An exploration of the risk factors, beliefs and management of hypertension in primary care in Nigeria - a mixed methods study

James Tosin Akinlua

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Department of Primary Care and Public Health, Institute of

Epidemiology and Health Care University College London

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SIGNED DECLARATION:

I, James Tosin Akinlua, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signed

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ABSTRACT

Objective: To explore ways to improve care of hypertension at the primary care level in Nigeria

Background: Chronic conditions like hypertension are common among both rural and urban populations in Nigeria. In many regions of Nigeria, the primary health care (PHC) facility is usually the only source of formal health care available. Many clients who use PHC facilities in Nigeria may have hypertension yet they often go undetected and untreated.

Studies Conducted: To achieve the above objective, the following studies were conducted:

2 systematic reviews ("*Current prevalence of hypertension in Nigeria*" and "*Beliefs of Health Care Providers, Lay Health Care Providers and Lay persons in Nigeria regarding hypertension*"), 1 pilot qualitative study in the United Kingdom and the main mixed method study in Nigeria.

Setting: The pilot qualitative study in the United Kingdom was conducted in a single Pentecostal church community in West London. In Nigeria, the study was conducted in twenty (20) [rural (N=10) and urban (N=10)] primary health care centres in the Federal Capital Territory Nigeria.

Methods: For the pilot qualitative UK study, a qualitative interview study was conducted. For the Nigerian study, a multi-level triangulation mixed method design was used.

Participants: In the pilot qualitative UK study, twenty-seven Nigerian migrant members of the church entered and completed the study. In Nigeria, forty-one (41) primary health care clients and forty-one (41) primary health care workers participated in the qualitative study while 650 clients participated in the quantitative study which investigated the prevalence of hypertension and cardiovascular risk factors.

Results: Overall, the 1st review showed that the overall crude prevalence of hypertension ranged from 0.1% (95%CI:-0.1 to 0.3) to 17.5% (95% CI: 13.6 to 21.4) in children and 2.1% (95%CI: 1.4 to 2.8) to 47.2% (95%CI: 43.6 to 50.8) in adults depending on the benchmark used for diagnosis of hypertension, the setting in which the study was conducted, sex and ethnic group. The 2nd review revealed both similarities and differences in the beliefs between laypersons and health care providers and identifies misperceptions that should be addressed when designing interventions for hypertension control in Nigeria. In, the pilot qualitative UK study, participants expressed beliefs in four major areas related to hypertension: (1) The Meaning of the term hypertension, (2) Perceptions of causation, (3) Effects of hypertension, and (4) Perceptions of treatment. The study revealed a diversity of beliefs about hypertension which incorporated both orthodox and culturally framed ideas. Furthermore, the main mixed method study in Nigeria revealed a substantial unmet need for hypertension in primary care in Nigeria. The sample population for this study is very young with about 90% of the population aged between 18-44 years old. Overall, among those 40years and older, 94.4% (95%CI: 88.9-97.7) had 10-year risk of cardiovascular event less than 10%. Most participants had 1-2 risk factors (58.4% [95%CI: 54.5-62.3]) while 32.3% [95%CI: 28.7-36.1]) had 3-5 risk factors for cardiovascular diseases. The overall hypertension service readiness and availability of the 20 primary care facilities was very low. The overall prevalence of hypertension was 27.9% (95%CI: 24.5- 31.6). The qualitative study identified important ethnic differences and similarities in beliefs about meaning, risk factors, symptoms and treatment of hypertension between PHC clients and workers. It also revealed that non-physician PHC workers were enthusiastic to take on additional roles in managing hypertension which is currently beyond their scope of duty.

Conclusions: Overall this study provides important information for improving care of hypertension in primary care in Nigeria by first highlighting the burden of hypertension and risk factors among primary care clients. Then it identifies differences and similarities in beliefs between PHC clients and PHC workers as well as current experiences of PHC workers with managing hypertension which could help inform appropriate hypertension management program in Nigeria.

Keywords: hypertension; blood pressure; beliefs; Nigeria; primary health care

IMPACT STATEMENT

Public value statement: In Nigeria, it is estimated that about 70% of Non Communicable Disease(NCD) related deaths occur in men and women less than 70 years old.. Hypertension is the main risk factor for cardiovascular diseases(CVD) and its burden is rising rapidly in Nigeria. Developing strategies to reduce the burden of hypertension and other risk factors such as tobacco smoking, harmful alcohol intake, physical inactivity and unhealthy diet will help prolong life and may reduce spending on managing CVD.

The situation: Government owned primary health care facilities are usually the only formal and affordable organised health care available in many rural and urban areas. But with the current structure of healthcare delivery in primary care many primary health care clients with hypertension often go undetected and untreated. Also, national, regional and state data regarding prevalence of hypertension, its risk factors and beliefs about hypertension among primary care clients and workers are largely unavailable. Recent government commitment to health care resulted in the passing of a National Health Bill into law which promises more direct funding for primary health care in Nigeria. Eliciting important data regarding hypertension in primary care will help provide evidence for planning, prioritizing and spending of increased primary care resources.

Extension response: I conducted a study on 20 primary care facilities in Federal Capital Territory (FCT) Abuja. The study used both qualitative and quantitative methods to examine different levels of the primary care system (PHC client level= those who use the services and PHC workers level= those who provide the services). The study revealed a substantial unmet need for hypertension care in primary care in Nigeria

Academic impact: (i) The findings from this study so far have resulted in 4 scientific publications. To date these publications have accrued 48 citations and 25,046 views according to PLoSOne and Google scholar metrics. (ii) These publications resulted in partnership with a pioneer pharmacy based m-health hypertension control program (vivahealth) in Nigeria. I currently work remotely as the technical expert/consultant for the program. The program is being piloted in Lagos State, Nigeria (see https://vivahealth.co/). (iii) These publications have also resulted in partnership with the European Union medical country of origin project (MedCOI Project). Currently, I serve as the consultant for medical information for non-communicable disease for Nigeria.

Societal and economic impact: based on my published work, (i) the federal ministry of health, Nigeria invited me to train members of the department of non-communicable diseases on how to conduct systematic reviews. (ii) I have also been asked by the federal ministry of health to join a team to do a rapid review of non-communicable disease risk factors in Nigeria in order to secure grants for a national WHO STEPwise survey of non-communicable diseases and its risk factors.

Future work: Conducting a trial of task sharing with non-physician health care workers using the total risk approach and m-health technology in primary care in Nigeria could help reduce the huge unmet need for hypertension care in Nigeria. This will require funding for an initial pilot in FCT, Abuja.

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Glossary of terms

NCD   non communicable diseases

FCT   Federal capital territory

HTN   hypertension

BP   blood pressure

PHC   primary health centre

WMHCP   Ward Minimum Health Care Package

BHSS   Basic Health Service Scheme

JCHEW Junior community health extension worker

CHEW Community health extension worker

CHO   Community health extension worker

WHO   World Health Organisation

CVD   Cardiovascular disease

SARA   Service availability and readiness assessment

VDC   Village development committee

GATS   Global Adult Tobacco Survey

GYTS   Global Youth Tobacco Survey

RQ   Research Question

LGA   Local Government Area

CAM   Complementary and Alternative Medicine

PMV   Patent Medicine Vendors

IEC   Information Education Communication

CONTRIBUTIONS OF OTHER AUTHORS IN PUBLISHED VERSIONS OF THIS WORK

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Contribution of authors:

James Tosin Akinlua
> **Roles** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Writing – original draft, Writing – review & editing

Richard Meakin
> **Roles** Conceptualization, Formal analysis, Investigation, Methodology, Resources , Supervision, Writing – review & editing

Umar Aminu
> **Roles** Formal analysis, Investigation, Writing – review & editing

Nick Freemantle
> **Roles** Conceptualization, Methodology, Supervision, Writing – review & editing

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Contribution of authors:

James Tosin Akinlua
> **Roles** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Writing – original draft, Writing – review & editing

Richard Meakin
> **Roles** Conceptualization, Formal analysis, Investigation, Methodology, Resources , Supervision, Writing – review & editing

Fadahunsi Philip
> **Roles** methodology, Investigation, Writing – review & editing

Nick Freemantle
> **Roles** Conceptualization, Methodology, Supervision, Writing – review & editing

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Contribution of authors:

James Tosin Akinlua
> **Roles** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Writing – original draft, Writing – review & editing

Richard Meakin
> **Roles** Conceptualization, Formal analysis, Investigation, Methodology, Resources, Supervision, Writing – review & editing

Nick Freemantle
> **Roles** Conceptualization, Methodology, Supervision, Writing – review & editing

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Contribution of authors:

James Tosin Akinlua

    Roles Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Writing – original draft, Writing – review & editing

Richard Meakin

    Roles Conceptualization, Formal analysis, Investigation, Methodology, Resource , Supervision, Writing – review & editing

Bashir Ibrahim

    Roles Methodology, resources, Investigation, Writing – review & editing

Nick Freemantle

    Roles Conceptualization, Methodology, Supervision, Writing – review & editing

CHAPTER 1: INTRODUCTION

This chapter describes the context of the research and addresses the following research issues: scope, rationale for study, problem statement, research questions, purpose, theoretical basis for parts of the study and definition of terms.

1.0 Country Profile

Amongst black nations of the world, Nigeria is the most populous and it is the most populated country in Africa with a population of over 170 million people [1a]. About 48% of this large population reside in cities while the remaining 52% reside in rural areas. Nigeria has over 250 ethnic groups [2a].

According to the Nigerian Demographic profile 2017 [3a] , Nigeria has an: annual population growth rate of 2.7%; Birth rate of 38.03/1000; Death rate of 13.16/1000; Net migration rate of –0.22/1000; Rate of urbanization of 3.75%; Total dependency ratio of 89.2% (84% youths and 5.2% elderly); Literacy rate of 61.3% (72.1% male, 50.4% female); Total fertility rate of 5.25; Contraceptive prevalence rate of 14.1%. The age structure is as follows:

- 0–14 years: 43.2%
- 15–24 years: 19.3%
- 25–54 years: 30.5%
- 55–64 years: 3.9%
- 65 years and over: 3.1%

Nigeria is Africa's largest economy with an estimated 2013 GDP of US$ 502 billion. The annual economic growth rate is estimated at 6–8%, largely driven by growth in agriculture, telecommunications and services. However, 70% of Nigerians live below the poverty line and approximately 62% live in extreme poverty. Taxes and other revenues contribute 4.8% of GDP (2019 estimate). Budget estimates for 2019 were US$ 29 billion for revenue and US$ 31.51 billion for expenditure, giving a deficit of –1.37% of GDP. Household income or consumption by percentage share was 1.8% for the lowest 10% and 38.2% for the highest 10%, as at 2010. Other macroeconomic indices are: GDP, purchasing power parity (PPP)- US$ 1.121 trillion (2017 figures);GDP per capita (PPP)- US$ 5400 (2019 figures); Gross national saving: 18.2% of GDP (2019 figures)[3a]

There is a democratically elected government and parliament at the three tiers of government namely: federal, state and local government within thirty six states, 6 geo-political zones and a federal capital territory (see Figure 1).
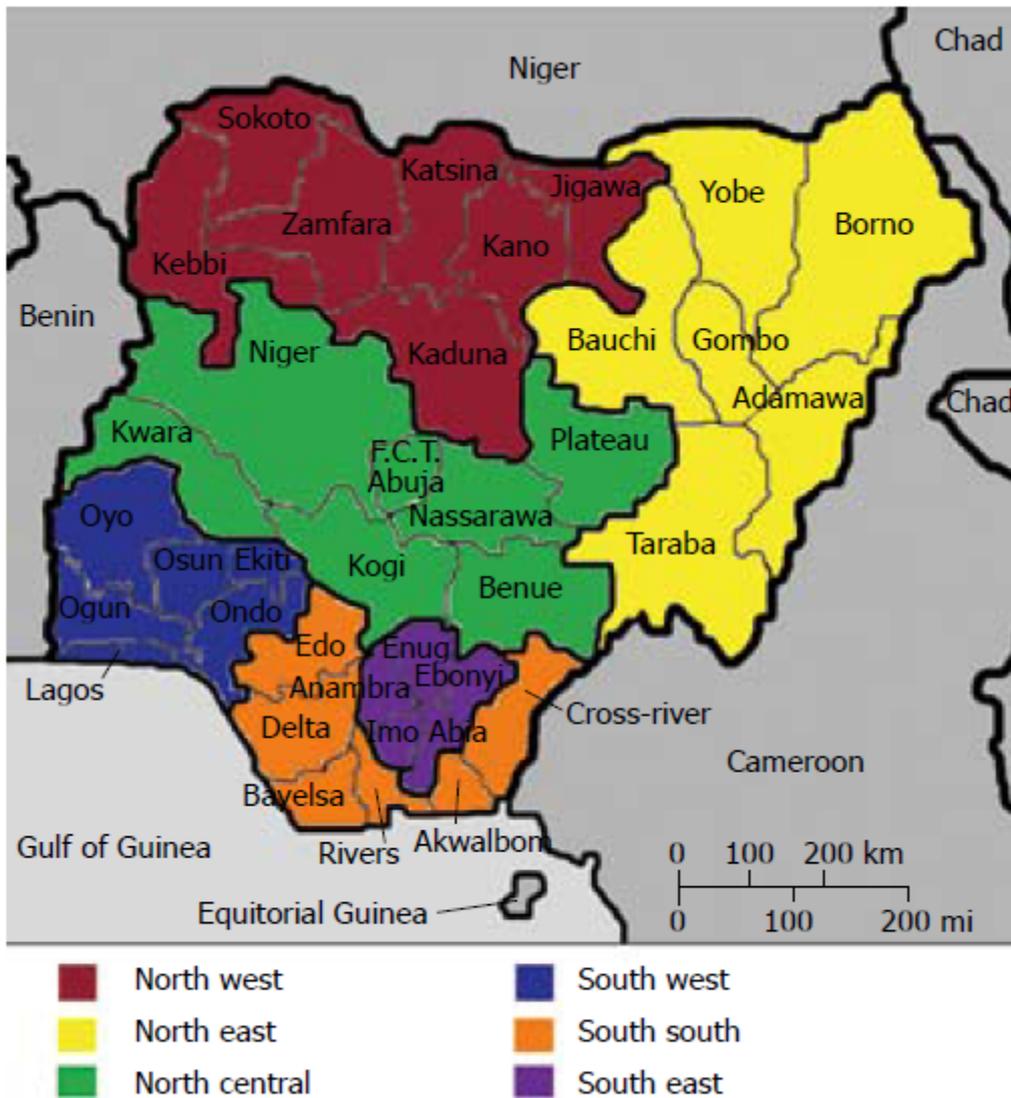
Figure 1: Map of Nigeria showing the 6 geo-political zones, 36 states and federal capita territory

1.1 The Nigerian Health System

The Nigerian Government operates a 3 tier governance structure namely: Federal, State and Local government. The health system of Nigeria is also patterned along these lines with primary health care being governed at local Government level, secondary health care at state Government level and Tertiary health care at federal government level. The private and informal health sectors also contribute substantially to health care in Nigeria. Similarly, the private sector offers services ranging from primary to tertiary care but only few Nigerians can afford to pay for their services.

Today, primary health care forms an integral part of the Nigerian social and economic development. It is the first level contact of the individual and community with the National Health System, thus bringing health care as close as possible to where people live and work and contributes the first element of a continuing health care process [1].

The primary health care system in Nigeria has evolved from the Basic Health Service Scheme (BHSS) of 1975-1980 to the current Ward Health System. The Ward Health System is the current national strategic thrust used by the Government to deliver primary health care services to Nigerians. It employs the electoral ward system as the basic unit of operation for the delivery of these services [2].

The Ward Minimum Health Care Package (WMHCP) was introduced in 2007 with the aim of providing a minimum level of health and heath care services in primary

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care at an affordable cost to the government and its partners without compromising quality to provide substantial health gains to every Nigerian [2]. The concept of the WMHCP was guided by the recommendations of Alma-Ata 1978 Conference Declaration on the minimum health service areas for primary health care [3].

The Alma-Ata recommended service areas are:
· Education on prevailing health problems and how to prevent them (health education)
· Provision of adequate water and basic sanitation (environmental health)
· Adequate food supply and good nutrition (public health nutrition)
· Maternal and child health including family planning (reproductive and family health)
· Immunization against the common communicable diseases
· Control of common endemic diseases (epidemiology and disease control)
· Treatment of common diseases and injury (primary medical care)
· Provision of essential drugs (community pharmacy practice)[3].

In line with the above recommendations, the WMHCP had a 5 year plan from 2007 to 2012 to offer the following interventions at the primary care level: (1) Control of Communicable Diseases (2) Child Survival (3) Maternal and New born Care (4) Nutrition (5) Non-Communicable Disease Prevention (6) Health Education and Community Mobilization [2].

One of the major policy documents guiding the implementation of primary health care in Nigeria is the Manual of Minimum Standards for Primary Health Care [2]. It contains the minimum standard for (a) health Infrastructure (b) human resources for health (c) and service provision for every primary health care level facility. Another major tool created to maintain similar standards across all centres is the Standing Order [2]. This contains an algorithm guide for evidence-based management of all health conditions within the ambit of the WMHCP. The standing order is similar to the National institute of clinical excellence(NICE) guidelines for managing different health conditions. The primary health worker is expected to refer to the standing order to guide diagnosis,investigations and treatment of common conditions which present to primary care. Hence any treatment or procedure not recommended by the

standing order is off license and may be used as evidence in a law court in the event of medical care law suits.

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1.2 Levels of Primary Care Facilities

The Ward Health system recognises 3 levels of primary care facility in Nigeria namely: (1) Health Post (2) Primary Health Clinic (3) Primary Health Care Centres. The complexity of skilled health workers available, essential drug list and services that can be rendered by these facilities increases from the Health Post to the Primary Health Care Centres. Full details of the operations and management can be found in the Manual of Minimum Standards for Primary Health Care. A brief description of each primary care facility is given below.

The Health Post formerly called a dispensary is being managed by the Village Development Committee (VDC) / Community Development Committee (CDC). It is expected that there should be 1 of such facilities per village or neighbourhood of about 500 persons. The Health Post should be headed by at a minimum, a Junior Community Health Extension Worker (JCHEW), who supervises Community Resource Persons (CORPs) working within the community. The CORPs are trained Community Volunteers including, Traditional Birth Attendants (TBA), Village Health Worker (VHW) and other community based service providers that have been duly trained and are recognised by the Local Government Authority. The services that can be offered include: health education and promotion, home visits and community outreach, health information management, immunization services, maternal, new born and child care and curative services for fever management, diarrhoea, skin diseases, simple anaemia, minor accidents and worm infestation. For maternal, new born and child care only JCHEWS who have had the Modified Life Saving Skills (MLSS) training are allowed to take delivery of low risk pregnancies and they are expected to counsel and motivate for referrals of cases above the scope of their duty (2 way referral) [2].

The Primary Health Clinic formerly known as Maternity Centre or Basic Health Centre is managed by the Local Government and Ward Development Committee (WDC). It is expected that there should be 1 of such facilities per group of villages/neighbourhoods with about 2,000 – 5000 persons. The Primary Health Clinic should have at least 2 Nurse Midwives, 2 Community Health Extension Workers, (CHEWS), 2 JCHEWS, 2 support staff. The services that can be rendered include all

that is available at the health post and advanced maternal, newborn and child care services and curative services. For example, services for treatment of sexually transmitted infections, antenatal care, delivery of low risk pregnancy, post natal care, care of the new born, growth monitoring and support for weaning. The health care workers in these facilities are expected to counsel and motivate for referrals cases above the scope of their duty (2 way referral) [2].

The Primary Health Care Centre formerly known as Comprehensive Health Centre or Model Primary Health Care Centre is being managed by the LGA. It is expected that 1 of such facilities be present per ward. With an average of 10 wards per LGA, a total of 10 Primary Health Care Centres are expected per local government to cater for an average population of 10000- 20000 people. The Primary Health Care Centres should ideally have 1 Medical Doctor (often not available), 1 Community Health Officer (CHO), 4 Nurse Midwives, 3 CHEWS, 1 Pharmacy Technician, 6 JCHEWS, 1 Environment Officer and a host of other support staff. It is the most advanced of the primary care facilities and offers comprehensive services i.e. services across all the 6 areas of the WMHCP stated earlier. It has admission facilities and advanced equipments, offers Basic Emergency Obstetric care (manual removal of placental, Post Partum Haemorrhage etc), Care of the Newborn, clean delivery, cord care, male circumcision and management of diseases like measles, neonatal tetanus and whooping cough. The health care workers in these facilities are expected to counsel and motivate for referrals cases above the scope of their duty (2 way referral)[2].

Based on the WMHCP and the Standing Order guides for primary care activities, there are algorithms for curative services as well as health promotion and disease prevention services for most endemic communicable diseases. Also, there are guidelines for provision of health preventive services for non-communicable diseases (NCD) however these are not necessarily culturally specific. But guidelines for curative services for non-communicable diseases (NCD) at the primary health care level are rather absent. For example, the Essential drug list at all levels of primary care does not contain anti-hypertensive drugs.

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According to the Manual of Minimum Standards for Primary Health Care, the standards should be reviewed every five years for possible addition of new indices and recommendations based on disease surveillance data. However, since the year 2007 there has not been any review of this guiding document [2]. It is only recently that a review team has begun work. But at the time of writing this thesis, no formal reviews were available.

1.3 The burden of hypertension and other risk factors for NCDs in Nigeria

It is an established fact that the "big three" infectious diseases- Malaria, Tuberculosis and HIV/AIDS coupled with childhood and maternal mortality are still the prominent causes of mortality and morbidity within Nigeria and Africa as a whole [4, 5], however, globally, the burden of non-communicable diseases (NCDs) and its risk factors such as hypertension is rapidly increasing, and the African continent may be the most affected region in the world [6]. For the first time in history, there are more people who are overweight than underweight, there are more deaths in adults than children and there are higher rates of NCDs and its risk factors such as hypertension in developing than developed countries [7]. The United Nations (alongside other major public health stakeholders) have declared NCDs a cause for global concern [7, 8].

It is estimated that hypertension affects over 1 billion people all over the world, contributes to about 7.1 million deaths annually, results in 92 million disability-adjusted life years, and it is the main risk factor for many other cardiovascular diseases [8,9,10,11]. The prevalence of hypertension in Nigeria may form a substantial proportion of the total burden in Africa because of the large population of the country currently estimated to be over 170 million[11,12,13]. According to the 2014 global NCD status report, it is estimated that in Nigeria, about 70% of Non Communicable Diseases(NCD) related deaths occur in men and women less than 70 years old. A recent review of estimates of prevalence of hypertension among adults greater than 18 years old in Nigeria have been shown to be about 30 [10]. With an increasing adult population and the

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changing lifestyle of Nigerians, the burden of hypertension may continue to increase in the coming years [14,15].

There are 4 main NCDs (CVDS [such as stroke and heart diseases], chronic obstructive pulmonary diseases, type 2 diabetes and cancer). Globally, NCDs are driven and maintained by risk factors such as smoking, lack of physical activity, unhealthy diet, smoking and use of tobacco [7]. The prevalence of these risk factors in Nigeria increased over time [10].

The 2012 GATS reported that about 5.6% of Nigerian adults use tobacco products [16]. The potential for increase in prevalence is possible as the 2008 GYTS survey revealed that smoking experimentation between children 13-15 years ranged from 3.6% to 16.2% across different states in Nigeria [16].

According to the WHO 2014 report Nigeria ranks 27th among countries with the highest per capita consumption of alcohol. The report also highlighted an increase in the consumption of alcohol from previous years. The overall prevalence of heavy episodic drinking in a 30 day period was 7% [17].

With regards to unhealthy diets, a study conducted in one of the largest cities in Nigeria (Oyo state), showed that fast foods and foods cooked outside the home accounted for 53.2% and 92.6% of the total nutrients intake of adults between 21 and 40 years old [18].

In 2014, the WHO global NCD status study reported that the national prevalence of physical inactivity was 19.8% (17.7% males; 21.9% females)[19]. But recent study by Adegoke et al 2011 [20] reported a higher prevalence of 41% among inhabitants of a major city in Nigeria.

The high burden of hypertension and other risk factors in Nigeria are indications that they are of public health importance and require urgent intervention.

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1.4. Management of Hypertension in Primary Care

In developing countries like Nigeria with over 170 million people, government owned primary health care (PHC) facilities are usually the only form of formal health care available in rural communities. In Nigeria, about half of the population now lives in urban areas while the other half live in rural areas [4, 5]. However, although there has been an increase in the number of rural-urban migrants globally [6], in Nigeria, most of these new migrants live in urban slums that are akin to rural areas with government owned PHC facilities as the only formal health care available.

In recent years, the utilization of primary healthcare services in many parts of Nigeria has increased with primary care centres being the first port of call for rural health needs especially maternal, child health and treatment of basic conditions like malaria and upper respiratory tract infections [7,8].However, many still use informal health care service providers such as patent medicine vendors and traditional healers which are largely unregulated [9].

Although national estimates reveal that prevalence of hypertension in Nigeria have been on the rise over the years[10], primary health care facilities in Nigeria seldom carry out risk assessment for cardiovascular diseases and only offer minimal prevention and curative health services for hypertension and other non-communicable diseases to their clients. For example, in most instances, cases that are not simple child and maternal problems or simple infectious diseases in adults are referred to secondary or tertiary care centres. This is because the primary health care level facilities are usually staffed by non-physician health workers who are restricted by both their skills and operating guidelines. These primary health care workers have a responsibility for treating a wide variety of endemic diseases and managing acute symptoms and emergencies without immediate recourse to specialist medical advice.

Furthermore, these non-physician primary health workers are only authorised to dispense a limited range of drugs at their own discretion for common, self-limiting conditions or common endemic diseases. Hence, the essential drug list for most

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primary health care facilities does not contain anti-hypertensive medicines [21] nor do they have adequate laboratory services. In some places, the primary health care facility may have a doctor attached, in which case anti-hypertensives may be prescribed. But, this is not the case with majority of primary health care facilities.

In addition, although a two-way referral system is in place, communication across the various levels of care and follow up especially from top to bottom is almost non-existent [22]. Consequently, because hypertension is largely asymptomatic, many times when clients are referred to higher levels of care because of high blood pressure or any other condition for that matter, a considerable number do not go [23]. Some of them would prefer to consult patent medicine vendors or traditional healers. Reasons for this include high cost of care, and the distance to get to these higher level facilities. The result is that when they eventually present at these higher health level facilities, they may already have complications which cost more to treat, thereby perpetuating the cycle of poverty [24].

Although health promotion activities are the main stay in the initial management of pre-hypertension and forms parts of treatment for severe forms of the disease, the consequence of this current arrangement (i.e. referring hypertension cases to higher levels of care, offering only minimal health promotion services at the primary health care level with no cardiovascular disease risk assessment procedures) is that there may be several missed opportunities for identification, risk assessment for cardiovascular disease complications and treatment of hypertension in primary health care facilities in Nigeria.

According to Maher, D. et al. (2010) [25], "practical policy proposals for improving non-communicable disease care in primary health care settings in Africa include: improving data on disease burden; implementing a structured approach to care delivery, with the part played by primary care in the broader system of care better defined; and highlighting quality of care, aligned with broader health system strengthening" [pg 945]. Thus further studies are needed to provide evidence to inform policy and appropriate intervention for the control of hypertension at the primary care level in Nigeria.

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1.5. Problem statement

First, in Nigeria, the last two decades has seen a rise in the number of studies on prevalence of hypertension and its risk factors. However, very few hypertension prevalence and risk factors studies have been conducted in the different Nigerian health care settings i.e. primary, secondary and tertiary health facilities. Although, some prevalence studies have been conducted in secondary and tertiary facilities, primary health care facility studies are rather scarce. Given the potential importance of different health care settings in the prevention, treatment and control of hypertension among all age groups, it is pertinent to have a broader picture of the prevalence of hypertension in Nigeria. This is particularly important when it is considered that Clients who patronise primary health care facilities or any health care facility for that matter are unique, in that their health seeking behaviour is different from those who do not go at all. Targeting this considerably large number of people may help reduce missed opportunities for untreated hypertension in both rural and urban areas.

Second, it is known that the rate of control of blood pressure in Sub-Saharan Africa including Nigeria is far less than that obtained in developed nations [26]. Although there are different barriers that hinder hypertension control at individual, institutional and health care provider levels, one key individual related factor that determines control of hypertension is adherence to recommended therapy [27]. Adherence/Non-adherence to recommended treatment is dependent on socio-cultural, economic and individual factors such as pre-existing beliefs about the illness and available treatment modalities [28, 29, 30, 31]. Out of all of these factors, personal beliefs about illness and treatment seem to be most important factor when change of behaviour is required [32]. But, information about the shared and divergent beliefs of Nigerians who may belong to one of over 250 ethnic groups on hypertension is very limited. The absence of this information presents a barrier to formulating effective blood pressure management programs and hinders blood pressure control at the individual level [33].

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Further, studies that used the Kleinman's anthropological explanatory model (EM) has shown that differences between lay health beliefs and beliefs of health care providers exist [34, 35]. They also showed that agreement between the EM of the health care provider and sick person has been reported to have positive impact on sick person outcomes. On the other hand, disagreement between EMs may result in negative outcomes such as non-adherence to recommended treatment methods [36]. In other words, when the healthcare provider understands the EM of his client (which may be different from his) and makes an attempt to form a constructive therapeutic relationship, health outcomes are better. Although, some studies on explanatory model of Health Care Providers (HCPs) on hypertension have been done in some other parts of the world, there appears to be a general paucity of these studies globally and in Nigeria [34, 36, 37, 38]. This is probably because it is assumed that since HCPs have been trained with the biomedical perspective, their perception would align entirely with the biomedical model. But, this may not always be the case as some studies have shown differences between HCP beliefs and the biomedical model perspective [39, 40, 41]. Understanding beliefs of HCPs as well as that of clients will help formulate appropriate interventions for control of hypertension in Nigeria.

Furthermore, there is a dearth of hypertension studies in the Federal Capital Territory compared to the south- west and south-east regions of the country where most of the available research has been done. As such, some ethnic groups in the federal capital territory may not have been well studied.

It is estimated that the Governments need to spend at least US$86 per person in order to provide basic health services [42] In 2013, the Government of Nigeria only spent US$31 [43, 44] With the recent passage of the national health bill by the National Assembly, more funding is promised for primary health care in Nigeria. Therefore, there is need for recent and appropriate evidence to guide planning, budgeting and spending of increased funding for primary health care in Nigeria.

To address these gaps, this thesis will investigate the prevalence of hypertension and risk factors among primary care clients in the Federal Capital Territory (FCT) with beliefs of FCT PHC clients and PHC health care workers about hypertension. Based on the evidence generated, a proposal for service provision (health promotion and curative) for hypertension in primary health care facilities will be suggested.

1.6. Aim: To explore ways to improve care of hypertension at the primary care level in Nigeria

1.7. Research Questions/Objectives

The following research questions (RQ) will be used to investigate and provide evidence for integration of curative services and public health activities for the care of hypertension in primary health care facilities in the FCT.

RQ1: What is the current prevalence pattern of hypertension in Nigeria?

RQ2: What is known about beliefs of the population in Nigeria regarding hypertension?

RQ3: What are the beliefs about hypertension among Nigerian immigrants to the United Kingdom?

RQ4: What are the beliefs and experiences of FCT PHC clients about hypertension?

RQ5: What are the beliefs and experiences of FCT PHC health workers about hypertension and care for hypertensive patients?

RQ6: What are types and levels of services available for hypertension in the selected health facilities in FCT?

RQ7: What is the prevalence of hypertension and risk factors for CVD among FCT PHC clients?

RQ8: What is the prevalence of CVD risk score of >30% among FCT PHC clients?

RQ9: What is the health utility of hypertensive and non-hypertensive FCT PHC clients?

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1.8. Research Purpose

The overall objective of this research is to help reduce the burden of hypertension in the most populous black nation in the world. The study design for this project, therefore, will aim to maximise the implementation of the knowledge created during this research and create "knowledge for action" not just "knowledge for understanding" [44]. It is my wish that this research allows the people who use PHC facilities to contribute to this research both to enhance the usefulness and trustworthiness of the research, and to influence the research that will ultimately impact the services they receive at Primary Health Care facilities. I hope the findings from this research will influence the policy and practice of the National Primary Health Care Development Agency and the Federal Ministry of Health in Nigeria.

