researcher showed negligible differences. The reliability of the anthropometric measurements was further ensured by taking an average of two measurements for each variable.

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3.10 Generalizability

The result of the study is generalizable to the population of the hospital catchment area because the study and sample population came from this population.

3.11 Limitations of the study

The study should be considered in light of the following limitations:

The findings are based on one town in Nigeria, so the result may not be generalizable over the whole country.

The inability to carry out toxicological assessments among the respondent and the fact that the population is hospital-base and not really in the community can also constitute a limitation.

3.12 Ethical consideration

Permission was sought from the University of Western Cape's Biomedical Research Ethics Committee, the Sokoto State Ministry of Health, the Kware Local government Health Authority and the Federal Neuropsychiatric Hospital kware Management Board. The researcher is a medical doctor, who works in the hospital and is familiar with the referral system, which enabled him to ensure that the participants were able to obtain appropriate counselling services based on the issues the participant presented.

Consent to participate was ensured and provided by the participants by signing a consent form. Given the nature of the research, it was most likely that informants perceived the research as threatening or invasive because of the venepuncture to take blood for blood sugar and cholesterol testing. The researcher addressed their fear by explaining the process to them thereby allaying their fear and the occlusion of the vein after venepuncture to prevent bleeding.

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It was anticipated that the research would cause no harm to the research participants as this is a minor medical procedure. It was expected to cause minor pain discomfort arising from the needle prick. The blood was discarded after the analysis and participants with abnormal readings were referred to the internist for further consultation.

Participants' information sheet was provided to all the participants explained and taken home to read with them. Each participant was provided with a letter explaining the research study, requesting their participation and assuring them of confidentiality. The participant information sheet explained the clinical measurements to be taken which include; blood for serum glucose and cholesterol by venepuncture, Ht, Wt, WC, and BP. The information sheet also contained information on the confidentiality of the study. Participants were also informed that their participation is voluntarily and they can withdraw at any time during the study. Finally, the participants were informed that there were no direct benefits to them and no costs incurred by participating in the study.

A concern regarding the mental state of the participants to participate in the study was raised but the researcher's sample was carefully planned to include only patients considered to be stable based on their diagnosis and treatment. The participants that were in sightless of their illness and those with serious effect of medication affecting their judgement were excluded. For those who had fatigue from responding to the lengthy questionnaire, the questionnaire were stopped and re-administered at a different time. Although Blood pressure is a routine procedure used for screening all users of health care facilities, the participants were encouraged to consent for the blood pressure and blood glucose screenings. In the event of refusal to participate, the individual was withdrawn from the study without any persecution from the researcher.

Confidentiality and anonymity were ensured by using unique numbers as identifiers for data collection and for the dissemination of results. The records of all participants and their consent

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forms was kept in a safe place under lock and key. The electronic data were protected by a password known only to the researcher. The data will be preserved for five years after thesis submission and thereafter will be destroyed by burning the questionnaires and the electronic data will be deleted.

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CHAPTER FOUR

Results

4.1 Introduction

This section outlines the descriptive and inferential results of the study. The descriptive results present the demographic characteristics of the study participants, while the inferential statistics presented the observed correlations and associations between various variables and the risk factors for NCDs.

4.2 Descriptive characteristics of the sample

Of the 336 respondents who participated in the study 168 (50%) were male and 168 (50%) were women (Table 4.1).

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Table 4.1: Sex characteristics

Category	Frequency	Percentage
Male	168	50.0
Female	168	50.0
Total	336	100.0

The participants were aged between 18 and 68 years, with a mean age of 36.6 years and a standard deviation of 1.1 (Table 4.2).

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Table 4.2: Age Group

Category **Mean = 36.63yrs SD± 1.051**	**Frequency**	**Percentage**
18-28years	82	24.4
29-38years	129	38.4
39-48years	72	21.4
49-58years	38	11.3
59-68years	15	4.5
Total	336	100.0%

A greater percentage of the participants were Hausas 311(92.6%) (Table 4.3).

Table 4.3: Tribe

Category	**Frequency**	**Percentage**
Hausa	311	92.6%
Yoruba	3	0.9%
Ibo	1	0.3%
Others	21	6.3%
Total	336	100.0%

The majority of the participants had no formal education 214(63.7%), 47(14.0%) and 38(11.3%) had secondary and primary school education respectively (Table 4.4).

Table 4.4: Level of education

Category	**Frequency**	**percentage**

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No formal Education	214	63.7%
Less than primary school	5	1.5%
Primary school completed	38	11.3%
Secondary school completed	47	14.0%
High school completed	9	2.7%
University completed	20	6.0%
Postgraduate degree	1	0.3%
Refused	2	0.6%
Total	336	100.0%

Approximately 213(63.4%) of respondents were married at the time of the survey (Table 4.5).

Table 4.5: Marital status

Category	**Frequency**	**Percentage**
Never married	66	19.6%
currently married	213	63.4%
Separated	3	0.9%
Divorced	41	12.2%
Widowed	13	3.9%
Total	336	100.0%

Regarding employment status, 3(0.9%) of respondents were involved in unpaid work, 157(46.7%) were self-employed, 10(3.0%) were non-government employees and 23(6.8%) were government employees (Table 4.6).

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Table 4.6: Employment status

Category	Frequency	Percentage
Government employee	23	6.8%
Nongovernmental employee	10	3.0%
Self employed	157	46.7%
Unpaid work	3	0.9%
Student	10	3.0%
Homemaker	57	17.0%
Unemployed (able to work)	53	15.8%
Unemployed (unable to work)	18	5.4%
Refused to give information	5	1.5%
Total	336	100.0%

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Two-thirds of the respondents 64.6% had between one and five individuals living in their households for more than 18years (Table 4.7).

Table 4.7: No of people > 18yrs In House

Category	Frequency	Percentage
Nil	9	2.7%
0-5	217	64.6%
6-10	90	26.8%
11-15	13	3.9%
16-20	6	1.8%

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22.00	1	0.3%
Total	336	100.0%

The majority of the participant's earn less than hundred dollars per week. (Table 4.8).

Table 4.8: Average earnings per week (USD)

Category	Frequency	Percentage
0-36,800	323	96.1%
36,801-73,600	5	1.5%
73601-110,400	5	1.5%
110,401-147,200	1	0.3%
147,201-184,000	2	0.6%
Total	336	100.0%

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4.3 Prevalence of risk factors for NCDs among the respondents

4.3.1 Tobacco use

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The prevalence of smoking among the respondents was 8.92%. On the average, respondents commenced smoking at 19.7years of age. About 7.9% of current daily smokers smoked manufactured cigarettes; this proportion was higher among men (7.4%) than women (0.5%).

Smokeless tobacco use was 6.0%. Regarding the type of smokeless used, 0.6% used snuff by mouth, 0.9% by nose, 0.9% used chewing tobacco and 0.6% had used betel or quid. The prevalence of tobacco use, both smoked and smokeless combined was 14.92%. Only 8% of respondents had been exposed to second-hand smoke at home and 10.5% in the workplace during the past 30 days.

***Table* 4.9: Prevalence of tobacco use**

Variables	Male	Female	Both
Currently smoke tobacco daily	27 8.03%	3 0.89%	30 8.92%
Average age started smoking (Years)	18.4	22.6	19.7
Daily smokers smoking manufactured cigarette	25 7.4%	2 0.5%	27 7.9%

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4.3.2 Alcohol consumption

The prevalence of alcohol consumption was 0.6%. Only men drank in the past 12 months (0.9%). Current drinkers had taken at least one alcoholic drink on 2 – 4 occasions in the past 30 days and consumed 2 – 5 standard drinks on a single occasion. Only one individual reported indulging in binge drinking for more than a single occasion.

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Current users reported consuming 5 standard drinks (male only) as the largest number of drinks on a single occasion. Male current user reported consuming 5 drinks on 2 occasions while their female counterparts reported no use of alcohol.

Table 4.10: Drinking status

Variables	Male	Female	Both sexes
Life Time Abstainers	163 48.5%	167 49.7%	330 98.2%
Past 12 Months Abstainers	165 49.1%	168 50%	333 99.1%
Currently Drink (Drank in the past 30 days)	2 0.6%	0 0%	2 0.6%
Engaged in heavy episodic drinking (Men who had 5 or more/women who have 4 or more drinks in the last 30 thirty days)	1 0.2%	0 0%	1 0.2%

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4.3.3 Prevalence of fruit and vegetable consumption

The study population ate fruit on average 2.6 days in a typical week (Table 4.11). Vegetable consumption was relatively better than fruit consumption with vegetable being eaten on average 3.0 days in a week. The quantity of intake was measured by servings of fruit defined as equal to medium sized banana or apple or equivalent and one serving of vegetables equal to one cup of green leafy vegetables or half cup of cooked vegetables. The minimum requirement

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for an adult is five or more servings of fruit or vegetables a day. An estimated 79.1% of the respondents did not consume fruits and vegetables on average per day.

Table 4.11: Fruit and vegetable consumption

Variable	Male	Female	Both sexes
Mean number of days fruit consumed	2.9	2.2	2.6
Mean number of servings of fruit consumed on average per day	3.5	2.6	3.1
Mean number of days vegetables consumed.	3.1	3.0	3.0
Mean number of servings of vegetable consumed on average per day	3.5	3.2	3.4
Percentage who ate less than 5 servings of fruit and or vegetable on average per day	37.5%	41.6%	79.1%

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4.3.4 Physical activities

Metabolic Equivalents (METs) are commonly used to express the intensity of physical activities. MET is the ratio of a person's working metabolic rate relative to the resting metabolic rate. One MET is defined as the energy cost of sitting quietly, and is equivalent to a caloric consumption of 1 kcal/kg/hour. It is estimated that, compared to sitting quietly, a person's

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caloric consumption is four times as high when being moderately active, and eight times as high when being vigorously active.

When calculating a person's overall energy expenditure, 4 METs get assigned to the time spent in moderate activities, and 8 METs to the time spent in vigorous activities (for example Walking two days a week at 4 METS for 30 minutes per session = 2 x 4 x 30 = 240 MET-minutes. Bike 1 day a week at 7 METS for 20 minutes = 1 x 7 x 20 = 140 MET-minutes. Aerobic machine 2 days a week at 6 METS for 40 minutes = 2 x 6 x 40 = 480 MET-minutes. Total MET-minutes for the week = 240 + 140 + 480 = 860 MET. Based on MET minute per week 48.5%% of the respondents engaged in low activity, while 18.4% undertook high physical activities. About 81.5% of the respondents did not engage in any form of exercise and did not meet WHO's recommendations for physical activity for health 150 minutes of moderate to intense physical activity per week or equivalent in adequate amount of fruit and vegetables on an average day.

Table 4.12: Levels of physical activity

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Physical Activities	Male	Female	Both sexes
Percentage with low level of activity (defined as < 600 MET- minute per week	82 24.4%	81 24.1%	163 48.5%
Percentage with high level of activity (defined as >= 3000 MET- minute per week	52 15.5%	10 2.9%	62 18.4%
Median time spent on physical activity on average per day (minutes)	4.8	4.0	4.7
Percentage not engaging in vigorous activities	116 34.5%	158 47.0%	274 81.5%

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4.4 Physical measurements

The mean body mass index (BMI) was 23.5, with 14.2% of the respondents being overweight with their BMI greater than 25kg/m^2 while 8.6% had obesity. The average waist circumference was 85.2% (Table 4.13) and the mean systolic and diastolic blood pressures were within normal limit for most of the respondents 115 and 76 mmHg of mercury respectively. A small percentage 5.9% had high blood pressure and were on medication with 7.7% having high blood pressure but not on medication (Table 5.4).