1.9. Theoretical basis for parts of the study

1.9.1. Explanatory Model theoretical framework

Beliefs in this study were defined using the Kleinman's explanatory model (EM) of illness.

As stated earlier there are different barriers that hinder hypertension control at individual, institutional and health care provider levels. At the individual level, personal beliefs about illness and treatment seem to be most important factor when change of behaviour is required [9,10a].

Individual beliefs about illnesses and reactions to health threats can be understood from different perspectives. For example, the following models-health belief model, common sense model and illness representation model have been used to explore beliefs about hypertension and medication adherence [10b]. However, the Kleinmann's anthropological viewpoint is particularly useful in the context of comparing, analysing and explaining different cultures as it relates to beliefs about specific illnesses.

Although, understanding another person's explanatory model of diseases will not and of itself resolve all conflicts in the care for illnesses. However, negotiation for a

course of care that is acceptable to both health care provider and client is formed. Negotiation and compromise is important in this context.

In Nigeria, no study has applied the models listed above to understand hypertension. But only one study have used the kleinmann explanatory model to elicit beliefs about hypertension among tertiary hospital clients [10c].

The Kleinman's anthropological explanatory model (EM) has been used to explain the differences between lay health beliefs and biomedical beliefs of health care providers [13, 14, 15]. Research studies that have applied this model have also suggested that lay persons' beliefs about hypertension differed from the orthodox bio-medical perspective [13, 14, 15]. Furthermore, studies have shown different

beliefs about hypertension among black people from different ethno-cultural backgrounds [26, 27].

According to Kleinman, an explanatory model of an illness refers to "the notions (beliefs) about an episode of sickness and its treatment that are employed by all those engaged in the clinical process" (p.105)[44]. A lay person's explanatory model of illness consists of the following items: a) what is the cause of my illness? (b) Why did I fall sick at this particular time? (c) How does this illness operate in my body system? (d) How will this illness affect me, what will the illness do to me? (e) How should this illness be treated?

On the other hand, a health care provider's explanatory model includes: the cause of illness (aetiology); time and mode of onset; patho-physiology (or mechanism) of disease; course of the disease including symptoms and signs and recommended treatment [44,45,46].

Moreover, Kleinman combined the lay and biomedical explanatory models to derive a generalised structure for explanatory models which allows lay and biomedical models to be categorised in a single structure namely: "cause/aetiology", "course of illness", "patho-physiology", "symptoms" and "treatment"[45].

Because the klienmann's explanatory model elicits beliefs or understands others by asking open ended questions such as who, why, what, how about illnesses, it is essentially a qualitative method of enquiry hence it is subject to biases common to qualitative methods. In chapter 4, 5 and 6 I discuss methods that was used to minimize bias in qualitative studies conducted.

1.10 Definition of terms

The following terms used in this study are defined below:

Blood Pressure Measurement: Measurement was done using standard mercury sphygmomanometer with the cuff covering at least 80% of the upper arm [47,48]. Blood pressure measurement is an important primary care measure used to determine onset of hypertension, a silent disease that has no symptoms at the onset of the disease [48]. Usually, blood pressure measurement is done more than one

time when the reading appears abnormal. A high reading recorded during these measurements is an indication for further evaluation and medical follow-up with the primary care physician [47].

Hypertension (high blood pressure): Onset of hypertension begins with elevated blood pressure. Hypertension is defined as at least 140 mmHg for SBP and 90 mmHg for DBP. This diagnostic criteria/case definition is based on the definitions of hypertension by the; Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure [48]; the 1999 WHO/International Society of Hypertension (WHO/ISH) definitions and classification of blood pressure levels [48,49]and the 2003 WHO/ISH Statement on Management of Hypertension[48, 49]. These organisations all put their threshold for hypertension at 140/90mmHg.

1.11. Summary

In this chapter, I have described the background and explained the justification for this research. In Chapter 2, I present a report of the review of relevant literature on current prevalence of hypertension in Nigeria. In chapter 3, I present a report of the review of literature on the beliefs of Nigerians about hypertension. In chapter 4, I present research design and methods used in this study. In chapter 5, I present results of the pilot study in the UK. In chapters 6 and 7 the results of the main qualitative and quantitative studies in Nigeria respectively will be presented. In chapter 8, I present the results of types and levels of services available for hypertension in the selected health facilities in FCT with the experiences of PHC workers in managing hypertension in primary care. In Chapter 9, discussion of findings will be done while chapter 10 will present the implications, the significance of study and the conclusions.

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Chapter 2- Review of literature 1: Current prevalence of hypertension in Nigeria

In this chapter, I present a systematic review of the current prevalence trends of hypertension in Nigeria. A version of this review has been published as; *"Akinlua, J. T., Meakin, R., Umar, A. M., & Freemantle, N. (2015). Current Prevalence Pattern of Hypertension in Nigeria: A Systematic Review. PloS one, 10(10), e0140021. doi:10.1371/journal.pone.0140021".*

2.1 Organisation of the review

This discussion includes a comprehensive review of previous research conducted in Nigeria on prevalence of hypertension but with special focus on the different health care settings (i.e. primary, secondary and tertiary health centres) where the studies were conducted and in rural versus urban settings. Prevalence of hypertension across demographic factors such as age, sex and ethnic groups was also reviewed. The differences in prevalence of hypertension using different benchmarks for hypertension diagnosis across were also evaluated.

2.2 Source of information

All Studies were found by searching through the electronic databases (MEDLINE AND EMBASE), WHO cardiovascular InfoBase and looking through reference list of articles identified for relevant articles not indexed in the databases. Government bulletins and documents such as the Federal Ministry of Health of Nigeria's National Non Communicable Disease surveys were also assessed. No language limits were applied to the search strategy. The electronic search was applied to MEDLINE (1966 till present date) and adapted to EMBASE (1980 till present date). The current content of the WHO cardiovascular InfoBase was also reviewed. The Last search was conducted on the 17th of February 2015.

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2.3 Search strategy

The following search terms were used to search all databases: prevalence, estimate*, hypertension, "blood pressure", "raised blood pressure", "high blood pressure", Nigeria*. For the purpose of comprehensiveness of search, both free text terms and medical subject headings searches were done in both databases. In addition, both free text terms and medical subject headings were exploded and truncated to capture as many articles as possible. No language, publication year or restriction of publication status was imposed in the search strategy. The limit "non-human" was included in the search strategy to exclude all articles conducted in non-humans. See appendix 1 for details of search strategy for EMBASE (ovidSP) and MEDLINE (ovidSP).

2.4 Study Selection

The search returned 1748 publications from MEDLINE (851), EMBASE (897), two (2) government documents from the Federal Ministry of Health, Nigeria, ten (10) from WHO cardiovascular InfoBase and ten (10) relevant articles from references of already identified articles. After removing duplicates and applying the limit "humans only", one thousand and fifty-one (1051) studies remained. After screening titles and abstracts for relevance i.e. prevalence studies conducted primarily on Nigerians, 973 studies were excluded. Therefore 78 full texts articles were assessed and after applying the eligibility criteria and quality criteria, a further 33 studies were excluded. Finally, a total of 45 studies [50-95] were included in the review. A table containing list of all potentially-eligible studies with reasons for exclusion is presented in Appendix 2. The process of study selection and extraction is presented in a PRISMA flow chart [96], in Figure 2a below.

Figure 2a: Study selection and extraction


```
Identification
┌──────────────────────────┐      ┌──────────────────────────┐
│ Records identified through│      │ Additional Records        │
│ database searching        │      │ identified through other  │
│ MEDLINE=851               │      │ sources                   │
│ EMBASE=897                │      │ (N=22)                    │
└──────────────────────────┘      └──────────────────────────┘

Screening
        ┌──────────────────────────────────────────┐
        │ Records after duplicates removed          │
        │ (n=1051)                                  │
        └──────────────────────────────────────────┘

        ┌──────────────────────┐      ┌──────────────────────┐
        │ Records screened      │─────▶│ Records excluded      │
        │ (n=1051)              │      │ (n=973)               │
        └──────────────────────┘      └──────────────────────┘

Eligibility
        ┌──────────────────────┐      ┌─────────────────────────────────────────┐
        │ Full text articles    │─────▶│ Potential studies excluded N=33          │
        │ assessed              │      │ -7 Sample size less than 400             │
        │ for eligibility       │      │ - 13 editorials and reviews              │
        │ (n=78)                │      │ - 13 did not measure point prevalence of │
        └──────────────────────┘      │   HTN                                    │
                                       └─────────────────────────────────────────┘

Included
        ┌──────────────────────┐
        │ Studies included in   │
        │ systematic review     │
        │ (n=45)                │
        └──────────────────────┘
```

2.5 Eligibility Criteria

Eligibility criteria and the protocol adopted for the study was patterned after that recommended by the National Health and Medical Research Council document 1999 for systematic reviews of cross-sectional studies [97].

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2.6 Types of studies

Cross Sectional studies conducted in rural or urban areas (including hospital-based studies) with study sample size of 400 or more were selected for this review. It was calculated that to be able to estimate a prevalence of between 10-50% with a 5% margin of error and 95% level of confidence, a minimum sample size of 400 was required [98]. Studies included must have employed random sampling of a well-defined population or studies using whole populations [99]. The Response rate should be greater than 70% and the study should be conducted on Nigerians only [100]. In addition, studies included should have reported prevalence of hypertension (age adjusted or unadjusted) [101].

2.7. Types of participant/case definitions:

Studies of prevalence of hypertension in all age groups and both sexes with standard methods of measuring blood pressure were considered [102]. For studies conducted on younger children (Pre-school age group); studies with hypertension defined as "systolic or diastolic blood pressure greater than or equal to the 95th percentile for age and gender measured on at least three separate occasions" were included (p 1) [103].

For studies conducted on adolescents and adults, studies with hypertension defined as at least 140 mmHg for SBP and 90 mmHg for DBP were included. This diagnostic criteria/case definition is based on the definitions of hypertension by the; Joint National Committee on Prevention, Detection, Evaluation, and Treatment of high blood pressure (JNC6 and JNC7); the 1999 WHO/International Society of Hypertension (WHO/ISH) definitions and classification of blood pressure levels [48,49,104] and the 2003 WHO/ISH Statement on Management of Hypertension [31]. These organisations all put their threshold for hypertension at 140/90mmHg.

However, it is worthy of note that many prevalence studies conducted before 1999 used a cut-off point of ≥160/95mmHg for diagnosing high blood pressure. Because the aim of this study is not to synthesize these data but to appraise the available data from different studies to give a broad picture of the problem, all these studies

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were included as well, and comparison made between studies that used different definitions.

2.8. Data Collection Process

Data from included studies were extracted in duplicate by JA and UA. Any uncertainties were resolved by discussion. The methods were developed and piloted on the first 10 papers using the data extraction template created for the study. Data extracted included the following items: year of survey, state and region where the study was conducted; age of participants; sampling methods; response rate; sample size, health-care setting, and BP definition used for hypertension. In addition, where available, prevalence of high blood pressure (adjusted and unadjusted) and percentage of people with high blood pressure who had been diagnosed before and on treatment were also retrieved.

2.9. Risk of Bias in Individual Studies

Because the review question is that of frequency of a health problem, the risk of bias in studies focused on 3 main areas: Sample frame, Case ascertainment and adequate response rate [97]. These areas of bias were addressed in the eligibility criteria hence to ascertain the validity of eligible studies, the eligibility criteria described above which were based on the recommendations of the National Health and Medical Research Council document were applied [97].

2.10. Synthesis and Statistical Methods

The principal purpose of the study was to appraise the available data to give a broad understanding of the scale of the problem of hypertension and the variation between different settings and populations in Nigeria.

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Because of the differences in design and context of different studies, and our interest in the differences between the estimates of hypertension prevalence in different contexts, we did not undertake quantitative synthesis of the results of the included studies (Meta analysis) but conducted a narrative synthesis.

In addition, we conducted a limited numbers of statistical tests to examine differences between studies addressing our objectives.

2.11. Results

2.11.1. Description of studies

Forty-five (45) independent studies [50-95] were included in this review. These studies were published between the years 1968 and 2015. 42 studies [50-92] were conducted across the 6 geopolitical zones of Nigeria and 3 studies [54, 90, 95] were conducted nationally. The numbers of those conducted in the zones are as follows: South- West 15; South-East 8; South-South 10; North-Central 4; North-East 1 and North-West 4.

Table 2a shows the characteristics of all studies included for the review including the crude prevalence of hypertension reported for each study. The included studies were generally large; community based; schools based; hospital based; and workers (civil-servants and factory workers). Sample sizes of studies ranged from 400 [50] to 13,591 [90]. The age of participants ranged from 0 to 110 years old. The settings where the studies were conducted included rural (14 studies), urban (22 studies including urban slums and semi-urban) and mixed (8 studies) i.e. urban and rural at the same time.

Five (5) studies [51, 82-85, 95] were conducted on children between 0 to18 years old. Although the search yielded more studies on this age group, most were concerned with pattern of blood pressure in this age group and not prevalence of hypertension. See appendix 2 for studies that were excluded and reasons for their exclusion.

Table2a: Characteristics of all studies included in the systematic review

FIRST AUTHOR	REGION	BP CUT-OFF	TARGET POPULATION	SETTING	Age (years)	SAMPLE SIZE (Response Rate %)	OVERALL (95%CI)	MEN(95%CI)	WOMEN(95%CI)
							CRUDE PREVALENCE %		
Odetunde, O et al 2014 [95]	South East	>95thpercentile	school based	urban	2 -5	630(100)	1.9 (0.83-2.96)	1.3 (0-4-2.1)	0.63 (0.01-1.3)
Abegunde, A et al 2013[50]	South West	140/90	community based	urban /rural	60-110	630(98.4)	36.5 (32.7-40.3)	NA	NA
Ekore, R.I et al 2009[51]	South West	140/90	hospital based	urban	18-44	405(100)	30.6 (26.1-35.1)	34.4 (26.9-41.9)	28.3 (22.7-33.9)
Cooper, R et al 1997[52]	National	140/90	community based	rural	25-74	2509(96)	14.5 (13.1-15.9)	14.7 (12.7-16.7)	14.30 (12.4-16.2)
Daniel, O et al 2013[53]	South West	140/90	community based	urban slum	20-81	964(100)	38.2 (35.1-41.3)	44.5 (39.1-49.9)	34.9 (31.1-38.6)
Makusidi, M et al 2013[54]	North West	140/90	community based	urban	15-80	535(99)	30.2 (26.3-34.1)	NA	NA
Murthy, G et al 2013[55]	National	140/90	community based	urban/rural	≥40	13,591(99.4)	44.7 (43.5-46.3)	42.6 (40.9-44.4)	46.8 (45.3-48.4)
Isezuo, S et al 2011[56]	North West	140/90	community based	rural	15-65	782(100)	24.8 (21.8-27.8)	24.9 (20.7-29.1)	23.60 (19.2-27.9)
Olatunbosun, S et al 2000[57]	South West	160/95	community based	urban	≥ 18	998(100)	10.3 (8.4-12.2)	13.9 (11.1-16.7)	5.3 (3.2-7.5)
okpechi, I et al 2013[58]	South East	140/90	community based	urban/rural	≥18	2983(99)	31.4 (29.7-33.1)	34.9 (32.1-37.4)	28.1 (25.9-30.3)
Oladapo, O. et al 2010[59]	South West	140/90	community based	rural	18-64	2000(100)	20.8 (19.0-22.6)	21.1 (18.4-23.8)	20.5 (18.1-22.9)
Ige,O et al 2013[60]	South West	140/90	community based	urban	28-50	525(95.9)	21.5 (17.9-25.0)	21.9 (6.9-26.8)	21.1 (16.1-26.1)

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Author	Region	BP cutoff	Type	Setting	Age	N (%)	Overall (95% CI)	Male (95% CI)	Female (95% CI)
Ekanem, U et al 2013[61]	South South	140/90	community based	urban	15-65	442(99)	47.0 (42.3-51.7)	30.1 (24.1-36.1)	16.8 (11.8-21.8)
Hendriks, M et al 2012[62]	North Central	140/90	community based	rural	≥18	2678(99)	19.3# (17.3-21.3)	NA	NA
Ulasi, I. et al 2010[63]	South East	140/90	community based	urban/rural	25-65	1458(75.8)	32.8 (30.4-35.2)	NA	NA
Johnson, O.1971[64]	South West	160/95	community based	urban	10-102	1392(100)	8.9 (7.4-10.4)	7.9 (5.8-10)	9.9 (7.8-12.0)
Okesina, A et al 1999[65]	North East	140/90	community based	rural	≥18	500(100)	15.2 (12.0-18.3)	19.1 (14.5-23.7)	10.3 (6.3-14.3)
Ejike et al 2010[66]	North Central	>95th percentile	community based	urban/rural	13-18	843(100)	10.1 (8.1-12.1)	9.0 (6.4-11.7)	11.3 (8.2-14.4)
Mijinyawa, M et al 2008[67]	North West	140/90	community based	urban	13-19	1000(100)	7.2 (5.6-8.9)	6.2 (4.0-8.4)	7.7 (5.3-10.1)
Ekezie, J et al 2011[68]	North Central/ South East	140/90	community based	urban/rural	20-80	567(82.7)	21.7 (18.3-25.1)	NA	NA
Ulasi,I et al 2011[69]	South East	140/90	community based	urban	≥20	731(94.1)	42.2 (38.5-35.9)	46.3 (43.6-48.9)	37.7 (32.5-42.9)
Ike. S et al 2009[70]	South East	140/90	hospital based	urban	≥20	1360(100)	18.4 (17.5-19.2)	17.2 (16.1-18.3)	18.9 (17.5-20.3)
Adedoyin, R et al 2008[71]	South West	140/90	community based	semi urban	21-100	2097(92.3)	36.6 (34.5-38.7)	36.8 (33.6-39.9)	36.4 (33.7-39.1)
Lawoyin, T et al 2002[72]	South West	160/95	community cohort	urban	≥18	2144(99.4)	12.4 (11.0-13.8)	12.1 (10.6-14.0)	12.7 (10.4-13.6)
Adebayo, A et al 2013[73]	South West	140/90	community based	rural	15-90	1000(100)	26.4 (23.7-29.1)	27.3 (23.3-31.3)	25.4 (21.6-29.2)
Ekpeyong, A et al 2012[74]	South South	140/90	community based	rural	18-60	2780(96.3)	14.4 (13.1-15.7)	12.6 (10.9-14.3)	12.2 (10.4-13.9)
Suleiman, A et al 2013[75]	South South	140/90	community based	rural	≥20	400(100)	15 (11.5-18.5)	18.8 (12.7-24.9)	12.5 (8.3-16.7)

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Oluyombo, R et al 2014[76]	South West	140/90	community based	semi urban	≥18	750(89.8)	47.2 (43.6-50.8)	48.9 (42.3-55.5)	47.3 (43.0-51.6)
Okpara. I et al 2015[77]	North Central	140/90	Community based(university)	urban	≥16	471(100)	15.7 (12.4-18.9)	16.5 (12.4-20.6)	14.1 (8.6-19.6)
Ezenwaka, C et al 1997[78]	South West	140/90	community based	urban/rural	≥55	500(100)	30 (25.9-34.0)	25.8 (19.8-31.8)	36.6 (31.1-42.1)
Andy, J et al 2012[79]	South South	140/90	community based	rural	≥18	3869(96.7)	23.6 (23.3-24.9)	31.2 (28.9-33.5)	18.1 (15.8-20.4)
Onwuchekwa, C et al 2012[80]	South South	140/90	community based	rural	≥18	1078(95)	18.3 (15.9-20.6)	NA	NA
Omuemu et al 2007[81]	South South	140/90	community based	rural	≥18	590(98)	20.2 (16.9-23.4)	26.2 (21.2-31.2)	13.2 (9.3-17.1)
Onwubere, et al 2011[82]	South East	140/90	community based	rural	40-60	858(70.4)	46.4 (43.1-49.7)	50.2 (43.9-56.4)	44.8 (40.9-48.7)
Ogunlesi et al 1991[83]	South West	160/95	male factory workers	urban	≥18	541(100)	8 (5.7-10.3)	NA	NA
Okpere et al 2013[84]	South South	>95th percentile	school based	urban	10- 17	820(100)	3.2 (1.9-4.4)	3.3 (1.5-5.1)	3.1 (1.4-4.8)
Ujunwa, F et al 2013[85]	South East	>95th percentile	school based	urban	10- 18	2694(100)	5.4 (4.5-6.3)	3.8 (2.8-4.8)	6.9 (5.6-8.2)
Oyewole, O et al 2012[86]	South West	>95th percentile	school based	urban	12-18	1638(100)	0.1 (-0.1-0.3)	0.1 (-0.2-0.33)	0.1 (-0.2-0.33)
Akinkugbe et al 1968[87]	South West	140/90	community based	rural	≥18	3602(100)	10.1 (9.1-11.1)	9.1 (8.1-10.1)	11.2 (10.2-12.2)
Jain et al 1977[88]	North West	160/95	hospital based	urban	≥18	2950(99.7)	3.8 (3.1-4.5)	2.9 (2.2-3.6)	4.9 (4.2-5.6)
Oviasu et al 1977[89]	South South	160/100	community based	rural	≥19	1482(96.8)	2.1 (1.4-2.8)	2.8 (2.1-3.5)	0.5 (0.2-2.1)
Oviasu et al 1980[90]	South South	140/90	civil servants	urban	≥18	1265(99)	13.3 (11.4-15.2)	14 (12.1-15.9)	10 (8.1-12.0)

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Idahosa 1985[91]	South South	140/90	civil servants	urban	≥18	1450(98.2)	15.1 (13.3-16.9)	NA	NA
Akinkugbe et al 1997[92]	National	160/95	community based	urban/rural	≥18	4930(98.4)	11.2 (10.3-12.1)	NA	NA

#=age standardised prevalence rate; NA= not available

2.11.2. Diagnosis of hypertension

Figure 2b illustrates the prevalence of hypertension for 8 studies [58, 65, 71-73, 81, 86, 92] that used 160/95mmHg as their benchmark for diagnosing hypertension. Only one study used 160/100mmHg as cut-off [70]. Five studies [51, 82-84, 102] used the 95th percentile value for age, sex and height as cut-off for hypertension in preschool and adolescents below 18 years of age. The remaining 32 studies used 140/90mmHg as cut-off.

Figure 2b: Forest Plot showing prevalence of hypertension% & 95%CI across studies that used BP cut-off ≥ 160/90mmHg.
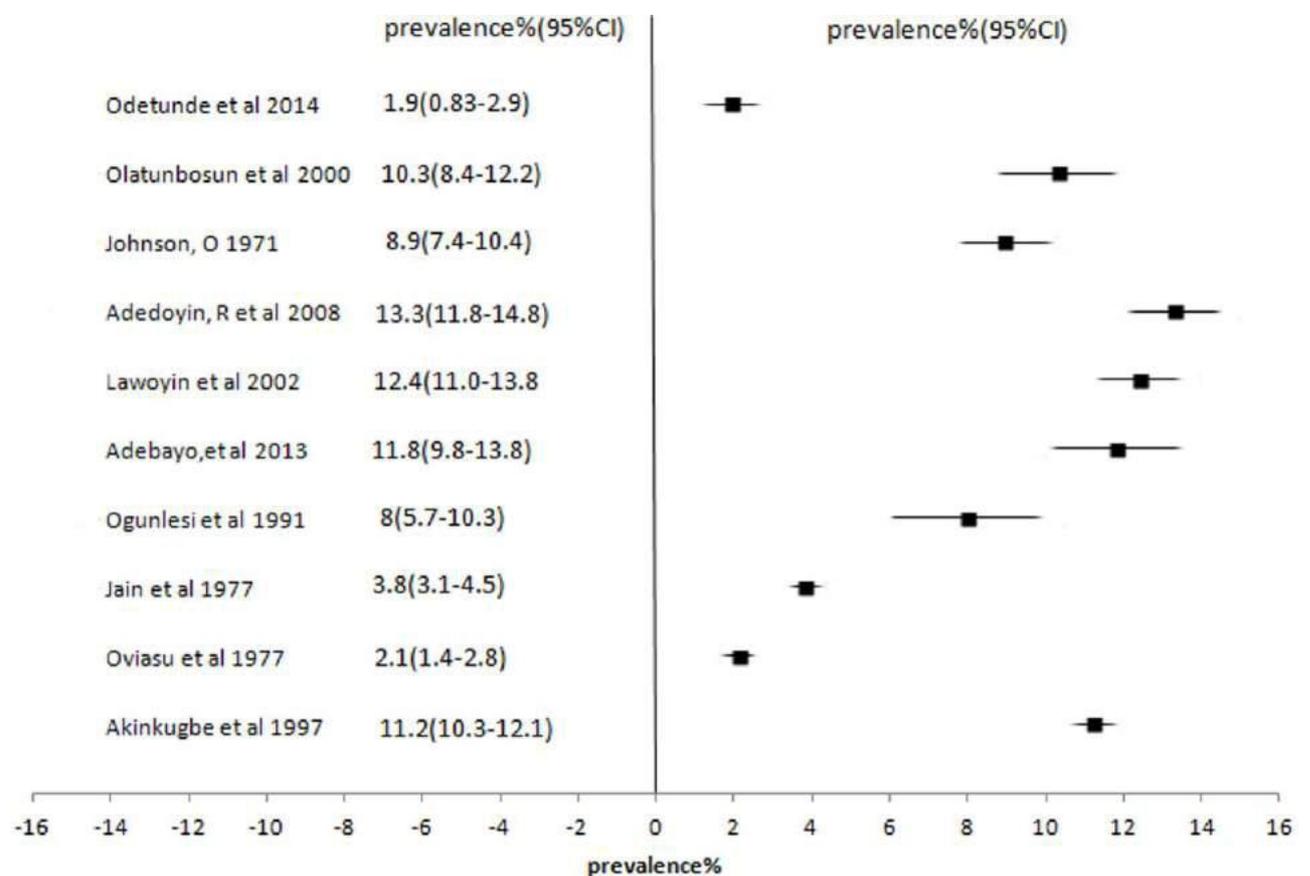
2.11.3. Prevalence of hypertension amongst children

Overall Crude Prevalence of hypertension recorded in studies conducted on children less than 18 years old [51, 82-84, 102] ranged from 0.1% (95%CI:-0.1 to 0.3) to 17.5% (95% CI: 13.6 to 21.4). The distribution of hypertension differed highly significantly across different studies conducted on children in Nigeria, x^2 = 155.69, (df, 5) p < 0.0001.

With respect to settings (rural/urban): The highest crude prevalence of hypertension 17.5% (95% CI: 13.6 to 21.4) was recorded in an urban area in the North Central zone. Similarly, the lowest prevalence 0.1% (95%CI:-0.1 to 0.3) was recorded in an urban area in the South West. However, the only study that compared adjusted prevalence between rural and urban children showed a slightly higher value for urban compared to rural (17.5% versus 4.6%).

With respect to sex: Where reported the overall prevalence in males and females were very similar.

With respect to increasing age: The 2 studies done in the South East zone showed substantial differences in the crude prevalence (5.4% versus 1.9%). But the crude prevalence of 5.4% (95%CI: 4.5 to 6.3) was for the age group 10-18 years old while 1.9% (95%CI: 0.83 to 2.96) was for age group 2-5 years. The prevalence recorded for 10-18 years old in the south-east zone study is relatively similar to the study conducted in Kano (North-West zone) which showed an overall prevalence of 7.2% (95%CI: 5.6 to 8.9) using BP cut off of 140/90mmhg amongst children aged 13-19 years old.

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2.11.4. Prevalence of hypertension amongst adults

The overall crude prevalence for studies conducted on adults aged 18 years and above ranged from 2.1% (95%CI: 1.4 to 2.8) to 47.2% (95%CI: 43.6 to 50.8).

With regards to sex: crude prevalence of hypertension ranged from 2.8% to 13.9% and 0.5% to 12.7% for males and females respectively in studies that used the BP benchmark of 160/95mmHg. In studies that used BP benchmark of 140/90mmHg crude prevalence rate of hypertension ranged from 6.2% to 48.9% and 10% to 47.3% for males and females respectively. Where male and female data are available irrespective of BP cut-off, overall crude prevalence rates were generally higher in males than in females (22 studies reported higher prevalence in males compared to females while 11 studies had higher prevalence in females compared to males. However, based on BP cut-off of 160/95mmHg, more studies had higher crude prevalence in females compared to males.

With regards to settings (Urban/Rural): figure 2c illustrates rural versus urban and urban-rural difference of crude prevalence in 6 available mixed studies settings (i.e. rural and urban in the same study) [51, 52, 59, 68, 69, 90]. It is clearly demonstrated in the forest plot that using urban-rural differences in prevalence rates, all mixed studies showed higher prevalence in urban compared to rural areas. Estimates from all mixed studies showed an overall prevalence ranging from 17.5% to 51.6% in urban areas and 4.6% to 43% in rural areas. In 5 out of the 6 studies conducted in mixed settings, prevalence were relatively higher in urban than in rural areas. However, one of the studies [59] reported that prevalence rate was higher in rural compared to urban area.

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Figure 2c: Forest Plot showing Urban-Rural difference of prevalence of hypertension in studies comparing rural and urban populations
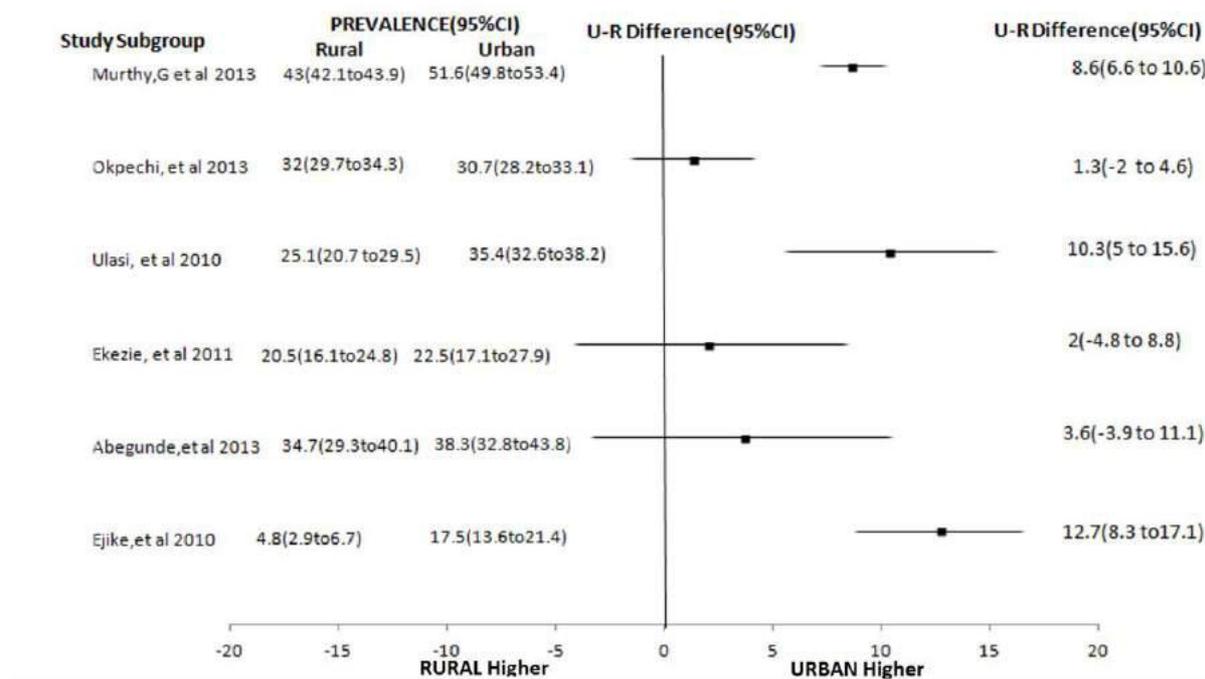
With regards to BP cut-off point: Generally the prevalence differed by wide margins when the BP cut-off point changed from 140/90mmHg to 160/90mmHg. Table 2b shows how prevalence changes with different BP cut-off. Four studies compared different BP cut-off points in their analysis [54,71,73,90]. In all the studies there appears to be a decrease in value of prevalence when BP cut-off was increased.