Table 4.13: Body mass index

Variables	Male	Female	Both sexes
Mean Body Mass Index – BMI (kg/m2)	22	24.50	23.5
Percentage who are overweight (BMI >= 25 kg/m2)	19 5.6%	29 8.6%	48 14.2%
Percentage who are obese	9 2.7%	20 5.9%	29 8.6%
Average Waist Circumference (cm)	83.5	86.5	85.2

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Table 4.14: Blood pressure

Variables	Male	Female	Both sexes
Mean Systolic Blood Pressure including those currently on medication for raised blood pressure	114	117	115
Mean Diastolic Blood Pressure including those currently on medication for raised blood pressure	75	77	76

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Percentage with raised blood pressure (>= 140/90 mmHg or who are currently on medication for raised blood pressure)	7 2.1%	13 3.8%	20 5.9%
Percentage with raised blood pressure (>= 140/90 mmHg or who are not currently on medication for raised blood pressure)	12 3.5%	14 4.2%	26 7.7%

4.5 Biomedical measures

The mean random blood glucose for the respondents, including those on medication for raised glucose was 4.99 (Table 4.15). Only five respondents (1.4%) had impaired random blood glucose with venous plasma value of ≥6.1mmol/L and 7mmol/L. Two respondents (0.6%) had a plasma glucose value≥7mmol/L or currently on medication for diabetes. The mean total blood cholesterol was 4.9mmol/L for both sexes but the plasma value was relatively lower by 0.1 in female than male. There is however no respondent with raised blood cholesterol level.

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Table 4.15: Blood glucose and cholesterol

Biochemical Measure	**Male**	**Female**	**Both sexes**
Mean Random Blood Glucose, including those currently on medication for raised blood glucose (mmol/L)	4.96	5.02	4.99
Percentage with impaired random glycaemia (plasma venous value >= 6.1 mmol/L and 7 mmol/L)	1 0.3%	4 1.1%	5 1.4%

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Percentage with raised random blood glucose (plasma venous value >= 7 mmol/L or currently on medication for raised blood glucose)	1 0.3%	1 0.3%	2 0.6%
Mean total blood cholesterol	4.8	4.9	4.9
Percentage with raised total cholesterol (>= 10.5mmol/L)	0 0%	0 0%	0 0%

Table 4.16: Percentage with Risk factors

Category	**Male**	**Female**
Percentage with none of the above risk factors	5 1.4%	7 2.1%
Percentage with 3 or more of the above risk factors aged 18 – 38 years	14 4.2%	12 3.5%
Percentage with 3 or more of the above risk factors aged 39 – 58 years	9 2.6%	24 7.1%
Percentage with 3 or more of the above risk factors aged 59 – 68 years	1 0.2%	4 1.2%

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4.6 Risk factors

Three or more of the combined risk factors (current daily smoking, < 5 servings of fruits and vegetables per day, low level of activity, overweight (BMI ≥ 25kg/m2), raised blood pressure)

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were present in 26 (7.7%) of those aged 18 – 38 years and 33 (8.8%) of those aged 39 – 58 years (Table 5.16). Only <5 servings of fruits and vegetables per day (P=0.026) and current use of cigarette (p= 0.043) increases the risk of developing NCD. Other variables were not significant (Table 4.17).

Table 4.17 Relationship between risk factor and NCDs

Variable	**B**	**Std. Error**	**Beta**	**Sig.P-Value**
Hypertension				
Low Level Activity	-.020	.039	-.028	.617
< 5 servings of fruit and vegetable per day	-.004	.007	-.035	.528
Current Daily Smokers	-.101	.071	-.080	.156
Alcohol Consumption	.119	.094	.070	.207
Medication	-.012	.012	-.054	.326
Obesity				
Low Level Activity	-.015	.046	-.018	.739
< 5 servings of fruit and vegetable per day	-.018	.008	-.125	.026**
Current Daily Smokers	-.170	.084	-.114	.043**
Alcohol Consumption	.088	.110	.044	.424
Medication	-.007	.014	-.029	.598
Diabetes				
Low Level Activity	.001	.009	.003	.953
< 5 servings of fruit and vegetable per day	.000	.002	.011	.843
Current Daily Smokers	-.007	.015	-.025	.659

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Alcohol Consumption	.003	.020	.008	.892
Medication	.001	.003	.016	.776

Significant value is when p-value ≥ 0.05**

Table 4.17 describes the existence of any relationship between antipsychotic medication and obesity. The Pearson correlation coefficient was -0.027 with a p-value of 0.626 implies that since the r-cal is less than 1 there is no association and the p-value is also not significant.

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Table 4.18: Relationship between medication and non-communicable disease (Obesity)

Variables	**N**	$\bar{X}$	**Std. Dev.**	***r-cal***	***P-Value***	**Remark**
Obesity	336	1.7708	0.42092	-0.027	0.626	Not Significant
Medication	336	3.26	1.672			

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CHAPTER FIVE

Discussions

5.1 Socio-demographic characteristics of respondents

Expectedly, the majority of the respondents were in their early adulthood (mean age 36.63 ± 1.051 SD range 18-68 years). The ages of the participants were similar to those reported in a sample of community living patients with psychiatric disorders in North India (Singh *et al*., 2019). A significant proportion of them were currently married (63.4%). The Hausa tribe constituted the largest proportion of the respondents (92.6%), because the study was carried out in Sokoto region, a predominantly Hausa city. The young representation could be attributed to the fact that most of the participants were drawn from a hospital setting with no household representation (other persons living in same house with participant). Sample representation is similar to that of another study conducted among PMI in Bahrain (Hamadeh *et al*., 2016), which reported the majority of its participants between the ages of 30 – 39 years, constituting 27.2% of all the participants from in-and-out patients from hospital settings. An observed 21.2% participants were unemployed with 15.8% able to work but unemployed and 5.4% are unable to work and unemployed. It compared well with similar study from Lagos (Akinwale *et al*., 2017), Most of the participants earned less than 100 USD per month.

Two hundred and fourteen of the respondents (63.7%) did not attend elementary school; reasons being cultural value opposed to female child education, ignorance and poverty (www.informationng.com). The level of education is an indicator of the individual's socio-economic status as used in the calculation of Human development Index (hdr.undp.org). Sokoto is a poor state with regards to human capital development (Nigerianstat.gov.ng), with the

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majority of participants 63.7% (N=214) having no formal education, the population may be expected to possess a higher risk factors (e.g. smoking) for NCDs, thus adversely exposing them to the development of chronic diseases. The socio-demographic characteristics of the locality as observed in this study seem to make them vulnerable to the known major risk factors for NCDs.

5.2 Risk factors among study participants

5.2.1 Smoking

Smoking, which is believed to be the number one major single known cause of non-communicable diseases (Toustad *et al*., 2016), is widespread around the world. Estimate of the World Health Organization (WHO) indicates that roughly about 30% of the global adult populations are smokers (Jha *et al*., 2015). Smoking and unhealthy lifestyle has been prevalent among mentally-ill patients in the developing countries (Singh *et al*., 2019).

The prevalence rate of smoking among the participants (male) who were aged between 18 and 68 years was 8.03%. The minimal rate recorded could in part be due to the small proportion of adult participants investigated, and that the study was done in a hospital environment. The study contrast to the Bahrain study that reported a higher prevalence rate of tobacco smoking 30.2% and 19.9% among the study participants and the general population respectively (Hamadeh *et al.,* 2016). Smoking has been associated with several types of mental illness with the prevalence rate of smoking twice that of the general population.

The study found no significant association between smoking, gender and work status, contrary to a Bahrain study that reported association between gender and smoking behaviour as male patients were 1.8 times more likely to be smokers and 2.4 times to be cigarette smoker than the general population (Hamadeh *et al*., 2016). It is clear, however, that the age of initiation into

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smoking behaviour and the mean age of smokers especially among men are lower than they were in the past (Hamadeh *et al.*, 2016).

5.2.2 Risky alcohol consumption

Alcoholic disorder or risky alcohol consumption is one of the common major risk factors known to predispose individuals to the development of chronic NCDs such as Type 2 diabetes, hypertension and chronic liver and pancreatic cancers (Kelvin *et al*., 2014). In this study, a relatively lower prevalence rate of 0.6% was recorded compared to a study conducted in sub-Saharan Africa where a prevalence rate of 24% was reported (Welbeek, 2012). The low prevalence of alcohol consumption recorded in this study is likely due to religious reasons as the study was done in a Muslim dominated area where consumption of alcoholic beverages is forbidden by the scripture and the sharia law (Lasebikan, *et al.*, 2018)

Despite the low prevalence of alcohol consumption recorded, our results indicated that males were the majority drinkers unlike the reported preponderance of female drinkers (Philips, 2015). Again, we found no association between lower level of educational or no educational attainment and female gender as indicators for alcoholic disorder. These variations reflect the complexity and variability of the interactions between health-related behaviours and socio-demographic characteristics among different mentally-ill patients, communities and even socioeconomic classes (Susan & Stefanie, 2015).

5.2.3 Physical inactivity

According to statistics by WHO, physical inactivity or sedentarism has become a major public health concern, making a significant contribution to the global NCD morbidity and mortality rates (WHO, 2018). This has largely been attributed to urbanisation and global socioeconomic transitions (Omoleke, 2013). The results of this study indicated that 48.5% of the respondents

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recorded inadequate levels of physical activity, with an observed positive correlation trend between a participant's spent time and the level of physical activity. Median time spent on physical activity on average per day (minutes) is 4.7. Therefore, socioeconomic status, determined by the participants' level of education and income, has in many epidemiological studies regarded as the major predictor for NCDs among PMI (Biswas *et al*., 2019). Results from the present study indicated that participants who attained a rather lower level of education, such as primary education, were more inactive than those who attained university or post-graduate education.

The rate of physical inactivity declined with a low level of education, signifying a positive correlation between physical activity level of education or socioeconomic status (Joens-Matre *et al*., 2014). This present study similarly found a higher prevalence of physical inactivity (48.5%), physical inactivity was also significantly associated with lower socioeconomic status and young age; this implies that the young and the poor in the community are more prone to inactivity-related diseases. However, this present study is at variance with another study that reported diabetes, hypertension and overweight/obesity were more prevalent among those with higher education, non-manual worker, higher socioeconomic status living in urban settings (Biswas *et al*., 2019). The difference in the result is as a result of the study setting and their socioeconomic status.

5.2.4 Biochemical measure

Elevated blood sugar is another well-known risk factor for non-communicable diseases (Hert *et al*., 2011). With morbidity and mortality rates attributable to Type 2 diabetes on an alarming increase regionally and globally, early detection of blood sugar level is vital to preventing diabetes and non-communicable diseases (Baxter *et al*., 2016).

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Analysis in our study indicated that 2% of the participants had blood sugar raised on an average of 4.99 including those currently on medication, compared to a study on the prevalence of diabetes in sub-Saharan African countries (Zimmermann *et al*., 2018), which reported a regional rate of 6%, the rates in this study are relatively low. However, the low proportion of participants who had been tested reflects a lack of public sensitization towards early detection (Baxter *et al*., 2016).

5.2.5 Body mass index classifications

The literature has portrayed overweight and obesity as the by-products of poor diet and inadequate physical activities following modernisation (Popkin & Reardon, 2018; Popkin *et al*., 2013 & Fox *et al*., 2019). Obesity is recognised as one of the common intermediate risk factors for most weight-related NCDs among mentally ill-patients, including Type 2 diabetes and CVDs (Mulugeta *et al*., 2019). In this study, however, the results showed a relatively lower rate of BMI of 14.2% among the respondents. Similarly, women were more likely to have mental illness and a higher mean BMI compared to men (Amugsi *et al*., 2017). Again, this present study showed a female predominance of 8.6% and 5.9% among participants who were overweight and obese respectively. This finding is in contrast to that of a study conducted in the Democratic Republic of Congo, which reported 16.51% and 13.26% of overweight and obesity in a community sample, showing that females are more at risk of developing weight-related chronic diseases (Mawaw *et al*., 2017).