	Table 2b: showing changing prevalence (%) using different BP cut-off				
				prevalence rate%(95%CI)	
No	Authors first name	Year of study	setting	definition 1	definition 2
1	Murthy, G. et al[90]	2013	national	44.9(43.5-46.3)	24.3(23.6- 25.0)
2	Cooper et al[54]	1997	national	14.5(13.1-15.9)	6.9(6.2-7.6)
3	Adedoyin, R. et al[71]	2008	SW	36.6(34.5-38.7)	13.3(11.8-14.8)
4	Adebayo, A.et al[73]	2013	SW	26.4(23.7-29.1)	11.8(9.8-13.8)

Definition 1: Systolic BP ≥140 mmHg or Diastolic BP ≥ 90 mmHg; Definition 2: Systolic BP ≥ 160 mmHg ≥ or Diastolic BP ≥ 90mmHg

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With regards to trends: Although pooled estimates were not done in this review, it appears that the mean blood pressure levels may have risen over time. The prevalence figures from the 2 national surveys done in 1997 and 2013 were 11.2% (95% CI: 10.3 to12.1) and 24.3 %(95% CI: 23.6 to 25) respectively using BP cut off of ≥160/90mmHg. When a threshold of 140/90mmHg was used in the 2013 national prevalence study, the prevalence rate increased to 45.9% (95% CI: 43.5–46.3%).

2.11.5. Prevalence of hypertension amongst hospital clients

Only three studies [53, 70, 86] included in the review were carried out in a hospital setting. Two (2) of the studies [53, 70] were conducted in 2009 using a BP cut-off of 140/90mmHg while one (1) [86] was conducted in 1977 with a BP cut off of 160/95mmHg. Crude prevalence recorded in these studies were 3.8% (95% CI: 3.1 to 4.5), 18.4% (95% CI: 17.5 to 19.2) and 30.6 % (95% CI: 26.1 to 35.1) conducted in 1977 and 2009 respectively. Although a BP cut-off of 160/95mmHg was used for the 1977 study, the results show a very low prevalence of hypertension among hospital attendees in 1977 compared to later years. This increasing pattern of prevalence rates amongst hospital attendees is similar to that experienced in community-based studies.

The hospital-based study that revealed a prevalence of 18.4% [36] also showed that during the period of review, 26.5% of all hospital cases and 46.1% of hypertension related complications respectively were due to hypertensive heart failure. A study which reviewed complications of hypertension also showed that the commonest risk factor for stroke, heart failure, and ischemic heart disease and chronic kidney disease in Nigeria was high blood pressure [94].

2.11.6. Prevalence of hypertension by ethnic groups and Geopolitical zones

There are over 250 distinct ethnic groups in Nigeria. But, only 2 studies have reported prevalence studies by ethnic groups [77, 90]. The study by Andy et al [77] compared prevalence of hypertension among only 3 ethnic groups (Obolo, Efiks, Ibibios) resident in the south-south region of the country. The prevalence rates ranged from 14.9% to 25.6% [77].The lowest rate was recorded amongst the "Obolo" ethnic group while the highest rate was in the "Efiks".

But the national survey by Murthy, G. et al [90] cut across 17 major ethnic groups scattered all over the country as illustrated in figure 5.

Fig 2d: Forest plot showing hypertension prevalence and 95% CI across 17 ethnic groups in the Murthy, G et al 2013 study [90]

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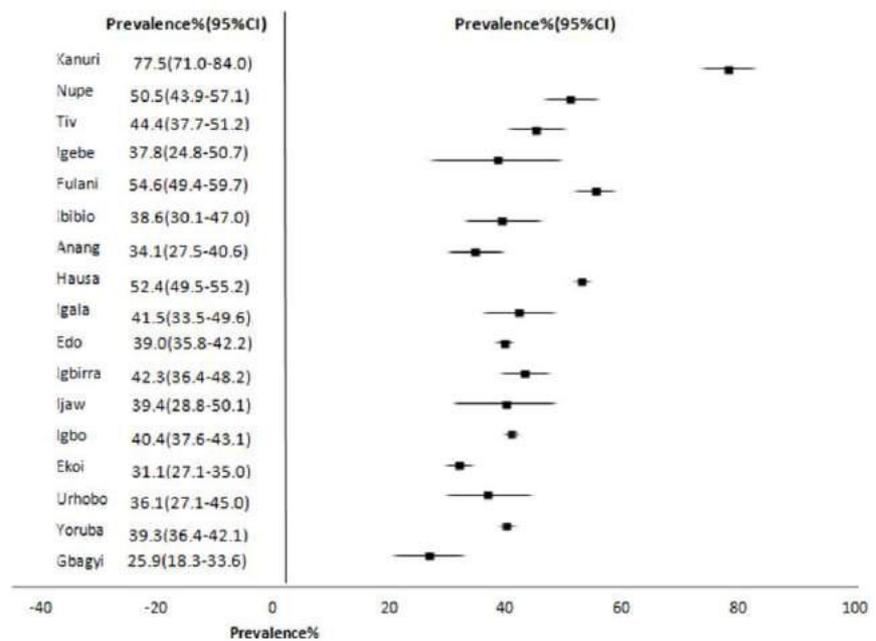
Using BP cut off of 140/90mmHg, prevalence rates ranged from 25.9% (95%CI: 18.3 to 33.6) to 77.5% (95%CI: 71.0 to 84.0) with the highest being in the Kanuri group and lowest in the Gbagyi group. Prevalence figures obtained among Ibibios(25.5%) in the Andy, J et al [77] study was less than in the Murthy, G et al study (38.6%(95%CI:30.1 to 47.0)).

The distribution of hypertension differed highly significantly across ethnic groups in Nigeria, x^2 = 361.46, (df, 16) $p < 0.0001$.

In addition, the only study that reported prevalence by geopolitical zone was the national survey by Murthy, G et al [90]. The crude prevalence of hypertension by geopolitical zones (North-East, South-East, South-South, North-West, South-West, North-Central) using BP cut off of 140/90mmHg were 60.4% (95%CI:55.1 to 65.8), 41.0%(95%CI:38.0 to 44.0), 34.2%(95%CI:31.2 to 37.2), 51.5%(95%CI:48.7 to 54.2), 40.1%(95%CI:37.1 to 43.2), and 39.5%(95%CI:35.7 to 43.3) respectively. Also, the distribution of hypertension differed highly significantly across geopolitical zones in Nigeria, x^2 =375.66,(df, 5) $p < 0.0001$.

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2.12. Discussion

Most studies reported only the crude prevalence of hypertension. Most of the studies carried out in the last 20 years reported a higher prevalence of hypertension compared to older studies [91, 96, 97]. Reported values of prevalence of hypertension in Nigeria vary widely. These wide variations in values are in part dependent on the blood pressure criteria used. Some of the variations can also be explained by methodological differences (e.g. some have focused on only rural populations) but variation in the age groups studied is likely to be a major factor. Information on trends in the prevalence of hypertension is limited because there were no follow up studies on similar population groups. Although, these populations might be located in the same geo-political zone or state, characteristics of each village or group or tribe differ significantly. A systematic review of hypertension prevalence studies by Adeloye et al 2015 [10] observed that pooled prevalence of hypertension increased from 8.6% over the period 1970–1979 to 22.5% over the period 2000–2011.

Many of the studies mentioned in this review that used cut-off of 140/90mmhg reported that prevalence of hypertension was higher in males than females but the reverse was reported for studies that used 160/90mmhg. This pattern is difficult to explain and adequate comparison can only be made with age and sex-adjusted figures which was lacking in most of the included studies. However, the pattern of higher blood pressure in males compared to females of middle age group is similar to findings in other Africans, African Americans and Afro-carribeans [98]. Similarly, in a related study, it was shown that men have higher blood pressure than women of the same age group before women attain the age of menopause [99]. This could be due to societal socio-economic roles assigned to men in the home where they have to provide most of the finances for family maintenance [96].

Most of the cross-sectional studies used for this review include middle-age subjects. However, some cross-sectional studies were conducted among older population groups [73, 80] or children [51, 82-84, 103]. Values of Prevalence of hypertension in children are much lower than that reported in adults. Also, there appears to be no

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gender preponderance for prevalence of hypertension when other risk factors such as obesity have been excluded [100]. Nevertheless, blood pressure readings increases with growth and development and result in high blood pressure by middle-age [101].In addition, children with high blood pressure tend to continue to have hypertension as they grow older [104-105].

The differences in prevalence of hypertension in rural versus urban areas is evident in most of the included studies. Pooled results from the review done by Adeloye et al also showed a higher urban prevalence compared to rural (31% versus 26%)[10]. This is contextually similar to other studies undertaken in African countries where higher prevalence rates have been reported among urban dwellers [106]. The higher prevalence amongst urban populations may portray a different lifestyle pattern. Urban dwellers are more likely to consume foods that are processed and foods that have high salt and fat content [102]. Furthermore, the lower rural prevalence may indicate higher physical activities levels from trekking long distances and physically taxing farming activities, in addition to greater consumption of freely available vegetables and fruits taking place in majority of rural areas [103, 104]. However, in a few studies [59] especially in the eastern part of Nigeria, it was noted that prevalence rate of hypertension was higher in rural than urban area (see figure 2c). This finding is similar to findings in some studies [107-109] in the United States and European population. It is likely that the rural population age pattern is older because it is a popular practice for older people to migrate to rural areas after retirement from active work.

The distribution of hypertension differed among ethnic groups and across geopolitical zones. The high hypertension prevalence rate recorded among the Kanuri ethnic group [90] indicates a need for further investigation for possible explanations because this ethnic group is concentrated in only 1 region of the country and the prevalence estimates may have been confounded by other factors. Some evidence of ethnic variations has been reported in other countries such as Kenya with statistically significant differences after adjusting for cardiovascular and socio-demographic risk factors [110].

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Report of data from studies done in hospitals reveal that hypertension and cardiovascular disease complications are the commonest NCDs in Nigeria [53, 70, 83]. This report is similar to a rate of 30% obtained from Tanzania [111].

A key limitation of this review was that across all studies retained for the review crucial data on sex, age and other descriptive statistics adjusted across rural and urban settings were not always available (see table 2a for overall characteristics of studies included in review).

2.121. Comments

This review summarised available reports on the prevalence of hypertension in Nigeria. From these reports, it appears that hypertension is a major public health problem in Nigeria. These prevalence estimates were gleaned from studies conducted in community and hospital-based settings. Most of the community-based studies were either conducted using house to house surveys or conducted in places of mass gathering such as churches, mosques and markets. All of the hospitals were either secondary or tertiary health care centres. However, hypertension studies have not been undertaken specifically on clients who visit primary health care centres which are often the first port of call for people living in both rural and urban areas. This is partly because the focus of primary health care in Nigeria has been on preventive and curative services for endemic communicable diseases and for maternal and child health-related issues in the community.

The effect of non-communicable diseases on development is two-fold [112,113,114]. They worsen poverty levels as well as reduce national income available for meaningful development [10,42]. "It is projected that in the next 10 years, China, India and Britain will lose USD 558 billion, USD237 billion, and USD33 billion respectively due to heart disease, stroke and diabetes mellitus"(pg260)[115].

Similarly, in Nigeria the economic burden posed by hypertension and its complications is high [116]. For example, a study on monthly cost of hypertension

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treatment per person in a community in the south-western part of Nigeria showed that an average of ten united state dollars (10USD) was spent on drugs alone aside from other direct costs. This is untenable in a population where many live below 2USD a day [10,117].

Moreover, it has been shown that the average monthly cost of treatment of hypertension could be higher especially in cases where the patients have to go back for follow-up more frequently than expected due to complications of management [118].

The low levels of awareness, treatment and control of hypertension, suggest that rates of cardiovascular complications such as cerebro-vascular accidents, heart failure, and renal failure will increase in coming years [10]. As health care services are currently organised in Nigeria, most of these complications will present at secondary and tertiary health care centres and may overwhelm these centres and their resources if measures are not taken to ensure adequate prevention and treatment in primary care settings.

 It is clear that hypertension and its complications will cause both governments and societies large financial and societal cost but the government needs to respond to this emerging challenge to ensure the future health of Nigerians. This suggests that there is a need for additional resources for the detection and control of hypertension and other NCDs in addition to resources being allocated for the control of major communicable diseases and neglected tropical diseases. In addition, interventions and strategies will be required to increase adherence to life-style changes and life-long medications.

The implication is that more hypertension control strategies should be developed and evaluated specifically in primary health care settings to inform sustainable policies and practices required for expanding preventive and curative services available at the primary health care level for hypertension and other NCDs in Nigeria.

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2.13. Summary

In this chapter, I summarised the up to date data on the prevalence and distribution of hypertension in Nigeria from prevalence studies. The overall crude prevalence of hypertension ranged from 0.1% (95%CI:-0.1 to 0.3) to 17.5% (95% CI: 13.6 to 21.4) in children and 2.1% (95%CI: 1.4 to 2.8) to 47.2% (95%CI: 43.6 to 50.8) in adults depending on the benchmark used for diagnosis of hypertension, the setting in which the study was conducted, sex and ethnic group. The crude prevalence of hypertension ranged from 6.2% (95%CI: 4.0 to 8.4) to 48.9% (95%CI: 42.3 to 55.5) for men and 10% (95%CI: 8.1 to 12) to 47.3% (95%CI: 43 to 51.6%) for women. In most studies, prevalence of hypertension was higher in males than females. In addition, prevalence across urban and rural ranged from 9.5% (95%CI: 13.6 to 21.4) to 51.6% (95%CI: 49.8 to 53.4) and 4.8% (95%CI: 2.9 to 6.7) to 43% (95%CI: 42.1 to 43.9) respectively.

This review answers research question 1(**RQ1): "**What is the current prevalence pattern of hypertension in Nigeria?"

In chapter 3, I present a review of studies of beliefs of Nigerians about hypertension. This will answer research question 2 (**RQ2)**: What is known about beliefs of the population in Nigeria regarding hypertension?

Contributions of other authors to this chapter

Dr. Aminu Umar of the department of science and technology, Salford University helped with data collection by acting as a second data extractor when screening retrieved studies for the systematic review.

My supervisors (Prof. Nick Freemantle and Dr. Richard Meakin) contributed to conceptualization, analysis, review and editing of this chapter.

Chapter 3- Review of literature 2: Beliefs of Health Care Providers, Lay Health Care Providers and Lay persons in Nigeria regarding hypertension

In the last chapter I systematically reviewed the literature on prevalence of hypertension in Nigeria. This answered research question 1(**RQ1**). In this chapter, I present a systematic review of the beliefs of Nigerians regarding hypertension which answers research question 2 (**RQ2**): "What is known about beliefs of the population in Nigeria regarding hypertension?" A version of this review has been published as: *"Akinlua JT, Meakin R, Fadahunsi P, Freemantle N (2016) Beliefs of Health Care Providers, Lay Health Care Providers and Lay Persons in Nigeria Regarding Hypertension. A Systematic Mixed Studies Review. PLOS ONE 11(5): e0154287.* https://doi.org/10.1371/journal.pone.0154287*".*

3.1 Organisation of the review

The aim of this review is to synthesize systematically available data from all types of studies on beliefs of the Nigerian populace about hypertension. The discussion focuses on three (3) different categories of Nigerians: healthcare providers, lay healthcare providers and lay persons. I included qualitative studies to gain in-depth understanding of people's perception about hypertension and quantitative studies to provide information on prevalence of various concepts and their clinical relevance. In addition to primary qualitative and quantitative studies, mixed methods studies that attempted to ascertain beliefs of Nigerians about hypertension were also included.

3.2 Explanatory Model theoretical framework

Although, there are many theories and perspectives that have been used to elicit beliefs about illnesses, the Kleinman's anthropological explanatory model is particularly useful in the context of comparing, analysing and explaining different cultures. Nigeria has over 250 distinct ethnic groups and very little is known about their beliefs about hypertension. Kleinman's explanatory model (EM) has also been extensively used to compare EMs of sick persons and healthcare providers.

Therefore, beliefs in this review were defined using the Kleinman's explanatory model (EM) of illness as a template to organise the studies' findings into different EM categories.

According to Kleinman, an explanatory model of an illness refers to "the notions (beliefs) about an episode of sickness and its treatment that are employed by all those engaged in the clinical process" (p.105) [44]. A lay person's explanatory model of illness consist of the following items: a) what is the cause of my illness? (b) Why did I fall sick at this particular time? (c) How does this illness operate in my body system? (d) How will this illness affect me, what will the illness do to me? (e) How should this illness be treated?

On the other hand, a health care provider's explanatory model includes: the cause of illness (aetiology); time and mode of onset; patho-physiology (or mechanism) of disease; course of the disease including symptoms and signs and recommended treatment [44, 45, 46].

Moreover, Kleinman combined the lay and biomedical explanatory models to derive a generalised structure for explanatory models which allows lay and biomedical models to be categorised in a single structure namely: "cause/aetiology", "course of illness", "patho-physiology", "symptoms" and "treatment" [44].

In this review, "definition" was added to the explanatory model for hypertension.

In this review, Lay Persons shall refer to persons who are known hypertensive patients or at risk of becoming hypertensive. Complementary and alternative medicine healthcare providers (CAM healers) and patent medicine vendors (PMV) will be collectively known as Lay Health Care Providers. Further, the term Health Care Provider shall refer to a physician, nurse, community health extension worker or pharmacist who has been trained in the biomedical perspective.

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3.3 Definitions of EM categories and assumptions in this review

Based on the modified Kleinman's EM of illness described above, beliefs or perceptions about 6 EM categories ("definition", "cause", "course", "patho-physiology", "symptoms" and "treatment") were extracted from studies included in this review.

The following definitions and assumptions apply for EM categories included in this review.

Definition: shall refer to what hypertension is? **Cause:** shall refer to beliefs or perceptions about the cause of hypertension **Course**: shall refer to beliefs about how the illness evolves or operate in the body and complications arising from non-treatment of disease. As such, it is assumed that beliefs about biomedical complications cited as motivation for adherence to treatment recommendations could be regarded as perception of the course of the disease. **Pathophysiology**: shall refer to biomedical explanation of the disordered activities that occurs in a disease or injury. **Symptoms**: shall refer to beliefs about what the illness will do to one's body. **Treatment**: shall refer to beliefs or perceptions about effective treatment modalities for hypertension. It also includes beliefs about whether hypertension could be cured or not.

3.4. Information Sources and Search strategy

A robust search strategy was developed to identify qualitative and quantitative studies. I searched the following electronic databases; Medline, EMBase, PsycInfo, AMED from their inception until date (July 2nd 2015) for all relevant articles. I also hand searched reference lists to identify other important articles that the electronic database search might have missed. Specifically, qualitative studies were identified using proven sensitive methodological terms for qualitative research [119]. Details of search results are presented in the appendixes 3 and 4. No limits were applied with

regards to language, year of publication, age, sex or groups of people. But the limit non-human was applied to exclude all articles conducted on non-humans.

3.5. Eligibility Criteria and Study Selection

The eligibility criteria for included studies are shown in Table 3a below. Figure 3a explains the procedure for selecting studies included in the review.

Table 3a: Eligibility Criteria

Types of participants
1. Any person of any age who is already hypertensive or at risk of hypertension
2. Health care providers (any one trained in the biomedical perspective)
3. Lay health care providers such as complementary and alternative medicine doctors, traditional healers and patent medicine vendors
Study outcome/focus
Beliefs or perceptions of individuals on hypertension assessed either directly (i.e. with no outcome measure) or indirectly (with outcome measure e.g. adherence to medications or use of CAM)
Types of studies
1. Qualitative, quantitative observational and mixed methods studies that assesses believes or perceptions of individuals on hypertension either directly (i.e. with no outcome measure) or indirectly (with outcome measure e.g. adherence to medications or use of CAM)

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2. Studies were included regardless of study quality
3. No publication date or language barrier was imposed
4. Grey literature such as conference abstracts and unpublished reports were included

Figure 3a: flow diagram of included studies
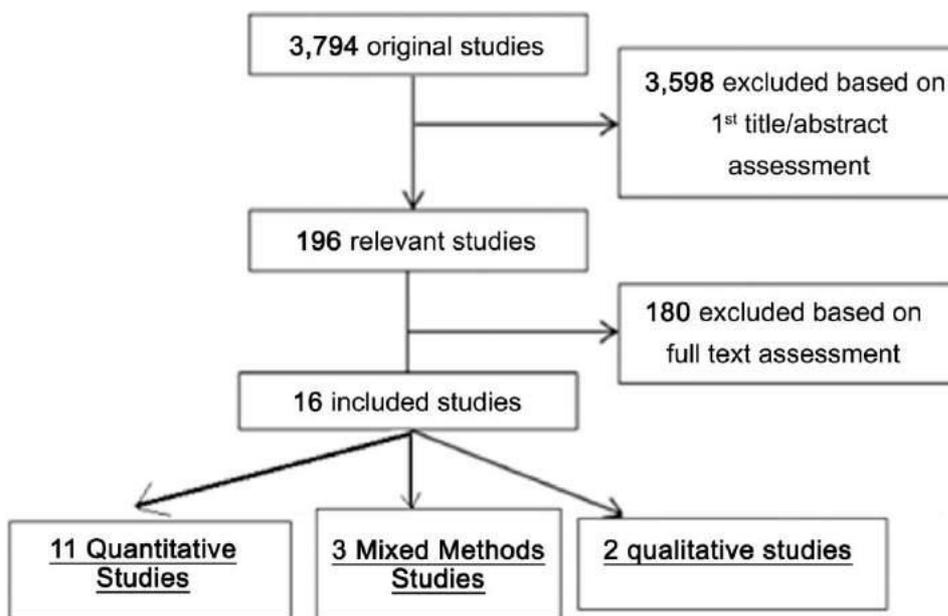
3.6. Data Collection and data item

Data were extracted independently by 2 reviewers (JA & PF) using a form that was piloted on 3 selected studies. The following items were extracted from each study: characteristics of study [Study design (quantitative or qualitative), setting, characteristics of participants and objectives]; EM categories and beliefs of participants under each EM category assessed in the study, prevalence of these

reported beliefs, information on use of theoretical model tools or any other validated tools to assess EM.

3.7. Assessment of study quality

Study quality and potential bias was assessed independently by 2 reviewers (JA & PF) by applying appropriate quality criteria for each type of study (qualitative, quantitative, mixed methods) using validated tools. For primary qualitative and quantitative studies, the Critical Appraisal Skills Program (CASP) checklist was used to assess their quality as shown in appendixes 5 and 6 respectively [120]. This framework was selected based on its use in previous systematic reviews, simplicity and rapid application of the tools and applicability to the various types of primary qualitative and quantitative studies included in the review [120-129].

For mixed methods studies, there is currently no consensus on the criteria for appraising quality of this methodology [130, 131] but there are some tools in the literature that have been proposed, many of which are still undergoing criteria refinement, content validity and reliability testing [132, 133, 134]. For this study, we used the current 2011 version of Mixed Method Appraisal Tool (MMAT) to assess quality of mixed method studies because its recommendations are based on rigorous literature review and have been revised using feedbacks from workshops for content validation [135]. It has also been used in at least fifty systematic mixed studies reviews worldwide [136].The results of quality assessment for mixed methods studies is presented in appendixes 7 and 8.

Any discrepancies were resolved by RM and NF who are specialists in qualitative and quantitative studies respectively.

3.8. Data Synthesis and Analysis

Selected articles were categorised as primary qualitative, quantitative or mixed methods studies according to the authors' descriptions and were arranged according to the theoretical framework for lay persons and health care providers respectively. All studies were included irrespective of methodological quality.

Qualitative evidence was derived from primary qualitative studies and qualitative components of mixed method studies while quantitative evidence was derived from primary quantitative studies and quantitative component of mixed method studies [132, 137].

Qualitative and quantitative data were integrated in the discussion section assuming a complementary stance i.e. Qualitative and quantitative data are treated separately but each component (qualitative or quantitative) adds to one another [132, 137].

Using a narrative synthesis, qualitative data were used to modify and group data into 6 EM categories ("definition", "cause", "course" , "patho-physiology", "symptoms" and "treatment") while quantitative data were used to measure the frequency of beliefs under the EM categories. Two (2) reviewers (JA &PF) independently assigned belief items under the EM categories. Disagreements were resolved by a third reviewer (RM).

Qualitative Analysis: findings from qualitative studies were analysed using descriptive analysis reporting format in how many beliefs under the EM categories arose with specific examples of belief statements to clarify EM categories.

Quantitative Analysis: The proportion of individuals who expressed a particular belief under each EM category was extracted from each study. This resulted in a frequency measure of how popular a belief is and facilitated identification of beliefs that might need addressing when seeking behavioural change for particular outcomes like adherence to medication.

3.9. Results
3.91. Study selection

Figure 1 shows a flow chart of included studies. A total of 3,794 articles were identified. Of these, 3,598 papers were excluded based on review of title/abstracts. Then, the full texts of the remaining 196 articles were examined in more detail, of

which 16 studies (2 qualitative, 11 quantitative and 3 mixed methods studies) were included in the review.

3.92. Study Characteristics

A Summary of study characteristics is presented in table 3b while detailed characteristics are presented in appendix 9, 10 and 11.

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Table 3b: study characteristics (n=16)

		Quantitative	Mixed Methods	Total
Number of studies				
Geo-political zones				
North- East(NE)	0	0	0	0
North -West(NW)	0	1	0	1
South- West(SW)	1	5	3	9
South- South(SS)	0	0	0	0
South- East(SE)	0	3	0	3
North-Central(NC)	1	2	0	3
Study Setting				
Primary health centre	0	1	0	1
Secondary/tertiary health centre	2	5	0	7
Community	0	5	3	8
Study type				
Focus groups	0	0	1	1
In depth interview	1	0	1	2
Focus groups & Interviews	1	0	0	1
Cross Sectional	0	11	1	12
Study population				
Only hypertensive patients	2	7	1	10
Physicians Only	0	1	0	1
Other health care workers (nurses,	0	0	1	1
Traditional healers (CAM healers,	0	0	1	1
Non hypertensive patients (but at	0	3	0	3
Total	**2**	**11**	**3**	**16**

*CHEW=community health extension workers, JCHEW= junior community health extension

worker ** CAM healers = complementary and alternative medicine healers

3.10. Results of individual studies and synthesis of results

Another EM ("definition") was added to the Kleinman's explanatory model for hypertension. This is because several studies [138-142] included in this review explored this concept as a separate entity. In addition, subsuming it under the 5EMs contained in Kleinman's original model may obscure a great deal of information that might potentially be important in the understanding of explanatory models of Nigerians about hypertension.

Across all studies, one aspect of EM was particularly absent: Pathophysiology or biomedical explanation of the disordered activities that occurs in a disease or injury. In contrast, perceptions of cause, course, symptoms and treatment of hypertension were expressed fairly frequently by all categories of participants in most studies. The definition of hypertension or "what hypertension is" was explored in only few studies.

The content analysis of the qualitative data in which textual data are assigned to EM categories is presented in Appendix 12

3.10.1 Health care provider reported beliefs in qualitative studies

Perception of health care providers about hypertension was explored in the qualitative component of one mixed methods study [143]. The study explored EM about hypertension amongst nurses in a primary health care centre.

Cause: Health care providers (Nurses) reported that although the cause of hypertension was unknown, stress was a major risk factor for acquiring the disease. In addition, other risk factors such as increased salt intake, heredity, lack of physical activity, poor diet (including increased fat intake, low consumption of fruits and vegetables) were also cited.

Course of illness: Health care providers (Nurses) reported that hypertension was a chronic disease and that it requires continuous follow up for life [143].

Symptoms and treatment: The perception of symptoms and treatment of hypertension was not explored among health care providers (nurses) in this study.

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3.10.2 Lay health care providers' reported beliefs in qualitative studies

Lay health care providers' (CAM practitioners and PMV) perception about hypertension varied by study and within study. Most participants, especially CAM healers had different views on the cause, course, symptoms and treatment of hypertension.

Cause: when asked what causes hypertension, some CAM practitioners reported that hypertension was caused by evil spiritual forces while others felt it was caused by poverty and too much blood in the body. Most PMVs said that smoking, high salt intake, low physical activity levels were prominent causes of hypertension [143, 144].

Course of illness: All PMVs stated that hypertension was not curable but perception of curability varied among CAM healers. However, both CAM healers and PMVs believed that untreated hypertension could lead to complications such as stroke and heart failure [143, 144].

Symptoms: when asked about symptoms of hypertension, no participant said it was symptomless but some, especially PMVs believed that headache and palpitation could be some of the symptoms of hypertension. Other symptoms of hypertension that were expressed by participants include chest pain, general weakness and loss of weight [144, 145].

Treatment: Most CAM healers believe that hypertension is curable by adhering strictly to using their herbal remedies and instructions [143, 145]. A few other CAM healers reported that they were not sure if hypertension was curable but they asserted that their remedies will help reduce the negative effects of hypertension [143]. Interestingly, across all studies, traditional healers do not consider themselves as the only care giver for hypertensive patients. Most of them reported that they would sometimes refer their clients to the hospital to check their blood pressure and would refer them to the hospital if their condition became very critical; for example, when they present with complications such as stroke [143, 144].

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3.10.3 Hypertensive patients' reported beliefs in qualitative studies

Perception about hypertension among hypertensive patients were explored by all primary qualitative studies and qualitative components of the 2 mixed methods studies**.**

Definition: Across all studies, most patients were able to identify their illness as hypertension, high BP or high blood pressure. However, one study reported variability in the meaning of hypertension and high blood pressure. While some reported that hypertension was a severe form of high blood pressure others said hypertension was the medical term for the lay word: "high blood pressure" [142].

Cause: perception about causes of hypertension varied by study and within study. Some studies asked questions about causes of hypertension separate from risk factors while some did not. But in this review, all responses regarding causes and risk factors are grouped under cause EM category. Many reported that hypertension was caused by stress, thinking too much and lack of social infrastructure [142, 143, 144, 145]. A number of participants asserted that hypertension was caused by the devil or some evil spirit [145].

Regarding risk factors for development of hypertension, some participants believed that high salt intake, smoking, excessive alcohol consumption, low levels of physical activity, high fat diet, and obesity could be potential risk factors but many others did not think so. In one study, a number of participants believed that obesity was a sign of good living and affluence and that weight loss was a sign of disease, poverty or miserliness [146].

Course: A number of participants expressed the belief that hypertension is temporary and not chronic. Very few thought that it was a chronic disease. In one study, some also reported that it could lead to stroke and sudden death [146].

One study showed gender specific motivation for taking drugs in that some men reported that they took their drugs regularly because they believe that non-adherence could lead to loss of libido and erectile dysfunction [142].

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Symptoms: Most participants reported headache, sleeplessness, dizziness, weakness and palpitations as the commonest symptom of hypertension [142, 146].Some also cited pain in the legs, chest and arms as symptoms. Very few asserted that it could be asymptomatic.

Treatment: Participants' view and activities varied across and within studies regarding behaviours, activities, agents or recommended actions that are believed to be effective in the treatment of hypertension. Beliefs about which treatment was effective was mostly linked to their perception of the cause of hypertension and affected their adherence to such treatment modality. Moreover, other factors also determined adherence to treatment.

Some of the participants believed that orthodox drugs on their own were effective in managing hypertension but could not cure it. Others reported that taking orthodox medicine and CAM simultaneously is more effective in curing hypertension [142, 143, 145, 146].

Generally, across all studies, most participants believed that hypertension could be cured whereas a few asserted that it could not be cured [142, 143, 145, 146].

Some believed that only prayer can cure hypertension because it is caused by an evil spirit, as such only God can heal the disease [143].

Regarding choice of medication, all participants deferred that decision to their physicians. Most believed that their doctors knew what was best for them.

A few participants across all studies believed and practiced behaviours such as not adding salt to food, not using tobacco, irregular alcohol consumption, weight reduction programmes, regular exercises, regular check of blood pressures and consumption of fruits and vegetables [142, 143, 145, 146].

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3.11 Health care provider reported beliefs in quantitative studies

Health care providers reported beliefs on hypertension were explored in only 1 quantitative study and was conducted on physicians (medical doctors) only.

Definition: There were wide differences in beliefs about the cut off for hypertension in the general population. Just over half (55%) of the physicians believed that 140/90 mmHg was the correct benchmark for non-complicated hypertension. Some believed that 130/80mmHg was the benchmark while a few (1%) believed that 120/75mmHg was a more appropriate benchmark [147].

Cause: Half of the physicians believe that stress was a contributory factor in the development of hypertension among other factors [147].

Treatment: A large number of physicians (76.2%) did not believe in the use of herbal preparations in the treatment of hypertension. But, about 13% of physicians still prescribed herbal drugs alongside orthodox drugs for their patients.