Our results also showed that factors related to age act in moderating the mean BMI. This was proved by the higher prevalence of overweight and obesity (8.6%) among participants aged 30 years and above compared to the younger age groups without weight issues. Obesity and overweight trends are high and are increasing at an alarming rate among those with mental illness. Ample evidence indicates the association between depression and obesity with

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longitudinal studies demonstrating a bidirectional link between the two conditions and a stronger association observed in women (Rajan & Menon, 2017). This is also in keeping with cross-sectional surveys composed of representative samples of the Al Kharj population in Saudi Arabia where a 54.3% prevalence of overweight and obesity was documented among participants aged 18 to 67 (Al-Ghamdi *et al*., 2018). Evidently, with overweight/obesity becoming ubiquitous among adult females, target-specific strategies should be embraced if desirable outcomes are to be achieved in alleviating the emerging chronic disease pandemic PMI.

5.2.6 Fruit and vegetable consumption

Regarding fruit and vegetable consumption, this study documented an average of 2.6 days for fruits and 3.0 days for vegetables intake per week. This finding is at variance with the study in which the vast majority of participants had ≤1 serving of fruits daily (97.7%) and ≤ 1 serving of vegetables daily (98.2%) (Ahmed *et al*., 2019). It also compared well to the mean number of servings per day of fruits and vegetables approximately 1 for men compared with 2.2 for women (Kjøllesdal *et al*., 2016). Males consumed more fruits overall than the females on daily basis. The same trend was also observed for vegetable consumption, meaning that on the average, none of the respondents met the basic dietary requirement as recommended by WHO, a serving of 4 – 5 fruits and vegetables per day, for which a standard serving of fruit and vegetable should constitute about 80gm. In this study, it is obvious that the respondents on the average consumed more than two servings of fruits and vegetables per day.

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5.2.7 Antipsychotic medication and non-communicable disease

Weight gain during the treatment of PMI are a well-known side effect of antipsychotics, affecting between 15 and 72% of patients (Kane *et al*., 2015; Hert De, 2011). All anti-

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psychotics regardless of their group are not weight-neutral, as the proportion of individuals experiencing ≥7% weight gain is greater with any anti-psychotics than with placebo (Hert De, 2011). In this study, 22.8% of the respondents are either overweight or obese (14.2% and 8.6% respectively) and compares well with the stated weight gain. Again, higher percentage of people with weight gained is not recorded as the research site is the poorest state in Nigeria with the lowest gross domestic product (GDP) and human development index (National Human Development Report, 2018) as most live on less than one dollar a day which invariably affects nutrition. Furthermore, most of the patients at the research site are indigent and about 70% of them are catered for by the state Zakat fund, a social investment programme (Personal Communication with H. Zaharadeen, Medical Director, Federal Neuropsychiatric Hospital kware Sokoto, 16th October 2014.).

5.2.8 Clustering of multiple risk factors

There is inadequate information on the prevalence and profiles of individual risk factors for NCDs among PMI (De Hert *et al*., 2011). Recent studies have, however, revealed that there exist quite considerable knowledge gaps on the clustering of these risk factors, which are known often to co-occur (Dhungana *et al*., 2019). The WHO (2005) report indicated that for any desirable outcome to be achieved in the prevention and control of NCDs, governments and public health departments must incorporate identification of the most common clusters of multiple risk factors in their surveillance systems. In this study, 18.8% of both male and female participants had multiple risk factors. This is consistent with the findings of an American multiple risk factor study (Fine *et al*., 2011), which reported a 17% multiple risk factor prevalence among their respondent. In conclusion, more females (13.9%) in this study had three or more risk factors, compared to 8.4% of their male counterparts.

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CHAPTER SIX

Conclusions and recommendations

6.1 Conclusion

Among the socio-economic and behavioural risk factors studied, the study documented a relatively high prevalence of active smoking 8.9%, low fruit and vegetable intake 79.1% among the respondents. The study also unveiled that 81.5% of the respondents did not engage in any form of exercise or physical activity, with 0.6% of participants having raised blood glucose and currently using medication while 5.9% and 7.7% had raised blood pressure and currently using and not using medication respectively. Current use of alcohol is reported to be 0.6%.

A trend of increasing levels of risk among variables studied with increasing age was observed. Females were found to be at high risk on most of the studied variables measured compared to males. For instance, 1.1% of respondent tested for raised blood sugar are females while only 0.3% were males. This evidence has clearly justified the basis of the study that 'NCDs and their risk factors are equally associated with gender. With respect to the anthropometric measurements, the prevalence rate of respondent being overweight was 8.6% and 5.9% obese, with more females 14.5% accounting for the higher prevalence rate than males 8.3%. With overweight more common among females, they are more at risk of developing weight-related chronic diseases. The implication of this finding is that just as it has been reported, NCDs are relatively common in this study population and effort needs to be geared toward preventing and combating it.

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6.2 Recommendations

Based on these findings, the following recommendations are hereby made:

- To increase awareness and improve monitoring for NCDs especially for those between the ages of 29-38 years in the primary care setting.
- To increase the availability of non-obesogenic, psychotropic drugs (Quentiapine, Aripriprazole, Haloperidol, Risperidone,) at the primary care level and update the essential drugs list to include the needed drugs to treat emerging public health issues like substance dependence.
- Clinicians should be aware of the potential risk of these psychotropic medications while trying to maintain the delicate balance of making clinical decisions, whether to use high or lower dose in achieving better outcome vis-à-vis their side effects.
- To explore the knowledge, attitude and practice among primary health-care physicians to psychiatric illness and militate against harmful cultural practices such as stigma that may affect the mental health of the patients.
- The Clinician and other health workers need to educate the patients on the deleterious effect of smoking on their health. The need to Increase fruits and vegetable consumption as well as physical activity for optimum health condition.

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APPENDIX A

OFFICE OF THE DIRECTOR: RESEARCH
RESEARCH AND INNOVATION DIVISION

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South Africa
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1 November 2017

Dr T Oladele
School of Public Health
Faculty of Community and Health Sciences

Ethics Reference Number: BM17/8/8

Project Title: Determining the risk of non-communicable diseases amongst the mentally ill patients attending psychiatric out-patient clinic at the Federal Nuero-psychiatric Hospital Kware Sokoto in Nigeria.

Approval Period: 31 October 2017 – 31 October 2018

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I hereby certify that the Biomedical Science Research Ethics Committee of the University of the Western Cape approved the scientific methodology and ethics of the

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APPENDIX B

FEDERAL NEUROPSYCHIATRIC HOSPITAL, KWARE

P.M.B 2196 KWARE ,SOKOTO

CHAIRMAN GOVERNING BOARD

HEAD OF ADMINISTRATION DEPARTMENT
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HOD CLINICAL SERVICES
Dr. Francis C. Nnaji, FMC Psych

Ref: FNPHK/ADM/SUB/809/VOL.I

Date: November, 2017

Dr. T. O. Oladele
Department of Clinical Services
Federal Neuropsychiatric Hospital
Kware, Sokoto.

RE: ETHICAL APPROVAL

Sequel to your earlier application dated 12th June, 2017 and your response of 7th November, 2017 on the above subject refers.

The Health Research Ethics committee hereby grants you approval to carry out your study on "Exploring factors for Non-Communicable Diseases amongst the mentally ill patients attending Psychiatric out Patient Clinic".

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We wish you success in your study.

Yours faithfully,

Dr. A.S. Adebisi
Chairman (HREC)

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APPENDIX C

English Version of WHO STEPS Instrument

For NCD risk factors

(Core and Expanded Version 1.4)

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Respondent Hospital Number ☐☐ ☐☐ ☐

Identification Information

This is a draft cover page. Each country will adapt this page to suit their local needs. The exact details to be collected in each country-specific STEPS instrument will depending on the survey design and implementation procedures. However, regardless of how the interview is administered (e.g. household, clinic or other) a process by which the cover page containing personal identifying information is stored should be carefully designed and must meet recommended ethical standards. Clear instruments on handling and storage of the cover sheets must be provided to the interviewers.

		Respondent id number ☐☐☐☐☐☐
S/N	**Consent**	
1	Consent has been read out to respondent	Yes 1 ☐ .. NO, read consent No 2
2	Consent has been obtained [verbal or written]	Yes 1 ☐ .. NO, read consent No 2
3	Interview language [insert language]	English 1 ☐ [add others 2
4	Time of interview [24 hour clock]	

Additional information that may be helpful

5	Contact phone number where possible	
6	Specify whose phone	Work 1 Home 2 Neighbor 3 ☐ Others specify 4
Treatment factor		
9	What type of psychotropic medication do you use? Psychiatric diagnosis ……	First generation [CPZ, TFP, Haldol] 1 Second generation [Resperidone, Olanzapine. Clozapine] 2 Anti-Depressants 3 ☐ Mood stabilizers 4 Combination 5
10	Are there any soccer or playing grounds in your area?	Yes 1 No 2 ☐

Note: identification 1 to 8 should be stored separately from the questionnaire because it contains confidential information. Please not village code (or household code) is required as part of main instrument for data analyses.

Date of interview is required to calculate age

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Respondent Hospital Number

STEP 1 CORE DEMOGRAPHIC INFORMATION

			CODING COLUM
C1	Sex (record male/female as observed)	Male 1 Female 2	
C2	What is your date of birth? If don't know see note' below and go to C3	Day Month ear	
C3	How old are you?	Years	
C4	In total how many years have you spent at school or in full-time study (excluding pre-school)	Years	

EXPANDED: DEMOGRAPHIC INFORMATION			
C5	What is your Tribe		
C6	What is the highest of education you have completed?	No formal schooling 01 Less than primary schooling 02 primary schooling completed 03 secondary school completed 04 high school completed 05 college university completed 06 post graduate degree 07	
C7	Which of the following best describes your employment status. [INSERT CONTRY SPECIFIC CATEGORIES] USE SHOCARD	Government emplotee 01 Non-government employee 02 Self-employed 03 Non-paid 04 Student 05 Homemaker 06 Retired 07 Unemployed (able to work) 08 Unemployed (unable to work) 08	
C8	How many people older than 18 years, including yourself live in your household?	Number of people	
C8	Take the past year can you tell me what the average earnings of the household have been?	Per week Or per month Or per year Go to next section Refused 8	
C10	If you don't know the amount can you give an **estimate** of the annual household income if read same options to you? Is it.	S quintile Q1 1 More than Q1, SQ2 2 More than Q2, SQ 3 3 More than Q3, SQ 4 4	

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	[READ OPTIONS] [INSERT QUINTILE VALUES]	More than Q4 Refused 5	

Step 1 Core Behavioural Measures

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Core Tobacco Use (Section S)			
Now I am going to ask you some questions about various health behaviours. This includes thing like smoking, drinking alcohol, eating fruits and vegetables and physical activity. Let's start with smoking.			
		Response	**Coding Column**
S 1a	Do you currently smoke any tobacco product such as cigarettes, cigar, or pipes?	Yes 1 No 2	☐
S 1b	If Yes Do you do you currently smoke tobacco products daily	Yes 1 No 2	☐
S 2a	How old were you when you first started smoking daily?	Age (years) Don't remember 77	☐☐
S 2b	Do you remember how long ago it was? *[CORE 77 FOR DON'T REMEMBER]*	In year Or in month Or in weeks	year ☐☐ month ☐☐ weeks ☐☐
S 3	On average how many of the following do you smoke each day? (Record for each type) Code 88 for not applicable ☐☐☐☐☐☐☐☐☐ ←	Manufacturer cigarette Hand rolled cigarette Pipes full of tobacco Cigar, cheroots, cigarillos Other (please specify)	☐☐ ☐☐ ☐☐ ☐☐ ☐☐

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EXPANDED Tobacco Use			
S 4	In the past did you ever smoke daily	Yes 1 No 2	☐
S 5a	If Yes How old were you when you stopped smoking daily	Age (years) Don't remember 77	☐☐
S 5b	How long ago did you stop smoking daily	Year ago Or month ago Or weeks ago	☐☐ ☐☐ ☐☐
S 6a	Do you **currently use** any **smokeless tobacco** such as [snuff, dewing tobacco beta]	Yes 1 No 2	☐

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S 6b	<u>If Yes</u> Do you **currently use smokeless tobacco** products daily?	Yes 1 No 2	

Amend skip instructions if EXPANDED or OPTIONAL items are added to the tobacco section.