3.12 Lay health care providers' reported beliefs in quantitative studies

There was no quantitative study conducted on lay health care providers (CAM practitioners and PMVs).

3.13 Lay Persons' reported beliefs in quantitative studies

Table 3c presents a summary of the proportions of participants with their beliefs abouthypertension.

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Table 3c: Proportion of Lay persons with respective beliefs under EM categories: "definition", "cause", "Course", "symptoms" &" treatment" in quantitative studies

EM Categories	Females(%)Reference	Males (%)Reference	Females &Males %Reference
DEFINITION			
- Raised Blood Pressure	112/252 (44.4%) [139]		445/1365(32.6%)[138] ; 117/254(46.1%)[150] 164/252(65.1%) [141]; 28/2000(1.4%) [140]
- Psycho-social stress			366/1365(27%) [138]
- Others			587/1365(43%) [138]
CAUSES			
-Psycho social stress(reported as risk)	178/252(70.6%) [139]		854/2000(42.7%)[140]; 183/275(66.5%)[149]; 1229/1365(90%)[138]
-obesity	167/252(66.3%) [139]; 30/101(30.1%) [148]	40/101(40%) [148]	887/1365(65%)[138]; 66/101(65%) [148]; 32/2000(1.6%)[140]; 169/275(61.5%)[149]
-smoking	137/252(54.4%) [139]; 25/101(25%) [148] 73/146(50%) [152]	30/101(30.1%) [148] 70/114(61.4%)[147]	875/1365(64%)[138]; 54/101(53%)[148]; 725/2000(36.2%)[140]; 185/275(67.5%)[149]
-reduced physical activity	7/101(7%) [148]	9/101(9%)[148]	11/101(11%) [148]; 24/2000(1.2%)[140]; 31/252(12.3%) [141]
-excessive alcohol intake	120/252(47.6%) [139]; 16/101(16%) [148] 85/146(58.2%)[152]	20/101(20%) [148] 84/114(73.7%)[152]	4/101(4%) [148]; 183/275(66.5%)[149]; 99/252(39.3%) [141]; 975/1365(71%)[138]

-excessive salt intake	40/101(40%) [148] 195/252(77.4%) [139]	50/101(50%) [148]	1004/1365(76%) [138]; 85/101(85%) [148]; 220/252(87.3%) [141]; 56/2000(2.8%)[140] 2.8%(Oladapo 2013); 76%(Adeniyi 2015)
-high fat diet	195/252(77.4%) [139] 89/146(61%)[152]	67/114(58.8%)[152]	894/1365(65%)[138]; 22/2000(1.1%) [140]; 42/252(16.7%)[141]
-family history	185/252(73.4%) [139]		98/1365(7.2%)[138]; 30/260(11.5%)[152]
-Race (being black)			120/254(47.2%) [150]
-low fruit and vegetable intake	18/101(18%)[148]	15/101(15%) [148]	25/101(25%) [148]; 35/2000(1.7%) [140]; 60/252(23.8%) [141]
-Psychosocial stress(reported as cause)			614/1365(45%)[138]; 130/260(50%)[152]
-Evil curses/spirits/charms	67/252(26.6%) [139]		68/1365(5%)[138]; 5/260(1.9%)[152]
SYMPTOMS			
-Asymptomatic	155/252(61.5%) [139]		47/275(17.1%)[149]
-headache	59/252(23.4%) [139]		213/275(77.5%)[138]
-internal heat	38/252(15.1%) [139]		
Dizziness			153/275(55.6%)[149]
Chest pain			155/275(56.4%)[149]
Palpitations			114/275(41.5%)[149]
COURSE			
Question/Item assessed in studies			
Do you believe not taking your medications poses an increased risk for developing complications?			Said YES – 21.63/30(76.1%) [151]; 59/252(23.4%) [141]
What are your fears about hypertension?			
Heavy financial burden			137/1365(10%) [138]
Heart attack			68/1365(5%) [138]; 135/254(53.2%)[150]
Stroke			546/1365(40%)[138]; 135/254(53.2%)[150]
Kidney failure			205/1365(15%)[138]; 135/254(53.2%)[150];
Sudden death			341/1365(25%)[138]; 191/275(69.5%)[149]

TREATMENT			
Participants who thought hypertension could be cured			**887/1365(65%)[138]; 164/254(64.6%)[150]; 162/252(64.1%) [148]**
Participants methods for control of hypertension			
Homeopathic medicine			**411/1365(30.1%)[138]**
Native doctors/Herbal concoction			**314/1365(23%)[138]**
Prayers and faith healing			**628/1365(46%) [138]**
Orthodox drugs	**190/252(75.4%)[139]; 7/59(11.8%)[140]**	**4/59(6.8%)[140]**	**11/59(18.6%) [140]**
Activities participants engage in for prevention or control of hypertension			
Non-addition of extra salt	**124/252(49.2%)[139]; 17/59(28.8%)[140]**	**13/59(22%) [140]**	**65/101(65%) [141]; 144/252(57.1%)[148]; 30/59(50.8%)[140]**
Weight reduction	**108/252(42.8%)[139]; 5/59(8.4%)[140]**	**2/59(3.3%)[140]**	**9/101(9%) [141]; 108/252(42.9%)[148]; 7/59(11.9%)[140]**
Non-tobacco use/smoking	**213/252(84.5%)[139]; 12/146(8.2%)[147]**	**26/114(22.8%)[152]**	**8/101(8%) [141]**
Reduced consumption of alcohol	**213/252(84.5%)[139]; 32/146(21.9%)[147]**	**61/114(53.5%)[152]**	**32/101(32%) [141]; 74/252(29.4%)[148]**
Consumption of vegetables/fruits	**174/252(69%) [139]**		**25/101(25%) [141]; 33/252(13.1%)[148]**

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Regular exercise	144/252(57.1%) [139]; 4/59(6.7%)[140]; 61/146(41.8%)[147]	3/59(5%)[140]; 45/114(39.5%)[152]	9/101(9%) [141]; 16/252(6.3%)[148] 7/59(11.9%)[140]
Regular BP check	108/252(42.9%) [139]; 2/59(3.3%) [140]	2/59(3.3%)[140]	4/59(6.7%) [140]
Reduced consumption of fat in diet	2/59(3.3%)[140]; 83/146(56.8%)[152]	62/114(54.4%)[152]	2/59(3.3%) [140]; 22/252(8.7%) [141]
Reduced stress	18/59(30.5%)[140]	20/59(33.8%)[140]	38/59(64.4%)[140]

Hypertensive and non-hypertensive individuals

Among the 10 studies that explored EM of lay persons, 7 of them strictly included hypertensive patients while 3 studies included both hypertensive and non-hypertensive individuals. But, no attempt was made by the studies to differentiate responses of hypertensive from non-hypertensive individuals. So findings are presented generally regardless of their blood pressure status i.e. hypertensive or not

Definition: Across all studies that asked what hypertension meant, the proportion of participants' who said that hypertension meant raised blood pressure ranged from 1.4% [48] to 65.1% [49]. In the study that was conducted on females only, 44.4% of them believed that hypertension meant raised blood pressure [47]. In the study conducted by Oke et al. (2004), 27% of participants thought that hypertension simply meant psychological stress. Other Beliefs elicited include: hypertension is a heart disease (4%), hypertension is nervousness (4%) and hypertension is palpitations (4%) [46].

Cause: Regarding beliefs about causes of hypertension, it is important to note that, in most quantitative studies the question about risk factors was asked separately from causes and some responses such as psychological stress overlap. But responses regarding risk factors and causes were reported together under the "cause" EM category.

 For example, a large number of participants ranging from 42.7% [140] to 90% [138] believed that psychological stress was a major risk factor for hypertension. But, only about half of participants in two studies believed that stress was a cause of hypertension [138]. A few of the participants in three studies, 1.9%, 5% and 26.6% respectively believed that evil spirits, charms or curses were the cause of hypertension [138, 139,152].

Symptoms: Two studies assessed participants' belief about symptoms of hypertension. The majority of participants said that headache was the main presentation of hypertension [139, 148, 149]. But in one study a considerable number (61.5%) thought that hypertension is asymptomatic [139].

Course: In most studies, beliefs about course of hypertension were extracted from motivations for taking prescribed orthodox drugs. In other words, perception of what will happen if hypertension was left to go untreated.

Motivation for taking prescribed orthodox drugs varied among participants in different studies. The most common motivation was the fear of developing stroke. This was expressed by an average of 60% of participants across 3 studies [138, 148, 149]

Treatment: In this review, it is important to note that it was assumed what people used in the treatment of hypertension i.e. their practices could be expressed as a measure of their EM or perception of treatment of hypertension.

Across 3 different studies, approximately 65% of participants believe that hypertension could be cured [150, 151, 152].

In one study, as much as 46% use faith healing and prayers alone as a means of control of hypertension [46]. Notably, there was generally a low rate of use of orthodox medicine alone in the treatment of hypertension. Conversely, in the study conducted by Azubike et al. (2014) [139] on women, 75.4% used orthodox drugs only compared to 11.8% in another study by Oladapo et al. (2013) [140].

Across all studies, regarding activities for the prevention or control of hypertension, there were generally low numbers of participants who practiced activities such as regular BP check, regular physical exercise, reduced fat intake, reduced consumption of alcohol and increased consumption of fruits and vegetables.

Relatively similar proportions of women and men practiced regular BP check and reduced consumption of fat diet [140,148,152]. But over 40% of women practiced regular BP check in the study conducted among female [139].

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3.14 Comparison of health beliefs among ethnic groups

Although a few studies [142, 143, 144, 145, 146, 152] collected data on ethnic groups of the participants, none of the studies reported beliefs about hypertension according to ethnic group.

3.11. Discussion

3.11.1. Summary of evidence

Among primary qualitative and qualitative component of mixed method studies, explanatory models of healthcare providers on hypertension were scarcely explored. This was also the case among quantitative studies where only 1 study assessed the beliefs of physicians about hypertension. Although, some studies on explanatory model of HCP on hypertension have been done in some other parts of the world, there appears to be a general paucity of these studies globally and in Nigeria [153-156]. This is probably because it is assumed that since HCPs have been trained in the biomedical perspective, their perception should align entirely with the biomedical model. But, this may not always be the case. For example, according to the biomedical model, evidence based data show that in 95% of cases, the cause of hypertension is unknown but that there are several risk factors which increase the risk of development of hypertension. Although it has been shown that links exist between increased risk of coronary heart disease and stress, there is no strong evidence yet that stress causes hypertension [157]. But, my review showed that in the quantitative study, most HCPs (especially medical doctors) believed that stress was a major cause of hypertension. The qualitative study conducted on nurses did not explore their perception on causes of hypertension so it difficult to make comparison between nurses and other HCPs. Furthermore, a small fraction believe that herbal medications could help in the control of hypertension and actually prescribe it for their patients but majority of them did not believe in or prescribe herbal medications. In the future, qualitative studies should explore the reason for the explanatory model of stress as cause of hypertension among HCPs.

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Perhaps the most surprising observation on perception of HCPs in Nigeria on hypertension is that their response to the question on blood pressure (BP) cut-off point for primary uncomplicated hypertension differed widely. Because no qualitative study explored the definition of hypertension among HCPs, it is difficult to ascertain whether this was a lack of knowledge problem or a contextual explanatory model of the physicians involved. Moreover, these findings are similar to reports from 2 different studies in Iran and Saudi Arabia respectively where knowledge about BP cut-offs differed among physicians [158,159]. Although, this may be attributed to multiple guidelines or personal experiences of HCPs, these findings are from a study with a low power, hence it is difficult to generalise. However, these differences in perspective highlight an important subject of concern and require further probing so as to have unified monitoring indicators for the management of hypertension in Nigeria.

For traditional healers (CAM healers and PMVs), their beliefs were explored only through qualitative studies. PMVs form an important part of the informal healthcare sector in Nigeria. PMVs beliefs about hypertension seem to be relatively similar to health care professionals in areas of risk factors for hypertension, course of hypertension (i.e. chronic nature of disease) and methods of treatment. This may be partly because most PMV sell orthodox drugs and are inclined to recommend it to their clients so as to make profit. However, what they actually believe and practice for themselves may not be different from other persons in the community.

Explanatory Models of hypertension differed widely between CAM healers. Although, some of them believed that hypertension could be caused by stress- a statement that resonated across all categories of participants; most differed in their beliefs about other risk factors for hypertension and treatment modalities. The reason for wide variations in beliefs about hypertension among CAM healers in the same geo-political zone of the country is unknown. This may simply be due to multiple ethnicities within geo-political zones but there may be others factors responsible for this and therefore requires further probing.

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For hypertensive and non-hypertensive patients, all study types including quantitative, qualitative and mixed methods studies explored beliefs about hypertension. Most qualitative studies were not conducted in the same community or similar populations as the quantitative studies, the variety of studies gave opportunity for contrasting findings of quantitative studies with views of participants from qualitative studies. In my review, most of the findings of qualitative studies were similar to those obtained from quantitative studies. However, the proportion of people with similar explanatory models differed substantially across different quantitative studies. This could be as a result of the variation in the study design and methodologies of the quantitative studies and heterogeneity of study populations, especially in the way questions were asked. However, with these inadequacies it was still possible to group findings from studies under the respective explanatory model categories and make inferences on which belief item was most popular.

Beliefs of Nigerian hypertensive and non- hypertensive patients about hypertension were relatively similar to those reported in a study on African-American patients [155] particularly in that misconceptions about the meaning of hypertension were quite high.

Across all studies included in the review, some Nigerians believed that life style habits such as alcohol intake, exercise levels, cigarette smoking were risk factors for developing hypertension .But in studies that compared beliefs about lifestyle habits versus practice of such habits, there was always a low rate of practice of life style modification compared to beliefs in the quantitative studies. The reasons for this discordance may be due to several factors that may be explained by the Necessity Concerns Framework (NCF)[160-163].Future studies applying the NCF model to different groups of patients may reveal specific factors that if properly addressed may help improve adherence.

However, overall, there appear to be more women practicing life style modifications such as non-tobacco use/smoking, reduced consumption of alcohol, consumption of vegetables/fruits, regular exercise, regular BP check, reduced consumption of fat in diet compared to men. Understanding these differences may help develop interventions that are appropriate for management of hypertension in Nigeria.

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Although very few studies have been conducted on beliefs of Nigerians about hypertension, this review brings together what is available and identifies gaps for future research. As postulated by the knowledge translation model, success is probable if interventions are tailored to evaluations of barriers and facilitators [164]. This review aids this process by pooling together beliefs of individuals which is an important individual level barrier to control of hypertension.

3.11.2. Study strengths and Limitations

To my knowledge, no systematic review of the literature on beliefs of hypertension among Nigerians has been published to date. The current review reveals both similarities and differences in the beliefs between laypersons and health care providers and identifies misperceptions that should be addressed when designing interventions for hypertension control in Nigeria.

Moreover, this review highlights an important gap in the literature on perceptions of different ethnic groups on hypertension. This review showed that most studies were conducted in urban areas such as state capitals that have populations that are ethnically diverse. Very few studies were conducted in rural areas that had homogenous ethnic group participants. This limited our ability to generalise findings because of potential differences influenced by ethnicity. This underscores the need for future research in rural communities and in rural health care facilities such as Primary Health Care Centres to identify specific explanatory models that might help in planning appropriate programs.

A unique strength this review presents is the systematic analysis of qualitative and quantitative studies. This enabled simultaneous comparison of findings. Although findings from quantitative studies were from heterogeneous study designs, they were mostly corroborated by results of entirely different qualitative studies. However, the qualitative studies were not always conducted among similar populations as the quantitative studies thereby making generalizability difficult.

One important limitation of this review is the assumption made about quantitative studies.

First, extracting the responses of knowledge of definitions, causes and courses from Knowledge Attitude and Practice (KAP) surveys to inform explanatory models or perceptions about hypertension may not give accurate culture specific notions of the illness, especially because the intention of the original researcher might have been different. For example, some studies have pointed out that public health professionals usually share the view that knowledge and beliefs are different. Knowledge to them is usually based on universal truths (biomedical ideas) while beliefs are erroneous ideas that are different from biomedical idea, and as such are barriers to achieving health promoting behaviours [165, 166]. But anthropologists do not consider knowledge different from belief. This is because the role of knowledge or beliefs the community possesses cannot be overemphasized in achieving control of diseases [166]. Although, sometimes, it may be difficult to elicit culture specific beliefs about illnesses in a KAP survey format, this review reveals information for further exploration.

Second, in this review knowledge of risk factors were grouped together as causes for ease of analysis. However, most of the quantitative studies separated the risk factors questions from cause questions with some items overlapping both domains. For example the word psychological stress appeared as an option for risk factor and cause of hypertension in different studies. One problem with this arrangement is that it is likely that in answering the questionnaires, the differences between what constitute a risk factor or a cause was not well explained to participants. Therefore distinct demarcation between these concepts could not be made.

Furthermore, the response to knowledge questions on definition, cause, course and symptoms framed in an ordinal scale format may not be representative of the true situation. But relative agreement between findings from quantitative and qualitative studies included in this review may give some confidence about reported beliefs.

In the same vein, the assumption that what people used in the treatment of hypertension i.e. their practices could be expressed as a measure of their EM or

perception of treatment of hypertension was quite audacious. This is because people may use a particular method of treatment for other reasons than their belief in it. But the results from qualitative studies about treatment beliefs were mostly congruent with the findings from quantitative studies.

The quality of the methodology employed in the study designs of qualitative, quantitative and mixed method was moderate. Not all studies used validated instruments for collecting data. In addition, most studies assessed beliefs using different question types and measurements. Further, some studies focused strictly on barriers to outcomes such as adherence to medications. Hence not all aspects of the aforementioned explanatory model categories were explored in many studies.

Another potential limiting factor is the small number of studies in the review and the contrasting age of participants across studies included in the review. Most studies did not investigate associations between age and the knowledge and awareness, attitudes and practices. Therefore a meta-analysis of the quantitative findings was not conducted.

It was also not possible to identify representativeness of studies included in the review as it was not always mentioned which socio-economic environment the studies were conducted (for example rural or urban). This factor may affect beliefs but this was not assessed in most studies.

3.12. Comment

In this chapter I reviewed all types of scientific literature on the beliefs of Nigerians about hypertension. The review identified important beliefs of healthcare providers, Lay healthcare providers and Lay persons under six (6) explanatory models headings. The strengths and limitations of the methodology used to systematically review this literature were also discussed. The finding from this review answers research question (**RQ2**) and reveals important gaps in information on beliefs of healthcare providers and clients that may have important implications when planning hypertension control programs. In chapter 4, I discuss the rationale, methods and

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methodology for main studies in Nigeria. Also, I justify the rationale for the methods and methodology and address issues of ethics.

Contributions of other authors to this chapter

Dr. Phillip Fadahunsi of the department of primary care and public health, Imperial College London helped with data collection by acting as a second data extractor when screening retrieved studies for the systematic review.

My supervisors (Prof. Nick Freemantle and Dr. Richard Meakin) contributed to conceptualization, analysis, review and editing of this chapter.

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Chapter 4- Research Design and Methods

In the last chapter I reviewed all types of scientific literature on the beliefs of Nigerians about hypertension. The review identified important beliefs of healthcare providers, Lay healthcare providers and Lay persons under six (6) explanatory models headings.This chapter presents a detailed description of the study design and methods used to explore ways to improve care of hypertension at the primary care level in Nigeria. It includes a detailed description of the methodology, the study population, recruitment methods, data collection instrument, the variables that will be measured, data collection and analysis procedures. Also the different stages of the research studies are discussed for clarity of research timeline and order of progression in the mind of the reader. The chapter concludes by discussing ethical considerations for this study.

4.1. Phases of the Research study

STAGE 1: Systematic reviews 1 and 2 to answer Research questions 1 and 2(**RQ1 & RQ2**)

STAGE 2: Pilot qualitative study conducted on Nigerian immigrants in the United Kingdom to elicit their beliefs about hypertension which answers research question (**RQ3**).

STAGE 3: Conduction of qualitative and quantitative studies on PHC clients and workers in FCT, Abuja Nigeria. This will answer research questions 4, 5, 6, 7, 8, 9 (**RQ4, RQ5, RQ6, RQ7, RQ8, RQ9**).

Stage 1 has already been discussed in chapters 2 and 3. The methodology, findings and comments for stage 2 will be discussed in chapter 5. The methods and design for stage 3 will be discussed in this chapter.

4.2. Research Design and Methods for Stage 3

According to Ulin et al., (2005)"*Because no single research method can tap all dimensions of a complex research problem, it is often valuable to combine two or more methods, drawing conclusions from a synthesis of the results*.(pg 5)[167]"

Arguably, the problems surrounding the control of hypertension and other Non communicable diseases is a complex one with many dimensions that requires both a multi-disciplinary approach and mixed methods of investigative inquiry for generating comprehensive answers[167].Therefore, a mixed method approach i.e. quantitative and qualitative will be useful in answering the research questions itemised in chapter 1.

A mixed method study is one that "*focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies .Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone*"(pg6)[168].

Using mixed methods study design has several advantages in finding solutions to complex problems like hypertension. It reflects participants' points of view and ensures that results are grounded in participants' experiences. Such studies also foster scholarly interaction between researchers of different paradigm orientation. It also collects rich and comprehensive data and provides methodological flexibility [168].

4.21 Types of mixed method design

Research design refers to procedures for collecting, analysing, interpreting and reporting data in research studies [168]. Once a researcher has selected a mixed method approach of inquiry then the next thing is to select the design that best answers the research question. There are 4 major types of mixed methods designs and each design has variants of itself depending on the purpose of research. It is important that when choosing mixed methods designs, the intent, procedures, strengths and weaknesses of each type be taken into consideration. Further, it is

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imperative to be aware of the timing, weighting and mixing of the different components of the mixed methods design [168].

First, I will discuss the four (4) types of mixed methods design, considerations for timing, weighting and mixing components of mixed method designs then discuss and justify the chosen mixed methods design for this study.

According to Creswell 2006, The 4 major types of mixed methods design are as follows:

1) Triangulation design
2) Embedded design
3) Explanatory design
4) Exploratory design

The common variants of each type of design are shown in the table below [168]

Table 4a: Mixed method designs and variants

Design Types	Variants
Triangulation	• Convergence • Data transformation • Validating quantitative data • Multi-level
Embedded	• Embedded experimental • Embedded correlational
Explanatory	• Follow-up explanations • Participant selection
Exploratory	• Instrument development • Taxonomy development

4.21.1 The Triangulation design

This is the most common and well-known type of mixed methods design [168]. According to Morse 1991, the purpose of this design is *"to obtain different but complementary data on the same topic"*(p.122)[169] so as to understand the research problem better. In other words, the purpose is to leverage on the strengths of both quantitative and qualitative studies given that the strength of one method make up for non-overlapping weaknesses of the other method [170]. This design, its

advantages and purposes have been well documented in the literature [169,171-172].

Design procedures for Triangulation: The triangulation design is a one-phase procedure that allows collection of qualitative and quantitative data at the same time and each are accorded equal weighting. In other words, quantitative and qualitative data are collected and analysed concurrently but separately so as to give the researcher a better understanding of the problem. Thereafter the researcher attempts to merge the two data sets by bringing together the quantitative and qualitative results in the discussion or by transforming one of the data to the other type of data so as to integrate them during analysis[168].

Variants of the triangulation model: As mentioned above, according to Creswell 2006, the four variants are the convergence variant, the data transformation variant, the validating quantitative data variant, and the multilevel variant. The first two variants differ in terms of how the two data types are merged either during interpretation or analysis. The third variant seeks to enhance findings from a survey and the fourth is used to research different levels of analysis [168]. Specifically, in the **convergence variant** on the same phenomenon, qualitative and quantitative data are collected and analysed separately. Then results are converged (i.e. compared and contrasted) during interpretation. In the **data transformation variant** quantitative and qualitative data are collected separately but during analysis, the researcher converts one type of data to the other type i.e. quantifying qualitative findings or qualifying quantitative findings [173]. Therefore the data are mixed during the analysis phase resulting in further analysis and comparison. In the **Validating quantitative data variant,** researchers validate and expand findings from quantitative data by including few open-ended qualitative questions. Hence, there is no rigorous qualitative analysis but quotes from open-ended questions are used to embellish quantitative findings. The fourth variant, **Multi-level triangulation design** is also known as "multi-level research" [173]. In this design, different methods i.e. qualitative or quantitative methods are used to investigate different levels in a

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system. In the discussion, findings from each level are merged into one overall interpretation of the system [168].

Challenges of the triangulation design: Although the triangulation design is the most popular mixed method design used in social and health research, it is also the most challenging of the four types of design [168]. The two major challenges affecting all variants of triangulation design are as follows:

(a) A significant amount of effort and expertise is needed to be able to use both methods. This is because both types of data are collected at the same time and equal weighting is given to them. One way to overcome this barrier is to form a research team that has both expertise or train one researcher in both quantitative and qualitative methods.

(b) Secondly, if qualitative and quantitative data do not agree, further data may need to be collected. The question of what type of additional data needs to be collected then arises. By contrast, in multi-level triangulation design, findings of conflicting data may highlight the overall picture of the system being investigated [168].

4.21.2 The Embedded Design

This is a mixed method design in which one of the datasets provides a supportive role in a study that is primarily based on the other data type [168].

Procedures for embedded design: The embedded design involves collection of both quantitative and qualitative datasets but one of them plays a supplementary role. Both data could be collected together in one-phase or split over two-phases to answer different research questions in a study [174]. Sometimes, it can be a challenge to differentiate embedded design from other mixed methods designs. But asking the question: *"Would the results of the secondary data type be useful or meaningful if they were not embedded within the other data set?"*(pg 69) [168] may help solve this challenge.

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Variants of the embedded model: Although there could be many variants of the embedded model, only the experimental and correlational embedded designs have been well discussed [168]. In the **Experimental embedded model**, a qualitative study is embedded within an experimental design. In this design, the experimental study is the priority while the qualitative study is subservient within this model [175]. This could be done in one-phase or two-phases [168, 176]. For example, in a one-phase approach, a researcher might want to embed a qualitative study during the administration of the intervention in an experimental design to elicit qualitative ideas about the intervention or in a two-phase approach, after the intervention a qualitative study is done to explain or gain experiences of certain outcomes from the intervention. In a two-phase approach, the qualitative study could also come before the intervention to modify the intervention or select participants [168,176]. The **correlational embedded model** is also another variant in which qualitative study is embedded within a quantitative correlational design to explain the mechanism in the correlational study [168].

Advantages and Challenges of the embedded design: This design is useful when there are not enough resources to commit to equal weighting of quantitative and qualitative research. The approach might also be more appealing to funding agencies whose research ethos are primarily positivistic. One major challenge is that very little literature exists on embedding a quantitative study within a qualitative study. In addition, the researcher must state clearly the need for collecting qualitative data within a large quantitative study [168].

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4.21.3 The Explanatory Design

This is a mixed method design with two phases in which qualitative data helps to build up or explain quantitative data [168]. This design is well suited for situations where the researcher wants to explain significant or non-significant results or outlier results from a quantitative study [169]. It can also be used when the researcher wants to follow up groups from the quantitative study through qualitative research [169,173].

Procedures for explanatory design: The explanatory design is also known as explanatory sequential design. It is a two-phase mixed methods design that starts with the quantitative study in the first phase followed by a qualitative study in the second phase. The qualitative study is designed in such a way that it connects to the results of the quantitative phase.

Variants of the explanatory design: There are two variants of the explanatory design. The **follow-up explanations model** and the **participant selection model.** In both models, there is an initial quantitative phase followed by a qualitative study phase. However the difference between the two is in the connection between the two phases. The follow-up explanations model focuses on expanding or explaining quantitative results while the other focuses on appropriate participants to be selected [168].

Advantages and challenges of the explanatory Design: The advantages of the explanatory design include: (i) the fact that a single researcher can conduct this design. This is because the design happens over 2 phases hence collects only one data at a time. (ii) It is easier to write the report for this design as it can be written in two phases. (iii) This design is very attractive to quantitative researchers as it a very

strong quantitative orientation. There are challenges that may be encountered when using this variant: (i) the timeframe to implement the two-phases may be too lengthy (ii) The choice of participants for each phase presents a dilemma. For example researchers have to decide if same individuals should be used for both phases or draw samples from the same population for each phase [168].

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4.21.4 The Exploratory Design

This mixed method design is a two-phase design that begins with a qualitative study then followed with a quantitative study. This design is used when measures or instruments are not available or a framework or theory is unavailable [168]. It is also an appropriate design when the intent is to generalise results to different groups [177] measure the prevalence of a phenomenon that has been studied in-depth or to test a new theory [169].

Procedures for exploratory design: As stated earlier it is two-phase design and is also known as the exploratory sequential design [168]. The design begins with qualitative study then the themes generated from the qualitative study are used build instruments that are used in the quantitative study. Therefore because it begins with the qualitative research, more emphasis is placed on the qualitative data.

Variants of the exploratory design: The two common variants of this design are as follows: ***instrument development model*** and ***the taxonomy development model***. Researchers use the instrument development model when the intent is to develop a survey instrument based on qualitative findings. The taxonomy development model is used when the purpose is to generate important variables for a classification system or taxonomy [168,173,177].

Advantages and challenges of the exploratory Design: Advantages of the exploratory model include: (i) because the design occurs over 2 separate phases, reporting and implementing the phases is quite straightforward
(ii) The inclusion of a quantitative phase makes it more attractive to quantitative researchers.

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The challenges of this design are as follows: (i) a considerable amount of time is required to implement two phases. (ii) It is difficult to specify the exact procedures of the quantitative phase because this is dependent on the qualitative findings. (iii) The decision of which participants to use for the quantitative study also needs to be discussed extensively.

4.22 Designing and conducting mixed methods research

The following table 4b summarises the four main types of mixed method design, variants, timing, weighting, mixing procedures and notations.

Table 4b: The Major Mixed Methods Design Types (Adapted from Creswell 2006) [168]

Design Type	Variants	Timing	weighting	mixing	notation
Triangulation	-Convergence -Data transformation -Validating quantitative data -Multilevel	Concurrent: quantitative and qualitative at same time	Usually Equal emphasis	Merge the data during the interpretation or analysis	QUAN + QUAL
Embedded	-Embedded experimental -Embedded correlational	Concurrent or sequential	Unequal emphasis depending on purpose of research	Embed one type of data within a larger design using the other type of data	QUAN(qual) or QUAL (quan)
Explanatory	- Follow-up explanations -Participant selection	Sequential: Quantitative followed by qualitative	Usually Quantitative emphasis	Connect the data between the two phases	QUAN ⟹ qual
Exploratory	-Instrument development -Taxonomy development	Sequential: Qualitative followed by quantitative	Usually qualitative emphasis	Connect the data between the two phases	QUAL ⟹ quan

4.22. Selecting a type of mixed method design

Selecting a type of mixed method design for a study should be guided by the research problem or question. In addition the available resources in terms of skills,

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funding resources and time should be considered before embarking on a mixed method design research.

The overall purpose of this study is to explore ways to improve care of hypertension at the primary care level in Nigeria by suggesting a model for both curative and preventive services at primary care centres in Nigeria. Therefore examining different levels in the primary care system is important. The relevant levels in the primary care system include the different cadres of primary health care workers and the clients who use the service. Hence, a multi-level triangulation design was deemed appropriate for this study. To ensure adequate skills for this study, an appropriate supervisory team was selected consisting of a qualitative specialist supervisor and quantitative specialist supervisor. I also received training in both qualitative and quantitative methods during my MSc public health program and carried out a pilot qualitative study in the United Kingdom before embarking on the main studies in Nigeria- the findings of which are discussed in chapter 5.

This study will involve collection of both qualitative and quantitative data simultaneously from both clients and health workers in primary care to have an overall picture of the beliefs, experiences and prevalence of hypertension and its risk factors. Consequently, integration of data from qualitative and quantitative studies, will take place during the discussion/interpretation of both quantitative and qualitative data.

The aim of this research is to not only to gather much needed data about hypertension from PHC clients and health workers but also that, through the research process, knowledge gained is used to improve service provision and ultimately reduce the burden of NCDs in Nigeria. Findings will be presented to professional stakeholders (National Assembly Committee on Health, Federal Ministry of Health and National Primary Health Care Development Agency) in order to improve service delivery. I will work with professionals at this level through discussions and presentation to gain their reaction and feedback and where necessary facilitate further discussion and understanding.