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S7	On average how many times a day do you use (RECORD FOR EACH TYPE) ☐ ☐☐☐☐☐☐☐☐	Snuff by mouth Snuff by nose Chewing tobacco ← Betel Other specify	☐☐ ☐☐ ☐☐ ☐☐ ☐☐
S8	In the past did you ever use smokeless tobacco such as [snuff, chewing tobacco, or betel] daily	Yes 1 No 2	☐

Core Alcohol Consumption (Section A)			
the next questions ask about the consumption of alcohol			
		Response	**Coding Column**
A 1a	Have ever consumed a drink that contains alcohol such as beer, wine, spirit, fermented cider or [add other local examples] USE SHOWCARD OR SHOW EXAMPLE	Yes 1 No 2	☐
A 1b	Have you consumed alcohol within the past 12 month	Yes 1 No 2	☐
A 2	In the past 12 month how frequently have you had at least one drink?	5 or more days a week 1 1-4 days per week 2 1-3 days a month 3 Less than once a month 4	☐
A3	When you drink alcohol on average how many drinks do you have during one day?	Number Don't Know 77	☐☐
A 4	During each of the past 7 days, how many standard drink of any alcoholic drink do you have each day? (RECORD FOR EACH DAY USE SHOWCARD)	Monday Tuesday Wednesday Thursday Friday Saturday Sunday	☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

EXPANDED Alcohol			
A 5	In the past 12 months, what was the largest number of drinks you had on a single occasion, counting all types of standard drinks together?	Largest number	☐☐
A 6a	<u>For men only</u>	Largest number	☐☐

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	In the past 12 months, on how many days did you have five or more standard drinks in a single day?		
A 6b	<u>For men only</u> In the past 12 months, on how many days did you have four or more standard drinks in a single day?	Largest number	☐☐

Amend skip instructions if EXPANDED or OPTIONAL items are added to the alcohol section.\

Respondent Hospital Number ☐☐ ☐☐ ☐☐

Core Diet (Section D)			
The next questions ask about the fruits and vegetables that you usually eat I have a nutrition card here that shows you some examples of local fruits and vegetables. Each picture represents the size of a serving. As you answer these questions please think of a typical week in the last year.			
D 1a	In a typical week, on how many days do you eat fruit? USE SHOWCARD	Number of days	☐☐
D 1b	How many serving of fruit do you eat on one of those days? USE SHOWCARD	Number of servings	☐☐
D 2a	In a typical week, on how many days do you eat vegetables? USE SHOWCARD	Number of days	☐☐
D 2b	How many serving of vegetable do you eat on one of those days? USE SHOWCARD	Number of serving	☐☐

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EXPANDED Diet			
D 3	What type of oil or fat is most often used for meal preparation in your household? USE SHOWCARD SELECT ONLY ONE ☐☐ ☐☐☐ ☐☐☐	Vegetable 01 Lard or suet 02 Butter or ghee 03 Margarine 04 ← Other 05 None in particular 06 None used 07 Don't know 77	☐☐

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Respondent Hospital Number ☐☐ ☐☐ ☐☐

CORE Physical Activity (Section P)

Next I am going to ask you about the time you spend doing different types of physical activity. Please answer these questions even if you do not consider yourself to be an active person.
Think first about the time you spend doing work. Think of work as the things that you have to do such as a paid or unpaid work, household chores, harvesting food, fishing or hunting for food, seeking employment. *[insert other examples if needed]*

P 1	Does your work involve mostly sitting or standing, with walking for no more than 10 minutes at a time	Yes 1 No 2	☐
P 2	Does your work involve vigorous activity, like [heavy lifting or construction work] for at least 10 minute at a time? INSERT EXAMPLE & USE SHOWCARD	Yes 1 No 2	☐
P 3a	In a typical week, on how many days do you do vigorous activities as part of your work?	Days a week	☐☐
P 3b	On a typical day on which you do vigorous activity how much time do you spend doing such work?	In hours and minutes hrs ☐.☐; mins. ☐☐ Or in minutes only or minutes ☐☐☐	
P 4	Does your work involve moderate intensity activity like brisk walking, [or carrying light load] for at least 10 minutes at a time INSERT EXAMPLE & USE SHOWCARD	Yes 1 No 2	☐
P 5a	In a typical week on how many days do you do moderate intensity as part of your work?	Days a week	☐☐
P 5b	On a typical day on which you do moderate intensity activities how much time do you spend doing such work?	In hours and minutes hrs ☐.☐; mins. ☐☐ Or in minutes only or minutes ☐☐☐	
P 6	How long is your typical work day?		

Other than activities that you've already mentioned, I would like to ask you about the way you travel to and from places. for example to work, for shopping, to market, to place of worship, (*insert other examples if needed]*

P 7	Do you work or use bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?	Yes 1 No 2	☐
P 8a	In a typical week on how many days do you work or bicycle for at least 10 minutes to get to and from places?	Days a week	☐☐
P 8b	How much time would you spend walking or bicycling for travel or typical day?	In hours and minutes hrs ☐.☐; mins. ☐☐ Or in minutes only or minutes ☐☐☐	

The next question ask about activities you do in your leisure time. Think about activities you do for recreation, fitness or sport [insert relevant terms]. Do not include the physical activities you do at work or for travel mentioned already

P 9	Does your [recreation, fitness sport or leisure time] involve mostly sitting,	Yes 1 No 2	☐