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In Nigeria, there are very few studies that have used mixed methods methodologies in exploring the management of hypertension. Furthermore, there are very few studies that have used triangulation mixed methods designs. In the literature I found only one study that used triangulation mixed methods designs for exploring hypertension. The study was conducted by Osamor [143]. He investigated the health care seeking behaviour for hypertension in an urban community in south west Nigeria. He conducted a community based cross sectional survey on 440 community residents who had hypertension and at the same time did Key informant interviews with 23 health care workers, patent medicine vendors and indigenous healers in the community. A large proportion of the participants over 60% of respondents reported that they sought for care for their condition from a hospital while about 5% said they use the patent medicine vendors. About 7.3% of participants used both patent medicine vendors and traditional medicine. Reports from the key informant interviews showed that hypertensive patients use the patent medicine vendors and traditional healers because of ease of access, time saving and lower cost of service [145].

4.23 Qualitative studies Methods

This part of the study will be used to investigate research questions four and five (RQ4 and RQ5).

RQ4: What are the beliefs and experiences of FCT PHC clients about hypertension?

RQ5: What are the beliefs and experiences of FCT PHC health workers about hypertension and care for hypertensive patients?

4.23.1 Setting

The study took place in Federal Capital Territory, FCT, Abuja, Nigeria. The Territory is located in the North Central Geo-Political Zone of Nigeria. FCT Abuja is the capital of Nigeria.

The indigenous inhabitants of Abuja are the Gbagyi (Gwari) ethnic group. In light of the ethnic and religious divisions of Nigeria, plans had been devised since Nigeria's

independence to have its capital in a place deemed neutral to all major ethnic parties (Yoruba, Hausa and Igbo), and also in close proximity to all the regions of Nigeria. The location was eventually designated as the centre of the country in the early 1970s as it signified neutrality and national unity. However, there has been influx of so many other ethnic groups into FCT since the democratic government was elected in 1999. As of 2015, the city is still experiencing an annual growth of at least 35%, still retaining its position as the fastest growing city on the African continent and one of the fastest in the world [178].

It occupies a land area of 7,753.9 Sq. Km. The territory shares boundaries with Kaduna, Kogi, Nassarawa and Niger States. The FCT has six local government areas namely: Abaji, Abuja Municipal Area Council, Bwari, Gwagwalada, Kuje and Kwali [178].

According to the Nigerian census bureau in 2011 [179], the estimated population of Nigeria is about 170million while FCT's population is about 2,238,800. Based on 2011 estimates, the population distribution of the FCT local government areas are as follows: Abaji-93,360; Abuja Municipal Area Council-1,235,880; Bwari-365,010; Gwagwalada-252,520; Kuje-154,800; Kwali-137,190 [179].

The study population area is a mixture of rural and urban settlements and primary health care facilities are fairly evenly distributed across the urban and rural areas.

This study will be conducted in the Primary Health Centres (PHCs)(formerly known as Comprehensive PHCs) which offers the most comprehensive services at the primary care level.

4.24. Sampling for qualitative study

The sample for this study was drawn from both PHC workers and adult PHC clients.

For PHC clients a purposive sampling strategy was used to recruit individuals from rural and urban PHCs. Clients over 20 years old were selected on the basis of age, ethnic group and blood pressure status (i.e. hypertensive and non-hypertensive

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patients). Since pregnancy induced hypertension has a different course and aetiology, pregnant or lactating hypertensive females were excluded from participating in this study. With the help of the PHC co-ordinator, clients who fulfilled the inclusion criteria were recruited either for a one to one interview or for a focus group discussion during regular clinic attendance. Those who agreed to be interviewed were interviewed at the PHC immediately. Focus group discussion participants were asked to come back to a chosen PHC on another day for the discussion. A token payment of Five Hundred Nigerian naira (£1) was given to each focus group participant to help with transportation costs.

For PHC workers, a purposive sampling strategy was also used to recruit PHC workers from all categories of PHC health workers across the PHCs in FCT. The following categories of health workers are available at PHCs in Nigeria; Medical Doctor, Nurse/Midwife, Community Health Extension Workers (CHEW), Junior Community Health Extension Workers (JCHEW), Pharmacy Technician, Laboratory Technician and Health Attendant/ Assistant [2,8].

With the help of the PHC coordinator and IB, PHC workers from each category were recruited for either a face to face interview or a focus group discussion over the phone. Those who agreed to be interviewed were interviewed at their respective PHC. Focus group discussion participants were asked to come to the local government headquarters office where the discussions took place. Each focus group discussion participant was given a token of five hundred naira (£1) to help with transportation costs.

4.25 Ethics

Ethical approval was initially obtained from the University College London Ethics Committee (Project ID number 7811/002), thereafter from the Nigerian FCT Health Research and Ethics Committee. Permission to conduct the study in respective PHCs was subsequently granted by the FCT Primary Health Care Development Board. Both written and verbal informed consent was obtained from participants.

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Interviews and focus group discussions were conducted privately and participants' transcripts were pseudo-anonymised.

4.26. Data Collection for qualitative study

All interviews and focus group discussions were conducted in English. Individual interviews lasted between 30 and 45 minutes while focus groups lasted between 1 to 2 hours. Interviews and focus groups discussions were recorded. JA conducted all interviews while JA and IB facilitated the focus group discussions.

The topic guide used in both interviews and focus group discussions was based on previous studies on beliefs about hypertension and earlier work on explanatory models of illness by Kleinman [35, 46]. When eliciting beliefs and comparing cultural understandings of illnesses the anthropological perspective may be very helpful, therefore Kleinman work on explanatory models(EM) which categorizes people's beliefs about illnesses into the cause of an illness, its course, diagnosis, symptoms and treatment was used [46].

For PHC clients and PHC workers, the standard interview protocol from Kleinman and Weiss' Explanatory Model Interview Catalogue [35, 46] composed of eight questions was used for the interviews and focus group discussion. Other relevant questions relevant to experiences of managing hypertension were included in the PHC workers interview and focus group discussion.

Probes and checks were used when needed to increase the richness and depth of responses. JA recorded reflections and iterative modifications about the interviews and focus group discussions in a diary and all participants were informed about the use of a reflective diary.

4.27. Data Analysis for qualitative study

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All interviews and focus group discussion were transcribed verbatim. The transcribed data and the reflective diary formed the data used in this analysis. The data were analysed thematically using the framework analysis approach (put a reference) with the NVivo 11 software. The analysis was done concurrently with the interviews so as to allow emerging themes from preceding interviews inform later interviews and focus group discussions. However, analysis was carried out separately for focus group discussion and interviews.

The process of analysis was as follows:

Familiarization with the raw data: After all transcripts from focus group discussion and interviews were retrieved from the transcription service, JA read through the entire transcript several times while listening to the audio-tapes to ensure accuracy of transcription. This allowed JA to familiarize with the raw data and identify emerging concepts from the data.

Identifying a thematic framework: JA identified recurring themes from the data to form an index of data that was used to label the transcript and divide them into sections corresponding to established ideas and themes. This formed the backbone of the thematic framework.

Coding the transcript according to themes identified: JA indexed the transcript and highlighted them according to established ideas and themes using the NVivo 11 software.

Charting the data: the NVivo 11 software was used to chart highlighted portions of data under appropriate thematic framework to which they belong.

Mapping and interpreting the data: The charted data were examined for relationships and interpreted to obtain conclusions.

The initial analysis was done by JA. A sample of the data was independently analysed by RM and similar themes were identified. A final interpretation was agreed upon following discussion.

4.28. Member Checking

After transcription and data analysis, a sample of participants was sent a copy of the transcripts for their feedback. There were no requests for amendments.

4.29 Quantitative study Methods

This part of the study will be used to investigate research questions six, seven, eight and Nine (**RQ6, RQ7, RQ8 and RQ9**).

RQ6: What are types and levels of services available for hypertension in the selected health facilities in FCT?
RQ7: What is the prevalence of hypertension and risk factors for CVD among FCT PHC clients?
RQ8: What is the prevalence of CVD risk score of >30% among FCT PHC clients?
RQ9: What is the health utility of hypertensive and non-hypertensive FCT PHC clients?

4.30 Setting and Study site selection and Sampling for quantitative study

Study setting and sites are similar to that used in Phase 1 qualitative studies. However, out of the 60 PHC facilities in the 6 LGAs in FCT, 20 PHC facilities were selected using Multi stage sampling technique. First PHC facilities were categorized by LGA location and then by urban or rural location. Simple random sampling using a computer software program was then used to select 2 PHC facilities per LGA (1 urban, 1 rural). In the end, 10 rural and 10 urban PHC facilities were selected. In each of these facilities, study participants were selected using systematic sampling technique. Every third client by consulting order was selected until sample size was achieved.

4.31. Eligibility Criteria and characteristics of study participants

For quantitative studies, all eligible adult PHC clients (greater than 20years old, male or non-pregnant female) who visited the primary health centre were recruited according to the sampling strategy described above. Everyone approached was free to decline participation.

4.32. Sample size

For the quantitative cross sectional surveys on clients of PHC, since the major focus is to measure prevalence of hypertension and CVD risk factors among PHC clients, the minimum sample size needed was calculated as follows:

The cut-off point for hypertension shall be Blood pressure greater than 140/90 according to the JNC 7 recommendations [48,49]. In order to estimate the proportion of successes in a dichotomous outcome variable (yes/no) in a single population, the formula for determining sample size would be:

$$N=P(1-P)(Z/E)^2$$

Where n= number of PHC clients required

P= proportion of PHC clients who are hypertensive

Z= is the value from the standard normal distribution reflecting the confidence level that will be used

E= desired margin of error [180]

 In order to be able to estimate a prevalence of between 10-50% with a 5% margin of error and 95% level of confidence the sample size required is: N= 0.5(1-0.5) x $(1.96/0.05)^2$

N= 0.5 X 0.5 X 1536.64

N= 384.16

Therefore, In order to ensure that the 95% confidence interval estimate of the proportion of PHC clients who have hypertension is within 5% of the true proportion, a sample of size 385 is needed.

4.33. Instrumentation

The following instruments were used for data collection in this quantitative study:

- **WHO STEPS survey-** version 2.1 was used verbatim. The WHO STEPS survey instrument for non-communicable disease (NCD) risk factors is a widely available public domain instrument and has been used extensively globally. The Instrument has 3 parts or steps .Socio demographic and behavioural information was collected in Step 1. Physical measurements such as height, weight and blood pressure were collected in Step 2. Biochemical measurements to assess blood glucose and cholesterol levels in Step 3 were not done due to financial constraints.

- **WHO Service Availability and Readiness Assessment (SARA) questionnaire** This tool was developed by WHO to objectively assess availability of services including equipments and personnel needed to meet specific health care needs in health facilities. The instrument assesses services available for different health care needs ranging from maternal health care to non-communicable diseases such as hypertension and diabetes. For this study, only the section on services available for non- communicable diseases was used to assess each of the PHCs.)

- **EQ-5D-5L questionnaire** this tool was developed by the EuroQol group to measure health related quality of life. This has wide application across different health problems and treatments. The EQ-5D consists of a descriptive

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system and the EQ VAS. The descriptive system has 5 dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression while The EQ VAS records the patient's self-rated health on a vertical visual analogue scale. The outcome of using this tool is that a quantitative measure of health outcome as described by the patient is generated. The scores on the 5 dimensions can be presented as a health profile or converted into a single index number (utility).

4.34. Number of observations and data storage format

-   There were 640 observations from the WHO STEPS survey and EQ-5D-5L questionnaire and 20 observations from the SARA questionnaire

- Data were stored on EXCEL spreadsheets

4.35. Data Collection

For the quantitative survey administration, a pencil-paper approach was used where the researcher reads the questions then the responses are recorded. The PHC client was approached by the attending healthcare practitioner and asked if they wanted to participate in the research, if they consent, they are then passed on to the research assistant in a designated room in the Primary health care center where the uestionnaires are filled. A total of 12 trained research assistants were employed to help with data collection across the primary health centres. Training was carried out within 2 days as most of them were primary healthcare students on holidays. I visited each centre weekly to collect all data collected for the week and phoned each data collector everyday to monitor and give support as needed. Anthropometric measurements and blood pressure measurement were done with a tape and sphygmanometers (Omron M2 electronic model-Tokyo Japan) respectively. Blood pressure was done on the left arm using appropriate cuff sizes and in seated position. Three readings were taken and the average recorded in the appropriate section.

4.36. Data Analysis

Data inclusion / exclusion criteria

- All the data collected from the WHO STEPS questionnaire and EQ-5D-5L were used

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- Only data relating to availability of instruments, drugs, personnel and services available for management of hypertension were collected from the SARA questionnaire.

4.37. VARIABLES TO BE USED IN THE MAIN ANALYSIS

(a) Variables from WHO STEPS questionnaire:

The variables that will be used in the main analysis are contained in the following documents: The FACT SHEET and WORKBOOK. They contain variables from the STEPS questionnaire. These documents have been developed by the WHO STEPS department. A copy of the original fact sheet is presented appendix 13 but a only a link to the workbook will be presented in appendix 13. The work book will guide presentation of the results section in chapter 7. The description of these documents is as follows:

1) The fact sheet is a short summary of key results of the STEPS Chronic disease risk factor survey. The purpose of the fact sheet is to provide interested parties with the key findings of the survey and to highlight the issues that the main report will cover in more depth.

2) The workbook contains all the variables and description from the STEPS questionnaire. The data book consists of tables that provide users with the:
   • Title of the tables
   • Layout of the tables (age/sex stratified, possible headings for columns)
   • Definition of information provided in tables
   • Analysis information
   − Questions from the Instrument that were used to generate the table
   (uses codes not Question numbers e.g. T1 or C1)

3) The WHO/ISH risk prediction chart for AFR D (World Health Organisation Africa region D) was used to calculate 10-year risk of fatal and non-fatal cardiovascular events using gender, age, systolic blood pressure, smoking status and presence or absence of diabetes mellitus. This chart was used because biochemical parameters (glucose and cholesterol levels) in the

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STEPS survey were not collected. Hence this non-biochemical based instrument was used. Please see appendix for copy of risk prediction chart.

(b) Variables from the EQ-5D-5L to be used in the analysis are as follows:

Descriptive dimensions of Mobility, Self-care, Activity, Pain, and Anxiety were represented as 5 digit codes and EQ_VAS was represented by percentages. The utility for each health state will be calculated using pre-determined value sets. As there is no value set for the Nigerian population, the Zimbabwean value set was used. In Africa, only Zimbabwe has a value set. The Zimbabwean value set is deemed comparable to the Nigerian population as the population is also majority black and are both in the AFR D region of World Health Organisation (WHO). Of note is the fact the Zimbabwean value set has a maximum score of 0.9 as opposed to 1 in other value sets.

(c) Variables from the SARA questionnaire for cardiovascular conditions such as hypertension to be used in the analysis are shown in the table below:

Domains	Tracer item(%of facilities with items)
Staff & training	• Guidelines for diagnosis and treatment of chronic cardiovascular conditions • Staff trained in diagnosis and treatment of chronic cardiovascular conditions in the past two years
Equipment	• Stethoscope • Blood pressure apparatus • Adult scale
Medicines & commodities	• ACE inhibitors • Thiazides • Beta blockers • Calcium channel blockers • Aspirin cap/tab • Metformin cap/tab • Oxygen cylinders/concentrators

4.37. STATISTICAL METHODS AND SOFTWARE

-The statistical software that was used was

R/Studio **4.38. KEY TABLE SHELLS -Univariable**

analysis

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All of the major Univariate analysis tables are already described in the fact sheet and work book presented above.

-**Multivariable analyses**

Because of the generalised low cardiovascular risk scores elicited in this study, there was no value in modelling predictors of high CVD risk scores in this population sample as they all essentially had low CVD risk scores. Hence the planned multivariable analysis was not conducted. However, Logistic regression analyses (providing odds ratios and 95%CI) were performed to identify associated risk factors of hypertension and to adjust for confounders such as socio-demographic variables and cardio-vascular risk factors. Fisher's exact test was be used to test statistical significance in each circumstance.

Comments

In this chapter, I have discussed the research design and methods used in the main qualitative and quantitative studies in Nigeria. The next chapter describes the design and findings from the pilot qualitative study in the United Kingdom. This study was conducted so as to gain necessary experience in qualitative methodology before commencing the Nigerian qualitative study as I had not been exposed to much qualitative field work in the past.

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Chapter 5- Methods, Methodology and Findings from pilot study in the United Kingdom

In the last chapter, I discussed the research design and methods used in the main qualitative and quantitative studies in Nigeria. This chapter presents the methods, methodology and findings from pilot study in the United Kingdom. A version of the findings of the pilot study has been published as: "*Akinlua JT, Meakin R, Freemantle N (2017) Beliefs about hypertension among Nigerian immigrants to the United Kingdom: A qualitative study. PLOS ONE 12(7): e0181909.* https://doi.org/10.1371/journal.pone.0181909"

5.1. Research Design and Methods for Phase 2

This study was conducted to develop the methodology and research skills needed for the qualitative part of the main research to be conducted in Nigeria as well as contributing to understanding of the factors affecting the management of hypertension among Nigerian immigrants in the United Kingdom.

Since one of the purposes of the pilot study was to elicit the beliefs and understandings of Nigerian migrants' to the United Kingdom about hypertension, a qualitative method that explores in-depth understanding and perception about hypertension was used [168]. Hence, the study design was a qualitative interview study examining the beliefs of Nigerian immigrants to the UK living in London. The principal researcher (JA) belongs to the Yoruba ethnic group, one of the ethnic groups in Nigeria, and is a member of the church community where the study was conducted.

5.2. Setting

A single Pentecostal church community in West London

5.3. Participants

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Twenty-seven Nigerian migrant members of the church entered and completed the study

5.4. Context and sampling

The study was either conducted in the church building or a convenient venue for participants. The study took place over a period of 3 months. JA recruited a convenience sample of 27 participants from the church. The church is located in the West London. More than 95% of the church membership is black and 93% of them are black Nigerian immigrants to the UK. The church consists of Nigerian immigrants from different cultural backgrounds with most of them having post graduate degrees. All members who were approached consented to take part in the research and every eligible participant (i.e. Nigerian members greater than 18 years old) was offered a chance to take part. Selection of participants for interview stopped when data saturation was achieved.

5.5. Relationship between researcher, participants and the church

The researcher and participants had a pre-established relationship as they were members of the same church community and some had worked together in the church in areas such as publicity and Sunday school teams. The interviewees were aware that JA is a medical doctor and a PhD student. This could have made the interviewees uncomfortable expressing their beliefs, if they thought that JA would judge whether they had adequate knowledge about hypertension. However, participants were told that there were no right or wrong answers. As JA is a Nigerian and currently a member of the community being studied, it was necessary to consider his relationship with the church. In the context of the study JA was not acting in a medical capacity and any participant who expressed a concern about their blood pressure was given an information leaflet at the end of the interview and advised to seek further advice from their general practitioner.

5.6. Ethics

Before commencement of the study, ethics approval was received from the University College London Ethics committee (Project ID number 7811/001). Permission to conduct the study was given by the Pastor of the church. Both written

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and verbal informed consent was obtained from participants. Interviews were conducted privately and participants' transcripts were pseudo-anonymised.

5.7. Data collection

Data were collected using semi-structured interviews and this took place between Dec.22, 2016 and Jan 30, 2017. However, JA recorded reflections and comments about the interviews in a diary. All iterative modification to the data collection and analysis were recorded in this diary and participants were notified about the use of a reflective diary.

5.8. Semi-structured interviews

Face to face semi-structured interviews with open-ended questions addressing patients' beliefs about HTN were conducted by JA using a standard interview protocol which composed of eight questions adapted from Kleinman and Weiss' Explanatory Model Interview Catalogue [35, 46].

All interviews were conducted in English as all church members are proficient in the English Language. The interviews were recorded and lasted up to 45minutes.

5.9. Data analysis

The interviews were transcribed verbatim. The transcribed data and the reflective diary formed the basic data used in the analysis. The data were manually analysed thematically using the framework analysis approach [170]. The analysis was done concurrently with the interviews allowing emerging themes from preceding interviews to inform later interviews. The process of data analysis was as follows:

1. *Familiarization with the raw data*: this took place through manually transcribing all the data and reading the manuscripts, reflective diary and comments from member checking process. This process allowed JA to identify emerging concepts from the data.

2. *Identifying a thematic framework*: JA labelled the transcript with identified index of emerging themes. The transcript was then divided into sections

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corresponding to well-established themes. This formed the backbone of the thematic framework.

3.   *Coding the transcripts according to themes identified*: this next level of analysis involved highlighting transcript with different colour codes representing themes.

4.   *Charting the data*: this process was done by cutting and pasting highlighted sections of data into respective thematic headings

5.   *Mapping and interpreting the data*: this level of analysis involved examination of the relationships and interaction between themes identified

Initial analysis was done by JA. The data was also independently analysed by RM and similar themes were identified by both researchers. A final interpretation was agreed upon following discussion.

5.10. Member checking

After transcription of recorded interviews and analysis of data, participants were sent a copy of the transcript and analysed data for their comments. All participants agreed with the content of the document.

5.11 Results

5.12 Participant characteristics

A total of 27 individuals participated in the study. Two interviews were unfortunately lost due to corrupted audiotapes bringing the final sample to 25 participants. In this sample, only 2 participants were known to be hypertensives while others were not known to be hypertensive. Participant characteristics are described in Table 5a.

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TABLE 5a: Characteristics of Participants (N=27)

	N (%)
Gender Male	12(44%)
Female	15(56%)
Age (Median (min, max))in years	
Men	35(24,73)
Women	30(22,51)
Ethnicity	
Yoruba	10(40%)
Igbo	4(12%)
Hausa	3(8%)
Tiv	5(20%)
Urhobo	2(8%)
Okpameri	1(4%)
Ijaw	2(8%)
Highest education level achieved	
Secondary	1(4%)
College or Graduate education	9(33%)
Post Graduate degree	17(63%)
Blood pressure status	
Known hypertensive	2(7%)
Not Known to be hypertensive	25(93%)

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Table 5b: Themes, subthemes and concepts

Themes	Sub-Themes	Concepts
The meaning of the term "hypertension"	Ethnic Understanding	HTN means high blood volume in my local language(n*=12) HTN means burning or boiling blood in my local language(n=9) HTN means resistance to blood flow in my local language(n=1) HTN means rising blood or blood shooting up in my local language(n=6)
	Biomedical Understanding	HTN is raised blood pressure as measured by an instrument (n=9) HTN is a severe form of disease while high BP is the mild form (n=2)
	Hyper – Tension	HTN equals too much stress or thinking too much(n=11)
Perceptions of causation	Bio-medical Causation	HTN may be caused by life style and old age (n=21)
	Stress	HTN is caused by high stress levels and stress is caused by thinking too much and not having enough rest (n= 23)
	Hereditary	HTN is a result of genetic inheritance (n=7) HTN is caused by learning wrong behavioural patterns from one's parents (n=2)
	Ethnic Models of Causation	HTN is caused by anything that leads to resistance to blood flow (n=1)
The effects of hypertension	Symptoms of Hypertension	HTN is announced by feelings like intermittent headaches, fast heart beat, dizziness and loss of appetite (n=20) Absence of symptoms indicate absence of HTN (n=6)
	Illness caused by hypertension	HTN causes unnoticed harm, burst blood vessel resulting in stroke or paralysis, damage to the heart, and sudden death(n=22) HTN causes bad dreams and mentally disordered behaviour (n=4)
Perceptions of treatment	Cure versus Management	It is not certain if HTN can be cured but it can be managed (n= 6)
	Therapeutic Agents	Use of orthodox medication only is effective for treatment of HTN (n=5) Use of orthodox and herbal medication together is effective for treatment of HTN (n=8) Orthodox medications in addition to life style changes are the best way to treat HTN (n=20) Orthodox medication are not effective and should not be trusted(n=2)
	Dealing with the underlying cause	Apart from taking orthodox and herbal remedies, underlying causes like stress needs to be addressed to treat HTN effectively(n=4)
	Spiritual Help	HTN can be cured if you are spiritually minded (n= 3)

*n refers to the number of respondents whose perceptions contribute to the corresponding concepts.

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5.13 Beliefs about hypertension

The analysis yielded the following four overarching themes about hypertension as shown in Table 5b: (1) Meaning of the term hypertension, (2) Perceptions of causation, (3) Effects of hypertension, and (4) Perceptions of treatment.

5.14 The meaning of the term "hypertension"

There was a variety of beliefs about the meaning of the term "hypertension" among participants. This theme was divided into 3 sub-themes; Ethnic Understandings, Biomedical Understandings and Hyper-Tension.

There was overlap between beliefs among participants. Eleven participants held both ethnic and biomedical understandings of hypertension. One participant (P4) expressed both biomedical understanding and belief that hypertension meant "Hyper- Tension". Both diagnosed hypertensive participants (P9 & P10) shared all the three understandings about hypertension.

However, the two participants who had been diagnosed by their doctor believed that they were not hypertensive because they believed that it was a state of mind and therefore adjusting one's state of mind removed the diagnosis. Since these two participants held all the three understandings of hypertension this may be congruent with holding a belief that hypertension was "hyper-tension".

"Well I am said to have it by doctors but personally I feel it's the condition of one's mind and so in my mind I resist it" (p10; 004).

"Well recently when I went for check up they said I had hypertension… but I don't believe I have" (p9; 010-014)

5.15 Ethnic Understandings

Although each study participant belonged to one of 7 ethnic groups, only 4 ethnic understandings of hypertension were identified namely; 'Raised or high blood volume', 'Burning or boiling blood', 'Resistance to blood flow', and 'Rising blood or blood that shoots up'. Mostly, these meanings were translations of the local ethnic names for hypertension or high blood pressure. In all interpretations of local ethnic languages for hypertension, reference is made to the blood as the affected entity in the body; but they differ slightly in their explanation of the underlying abnormality.

The concept of raised or high blood volume being the meaning of hypertension was shared by about half of the participants particularly among those from Yoruba and Tiv ethnic backgrounds.

*"Ahhh...in my own language we call it eje riru… I think the volume within the blood vessels is raised yeah(*p1; 011-015)"

"Ehm... we call it "awambe-atave" .It means the blood is high… Well this refers to the volume of blood being high or raised"(p9;018-022)

The explanation of burning or boiling blood was peculiar to the majority of Yoruba ethnic group participants

"...Yeah we call it eje-riru meaning …basically when your blood is just burning or boiling (P3; 013)"

The notion that hypertension meant resistance to blood flow was expressed by only one participant, the participant being one of the two known hypertensive participants of this study. This notion is a different interpretation of the same local name for hypertension among the Tiv ethnic group.

"It is some form of resistance in blood flow in the veins, that is, something that I think it should be. In my language it's called "awambe-ataver… Well I think it is some form of narrowing in the veins which leads to obstruction to the flow of blood due to

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anything. Don't know what causes the narrowing but I think this is the situation. Well that's the way I look at it. (P10; 008-011)"

There was overlap in ethnic understandings about hypertension as some Yoruba and Tiv ethnic participants gave similar meanings to different local names for hypertension as well as different meanings to similar local names.

Rising blood or blood that shoots up' was the meaning given to hypertension by participants from Hausa and Igbo ethnic groups respectively.

"It is called "hawan jini" in hausa. It means ...high..ehm...hawan-thats you're rising, jini-is blood so rising blood yeah"(p22;039-040)

"Yeah we have a name in my dialect. Obara-means blood, mgbanyi-enu-this means to shoot up so blood that shoot up" (p23;022)

Bio-Medical Understanding

Some participants expressed a biomedical understanding of the term hypertension in that they believed hypertension was raised blood pressure as measured by an instrument usually by a health professional.

"Yes that's all I know about it… by measuring it and pressure is high" (p4; 012)

However, two participants who expressed biomedical understandings believed that hypertension was a separate construct from high blood pressure. In essence, they believed high blood pressure referred to the mild form of the ailment while hypertension was a severe form of the disease.

"If it is just like ehm... one figure above the normal that's is high blood pressure when...It is when it goes up higher and there's an alarm, it leads to hypertension and then to stroke"(p25;072).

Hyper-Tension

Some participants simply said hypertension means "Hyper – Tension" (i.e. hypertension equals too much stress or thinking too much)

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"…Ehm, high blood pressure is high stress level" (p5; 041)

5.15 Perceptions of causation

Participants expressed several beliefs about causes of hypertension. These were grouped into 4 sub-themes; "biomedical causation", "stress", "hereditary" and "ethnic models of causation". Most participants held more than one belief about the causation of hypertension. In particular, most participants shared both biomedical and stress related causes for hypertension.

Bio-medical Causation

Biomedical causes refer to known risk factors for hypertension that have been identified by medical science. These include life style choices such as diet, physical activity, excessive alcohol intake, smoking and being overweight and other non-modifiable risk factor like old age. Most of the participants believed that all these risk factors could be a cause of hypertension.

"Ahm... In the first place there are certain things that can give rise to hypertension. One, we believe that if somebody is heavily built, very fat people, you know they are prone to hypertension"(p1;021-022)

"…Junk food then too much of salt intake…" (p2; 020)

Some participants believed that certain life style habits such as taking too much caffeine and taking recreational drugs were causes of hypertension.

"...I think caffeine as well… (P6; 053)"

"I think taking drugs like cocaine…(P2;018)"

Some participants thought that it was a natural consequence of the aging process.

"From my own personal experience, I don't know much… I don't know much about blood pressure. One is because another answer to my culture is that they believe it is older people that have it… like middle age people" (p4; 033-036)

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Stress

Most of the participants believed that high stress levels were a cause of hypertension and that the stress could be caused by thinking too much, working too much without taking a rest, targets not being met, being depressed as a result of losing a loved one, lack of money and worrying about a various issues of life.

 " I think the major thing is stress and stress come in through worries (p5;050)

Some participants expressed the view that stress may not cause permanent raise in blood pressure. Blood pressure may go back to normal when stress level reduces.

"Yes I would classify worry under stress. But, I wouldn't say it's a constant thing. Like your pressure might be high at a particular period like if you are going thru a loss, your pressure might be high then, and it might only be high for the first couple of days after when you started accepting, maybe when you are in denial it might be high then it might go down"(p4;042-044)

 One participant believed that certain foods cause pressure on physical nature leading to emotional stress but that different foods affect people differently.

"I think there are some foods that may put pressure on you and the physical nature will translate to emotional stress as well. I would not be particular about the food but I think it will be specific to a person… "(P8; 046-051)

Hereditary

A number of participants believed that the cause of hypertension could simply be genetic. In other words, the blood pressure genes get passed down from parents to siblings.

"I think it can be passed down from parents… (P4; 108)"

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Two participants thought that hypertension was not necessarily genetically inherited but that you learned certain behavioural patterns such as the way you handled stress from your parents.

"...Like basically not everyone will be born to deal with situations in the most appropriate way. Some people are just born to be stressed, so I wouldn't say that is genetics, if your parents can not handle stress, you might take that from them and not be able to handle stress as well. (P3; 017-019)"

"Well I wouldn't say it's directly it is because of the genes I would say it's because you take traits from your parents. So the way they react or act to certain things might affect you… It's not like there's hypertension in this person's blood and it is passing. It's more like behaving in a certain way that is similar (P8; 122-129)"

Ethnic Models of causation

One of the diagnosed hypertensive participants expressed what his community believed was the cause of hypertension. He thought that it was due to anything that causes resistance in blood flow.

"We believe that anything that could cause clotting of blood in your vein could cause the slowness of flow of blood… Maybe eating a lot of fat may be harmful, smoking may be harmful. Each of these things could reduce flow of blood causing hypertension (P10; 013-018)"

There seemed to be a direct relationship between beliefs about meaning and the cause of hypertension. This is evident among those who believe hypertension means high stress level and participant (P10) who believed hypertension meant resistance to blood flow.

5.16 The effects of hypertension

Participants' beliefs about effects of hypertension are divided into 2 sub-themes: "Symptoms" and "Illness caused by hypertension".

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Symptoms

Symptoms referred to certain feelings in the body that indicated the presence of HTN.

Many participants including those who had been diagnosed with hypertension asserted that intermittent headaches, fast heart beat, dizziness and loss of appetite are signs of raised blood pressure. Many participants who held these beliefs about the symptoms of hypertension also held stress related beliefs of causation.

"Yes severe headache is a big sign of hypertension (p24; 091)"

"When stressed, the heart starts beating fast… (p16; 093)"

However, some participants thought that absence of symptoms indicate absence of hypertension.

"What else can i say…ehmm...cause i look healthy and feel well so i don't think i have it so...(p2;007)

Illness caused by hypertension

Many of the participants described complications that have been identified by medical science such as unnoticed harm, burst blood vessel resulting in stroke or paralysis, damage to the heart, and sudden death.

"What I fear most about it is the fact that it doesn't give a moment notice before it strikes and sometimes some people don't know they have it. They will be going about their daily activities until they are completely down. That is when they would go to the hospital and they will now find out" (p23; 066-067)

"I think it can lead to stroke… (P2; 035)"

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"The main thing is may be stress on your heart… (P4; 073-074)"

However, some participants expressed non-orthodox ideas about illnesses that could be caused by hypertension such as bad dreams and mentally disordered behaviour.

"… It may cause bad dreams" (p15; 060)

"To me hypertension can still lead to having mental disorder. Like you being lunatic. That is having a lunatic display"(p17; 120)

5.17 Perceptions of treatment

Participants' perceptions of treatment for hypertension were grouped into 4 sub-themes; "Cure v Management", "Therapeutic Agents", "Dealing with the underlying cause" and "Spiritual Help"

Cure v Management

While many believed that hypertension could be cured by using drugs, making life style changes or seeking spiritual help, some participants believed that hypertension could only be managed and not cured. The beliefs of those who said hypertension could only be managed seemed to be influenced by the experience of those in their social network who had the disease.

"Well since I don't think it is curable to start off with… But actually, Grandma has continued to take drugs for years"(p11; 069-070)

Therapeutic Agents

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Only a few participants believed that use of orthodox drugs alone was effective. The majority of participants believed that orthodox medications in addition to life style changes are the best way to treat HTN. However, some believed that using orthodox drugs and herbal remedies together were more effective than orthodox medicine alone.

"Yeah. You can get tablet from doctors and you can also use herbal medication as well. That is what we use in Africa for most of us" (p12; 100).

"I think the orthodox ones are better but the herbal remedies too can help. You can just supplement with it. It's not going to be the major treatment (p15;105)"

Two participants (not known to be hypertensive) thought that orthodox drugs were not effective and would not take them no matter what.

"Well. I don't think orthodox drugs are effective. Because if they were effective those of them who go to hospital should have had the illness cured or be gone forever or be gone for a long time. they still have to be going and coming so in that case it only subdues it .so it is not effective(p18;064-065)"

One of these two participants also believed that eating special foods can cure hypertension.

"Ok. I have different ideas with the treatment because I have someone that has hypertension. Like celery leaf, garlic, garlic juice, water melon seed, ehm.....banana, eating of banana" (p2; 037-044).

Dealing with the underlying cause

Some of participants who expressed the view that orthodox and herbal remedies could be used in treating hypertension believed that if underlying factors such as stress and life style habits were not addressed, these treatment modalities would be ineffective.

"I think the major thing is before you treat an illness or a sickness, you must know the cause and it applies to if not all, everything when you know the problem then you know where to start from. From my own knowledge I believe that hypertension is

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caused mostly by the stress level in mankind…so once those things are known and addressed then systematically or simultaneously you can prescribe drugs and at the same time give the carrier the kind of encouragement they need"(p5;129-132)

Spiritual Help

Some participants believed that hypertension could be cured by spiritual means. This belief appeared to be equally common among those who held differing beliefs about causation.

"For me, I am a spiritual person because I believe in Christ, so I believe that Christ also heals. So I believe that with Christ in me, I can be healed of anything" (p7; 104)".

5.18 DISCUSSION

There have been other studies which investigated the beliefs about hypertension among ethnic minority groups in the United Kingdom [181-190] and other developed nations [32, 37, 191]. There have also been studies which investigated the beliefs regarding other chronic health conditions among immigrant communities in developed countries [192, 193]. However this is the first study that has explored the beliefs, perceptions and attitudes regarding hypertension among Nigerians living in the United Kingdom. It is important to note that an overwhelming majority of the participants in this study were not known hypertensives. Only two participants were diagnosed hypertensive. Therefore the views presented may not be completely representative of those who live with the disease but beliefs of those not known to be hypertensive may be very useful in giving insights into beliefs, attitudes and behaviours regarding hypertension that exist in the community and provide the background against which people who are diagnosed with hypertension develop their understanding of the condition and its management.

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This study revealed a diversity of beliefs among Nigerian immigrants about hypertension. Its findings show that although there may be many similarities across sub-Saharan African migrants' beliefs and values about illnesses such as diabetes and hypertension [181, 190, 193], there may be subtle differences not previously identified in the literature. It is therefore important to explore beliefs of migrants from individual countries of origin and if possible specific in-country ethnic groups.

This study showed that Nigerian immigrants may hold multiple beliefs about the meaning of hypertension at the same time including ethnic beliefs, biomedical understanding and the idea of "hyper-tension" identified in other studies of beliefs about hypertension [36, 47, 193]. Though other studies have identified different understandings of hypertension [36, 47, 193] they have not previously reported participants holding these simultaneously.

Raised blood volume was one of the popular ethnic understandings of the meaning of the term hypertension. This is consistent with findings from the study by Taylor et al [47] conducted among diagnosed hypertensive patients living in Nigeria. However, some other meanings elicited in this study such as "burning or boiling blood", "resistance to blood flow", and "rising blood or blood that shoots up" have not been reported in the literature. Although, there was no clear indication of a relationship between these beliefs and perceived cause or treatment of hypertension these ideas may need further exploration in larger samples.

Moreover, although the majority of participants in this study were highly educated and had not been diagnosed with hypertension, many did not express the understanding that hypertension meant high blood pressure as measured by an instrument. This may indicate that biomedical knowledge about hypertension may be lacking among highly educated Nigerian immigrants. The belief that hypertension is a separate construct from high blood pressure was only elicited in 2 participants who were not known to be hypertensive in this study, which contrasts with the study

by Taylor et al. [47] where the majority of the less well educated diagnosed hypertensive patients expressed this idea.

Overall, participants demonstrated ideas about the causes of hypertension that were similar to diagnosed hypertensive patients living in Nigeria in the study by Taylor et al [47]. Most were certain that life style such as diet, alcohol, exercise could cause hypertension or impact on the outcome of treatment of hypertension. Most thought that stress was a major cause of hypertension. Thinking too much and not having enough rest was believed to be the cause of high stress levels and by extension hypertension. These beliefs have also been reported in previous studies on Nigerians [138-141].

Interestingly, although the concept of heredity as a factor for developing hypertension was elicited in this study and other studies [138-141,143-146], in our study some participants expressed the idea that hypertension was caused by inheriting poor stress management technique from one's parents. Although this idea is congruent with the widely held belief that stress is a cause of hypertension, this finding has not been reported in other studies. This needs further exploration as to how common this belief is in the general population and understanding of what constitutes poor stress management technique.

Unusual Ideas about effects of hypertension such as hypertension causing mental health problems was elicited in this sample. This concept has not been demonstrated in other studies conducted on Nigerians [47, 138-141].

However, some participants believed that having no symptoms means not being hypertensive. Other studies conducted on sub-Saharan African migrants including Nigerians and host western populations have reported similar beliefs [36, 47, 193]. This finding is quite significant as this may impact on adherence to prescribed medications.

Unlike in the Taylor et al Nigerian hypertensive study [47], where there were gender specific differences in the area of effects of hypertension there were no differences in the perception of effects of hypertension across gender in this sample.

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Although, this sample was made up predominantly of participants who were not known to be hypertensive, perceptions about treatment were similar to that expressed in the study by Taylor et al [47] and findings from other quantitative studies conducted on Nigerians [138-141].

Findings about acculturation and migration experience associated with hypertension were absent in this present study compared with other studies on migrants [194]. For example despite the fact that the concept of stress was elicited in this sample, issues related to acculturation stress like living in poor settlement areas, weather change and feelings of isolation were absent. This is probably because the majority of the participants were highly educated migrants with high income jobs. While it is not suggested that this class of individuals are not influenced by acculturation related stress, it may not always explain minority groups' health behaviour patterns overtime [195].

Strengths and limitations

An important strength of this study is that it explored beliefs about hypertension among a fairly wide range of ethnic groups in a Nigerian community in the United Kingdom.

However, because most of the participants in this study were not known to be hypertensives, it is possible that beliefs of those who are already known hypertensives may not have been captured. In most instances there was not much difference between ideas expressed by the 2 participants who were known to be hypertensive and other participants in this study.

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In the same vein, some factors such as the high educational level and the young age of most of the participants may have influenced beliefs presented in this study. Even though studies on beliefs about hypertension have not demonstrated marked differences in beliefs based on age and educational background, it is suggested that further research should be done to capture the beliefs of older and the less well educated. However, even though the beliefs of older and less well educated Nigerian immigrants have not been explored, the beliefs of this age group and social class are equally important in understanding the breadth of beliefs among Nigerian immigrants.

The researcher being a member of one of the ethnic groups could have influenced the interpretation of the data due to their shared understanding of the culture. For example, this may have helped in understanding the cultural context of beliefs but could have also resulted in under exploration of some beliefs identified during the interviews and data analysis. In order to obviate this bias, another researcher (RM) analysed the data independently then results were compared and final thematic framework was agreed upon by all authors. In addition member checking was done.

I also believe that data saturation was achieved as no new themes were identified in the later interviews. However, the study could have been strengthened by triangulation using another method of data collection.

Implications

This study identified important beliefs among Nigerian immigrants about hypertension that contribute to our understanding of the management of hypertension in this group and suggests the need for further research to determine whether these beliefs are representative of this group.

In particular one important finding is that within the same ethnic group there may be different beliefs about hypertension and individuals may hold more than one belief at the same time. If this is confirmed in further studies, the implication for practice is

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that health care providers should endeavour to elicit individual patient's beliefs and tailor care to suit individual needs.

Another interesting finding of this study is that while most people believed that hypertension was announced by the presence of symptoms such as palpitation and headaches some people thought that the absence of symptoms meant absence of hypertension. Studies suggest people only take actions to initiate treatment of an illness when they experience certain symptoms [196]. Hence, it may not make sense to the patient to initiate life style changes for example, when there are no apparent symptoms of a disease. Moreover, even when patients develop symptoms and are treated with drugs; as soon as symptoms are alleviated they may stop taking drugs thereby adversely affecting the outcome of treatment.

5.19 Comments

In this chapter I presented the methodology and findings from the pilot study on Nigerian immigrants in the United Kingdom. The experience of conducting this study was very useful for conducting the main study in Nigeria. The findings from this study could help optimise self management and treatment among Nigerians living in the United Kingdom. In addition, the study yielded findings that will enable appropriate comparison with the qualitative study in Nigeria. In the next chapter I will discuss the findings from the qualitative study in Nigeria

Contributions of other authors to this chapter

Dr. Richard Meakin (RM) also independently analysed the data and similar themes were identified by both researchers. A final interpretation was agreed upon following discussion.

Prof. Nick Freemantle and Dr. Richard Meakin both contributed to conceptualization, resources for conducting research, review and editing of this chapter.

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Chapter 6: Results of qualitative study in Nigeria

In the last chapter I presented the methodology and findings from the pilot study on Nigerian immigrants in the United Kingdom. In this chapter I present the results of the qualitative study in Nigeria. A version of this chapter has published with PLoSOne journal titled: *Akinlua JT, Meakin R, Bashir I, Freemantle N (2018) Beliefs about hypertension among primary health care workers and clients in Nigeria: A qualitative study. PLoS ONE 13(12): e0209334. https://doi.org/10.1371/journal.pone.0209334*

The results of the qualitative study in Nigeria answers research questions 4 and 5 **RQ 4** and **5 (RQ4:** What are the beliefs and experiences of FCT PHC clients about hypertension, **RQ5**: What are the beliefs and experiences of FCT PHC health workers about hypertension and care for hypertensive patients? As discussed in chapter 4, purposive sampling was used to select the sample for this study ensuring a mix of both hypertensive and non-hypertensive patients and as diverse ethnic group as possible.

6.1 Results

Participant characteristics

6.1.1 PHC Clients

Forty-one clients agreed to participate. One individual in-depth interview was unfortunately lost due to a corrupted audio file bringing the final sample of PHC clients to 40 participants (30 individual interviews and 10 focus group discussion participants).

In-depth interview and focus group discussion participants' characteristics among PHC clients are described in Table 6a.

6.1.2 PHC workers

A total of 41 participated in the study including 31 semi-structured in-depth individual interviews and 1 focus group discussion of 10 participants.

In-depth interview and focus group discussion participants' characteristics among PHC workers are described in Table 6b.

Table 6a: Characteristics of PHC clients used in the in-depth interviews and focus group discussion

Characteristics	In-depth interview PHC clients (N=30)	focus group discussion PHC clients (N=10)
Gender		
Male	13	5
Female	17	5
Age {Median (min, max)}in years		
Men	35(23,67)	40(21,66)
Women	42(22,65)	40(28,53)
Ethnicity		
Igbo	4	2
Yoruba	3	1
Hausa	2	2
Nupe	2	3
Higi	-	1
Tarok	-	1
Etsako	2	-
Kataf	2	-
*Others	15	
Highest education level achieved		
Primary	2	-
Secondary	13	2
Associate degrees	2	-
University education	11	8
Post graduate	-	-
No formal education	2	-
Blood pressure status		
Known hypertensive	13	1
Not Known to be hypertensive	17	9

*others refer to ethnicities where there was only 1 participant of each ethnic group

Table 6b: Characteristics of PHC workers used in the in-depth interviews and focus group discussion

Characteristics	In depth interview PHC workers (N=31)	focus group discussion PHC workers (N=10)
Gender		
Male	17	6
Female	14	4
Age {Median (min, max}in years		
Men	35(29,53)	36.5(28,51)
Women	35(23,55)	28.5(25,36)
Ethnicity		
Igbo	4	2
Yoruba	2	1
Hausa	2	2
Nupe	4	3
Fulani	2	-
Gbagyi	2	-
Higi	2	1
Tarok	3	1
*Others	10	-
Highest education level achieved		
Primary	-	-
Secondary	5	2
Associate degrees	-	-
University education	24	8
Post graduate	2	-
No formal education	-	-
Blood pressure status		
Known hypertensive	1	1
Not Known to be hypertensive	30	9
Health Care Worker Category		
JCHEW	4	2
CHEW	6	2
Nurse	5	1
Medical Doctor	3	-
CHO	2	1
Health assistant	6	2

Laboratory Technician	3	1
Laboratory Scientist	1	1
Pharmacy Technician	1	-

*others refer to ethnicities where there was only 1 participant of each ethnic group

6.2 Beliefs about hypertension

The analysis yielded four (4) themes that were shared by both clients and healthcare workers, namely (1) Meaning of hypertension (2) causes of hypertension, (3) Consequences of hypertension (4) Perceptions of treatment. However, one additional distinct theme was found among PHC workers "contextual explanation". There were no differences in the themes that emerged from focus group discussions compared with the in-depth interviews among both PHC clients and workers.

Table 6c summarizes the similarities and differences in the themes and subthemes between PHC workers and clients.

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Table 6c: Summary of similarities and differences in themes and subthemes

Themes	PHC Clients Subthemes	PHC workers Subthemes	Overall Similarities and differences
Meaning Of hypertension	-Biomedical understanding -Cultural perception -Hyper-Tension	-Biomedical understanding	All PHC workers expressed mainly biomedical understanding of hypertension. Some PHC clients shared similar beliefs with PHC workers in the area of biomedical understanding but many PHC clients had other significant cultural and psycho-social perceptions about meaning of hypertension. Overlap in ethnic understandings as well as different intra-ethnic meanings existed among PHC clients. Overall known HTN and not known HTN expressed fairly similar beliefs on meaning but differed slightly in areas such as biomedical understanding
Causes of hypertension	-stress -biomedical causation -drug abuse -divine destiny	-Stress -Biomedical causation -Drug abuse	Both PHC workers and clients (known HTN and not known HTN) shared mostly similar understanding of the causation of hypertension but differed in that some PHC clients believed in the role of spiritual forces.
Consequences of hypertension	-symptoms of hypertension -Poverty -Solitude	-symptoms of hypertension -illnesses caused by hypertension	Generally, both PHC clients and workers (known HTN and not known HTN) expressed similar beliefs about consequences of hypertension in terms of common medical symptoms of hypertension. But differed in that PHC clients did not express any complications of hypertension such as stroke as a consequence. Only PHC workers believed that it could be asymptomatic. Further, only those PHC clients who are known HTN expressed financial stress as a major consequence.
Perception of treatment	-cure versus manage -spiritual help -therapeutic agents -life style modification -stress management	-cure versus manage -spiritual help -therapeutic agents -Life style modification	Overall, many PHC clients and workers shared more than one similar belief about treatment for hypertension. But, most PHC clients who shared more than one belief about treatment thought that spiritual help should be an adjunct to any other treatment modality. However, only a few PHC workers would recommend spiritual help for their clients. Although most PHC clients expressed beliefs about stress management as a form of treatment, no PHC worker expressed this idea.
Contextual explanations			This theme was unique to PHC workers. Contextual explanation refers to the way the PHC worker would explain the diagnosis of hypertension to a client. Among all PHC workers, the explanation offered is guided by the local name and meaning of hypertension in the community in which they practice. However, each time although the local name is used explanation is tailored to reflect biomedical understanding.

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6.2.1 Meaning of hypertension

There was a variety of beliefs about what the term "hypertension" meant among both PHC clients and workers. This theme was divided into 3 sub-themes for PHC clients including; "Cultural perception", "Biomedical understanding", and "stress" and only 1 sub-theme for PHC workers; "biomedical understanding".

Many PHC clients expressed only one understanding of hypertension. However, there were overlaps of beliefs among some PHC clients as they shared all the three understandings of hypertension elicited.

All PHC workers expressed mainly biomedical understanding of hypertension. Moreover, there was no specific difference in understanding between types of PHC worker.

Overall, on the meaning of hypertension, some PHC clients shared similar beliefs with PHC workers in the area of biomedical understanding but many PHC clients held beliefs related to culture and stress.

Bio-Medical Understanding

Some PHC clients and all PHC workers expressed understandings about meaning of hypertension related to biomedical views of raised blood pressure as measured by some medical equipment.

"No, the only name I know for hypertension is hypertension when the doctor measures it with a machine" (cp4:I)

However, PHC workers explained the meaning in more definite terms using cut-off points for abnormal blood pressure measurement. But, different cut-offs for diagnosis of hypertension were mentioned by two senior PHC workers.

Notably, during the focus group discussion for PHC workers a discussion took place over the issue of blood pressure cut-off point for diagnosis of hypertension and all arrived at a consensus that they needed to look up in the books for the acceptable

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cut-off point.

"Apart from hypertension, it is also known as high blood pressure, increase in your BP that is the blood pressure is more than 160/100, or 160/110 that is hypertension…"(wp4:I)

"You see, when the systolic pressure rises from the range 100 to 140, that person is free. So if, the diastolic pressure too from 60-90, it is expected that, that person doesn't have any cause for alarm so, if the systolic pressure is above 140, that is where we say the blood pressure is high now and we try to explain things to them"(wP1:I)

All PHC clients who expressed biomedical views also expressed other views about meaning of hypertension and all were diagnosed hypertensive clients. All of those who did not express biomedical views of meaning were not known to be hypertensive.

Cultural Perceptions

This study involved participants from twenty-one ethnic groups. Three (3) diagnosed hypertensive participants who gave the ethnic/cultural names for hypertension explained their meanings in terms of stress and biomedical related complications.

"In Yoruba, we call it Ejeriru. The meaning is that, when you over labour the body, the way the heart pumps out blood, is too high and the temperature will go high and all the body will collapse, and that part of the body, will be functionless either the leg, hand or the whole body"(cp9:fg)

"Like in my own language, Igbo, we call it ''ogbaramgbanyi-enu'' i.e. high BP high blood pressure.It means someone who is over thinking has something disturbing or worrying him, that causes him may be, sleepless nights and all that and sometimes the person starts misbehaving at times it leads to paralysis or stroke". (cp8:fg)

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Other ethnic understandings of hypertension elicited from this study did not relate to stress or biomedical complications but were verbatim translations of the native/ethnic/cultural names for hypertension. They include perceptions like; "the blood volume is going high", "climbing blood", "blood shooting up" and "a dangerous ailment that is incurable". These perceptions were elicited from Igbo, Tiv, Hausa and Esan-edo ethnic groups respectively.

"We call it ''ogbaramgbanyi-enu'' it means somebody's blood level is going high" (cp30:I).

"Hypertension…some locals call it bubun jini, but the enlightened ones would say; hawan jinni. It means Climbing blood (literally) but it means hypertension" (wp20:I).

"Well generally in Hausa we call it hawan jini. It means the blood is shooting up"(cp8:I)

"In my dialect we have a name for it. It is called, 'Ujagbe'. It means something that is a dangerous ailment that is un-curable"(cp21:I).

It was noted that among the Igbo ethnic group, different meanings were given to the same ethnic names for hypertension.

"Like in my own language, Igbo, we call it ''ogbaramgbanyi-enu'' i.e. high BP high blood pressure.It means someone who is over thinking has something disturbing or worrying him, that causes him may be, sleepless nights and all that and sometimes the person starts misbehaving at times it leads to (paralysis) paralyze or stroke". (cp8:fg)

"We call it ''ogbaramgbanyi-enu'' it means somebody's blood level is going high" (cp30:I).

There was also overlap between the Yoruba ethnic understandings and Hausa ethnic understandings as participants belonging to these groups expressed similar meanings to different native names.

"Well in Hausa we call it hawan jini. It means the blood is shooting up"(cp23:I)

"I don't know any other name but the Yourba call it ejeriru which means blood shooting up"(cp28:I)

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All these beliefs were expressed by both diagnosed hypertensives and patients not known to be hypertensive alike. There was no indication of any distinction in beliefs between diagnosed hypertensives and participants not known to be hypertensive.

Hyper-Tension

Some PHC clients expressed the understanding that hypertension simply meant stress. Stress was colloquially termed "thinking too much" or "thinking" which is caused by negative circumstances in life.

"It means when you are thinking, like when something is disturbing you and you are thinking too much of how to get out of that problem and then that thinking enters your blood and make your blood pressure to rise"(cp10:I)

"It means someone who is over thinking has something disturbing or worrying him, that causes him may be, sleepless nights and all that…"(cp5:fg).

Among PHC workers, stress was only mentioned as a cause of hypertension and not understood to mean hypertension.

6.2.2 Causes of hypertension

PHC workers and clients expressed similar beliefs on causes of hypertension under three subthemes namely: "stress", "biomedical causation" and "drug abuse". PHC clients expressed other beliefs under the subtheme "divine destiny".

Both PHC workers and clients shared more than one understanding of the causation of hypertension. Most PHC clients who held more than one belief about causes of hypertension included stress as part of their understanding for cause of hypertension.

"Well, they are numerous but I will just say one or two: Heredity. In your family line, your lifestyle i.e. what you eat and stress. There are also disease conditions like nephritis, diabetes; these are some of the diseases"(cp20:I).

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Stress

Stress was the most prominent belief expressed in this sample as the cause of hypertension. The majority of participants (PHC workers and clients) expressed stress as the cause of hypertension. There was no specific difference in the beliefs about stress amongst diagnosed hypertensives and those not known to be hypertensive. It is also of note that there was no difference in the aetiology of stressors identified by men and women in this sample. Generally, stressors identified in this sample refer to thinking too much about life circumstances such as poverty, health related problems, relationship problems, loss of a loved one, unemployment, family responsibilities and financial demands or anything that reduces the amount of sleeping time.

"When you are anxious about something and you are not getting it, eventually, it can result to hypertension" (cp7:fg)

"Yes if one over thinks about something in the sense that it affects your sleep. You don't sleep well it affects the brain. Your brain doesn't rest, neither does it get adequate rest. It can lead to high B.P"(wP2:fg).

One PHC client disagreed with the fact that being biologically old in age may be a risk factor for hypertension but felt that most hypertension in old age was as a result of stress in old age.

"It depends on the person because most old people stress themselves to the extent that they will not have time to relax and some other people they have time to relax because their children do everything for them, so they don't have anything to think about. It is when they start thinking about maybe the wellbeing of their children which is not okay and that might lead to hypertension"(cP29:I)

Most PHC workers who said stress was a cause of hypertension had practical examples among their clients to back up their claims.

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"Maybe, all the time, you are busy doing this or that, thinking of this or that all through the night, you don't sleep, you are having insomnia, it could lead to hypertension too"(wp1:I).

"It is not just my opinion but from what I have learnt and experienced, it is caused by too much thinking, stress. People don't have a history for rest" (wP14:I).

Bio-medical Causation

Most PHC clients and all PHC workers believed that biomedical identified risk factors such as excessive salt intake, lack of exercise, excessive fat consumption, smoking and aging could be a cause of hypertension. However, for PHC workers some specifically used the word "causes" while others were more cautious preferring to use the word "predisposing factors" for hypertension.

"I don't think salt causes hypertension. It is just a predisposing i.e. a contributing factor"(wp5:fg)

"Smoking can make the blood pressure to increase"(wp22:I)

"Yeah because I believe that too much fat will block some blood vessels and that can cause it"(wp23:I)

There were no differences found in beliefs between clients known to be hypertensive and those that are not known to be hypertensive.

However, some PHC clients who believed that biomedical risk factors could trigger hypertension disagreed with some known biomedical risk factors. Some of the disagreements were based on personal experiences or experiences of people in their social network.

"Because as for myself I don't sit in one place, I am always about but yet I still have it"(cp11:I)

"Why I will not agree with that is because my mother who died at the age of ninety five (95) did not have hypertension so, I don't believe that"(cp21:I)

One PHC client who didn't agree with the fact that alcohol could be a cause of hypertension thought so because of the ability of alcohol to reduce "thinking" or stress.

"If you take alcohol, you feel relaxed, so you don't think"(cp31:I).

All PHC workers also expressed beliefs that hypertension could be genetically inherited and that it could occur as a result of complications from other medical conditions. However, this was not the case with PHC clients. Some believed it could be inherited while others did not. Most of the PHC client who expressed agreement or disagreement with heredity as a cause of hypertension did so on account of personal experiences. For most of these participants, these did not affect other held beliefs as most of them still thought that other biomedical risk factors could cause hypertension.

*"…. one my bosses, she has an eye problem and she told me that her dad had it...
Her dad and mum had it and now one of her children is facing it. So likewise hypertension, it can be caused by heredity"(cP6:I).*

"…Like I told you earlier, that I don't think I inherited it from my parents. Maybe, in a way, I contributed negatively either my lifestyle or diet"(cP20:I)

Regarding salt intake, there were two camps in the focus group discussion. Some PHC workers specified that salt was more dangerous than some certain types of food seasoning while others disagreed.

"I have observed that people in the North, hardly suffer from hypertension but in the East, you see a lot of adults with it because of the kind of food they eat. The Northerners tell me that they don't cook with salt, instead they use magi in place of salt. You can see them using up to ten (10) to fifteen (15) cubes of magi for cooking soup but in the East, we don't use maggi and some of our local foods, require raw salt and you know that raw salt is more dangerous than cooked salt"(wp3:fg).

"I don't agree with taking only maggi. As she has rightly said, the major ingredient in maggi is salt so I do not agree with taking only maggi if there is no salt, there should be no maggi too"(wP7:fg).

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Drug abuse

Both PHC clients and workers expressed the idea that addiction to recreational drugs like cocaine and cannabis could cause hypertension.

"Yes. In those who are involved in social vices, like; drugs, drug addict, someone who takes a lot of alcohol too. All these ones are prone to hypertension" (wP11:I).

Divine destiny

Two PHC clients felt that sometimes the cause of hypertension may not be attributable to any physical cause but the divine will. It is important to note that these participants still expressed beliefs about other causes of hypertension such as stress.

"There are two types; one that comes from over-thinking and vexing, the other comes naturally from the air divinely" (cP27:I)

6.2.3 Consequences of hypertension

Both PHC clients and workers expressed generally similar beliefs about consequences of hypertension in terms of "symptoms of hypertension". But PHC workers expressed other beliefs about "illnesses caused by hypertension" and PHC clients expressed other beliefs under the subtheme "solitude" and "poverty".

Symptoms of hypertension

All PHC workers reported at least one symptom of hypertension. This was based on their experiences of managing patients with hypertension. The most common symptoms mentioned were headaches, palpitations, dizziness, blurred vision. Among PHC clients the commonest symptoms mentioned were palpitations and dizziness

"I will tell the person the signs and symptoms of hypertension some are headache, dizziness and some will have palpitations"(wP15:I)

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A few PHC clients said they didn't know what effects hypertension could have because they did not have the disease. All of the five participants who said this were not known to be hypertensive.

"Well, since I don't have it, I don't think I can't say much about it" (cP6:I)

However, some clients not known to be hypertensive still gave their opinion on the effects of hypertension based on experiences of those in their social network.

"Yes, my sister. Sometimes she dey say her eye dey turn (feels dizzy) and her heart dey beat fast (palpitations). When she starts to feel like that, she has to go to the hospital to run some tests"(cP3:I)

Some PHC workers also believed that hypertension could result in weight loss and sleeplessness and would tell their clients to watch out for these signs among others as mentioned above.

"Sometimes, if you have hypertension, you lose weight, and experience headache, your blood pressure is checked or you are sent to the laboratory to know what is there"(wP18:I).

Only few PHC workers mentioned that hypertension could be asymptomatic. Most of those who said these were high level cadre health care workers like doctors, nurses and senior community health extension workers.

Illnesses caused by hypertension

Most PHC workers reported that hypertension could result in other health problems if not well managed. The most common illness reported was stroke, eye problems, hypertension in pregnancy related complications and sudden death.

"I fear these two things; having stroke (paraplegia)" and then sudden death. Those are the things that scare me about hypertension"(wp3:fg).

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Poverty

The idea of hypertension making one poor was expressed by only diagnosed hypertensive PHC clients who have been on hypertensive medications for a long time.

"I can't just say because if I see the situation I am in now, I can't pay for my drugs, I can't eat good food, these are the major problems I have faced"(cP24:I)

Solitude

One PHC client not known to be hypertensive expressed the idea that he has observed that hypertensive patients usually like to stay in serene locations at all times as they may not want to be disturbed. It is not clear whether the participant viewed this as a positive or negative outcome. However, during the focus group discussions with PHC clients, this idea was disputed by most diagnosed hypertensive participants.

"Well people that have hypertension, they do not like staying around places that are disturbed, they always want to be where it is quiet" (cP6:I).

6.2.4 Perceptions of treatment

PHC workers and clients' beliefs on treatment of hypertension could be summarised under 4 similar subthemes namely: "cure versus manage", "spiritual help", "life style modification" and "therapeutic agent". But PHC clients expressed other beliefs under the subtheme "stress management"

Overall, many PHC clients and workers shared more than one belief about treatment for hypertension. Most PHC clients who shared more than one belief about treatment thought that spiritual help should be an adjunct to any other treatment modality you

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choose to engage with. However, only a few PHC workers would recommend spiritual help for their clients.

"The only thing I have to tell the whole country (Nigeria) that is you and I, as soon as you have any problem with hypertension, come to the hospital and take care of it, let them test you, collect drugs and after then pray to God to heal you"(cP9:I)

Similar beliefs about the treatment of hypertension were expressed by both hypertensive clients and clients not known to be hypertensive." and "beliefs about treatment modalities including stress management and lifestyle change were commoner among clients who believed stress and biomedical risk factors were causes of hypertension.

Cure versus manage

There was a general consensus amongst all PHC workers that hypertension can be managed and not cured. However, PHC clients' response on whether hypertension would last for a short or long time was variable. A few believed that hypertension could be cured while many thought that it could only be managed. There was no relationship noted between the beliefs about the cause of hypertension and curability. Many who thought hypertension could be managed were influenced by personal and shared experiences.

"I heard some people say that on its own after a while it vanishes" (cP30:I)

"You know one thing I don't believe this thing has a remedy or a cure… (cp31:I)

Spiritual help

Only a few PHC workers thought that spiritual forces could help in the treatment of hypertension. Most of those who prescribe spiritual help for their clients specifically recommend it as means of alleviating negative life circumstances that can lead to thinking too much and in turn hypertension. There was no difference between health worker cadre and recommendation of spiritual help.