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	reclining, or standing; with no physical activity lasting more than 10 minutes at a time?		
P 10	In your [leisure time], do you do any vigorous activities like [running or strenuous sports, weight lifting] for at least 10 minutes at a time? INSERT EXAMPLE & USE SHOWCARD	Yes 1 No 2	☐
P11a	<u>If Yes</u> In a typical week on how many days to you do vigorous activities as part of your [leisure time]?	Day a week	☐☐
P11b	How much time do you spend doing this on a typical day?	In hours and minute's hrs. ☐.☐ mins. ☐☐ Or in minutes only or minutes ☐☐☐	
P12	In your [leisure time], do you do any moderate activities like brisk walking, (cycling or swimming] for at least 10 minutes at a time?	Yes 1 No 2	☐
P13a	<u>If Yes</u> In a typical week on how many days to you do moderate intensity activities as part of your [leisure time]?	Day a week	☐☐
P13b	How much time do you spend on a typical day?	In hours and minutes hrs ☐.☐; mins. ☐☐ Or in minutes only or minutes ☐☐☐	
The following question is about sitting or reclining. think back over the past 7 days, to time spent at work, at home, in [leisure], including time spent sitting at a desk, visiting friends, reading, or watching telvision, but do not include time spent sleeping.			
P14	Over the past 7 day how much time did you spend sitting or reclining on a typical day?	In hours and minutes hrs ☐☐….; mins. ☐☐ Or in minutes only or minutes ☐☐☐	

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EXPANDED:	History of high blood pressure		
H1	What was your blood pressure last measured by a health professional	Yes 1 No 2	☐
H2	During the past 12 months have you been told by a doctor or other health worker that you have elevated blood pressure or hypertension?	Yes 1 No 2	☐
H3	Are you currently receiving any of the following treatment for high blood pressure prescribed by a doctor or other health worker?		
H3a	Drug (medication) that you have taken in the last 2 weeks	Yes 1 No 2	☐
H3b	Special prescribed diet	Yes 1 No 2	☐
H3c	Advice or treatment to lose weight	Yes 1 No 2	☐
H3d	Advice or treatment to stop smoking	Yes 1 No 2	☐
H3e	Advice to start or do more exercise	Yes 1 No 2	☐
H4	During the past 12 month have you seen a traditional healer for elevated blood pressure or hypertension?	Yes 1 No 2	☐
H5	Are you currently taking any herbal or traditional remedy for your high blood pressure?	Yes 1 No 2	☐

EXPANDED	History Of Diabetes		
H 6	Have you had your blood sugar measured in the last 12 month?	Yes 1 No 2	☐
H 7	During the past 12 month have you ever been told by a doctor or other health worker that you have diabetes?	Yes 1 No 2	☐
H 8	Are you currently receiving any of the following treatments for diabetes prescribed by a doctor or other health worker?		
H8a	Insulin	Yes 1 No 2	☐
H8b	Oral drug medication that you have taken in the last 2 week.	Yes 1 No 2	☐
H8c	Special prescribed diet	Yes 1 No 2	☐
H8d	Advice or treatment to lose weight	Yes 1 No 2	☐
H8e	Advice or treatment to stop smoking	Yes 1 No 2	☐
H8f	Advice to start or do more exercise	Yes 1 No 2	☐
H9	During the past 12 month have you seen a traditional healer for diabetes?	Yes 1 No 2	☐
H10	Are you currently taking any herbal or traditional remedy for your diabetes?	Yes 1 No 2	☐

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Respondent Hospital Number ☐☐ ☐☐ ☐☐

step 2 physical measurement

Height and Weight			Coding Column
M1	Technician ID Code		☐☐☐
M2a & 2b	Device ID for height and weight	(2a) height ☐☐	(2b) Weight ☐☐
M3	Height	(in centimeter)	☐☐☐
M4	Weight If too large for scale, code 666,6	(in kilogram)	☐☐☐
M5	**(For women)** are you pregnant?	Yes 1 No 2	☐
Waist			
M6	Technician ID		☐☐
M7	Device ID for waist		☐☐
M8	What circumferences	(in centimeter)	☐☐☐

Blood Pressure			Coding Column
M9	Technician ID		☐☐
M10	Device ID for blood pressure		☐☐
M11	Cuff Size used	Small 1 Normal 2 Large 3	☐
M12a & M12b	Read 1 systolic BP Diastolic BP	Systolic mnhg Diastolic mnhg	☐☐ ☐☐
M13a & M13b	Read 2 systolic BP Diastolic BP	Systolic mnhg Diastolic mnhg	☐☐ ☐☐
M14a & M14b	Read 3 systolic BP Diastolic BP	Systolic mnhg Diastolic mnhg	☐☐ ☐☐
M15	During the past two week have you treated for high blood pressure with drugs (medication) prescribed by a doctor or other health worker?	Yes 1 No 2	☐

SELECTED EXPANDED ITEMS			
M16	Hip circumference	(In centimeter)	☐☐☐
Heart Rate (Record if automatic blood pressure device is used)			
M17a	Reading 1	Beat per minutes	☐☐
M17b	Reading 2	Beat per minutes	☐☐
M17c	Reading 3	Beat per minutes	☐☐

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Respondent Hospital Number ☐☐ ☐☐ ☐☐

Step 3 Biochemical Measurements

Core	Blood Glucose		Coding Column
B1	During the last 12 hours have you had anything to eat or drink, other than water	Yes 1 No 2	☐
B2	Technician ID Code		☐☐☐
B3	Device ID code		☐☐
B4	Time of day blood specimen taken (24 hour clock)		hrs ☐☐ : mins ☐☐
B5	Blood glucose	Low 1 High 2 Unable to assess 3	☐☐☐ ☐
CORE	**Blood Lipids**		
B6	Technician ID code		☐☐☐
B7	Device ID code		☐☐
B8	Total cholesterol	Low 1 High 2 Unable to assess 3	☐☐☐ ☐

SELECTED EXPANDED ITEMS			
B9	Technician ID code		☐☐☐
B10	Device ID code		☐☐
B11	Triglycerides	Low 1 High 2 Unable to assess 3	☐☐☐ ☐
B12	Technician ID code		☐☐☐
B13	Device ID code		☐☐
B14	HDL cholesterol	Low 1 High 2 Unable to assess 3	mmol/l ☐ . ☐☐ ☐

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