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"Any issue you know you cannot handle, don't think about it but pray and hand it over to God" (wP9:I)

However, although most PHC clients believed spiritual help was useful, they all thought it should be combined with other treatment modalities. However, one hypertensive female PHC client believed that God would heal everybody in the future.

"God will heal everybody someday"(cP17:I)

Therapeutic agents

Therapeutic agents refer to beliefs about the use of some external agents such as orthodox drugs or herbal medications. Most PHC workers believed that you needed some form of therapeutic agent to bring down blood pressure. Orthodox medications were believed to be effective if strictly adhered to. As for herbal medications while majority will not recommend it, a few PHC workers would still prescribe it for their clients. In addition, most PHC workers would not recommend taking herbal medications together with orthodox medication as it could cause adverse reactions. Those who prescribe herbal medications do it based on positive experiences in the past. One PHC worker said:

"I used to be one of those that is totally against herbal medication but I just noticed of recent, on the herbal medication that was given to a hypertensive patient with a case of obesity and I think they were just natural roots given to her to keep boiling and drinking. Of a truth, she did as she was told and she involved herself in exercise as well. The obese nature dropped drastically which the patient continued taking those herbs for almost three weeks or so and it dropped and the person continued with the exercise…." (wP2:Fg)

However, half of PHC clients believed that orthodox drugs alone as prescribed by a doctor was effective in treating hypertension but only a few believed that using herbal medications alone could be effective. Some of the participants who believe

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that herbal medications alone could be effective thought that you needed a doctor to make a diagnosis before using herbal medications.

"You can take herbs when you know what the problem is. When you know what you are having it is then you can start taking herbs instead of taking anything when you don't know the problem"(cP2;I).

A few PHC clients believed that you could use both herbal and orthodox medications together.

"Yes they should take both. You can use the herbal for a start then the orthodox medicine"(cP7:I)

Life style modification

All of the PHC workers and most PHC clients believed that life style modification was a key element in the treatment of hypertension.

"Yes, number one, you have to assure them; two, you have to sensitize them .i.e. you do community health education and mobilization, and that they should be able to take their drugs constantly" (wP12:I).

"The kind of food you eat matters a lot because it goes into the body so, if you take in too much salt, fats, can lead to it. You will reduce some kind of food intake that is what I think apart from the drugs"(cP29:I)

However, only about half of the PHC workers reminded their patients regularly about modification of life style habits during consultation.

Stress management

Since majority of PHC clients thought that stress was a cause of hypertension, many thought that stress management i.e. not thinking too much and taking a rest was a

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personal remedy for hypertension. However, the idea of stress management was not particularly expressed by PHC workers of any cadre.

"First I would call it a personal remedy. You should try and reduce your thinking, then maybe stay away from things that cause you to think, stay away from problems although you I don't think you can escape problems but you can just try to help yourself then constant check-up"(cP7:I).

6.2.5 Contextual explanation

Contextual explanation refers to the way the PHC worker would explain the diagnosis of hypertension to a client. Among all PHC workers, the explanation offered is guided by the local name and meaning of hypertension in the community in which they practice. However, each time although the local name is used explanation is tailored to reflect biomedical understanding.

"Where I practice, I have Hausas mixed with Yoruba's, when they come; the language we use in Yoruba is Ejeriru then for the Hausas, Hawan Jini. Those are the languages we use in our practice. When we meet someone who is advanced in knowledge, we use hypertension. These are the two languages use in the place where I work".(wp6:I)

"It depends. If it is in English, and for lay persons that are a bit literate, they don't know hypertension, so you tell them, high blood pressure or if it is in the area council, which is multi-lingual. It has so many tribes. The commonest I see, they have Hausa, Igbirras and Ganagana. Hausa call it Hawan Jini, Igbirra call it "anyahire", i.e. blood has risen or raised blood. I can't remember how the Ganana call it but it has to do with blood too. I am talking about how blood has risen it is just a sentence and not a word" (wP24: I).

6.3 Comments

In this chapter, I presented the results of the qualitative study conducted in Nigeria.

The Nigerian qualitative study identified important ethnic differences and similarities in beliefs about meaning, risk factors, symptoms and treatment of hypertension between PHC clients and workers. Table 3 presents a summary of similarities and

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differences in beliefs of both primary health care workers and primary health care clients.

In the next chapter I present the results of the quantitative study conducted in Nigeria.

Chapter 7: Results of quantitative study in Nigeria

In the last chapter I presented findings from the qualitative study conducted in Nigeria. In this chapter I present the results of the quantitative study in Nigeria. This study explores the prevalence of hypertension and its risk factors among primary health care clients.

7.1. Sampling and response proportions

The study was conducted in 20 PHCs across Federal Capital Territory, Abuja. The questionnaires (WHO STEPS and EQ5D) were completed by 650 people but 10 questionnaires were unusable due to completion errors. Therefore a total of 640 were analysed. All the questions in steps 1 and 2 contained in the WHO step-wise approach to surveillance of non-communicable diseases were used verbatim except those in the section on biochemical measurements (Step 3) as biochemical measurements were not done in this study due to cost constraints.

7.2 Results from STEPS survey

7.2.1 General Characteristics

The physical and socio-demographic characteristics of the FCT PHC clients are described in table 7a. The median age of the participant was 30 years (min=18yrs, max=77yrs) with more than 90% of the respondents (males and female) between the ages of 18-44 years.

Three hundred and eighty- four (384) of the participants lived in urban areas (49.5% males and 50.5% females) while 256 participants lived in rural areas (48% males and 52% females). Overall, there were more males and females between ages 18-29 years old living in urban areas compared to other age groups.

Overall among both males and females, there were more people in rural areas with no formal schooling experience compared to urban areas (14.1% versus 6.8%, diff=7.3% [95%CI: 2.3 to 12.2]). Furthermore, overall, there were slightly more females with no formal schooling compared to males (11.6% versus 7.7% diff=3.9% [95%CI: 0.6 to 8.5]). Regarding highest level of education attained there were more

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participants in urban compared to rural areas who had completed university education (27.6% versus 19.9%, diff=7.7% [95%CI: 1.1 to 14.3]). However, for other levels of education (primary school, secondary school, high school and post graduate education), there were no differences between sexes and dwelling area (urban or rural) of participants.

Overall, participants from this study were from one of 46 ethnic groups but the majority of participants were from the 3 major ethnic groups in Nigeria (Yoruba, Igbo and Hausa) with proportions: 10.5%, 10.2% and 9.2% respectively.

The marital status of the participants was diverse: overall similar proportions reported having never married in both rural and urban areas (38.8% versus 35.9%, diff=2.9% [95%CI: 4.7 to 11]). Overall there were slightly more married participants in rural versus urban area (60.2% versus 55.7%, diff=4.4% [95%CI: 3.3 to 12.2]). There was no difference in divorce or separation rate across both rural and urban areas. Cohabiting was absent in rural areas and only present in limited numbers in urban areas.

Overall among both male and female participants, more urban residents were in some form of paid employment (governmental or non-government) compared to rural areas. But there were more self-employed individuals in rural compared to urban areas (30.5% versus 22.1%, diff=8.3% [95%CI: 1.3 to 15.3]). Unemployment among those able to work was slightly higher in urban areas compared to rural areas (7% versus 3.1%, diff=3.9% [95%CI: 0.6 to 7.2]). Also, overall, there were slightly more unemployed females who were available for work compared to males (6.7% versus 4.2%, diff=2.3% [95%CI: 0.9 to 6.1]).

It was not easy to collect information on household income as many participants especially those between 18-29 years old did not know how much the family earned. Only 491/640 (76.7%) of participants were able to give information about household income. The median monthly income of all participants was N30, 000 (min=N3000; max=N200 000). Overall, 38.6% had monthly income below N20000. There were more people in urban areas compared to rural areas with monthly income below N20000 (30.2% versus 26.2%, diff=4% [95%CI: 3 to 11.1]). There were slightly more

females earning below N20000 compared to males (30% versus 27.2%, diff=2.8% [95%CI: 4.2 to 9.8]). Overall, for those who earn between N21,000- N100,000, there were more people in rural areas compared to urban areas(40.6% versus 54.3%, diff=13.7% [95%CI: 5.8 to 21.5]. For high monthly income earners (i.e. monthly income >N100000), there were more participants in urban area compared to rural areas with high monthly income (9% versus 4%, diff=0.7% [95%CI: 1.4 to 2.9]. Also, there were more males compared to females with high monthly income (3.2% versus 0.9%, diff=2.3% [95%CI: 0.07 to 4.5]).

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Table 7a: Demographic features of participants enrolled in the STEPS survey across FCT PHCs

Factor	Overall (n=640) n(%)	Urban(n=384) n(%)	Rural(n=256) n(%)	Male(n=313) n(%)	Female(n=327) n(%)
Male	313(48.9%)	190(49.5%)	123(48.0%)	313(100%)	-
Female	327(51.1%)	194(50.5%)	133(52.0%)	-	327(100%)
Age(years)	30(18,77)	30(18,65)	30(18,77)	30(18,70)	30(18,77)
18-29	306(47.8%)	182(47.4%)	124 (48.4%)	143(45.7%)	163(49.8%)
30-44	254(39.7%)	161(41.9%)	93(36.3%)	122(39.0%)	132(40.4%)
45-59	65(10.2%)	35(9.1%)	30(11.7%)	42(13.4%)	23(7.0%)
>60	15(2.3%)	6(1.6%)	9(3.52%)	6(1.9%)	9(2.8%)
Highest level of education					
No formal schooling	62(9.7%)	26(6.8%)	36(14.1%)	24(7.7%)	38(11.6%)
Less than primary school	11(1.7%)	4(1.0%)	7(2.7%)	4(1.3%)	7(2.1%)
Primary school completed	63(9.8%)	29(7.6%)	34(13.3%)	28(9.0%)	35(10.7%)
Secondary school completed	220(34.4%)	138(35.9%)	82(32%)	112(35.8%)	108(33.0%)
High school completed	111(17.3%)	69(18%)	42(16.4%)	54(17.3%)	57(17.4%)
College/University completed	157(24.5%)	106(27.6%)	51(19.9%)	79(25.2%)	78(23.9%)
Postgraduate degree completed	16(2.5%)	12(3.1%)	4(1.6%)	12(3.8%)	4(1.2%)
Ethnic group					
Yoruba	67(10.5%)	41(10.7%)	27(10.5%)	32(10.2%)	35(10.7%)
Igbo	65(10.2%)	40(10.4%)	24(9.4%)	25(7.8%)	40(12.2%)
Hausa	59(9.2%)	34(8.9%)	25(9.8%)	27(8.6%)	32(9.8%)
Nupe	48(7.5%)	29(7.6%)	19(7.4%)	25(8.0%)	23(7.0%)
Igala	40(6.3%)	28(7.3%)	12(4.7%)	21(6.7%)	19(5.1%)
Bassa	37(5.8%)	23(6%)	14(5.5%)	21(6.7%)	16(4.9%)
Gbagyi	34(5.3%)	21(5.5%)	13(5.1%)	21(6.7%)	13(4.0%)
Ganagana	33(5.2%)	12(3.1%)	21(8.2%)	18(5.8%)	15(4.6%)
Others*	257(40.2%)	156(40.6%)	155(39.5%)	190(39.3%)	134(41%)
Marital status					
Never married	241(37.7%)	149(38.8%)	92(35.9%)	124(39.6%)	117(35.8%)
Currently married	368(57.5%)	214(55.7%)	154(60.2%)	180(57.5%)	188(57.5%)
Separated	8(1.3%)	4(1.0%)	4(1.6%)	2(0.6%)	6(1.8%)
Divorced	4(0.6%)	2(0.5%)	2(0.8%)	2(0.6%)	2(0.6%)
Widowed	18(2.8%)	14(3.7%)	4(1.6%)	4(1.3%)	14(4.3%)
Cohabiting	1(0.2%)	1(0.3%)	-	1(0.3%)	-
Employment Status					
Government Employee	196(30.6%)	130(33.9%)	66(25.8%)	104(33.2%)	92(28.1%)
Non-Government Employee	74(11.6%)	46(12%)	28(10.9%)	33(10.5%)	41(12.5%)
Self-employed	163(25.5%)	85(22.1%)	78(30.5%)	82(26.2%)	81(24.8%)
Non-paid	18(2.81%)	7(1.8%)	11(4.3%)	7(2.2%)	11(3.4%)
Student	114(17.8%)	66(17.2%)	48(18.8%)	60(19.2%)	54(16.5%)
Homemaker	19(3%)	15(3.9%)	4(1.6%)	3(0.9%)	16(4.9%)
Retired	8(1.3%)	6(1.6%)	2(0.8%)	6(1.9%)	2(0.6%)
Unemployed(able to work)	35(5.5%)	27(7%)	8(3.1%)	13(4.2%)	22(6.7%)
Unemployed(unable to work)	13(2%)	2(0.5%)	11(4.3%)	5(1.6%)	8(2.4%)
Average monthly income(Naira)					
<20,999	183(28.6%)	116(30.2%)	67(26.2%)	85(27.2%)	98(30%)
21,000-60,999	229(35.8%)	122(31.8%)	107(41.8%)	113(36.1%)	116(35.5%)
61,000-100,000	66(10.3%)	34(8.9%)	32(12.5%)	35(11.2%)	31(9.5%)
>100,000	13(2%)	9(2.3%)	4(1.6%)	10(3.2%)	3(0.9%)
Not available	149(23.3%)	103(26.8%)	46(18%)	70(22.4%)	79(24.2%)

Data are presented as median (min, max) or as number of participants (percentage). *others refer to 38 ethnic groups with fewer than 5% of total subjects. These include Agatu, Barazan, Birom, Boma, Calabar ,Chibok ,Igbira,Efik,Egon,Etsako,Etuhun,Fulani,Gwari,Ibibio,Idoma,Igede,Ijaw,Isan,Isoko,Itsekiri,Jaba,Jukun,Kabba,Kanuri,Kagoro,Kaje, Kataf,Kilba,Koro,Kwale,Mada,Miango,Ogori,Okpameri,Tarok,Tiv,Urhobo ethnic groups.

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7.2.2 Prevalence of Hypertension and distribution with socio-demographic characteristics

The overall prevalence of hypertension (i.e. those with systolic blood pressure ≥ 140 or /and diastolic blood pressure ≥90 or known hypertensive with controlled blood pressure) and 95% Confidence Intervals was estimated and described across all socio-demographic characteristics in tables 7b and 7c below. The hypertension definition is based on systolic blood pressure (SBP) ≥140 and diastolic blood pressure (DBP) ≥90 for comparison in the following discussion. Also a p-value less than 0.05 from Fisher's exact test of independence was taken as significant. The median SBP was 120 mmhg (1st quartile=110, 3rd quartile=130), while median DBP was 78.3(1st quartile =70, 3rd quartile=80). The overall prevalence of high blood pressure using a criteria of SBP≥140 and DBP≥90 was 27.9% (95% CI: 24.5 to 31.6) while using a criteria of SBP≥160 and DBP≥90, the overall prevalence was 22.8% (95% CI: 19.6 to 26.3).

Overall male participants had higher prevalence of hypertension compared to female participants and this association was statistically significant (32.3% versus 23.9%, diff= 8.4% [95% CI: 1.5 to 15]).

The overall prevalence of hypertension in urban areas was more compared to rural areas (29.7% versus 25.4% diff= 4.3% [95% CI: -2.7 to 11.3]) but was not statistically significant. Similarly, in both urban and rural areas the prevalence of hypertension was higher in males compared to females but the estimate in urban areas was not statistically significant (32.6% versus 26.8%, diff= 5.8% [95% CI: -3.3 to 15]). On the contrary, there was a significant difference between prevalence of hypertension and males and females in rural areas (31.7% versus 19.5%, diff= 12.1% [95% CI: 1.5 to 22.8]).

The prevalence of hypertension increased with age-22.2% (95% CI: 17.7 to 27.3) for 18-29; 26.8% (95% CI: 21.4 to 32.7) for 30-44; 52.3% (95% CI: 39.5 to 64.9) for 45-59 and 60% (95% CI: 32.3 to 83.7) for those 60 years above.

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For different levels of education, the prevalence of hypertension was higher among those with post-graduate degrees compared to those who only completed secondary school (50% versus 27.7% diff= 22.3% [95% CI: -2.9 to 47.5]) but was not statistically significant.

Across all ethnic groups, prevalence of hypertension was not observed to be different.

With regards to marital status, the prevalence of hypertension was relatively higher in those widowed compared to others (50% versus 27.3% diff= 22.7% [95% CI: -6.9 to 46]) but was not statistically significant.

The prevalence of hypertension across different employment categories was almost similar to the overall prevalence but significantly higher among those retired, 62.5% versus 27.5% diff= 34.9% [95% CI: 1.2 to 68.7]).

Prevalence of hypertension was generally higher among high income earners (36.4% (95% CI: 24.9-49.1) for N61000-N100000; 46.2% (95% CI: 19.2-74.9) for >N100000.

Table 7b: Blood Pressure of PHC clients in rural and urban PHCs in FCT

Blood pressure class	Overall(n=640) n(%)	Urban(n=384) n(%)		Rural(n=256) n(%)	
		Male n= 190	Female n=194	Male n=123	Female n=133
Median SBP(mmhg)	120(110,130)	120(118.3,130)	120(110,130)	120(106.3,130)	117(100,126.7)
Median DBP(mmhg)	78.3(70,80)	80(70,84.7)	73.3(70,80)	80(70,86.7)	76.7(70,80)
Hypertension(SBP≥140 or /and DBP≥90 or known hypertensive with controlled BP)(%)(95% CI)	179(27.9) (24.5- 31.6)	62(32.6)(27.4-42.8)	52(26.8)(21.8-37.2)	39(31.7)(14.5-29.9)	26(19.5)(7.3-22.7)
P value for trend	0.065	0.221		0.031	
Hypertension(SBP≥160 or /and DBP≥90 or known hypertensive with controlled BP)	146(22.8)(19.6-26.3)	50(26.3)(26-43)	43(22.1)(21.2-38.2)	31(25.2)(13-30)	22(16.5)(6.8-23.9)
P value for trend	0.337	0.404		0.092	

Data are presented as median (25th, 75th percentiles) or as number of participants (percentages)

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Table 7c: Socio-demographic characteristics and distribution of hypertension

Factor	N(Total)	Hypertension Yes (n=179) (n%; 95% CI)	No (n=461) n(%; 95% CI)	P-value
Sex				**0.02**
Male	313	101(32.3%; 27.1-37.8)	212(67.7%;62.2-72.9)	
Female	327	78(23.9%;19.3-28.9)	249(76.1%;71.1-80.7)	
Age(years)				**<0.0001**
18-29	306	68(22.2%;17.7-27.3)	238(77.8%;72.7-82.3)	
30-44	254	68(26.8%;21.4-32.7)	186(73.2%;67.3-78.6)	
45-59	65	34(52.3%;39.5-64.9)	31(47.7%;35.1-60.5)	
>60	15	9(60%;32.3-83.7)	6(40%;16.3-67.7)	
Highest level of education				**0.213**
No formal schooling	62	15(24.2%;14.2-36.7)	47(75.8%;63.3-85.8)	
Less than primary school	11	1(9.1%;0.2-41.3)	10(90.9%;58.7-99.8)	
Primary school completed	63	13(20.6%;11.5-32.7)	50(79.4%;67.3-88.5)	
Secondary school	220	61(27.7%;21.9-34.1)	159(72.3%;65.9-78.1)	
High school completed	111	35(31.5%; 23-41)	76(68.5%;59-77)	
College/University	157	46(29.3%;22.3-37.1)	111(70.7%;62.9-77.7)	
Postgraduate degree completed	16	8(50%;24.7-75.3)	8(50%;24.7-75.3)	
Ethnic group				**0.386**
Yoruba	67	17(25.4%;15.5-37.5)	50(74.6%;62.5-84.5)	
Igbo	65	15(23.1%;13.5-35.2)	50(76.9%;64.8-86.5)	
Hausa	59	14(23.7%;13.6-36.6)	45(76.3%;63.4-86.4)	
Nupe	48	12(25%;13.6-39.6)	36(75%;60.4-86.4)	
Igala	40	9(22.5%;10.8-38.5)	31(77.5%;61.5-89.2)	
Bassa	37	6(16.2%;6.2-32)	31(83.8%;68-93.8)	
Gbagyi	34	10(29.4%;15.1-47.5)	24(70.6%;52.5-84.9)	
Ganagana	33	10(30.3%;15.6-48.7)	23(69.7%;51.3-84.4)	
Others	257	86(33.5%;27.7-39.6)	171(66.5%;60.4-72.3)	
Marital Status				**0.035**
Never married	241	54(22.4%;17.3-28.2)	187(77.6%;71.8-82.7)	
Currently married	368	112(30.4%;25.8-35.4)	256(69.6%;64.6-74.2)	
Separated	8	3(37.5%;8.5-75.5)	5(62.5%;24.5-91.5)	
Divorced	4	1(25%;0.6-80.6)	3(75%;19.4-99.4)	
Widowed	18	9(50%;26-74)	9(50%;26-74)	
Cohabiting	1	0	1(100%;2.5-100)	
Employment status				**0.0006**
Government Employee	196	73(37.2%;30.5-44.4)	123(62.8%;55.6-69.5)	
Non-Government Employee	74	18(24.3%;15.1-35.7)	56(75.7%;64.3-84.9)	
Self-employed	163	45(27.6%;20.9-35.1)	118(72.4%;64.9-79.1)	
Non-paid	18	4(22.2%;6.4-47.6)	14(77.8%;52.4-93.6)	
Student	114	18(15.8%;9.6-23.8)	96(84.2%;76.2-90.4)	
Homemaker	19	2(10.5%;1.3-33.1)	17(89.5%;66.9-98.7)	
Retired	8	5(62.5%;24.5-91.5)	3(37.5%;8.5-75.5)	
Unemployed(able to work)	35	10(28.6%;14.6-46.3)	25(71.4%;53.7-85.4)	
Unemployed(unable to work)	13	4(30.8%;9.1-61.4)	9(69.2%;38.6-90.9)	
Average Monthly income(Naira)				**0.059**
<20,999	183	57(31.1%;24.5-38.4)	126(68.9%;61.6-75.5)	
21,000-60,999	229	60(26.2%;20-6-32.4)	169(73.8%;67.6-79.4)	
61,000-100,000	66	24(36.4%;24.9-49.1)	42(63.6%;50.9-75.1)	
>100,000	13	6(46.2%;19.2-74.9)	7(53.8%;25.1-80.8)	
Not available	149	32(21.5%;15.2-28.9)	117(78.5%;71.1-84.8)	

Data are presented as number of participants (percentages)

7.2.3 Prevalence of categories of cascade of hypertension care among hypertensive FCT PHC clients

The hypertension care cascade among those that are hypertensive in this study was grouped into the following categories: (1) Screened and unscreened (2) diagnosed and undiagnosed (3) treated and untreated (4) controlled and uncontrolled.

A summarised result of hypertension care cascade analysis for FCT PHC clients is presented in figure 7a below. As described above screening is the first stage. Among clients with hypertension only 64.8% reported that they had been screened for hypertension in the past (leaving a loss of 35.2% to care). Among those who have been screened, only 66.4% had been diagnosed i.e. told by a healthcare worker to have hypertension (leaving a loss of 33.6% to care). Among those diagnosed, only 58.4% are currently being treated or took medications in the last 2 weeks (leaving a loss of 41.6% to care). Among those treated only 37.8% had controlled blood pressure (i.e. BP< 140/90) (leaving a loss of 62.2% to care).

The following paragraphs describe different levels in the care cascade in relation to selected socio- demographic factors.

Figure 7a: Summary of hypertension care cascade for FCT PHC clients

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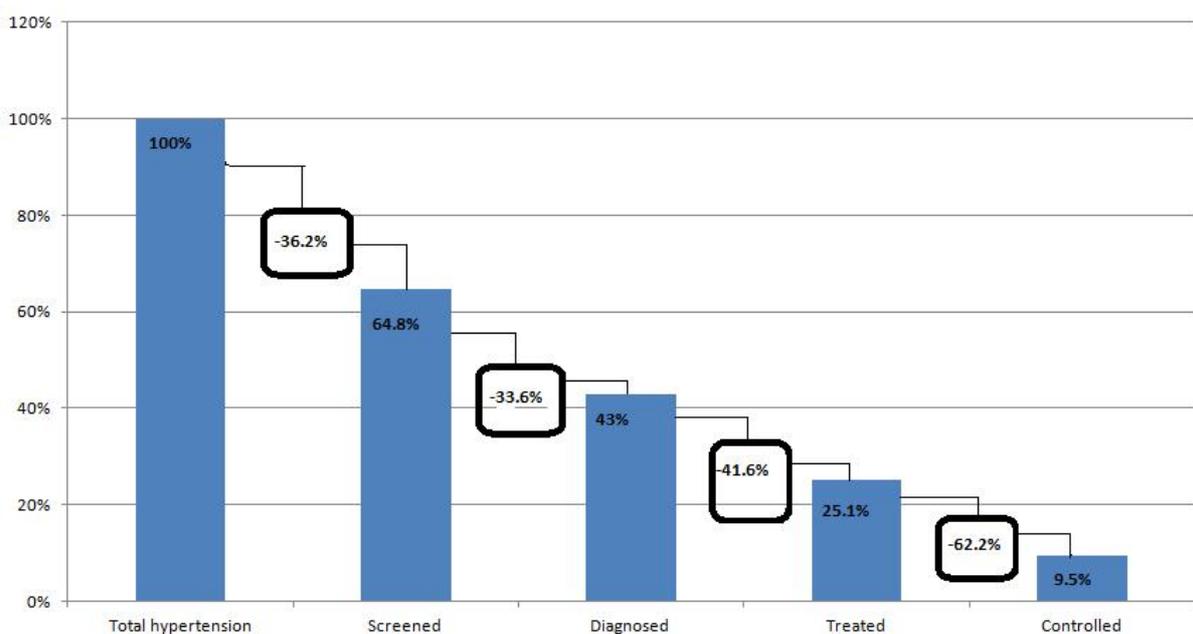
Figure 7a was adapted from Berry M et al [197].

7.2.3.1 Screened and un-screened among those with hypertension

"Unscreened" refers to those with hypertension who haven't had their blood pressure measured before. "Screened" are those that have had BP measured before. See table 7d below.

Overall, among those with blood pressure ≥140/90 in this study, only 64.8% (95% CI: 57.3 to 71.8) had been screened before while 35.2% (95% CI: 28.2 to 42.7) had never had their blood pressure measured before. Overall, there were more unscreened males compared to females (42.6% versus 25.6%, diff= 16.9% [95% CI: 3.3 to 30.6]). In both urban and rural areas there were more unscreened males compared to females, (37.1% versus 21.2%, diff= 15.9% [95% CI: -0.4 to 32.3]) and (51.3% versus 34.6%, diff= 16.7% [95% CI: -7 to 40.7]) respectively but the differences were not statistically significant.

Table 7d: Proportion of screened and un-screened among those with hypertension

Screening Status	Overall (N=179) (n%;95%CI)	P-value	Urban (n=114) (n%;95%CI)		P-value	Rural (n=65) (n%;95%CI)		P-value
		0.052	Male n= 62	Female n=52	0.069	Male n=39	Female n=26	0.212
Screened	116(64.8%;57.3-71.8)		39(62.9%;49.7-74.8)	41(78.8%;65.3-88.9)		19(48.7%;32.4-65.2)	17(65.4%;44.3-82.8)	
Unscreened	63(35.2%;28.2-42.7)		23(37.1%;25.2-50.3)	11(21.2%;11.1-34.7)		20(51.3%;34.8-67.6)	9(34.6%;17.2-55.7)	

Data are presented as number of participants (percentages)

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7.2.3.2 Diagnosed and undiagnosed among those with hypertension

"Diagnosed" refers to those who have been previously diagnosed i.e. told by health worker to be hypertensive within the last 12 months. "Undiagnosed" are those who have been screened but no prior diagnosis of hypertension within the last 12 months. See Table 7e below. The prevalence of undiagnosed urban males was more than urban females (42.5% versus 31.7%, diff= 10.8% [95% CI: -10.1 to 31.7]) but not statistically significant. Conversely, in rural areas there were more undiagnosed females compared to males (37.5% versus 15.8%, diff= 21.7% [95% CI: -7.1 to 50.5]) but this was not statistically significant.

Table 7e: Proportion of diagnosed and undiagnosed among those with hypertension

Hypertension diagnosis	Overall (N=116) (N%;95%CI)	p-value	Urban (n=81) (n%;95%CI)		p-value	Rural (n=35) (n%;95%CI)		p-value
		0.287	Male n= 40	Female n=41	0.363	Male n=19	Female n=16	0.245
Diagnosed	77(66.4%;57-74.9)		23(57.5%;40.9-73)	28(68.3%;51.9-81.9)		16(84.2%;60.4-96.6)	10(62.5%;35.4-84.8)	
Undiagnosed	39(33.6%;25-43)		17(42.5%;27-59.1)	13(31.7%;18.1-48.1)		3(15.8%;3.4-39.6)	6(37.5%;15.2-64.6)	

Data are presented as number of participants (percentages).

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7.2.3.3 Treated and untreated among those previously diagnosed of hypertension

"Untreated" refers to those with BP≥140/90 and previously diagnosed hypertensive but have not been on any medication in the last 2weeks."Treated" refers to those diagnosed with hypertension and using medications for hypertension at least within the last 2 weeks. See table 7f. Overall, 41.6% (95% CI: 30.4 to 53.4) of those previously diagnosed with hypertension were untreated. In both rural (52.9% versus 20% diff= 32.9% [95% CI: -1.4 to 67.2]) and urban (45.5% versus 39.3%, diff= 6.2% [95% CI: -21 to 33.7]) areas there were more males with untreated hypertension compared to females but these findings were not statistically significant.

Table 7f: Proportion of treated and untreated among those previously diagnosed of hypertension

Hypertension treatment status	Overall (N=77) (N%;95%CI)	P-value	Urban (n=50)(n%;95%CI)		P-value	Rural (n=27)(n%;95%CI)		P-value
		1	Male n= 22	Female n=28	0.775	Male n=17	Female n=10	0.124
Treated	45(58.4%;46.6-69.6)		12(54.5%;32.2-75.6)	17(60.7%;40.6-78.5)		8(47.1%;23-72.2)	8(80%;44.4-97.5)	
Untreated	32(41.6%;30.4-53.4)		10(45.5%;24.4-67.8)	11(39.3%;21.5-59.4)		9(52.9%;27.8-77)	2(20%;2.5-55.6)	

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7.2.3.4 Those with controlled and uncontrolled BP among those on treatment for hypertension

"Controlled" refers to those previously diagnosed hypertensive and on treatment with blood pressure less than 140/90. "Uncontrolled" refers to those previously diagnosed hypertensive and on treatment but whose blood pressure was greater than 140/90. See table 7g below.

Overall, 62.2% (95% CI: 46.5 to 76.2) of those on treatment have uncontrolled blood pressure. In urban areas there were more females with uncontrolled BP compared to males (64.7% versus 58.3%, diff= 6.4% [95% CI: -42.3 to 29.6]). On the contrary, in rural areas, there were more males with uncontrolled BP compared to females (75% versus 50%, diff= 25% [95% CI: -20.8 to 70.8]). But these estimates were not statistically significant.

Table 7g: Proportion of those with controlled and uncontrolled blood pressure (BP) among those on treatment

BP control status	Overall (N=45) (n%;95%CI)	P-value	Urban (n=29)(n%;95%CI)		P-value	Rural (n=16) (n%;95%CI)		P-value
		1	Male n= 12	Female n=17	1	Male n=8	Female n=8	0.608
Controlled	17(37.8%;23.8-53.5)		5(41.7%;15.2-72.3)	6(35.3%;14.2-61.7)		2(25%;3.2-65.1)	4(50%;15.7-84.3)	
Uncontrolled	28(62.2%;46.5-76.2)		7(58.3%;27.7-84.8)	11(64.7%;38.3-85.8)		6(75%;34.9-96.8)	4(50%;15.7-84.3)	

Data are presented as number of participants (percentages)

7.3. Prevalence of behavioural and other biological risk factors

The prevalence of behavioural and other biological risk factors with socio-demographic characteristics are presented in Tables 7h and 7i.

7.3.1 Tobacco Consumption

The overall prevalence of current smoking among FCT PHC clients was 10.8% (95% CI: 8.5-13.4). The prevalence of smoking among rural compared to urban dwellers was 13.3% versus 9.1% (diff= 4.1% [95% CI: -9.2 to 0.8]). Overall, the prevalence of smoking among males was higher than that of females 13.7% versus 7.9% (diff= 5.7% [95% CI: 0.9 to 10.6]). The prevalence of smoking was highest among those aged 45-59 years old, 13.8% (95% CI: 6.5 to 24.7). Those who had less than primary school education had the higher prevalence of smoking compared to others 36.4% versus 10.3% (diff= 26% [95% CI: -2.5 to 54.6]) but was not statistically significant. The prevalence of smoking was highest among the Ganagana ethnic group compared to other ethnic groups 15.2% versus 10.5% (diff= 4.6% [95% CI: -7.8 to 17.1]) but was not statistically significant.

7.3.2 Alcohol Consumption

Harmful alcohol intake for males was defined as those who took more than 60g of alcohol on average per occasion while for females was defined as those who took more than 40g on average per occasion. Overall, very few number 1.3% (95% CI: 0.5 to 2.4) of participants consumed alcohol in harmful quantities. The prevalence of harmful alcohol intake was not observed to be different across urban and rural areas. The prevalence of harmful alcohol intake among males was 1.9% (95%CI: 0.7 to 4.1) and 0.6% (95%CI: 0.1 to 2.2) among females. The prevalence of harmful alcohol consumption was highest among those aged 18-29 years old (1.6% (95CI%:49.1 to 60.6).

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7.3.3. Physical inactivity

The WHO recommendations for physical activity are as follows: throughout a week, including activity for work, during transport and leisure time, adults should do at least

- 150 minutes of moderate-intensity physical activity OR
- 75 minutes of vigorous-intensity physical activity OR
- An equivalent combination of moderate- and vigorous-intensity physical activity achieving at least 600 MET-minutes

For this study, MET-minutes were used to express the intensity of physical activities.

METs (Metabolic Equivalents) are commonly used to express the intensity of physical activities, and are also used for the analysis of Global Physical Activity Questionnaire (GPAQ) data. For the analysis of GPAQ data, existing guidelines have been adopted: It is estimated that, compared to sitting quietly, a person's caloric consumption is four times as high when being moderately active, and eight times as high when being vigorously active.

Therefore, for the calculation of a person's total physical activity using GPAQ data, the following MET values are used:

Domain	MET value
Work	• Moderate MET value = 4.0 • Vigorous MET value = 8.0
Transport	Cycling and walking MET value = 4.0
Recreation	• Moderate MET value = 4.0 • Vigorous MET value = 8.0

For example if a participant cycled to work for 10 minutes every day, the MET-minutes is equal to 40(10x4). Also if a participant did strenuous farm work for 60 minutes daily, the MET-minutes is 480 (60x8). Hence Total MET-minutes for this participant per day is 520 (40+480).

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Overall, 55.3% (95CI: 51.4 to 59.2) of participants were physically inactive. There were more participants in urban areas compared to rural areas 65.9% versus 39.4% (diff= 26.4% [95%CI: 18.7 to 34]) not meeting World Health Organisation (WHO) recommendations on physical activity for health. There were more physically inactive females compared to males 62.9% versus 47.3% (diff= 15.7% [95%CI: 8.1 to 23.3]). There was no association between hypertension and physical activity. But, those who had post-graduate degrees had the highest prevalence of physical inactivity (62.5% (95%CI: 35.4 to 84.8). The prevalence of inactivity was not observed to be different across all ethnic groups. There was no association between physical activity and marital status but those who are widowed had the highest prevalence of inactivity, 72.2% (95%CI: 46.5 to 90.3). The prevalence of inactivity among the highest income group (>N100000) was higher compared to other income groups 76.9% versus 54.9% (diff= 22.1% [95%CI: 1.2 to 45.2])

7.3.4 Inadequate intake of fruits and vegetables

According to WHO recommendations' consuming less than five servings of fruit and/or vegetables on average per day is inadequate. Participants in this study were analysed using this criterion.

Overall, 65.9% (95%CI: 62.1 to 69.6) of participants were taking fewer than 5 servings of fruits and vegetables per day. Prevalence of low fruit and vegetable intake was higher in urban areas compared to rural areas 69.5% versus 60.5% (diff= 9% [95%CI: 1.4 to 16.5]). Prevalence of low fruits and vegetable intake was significantly higher in males compared to females 73.2% versus 59% (diff= 14.2% [95%CI: 6.9 to 21.4]). The prevalence of low fruit and vegetable intake was highest among the age group 30-44 years old (74.0% [95%CI: 68.2 to 79.3]. The prevalence of inadequate vegetable and fruit intake was not associated with ethnic group. Prevalence of low fruit and vegetable intake was higher in the highest income group compared to other income groups 92.3% versus 65.4% (diff= 26.9% [95%CI: 11.9 to 41.9]).

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7.3.5 Obese or Overweight

Being overweight or obese was assessed using BMI (body mass index) calculations. Based on WHO recommendations, BMI > 25kg/m^2 was considered overweight and BMI >30kg/m^2 obese. In this analysis, everyone with BMI>25 was considered overweight or obese. Overall 41.9% (95%CI: 38 to 45.8) of all participants were overweight or obese. The prevalence of obese or overweight in urban areas and rural areas were 44.0% (95%CI: 39 to 49.1) and 38.7% (95%CI: 32.7 to 44.9) respectively. The prevalence of obese or overweight in males and females were 41.2% (95%CI: 35.7-46.9) and 42.5% (95%CI: 37.1-48.1) respectively. Those aged 30-44 years old had a higher prevalence of overweight or obesity compared to others age groups 48.0% versus 37.8%(diff= 10.2% [95%CI: 2.4 to 18]). The Igbo ethnic group had a higher prevalence of overweight or obesity compared to other ethnic groups 60% versus 39.8% (diff= 20.2% [95%CI: 7.6 to 32.7]). Prevalence of obesity or overweight was higher among government employees compared to other employment statuses- 53.1% versus 36.9% (diff= 10.2% [95%CI: 2.4 to 18). There was no association between income and prevalence of overweight or obese status. But prevalence of overweight and obesity seem to increase with increase in income earnings: N<20999 (38.3% [95%CI: 31.2 to 45.7]); N21000 to 60999 (44.1% [95%CI: 37.6 to 50.8]); N61000 to 100000 (54.5% [95%CI: 41.8 to 66.9]).

7.3.6 Diabetes

The general prevalence of diabetes (self-reported) in the study population was 3.6% (95%CI: 2.3 to 5.3). The prevalence of diabetes was not associated with sex or dwelling area, although the low prevalence of diabetes means that these comparisons have low power. The prevalence of diabetes was higher in those greater than 60 years old compared to others, 20% versus 3.2% (diff= 21.8% [95%CI: -2.7 to 46.4]) but was not statistically significant. But, there was a significant difference in prevalence of diabetes between those who had completed post

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graduate degrees compared to other levels of education, 25% versus 3% (diff= 30.3% [95%CI: 3.6 to 57]).

Table 7h: Distribution of NCDs (hypertension & Diabetes) and their risk factors among PHC clients

Variable	Overall(n=640) (n%;95%CI)	Urban(n=384) (n%;95%CI)	Rural(n=256) (n%;95%CI)	Male(n=313) (n%;95%CI)	Female(n=327) (n%;95%CI)
Hypertension(SBP≥140 or /and DBP≥90 or known hypertensive with controlled BP)					
Yes	179(27.9%; 24.5-31.6)	114(29.7%; 25.2-34.5)	65(25.3% ;20.2-31.2)	101(32.3% ;27.1-37.8)	78(23.9%;19.3-28.9)
No	461(72.1%; 68.4-75.5)	270(70.3%; 65.5-74.8)	191(74.7% ;68.8-79.8)	212(67.7% ;62.2-72.9)	249(76.1%;71.1-80.7)
P value		**0.244**		**0.022**	
Diabetes(self-reported)					
Yes	23(3.6%; 2.3-5.3)	18(4.7%; 2.8-7.3)	5(1.9%; 0.6-4.5)	14(4.5% ;2.5-7.4)	9(2.8%;1.3-5.2)
No	617(96.4%; 94.7-97.7)	366(95.3% ;92.7-97.2)	251(98.1% ;95.5-99.4)	299(95.5% ;92.6-97.5)	318(97.2%;94.8-98.7)
P value		**0.083**		**0.291**	
Physical Inactivity					
Yes	354(55.3%; 51.4-59.2)	253(65.9% ;60.9-70.6)	101(39.4% ;33.4-45.7)	148(47.3% ;41.6-53)	206(62.9%;50.9-61.3)
No	286(44.7%; 40.8-48.6)	131(34.1% ;29.4-39.1)	155(60.6% ;54.3-66.6)	165(52.7%; 47-58.4)	121(37.1%;38.7-49.1)
P value		**<0.0001**		**<0.0001**	
Harmful Alcohol use					
Yes	8(1.3%; 0.5-2.4)	4(1.0% ;0.3-2.6)	4(1.6% ;0.4-4)	6(1.9% ;0.7-4.2)	2(0.6%;0.1-2.2)
No	632(98.7%; 97.6-99.5)	380(99% ;97.4-99.7)	252(98.4% ;96-99.6)	304(98.1%; 95.8-99.3)	325(99.4%;97.8-99.9)
P value		**0.719**		**0.167**	
Current daily smoking					
Yes	69(10.8%; 8.5-13.4)	35(9.1% ;6.4-12.4)	34(13.3% ;9.4-18.1)	43(13.7%;10.1-18.1)	26(7.9%;5.3-11.4)
No	571(89.2%; 86.6-91.5)	349(90.9% ;87.6-93.6)	222(86.7% ;81.9-90.6)	270(86.3%;81.9-89.9)	301(92.1%;88.6-94.7)
P value		**0.118**		**0.022**	
Inadequate intake of fruits and vegetables					
Yes	422(65.9% ;62.1-69.6)	267(69.5% ;64.7-74.1)	155(60.5% ;54.3-66.6)	229(73.2%;67.9-78)	193(59.0%;53.5-64.4)
No	218(34.1% ;30.4-37.9)	117(30.5% ;25.9-35.3)	101(39.5% ;33.4-45.7)	84(26.8%;22-32.1)	134(41.0%;35.6-46.5)
P value		**0.022**		**0.0002**	
Obese or Overweight					
Yes	268(41.9% ; 38-45.8)	169(44.0% ;39-49.1)	99(38.7% ;32.7-44.9)	129(41.2%;35.7-46.9)	139(42.5%;37.1-48.1)
No	372(58.1% ;54.2-62)	215(56% ;50.9-61)	157(61.3% ;55.1-67.3)	184(58.8%;53.1-64.3)	188(57.5%;51.9-62.9)
P value		**0.191**		**0.749**	

Data are presented as number of participants (percentages)

Table 7i: Scale of prevalence of selected cardiovascular disease risk factors and demographic characteristics

Variable	Diabetes (n%;95%CI)	Physical Inactivity (n%;95%CI)	Harmful Alcohol use (n%;95%CI)	Current daily smoking (n%;95%CI)	Inadequate intake of fruits and vegetables (n%;95%CI)	Obese or Overweight (n%;95%CI)
Male	14(4.5%;2.5-7.4)	148(47.3%;41.6-53)	6(1.9%;0.7-4.1)	43(13.8%;10.1-18.1)	229(73.2%;67.9-78)	129(41.2%;35.7-46.9)
Female	9(2.8%;1.3-5.2)	206(63%;57.5-68.2)	2(0.6%;0.1-2.2)	26(8%;5.3-11.4)	193(59%;53.5-64.4)	139(42.5)(37.1-48.1)
P value	**0.291**	**0.00007**	**0.168**	**0.021**	**0.0002**	**0.749**
Age(years)						
18-29	6(2%;0.7-4.2)	168(54.9%;49.1-60.6)	5(1.6%;49.1-60.6)	34(11.1%;7.8-15.2)	188(61.4%;55.7-66.9)	112(36.6%;31.2-42.3)
30-44	10(3.9%;1.9-7.1)	149(58.7%;52.3-64.8)	2(0.8%;0.1-2.8)	25(9.8%;6.5-14.2)	188(74.0%;68.2-79.3)	122(48.0%;41.7-54.4)
45-59	4(6.2%;1.7-15)	31(47.7%;35.1-60.5)	1(1.5%;0-8.3)	9(13.8%;6.5-24.7)	36(55.4%;42.5-67.7)	29(44.6%;32.3-57.5)
≥60	3(20%;4.3-48.1)	6(40%;16.3-67.7)	0	1(6.7%;0.2-31.9)	10(66.7%;38.4-88.2)	5(33.3%;11.8-61.6)
P value	**0.007**	**0.247**	**0.649**	**0.779**	**0.71**	**0.005**
Highest level of education						
No formal schooling	1(1.6%;0-8.7)	28(45.2%;32.5-58.3)	0	6(9.7%;3.6-19.9)	38(61.3%;48.1-73.4)	19(30.6%;19.6-43.7)
Less than primary school	0	5(45.5%;16.7-76.6)	0	4(36.4%;10.9-69.2)	5(45.5%;16.7-76.6)	3(27.3%;6-61)
Primary school completed	1(1.6%;0-8.5)	26(41.3%;29-54.4)	0	6(9.5%;3.6-19.6)	36(57.1%;44-69.5)	25(39.7%;27.6-52.8)
Secondary school completed	6(2.7%;1-5.8)	131(59.5%;52.7-66.1)	2(0.9%;0.1-3.2)	16(7.3%;4.2-11.5)	165(75%;68.7-80.6)	85(38.6%;32.2-45.4)
High school completed	7(6.3%;2.6-12.6)	60(54.1%;44.3-63.6)	2(1.8%;0.2-6.4)	11(9.9%;5.1-17)	67(60.4%;50.6-69.5)	51(45.9%;36.4-55.7)
College/University completed	4(2.5%;0.7-6.4)	94(59.9%;51.8-67.6)	3(1.9%;0.4-5.5)	25(15.9%;10.6-22.6)	104(66.2%;58.3-73.6)	77(49.0%;41-57.1)
Postgraduate degree completed	4(25%;7.3-52.4)	10(62.5%;35.4-84.8)	1(6.3%;0.2-30.2)	1(6.3%;0.2-30.2)	7(43.8%;19.8-70.1)	8(50%;24.7-75.3)
P value	**0.017**	**0.077**	**0.417**	**0.033**	**0.005**	**0.136**
Ethnic group						
Yoruba	1(1.5%;0-8)	37(55.2%;42.6-67.4)	1(1.5%;0-8)	10(14.9%;7.4-25.7)	42(62.7%;50-74.2)	31(46.3%;34-58.9)
Igbo	2(3.1%;0.4-10.7)	35(53.8%;41-66.3)	2(3.1%;0.4-10.7)	8(12.3%;5.5-22.8)	39(60%;47.1-72)	39(60%;47.1-72)
Hausa	2(3.4%;0.4-11.7)	29(49.2%;35.9-62.5)	0	5(8.5%;2.8-18.7)	35(59.3%;45.7-71.9)	22(37.3%;25-50.9)
Nupe	2(4.2%;0.5-14.3)	29(60.4%;45.3-74.2)	0	0	35(72.9%;58.2-84.7)	25(52.1%;37.2-66.7)
Igala	0	29(72.5%;56.1-85.4)	0	0	30(75%;58.8-87.3)	14(35%;20.6-51.7)
Bassa	1(2.7%;0.1-14.2)	16(43.2%;27.1-60.5)	0	0	25(67.6%;50.2-82)	10(27%;13.8-44.1)
Gbagyi	0	13(38.2%;22.2-56.4)	0	4(11.8%;3.3-27.5)	20(58.8%;40.7-75.4)	15(44.1%;27.2-62.1)
Ganagana	2(6.1%;0.7-20.2)	15(45.5%;28.1-63.6)	0	5(15.2%;5.1-31.9)	22(66.7%;48.2-82)	8(24.2%;11.1-42.3)
Others	13(5.1%;2.7-8.5)	151(58.8%;52.5-64.8)	5(1.9%;0.6-4.5)	37(14.4%;10.3-19.3)	174(67.7%;61.6-73.4)	104(40.5%;34.4-46.7)
P value	**0.763**	**0.076**	**0.899**	**0.0005**	**0.521**	**0.016**
Marital status						

Never married	7(2.9%;1.2-5.9)	134(55.6%;49.1-62)	5(2.1%;0.7-4.8)	20(8.3%;5.1-12.5)	158(65.6%;59.2-71.5)	84(34.9%;28.9-41.2)
Currently married	15(4.1%;2.3-6.6)	198(53.8%;48.6-59)	2(0.5%;0.1-1.9)	43(11.7%;8.6-15.4)	240(65.2%;60.1-70.1)	171(46.5%;41.3-51.7)
Separated	0	6(75%;34.9-96.8)	0	2(25%;3.2-65.1)	4(50%;15.7-84.3)	5(62.5%;24.5-91.5)
Divorced	0	2(50%;6.8-93.2)	0	0	4(100%;39.8-100)	3(75%;19.4-99.4)
Widowed	1(5.6%;0.1-27.3)	13(72.2%;46.5-90.3)	1(5.6%;0.1-27.3)	4(22.2%;6.4-47.6)	15(83.3%;58.6-96.4)	4(22.2%;6.4-47.6)
Cohabiting	0	1(100%;2.5-100)	0	0	1(100%;2.5-100)	1(100%;2.5-100)
P value	**0.666**	**0.490**	**0.152**	**0.183**	**0.323**	**0.004**
Employment Status						
Government Employee	14(7.1%;4-11.7)	120(61.2%;54-68.1)	1(0.5%;0-2.8)	25(12.8%;8.4-18.3)	124(63.3%;56.1-70)	104(53.1%;45.8-60.2)
Non-Government Employee	1(1.4%;0-7.3)	36(48.6%;36.9-60.6)	0	4(5.4%;1.5-13.3)	44(59.5%; 41-70)	33(44.6%;47.4-70.7)
Self-employed	3(1.8%;20.3-34.5)	70(42.9%;35.2-50.9)	3(1.8%;0.4-5.3)	23(14.1%;9.2-20.4)	104(63.8%;55.9-71.2)	65(39.9%;32.3-47.8)
Non-paid	0	9(50%;26-74)	0	1(5.6%;0.1-27.3)	12(66.7%;41-86.7)	2(11.1%;1.4-34.7)
Student	3(2.6%;0.5-7.5)	72(63.2%;53.6-72)	3(2.6%;0.5-7.5)	11(9.6%;4.9-16.6)	85(74.6%;65.6-82.3)	33(28.9%;20.8-38.2)
Homemaker	0	12(63.2%;38.4-83.7)	0	1(5.3%;0.1-26)	15(78.9%;54.4-93.9)	8(42.1%;20.3-66.5)
Retired	1(12.5%;0.3-52.7)	5(62.5%;24.5-91.5)	0	0	5(62.5%;24.5-91.5)	4(50%;15.7-84.3)
Unemployed(able to work)	1(2.9%;0.1-14.9)	21(60%;42.1-76.1)	1(2.9%;0.1-14.9)	3(8.6%;1.8-23.1)	26(74.3%;56.7-87.5)	17(48.6%;31.4-66)
Unemployed(unable to work)	0	9(69.2%;38.6-90.9)	0	1(7.7%;0.2-36)	7(53.8%;25.1-80.8)	2(15.4%;1.9-45.4)
P value	**0.105**	**<0.000**	**0.568**	**0.525**	**0.326**	**0.0003**
Average monthly income(Naira)						
<20,999	7(3.8%;1.6-7.7)	93(50.8%;43.3-58.3)	6(3.3%;1.2-7)	16(8.7%;5.1-13.8)	121(66.1%;58.8-72.9)	70(38.3%;31.2-45.7)
21,000-60,999	6(2.6%;1-5.6)	119(51.9%;45.3-58.6)	1(0.4%;0-2.4)	29(12.7%;8.6-17.7)	143(62.4%;55.8-68.7)	101(44.1%;37.6-50.8)
61,000-100,000	2(3.0%;0.4-10.5)	32(48.5%;36-61.1)	1(1.5%;0-8.2)	10(15.2%;7.5-26.1)	36(54.5%;41.8-66.9)	36(54.5%;41.8-66.9)
>100,000	1(7.7%;0.2-36)	10(76.9%;46.2-95	0	2(15.4%;1.9-45.4)	12(92.3%;64-99.8)	7(53.8%;25.1-80.8)
Not available	7(4.7%;1.9-9.4)	100(67.1%;59-74.6)	0	12(8.1%;4.2-13.6)	110(73.8%;66-80.7)	54(36.2%;28.5-44.5)
P value	**0.579**	**0.005**	**0.551**	**0.359**	**0.009**	**0.073**

Data are presented as number of participants (percentages)

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7.4 Summary of combined Risk Factors in study participants

According to WHO STEPS analysis guide, summary of combined risk factors refers to percentage of respondents with 0, 1-2, or 3-5 of the following risk factors:

- Current daily smoking
- Less than five servings of fruit and/or vegetables per day
- Not meeting WHO recommendations on physical activity for health (<150 minutes of moderate activity per week, or equivalent)
- Overweight or obese (BMI ≥ 25 kg/m^2)
- Raised BP (SBP ≥ 140 and/or DBP ≥ 90 mmHg or currently on medication for raised BP).

The prevalence of multiple risk factors in study participants stratified by demographic factors is presented in table 10 while overall prevalence of multiple risk factors among FCT PHC clients is presented in figure 1. Overall a small proportion of participants, 9.1% (95%CI: 7 to 11.6) were free of cardiovascular risk factors. Most participants had 1 or 2 risk factors (58.4% [95%CI: 54.5 to 62.3]) while about 1 in 3 participants (32.3% [95%CI: 28.7 to 36.1]) had 3 to 5 risk factors. Also, overall for each level of socio-demographic characteristics, those with 1 or 2 risk factors were the most prevalent, followed by those with 3 to 5 risk factors and those with no risk factors. However, this pattern was reversed in those with post graduate education (1 or 2 risk factors= 31.3%[95%CI: 11 to 58.7] ;3-5 risk factors= 50% [95%CI: 24.7 to 75.3]) and in high income earners(>NGN100000)(1 or2 risk factors= 3.1%[95%CI: 9.1 to 61.4]; 3 to 5 risk factors= 69.2%[95%CI: 38.6 to 90.9]. Moreover, there was no observed difference in the proportion of risk factors between male and female participants. However, it was observed that with increasing age the proportion of those with 1 or 2 risk factors decreased but the proportion of those with 3 to 5 risk factors increased.

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Table 7j: Summary of combined cardiovascular disease risk factors and demographic characteristics

Variable	0 risk factors (n=58) (n%;95%CI)	1-2 risk factors (n=374) (n%;95%CI)	3-5 risk factors (n=207) (n%;95%CI)
Male	24(7.7%;5-11.2)	184(58.8%;53.1-64.3)	105(33.5%;28.3-39.1)
Female	34(10.4%;7.3-14.2)	190(58.1%;2.6-63.5)	102(31.2%;26.2-36.5)
P value	0.459		
Age group			
18-29	31(10.1%;7-14.1)	198(64.7%;59.1-70.1)	76(24.8%;20.1-30.1)
30-44	17(6.7%;3.9-10.5)	140(55.1%; 48.8-61.3)	97(38.2%;32.2-44.5)
45-59	7(10.8%;4.4-20.9)	31(47.7%;35.1-60.5)	27(41.5%;29.4-54.4)
>60	3(20%;4.3-48.1)	5(33.3%;11.8-61.6)	7(46.7%;21.3-73.4)
P value	0.001		
Highest level of education			
No formal schooling	8(12.9%;5.7-23.9)	40(64.5%;51.3-76.3)	14(22.6%;12.9-35)
Less than primary school	1(9.1%;0.2-41.3)	8(72.7%;39-94)	2(18.2%;2.3-51.8)
Primary school completed	12(19%;10.2-30.9)	38(60.3 %;47.2-72.4)	13(20.6%;11.5-32.7)
Secondary school completed	17(7.7%;4.6-12.1)	126(57.3%;50.4-63.9)	77(35%;28.7-41.7)
High school completed	6(5.4%; 2-11.4)	72(64.9%;55.2-73.7)	33(29.7%;21.4-39.1)
College/University completed	11(7%; 3.5-12.2)	85(54.1%;46-62.1)	60(38.2%;30.6-46.3)
Postgraduate degree completed	3(18.8%;4-45.6)	5(31.3%;11-58.7)	8(50%;24.7-75.3)
P value	p<0.001		
Ethnic group			
Yoruba	5(7.5%;2.5-16.6)	42(62.7%;50-74.2)	20(29.9%;19.3-42.3)
Igbo	6(9.2%;3.5-19)	35(53.8%;41-66.3)	23(35.4%;23.9-48.2)
Hausa	10(16.9%;8.4-29)	33(55.9%;42.4-68.8)	16(27.1%16.4-40.3)
Nupe	0	30(62.5%;47.4-76)	17(35.4%;22.2-50.5)
Igala	0	28(70%;53.5-83.4)	11(27.5%;14.6-43.9)
Bassa	4(10.8%;3-25.4)	30(81.1%;64.8-92)	7(18.9%;8-35.2)
Gbagyi	4(11.7%;3.3-27.5)	20(58.8%;40.7-75.4)	10(29.4%;15.1-47.5)
Ganagana	4(12.1%;3.4-28.2)	22(66.7%;48.2-82)	7(21.2%;9-38.9)
Others	25(9.7%;6.4-14)	134(52.1%;45.8-58.4)	96(37.4%;31.4-43.6)
P value	0.175		
Marital Status			
Never married	22(9.1%;5.8-13.5)	158(65.6%;59.2-71.5)	61(25.3%;59.2-71.5)
Currently married	35(9.5%;37.8-48.2)	203(55.2%;71.5-83.3)	129(35.1%;56.5-70.2)
Separated	0	4(50%;15.7-84.3)	4(50%;15.7-84.3)
Divorced	0	2(50%;6.8-93.2)	2(50%;6.8-93.2)
Widowed	1(5.6%;0.1-27.3)	7(38.9%;17.3-64.3)	10(55.6%;30.8-78.5)
Cohabiting	0	0	1(100%;2.5-100)
P value	0.064		
Employment Status			
Government Employee	11(5.6%;2.8-9.8)	100(51% ;43.8-58.2)	84(42.8% ;35.8-50.1)
Non-Government Employee	12(16.2%;8.7-26.6)	43(58.1% ;46.1-69.5)	19(25.7% ;16.2-37.2)
Self-employed	17(10.4%;6.2-16.2)	103(63.2% ;55.3-70.6)	43(26.4%;19.8-33.8)
Non-paid	3(16.7%; 3.6-41.4)	12(66.7% ;41-86.7)	3(16.7%;3.6-41.4)
Student	10(8.8%; 4.3-15.5)	75(65.8%;56.3-74.4)	29(25.4%; 17.7-34.4)
Homemaker	0	14(73.7%;48.8-90.9)	5(26.3%;9.1-51.2)
Retired	0	4(50% ;15.7-84.3)	4(50%;15.7-84.3)
Unemployed(able to work)	4(11.4% ;3.2-26.7)	14(40 %;23.9-57.9)	17(48.6%;31.4-66)
Unemployed(unable to work)	1(7.7% ;0.2-36)	9(69.2% ;38.6-90.9)	3(23.1%;5-53.8)
P value	0.005		
Average monthly income in Naira (n%)			

<20,999	16(8.7%;5.1-13.8)	113(61.7%;54.3-68.8)	54(29.5%;23-36.7)
21,000-60,999	23(10%;6.5-14.7)	132(57.6%;51-64.1)	73(31.9%;25.9-38.3)
61,000-100,000	9(13.6%;6.4-24.3)	30(45.5%;33.1-58.2)	27(40.9%;29-53.7)
>100,000	0	4(3.1%;9.1-61.4)	9(69.2%;38.6-90.9)
Not available	10(6.7%;3.3-12)	95(63.8%;55.5-71.5)	44(29.5%; 22.3-37.5)
P value	0.245		

Data is presented as number of participants (percentages)

Figure 7b: Prevalence of summary of combined risk factors for FCT PHC clients

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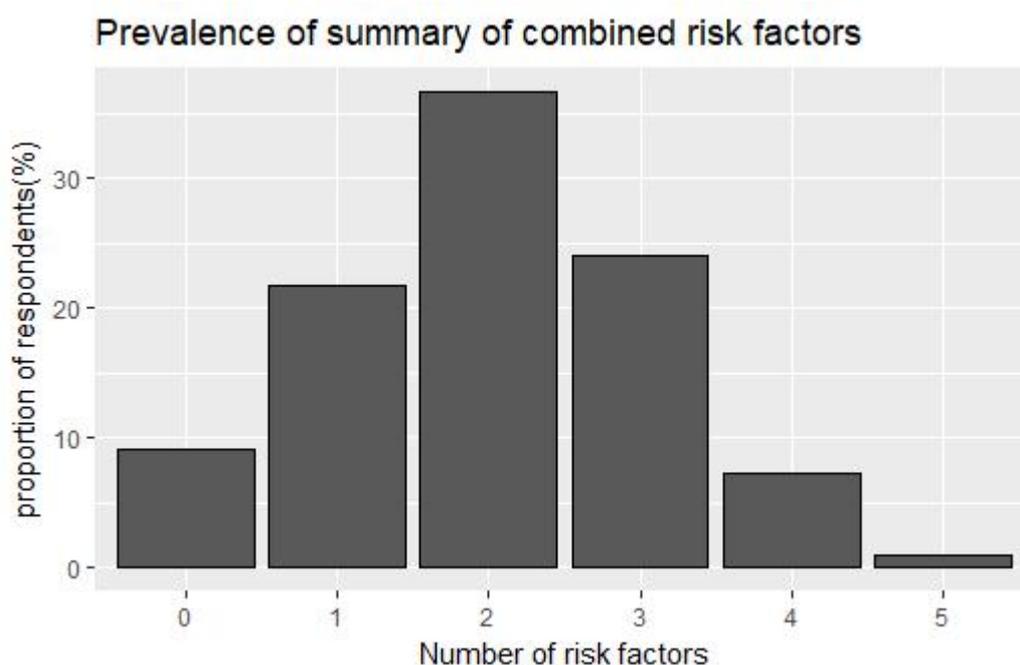
7.5. Cardiovascular disease risk levels

The cardiovascular disease risk for those aged >40 years is presented in table 7k. Cardiovascular risk was assessed using the WHO/ISH colour chart with risk levels classification as follows: green (<10%), yellow (10% to <20%), orange (20% to <30%), light red (30% to <40%) and dark red (≥40%). Overall, 94.4% (95%CI: 88.9 to 97.7) of those 40 years and older had less than 10% risk of cardiovascular events while only 5.6% (95%CI: 2.3 to 11.1) had between 10-20% risk of cardiovascular events. There was no observed difference in prevalence of risk levels across rural and urban areas and between male and female participants.

Table 7k: Cardiovascular disease risk level and selected demographic characteristics for those >40years old

Risk Level	Overall (N=126) (N%;95%CI)	P value	Urban (n=66) (n%;95%CI)		P value	Rural (n=60) (n%;95%CI)		P Value
		0.817	Male n= 35	Female n=31	1.135	Male n=33	Female n=27	0.245
Green	119(94.4%;88.9-97.7)		33(94.3%;80.8-99.3)	29(93.5%;78.6-99.2)		30(90.9%;75.7-98.1)	27(100%;87.2-100)	
Yellow	7(5.6%;2.3-11.1)		2(5.7%;0.7-19.2)	2(6.5%;0.8-21.4)		3(9.1%;1.9-24.3)	0	

CVD risk levels: Green=<10%, yellow=10%-20% based on WHO/ISH Risk prediction charts for WHO region sub-region D, Data are presented as number of participants (percentages)

7.6. Multivariable analysis using cardiovascular risk

According to the findings from table 7k above, about 94% of participants 40 years old and above had cardiovascular risk score of less than 10% while the remaining 6% of this age group had a cardiovascular risk of between 10% and 20%.

Because of the generalised low risk scores elicited, there was no value in modelling predictors of high CVD risk scores in this population sample as they all essentially had low CVD risk scores. Hence the planned multivariable analysis was not conducted.

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7.6.1 Associated risk factors of hypertension

Logistic regression analyses (providing odds ratios and 95%CI) were performed to identify associated risk factors of hypertension and to adjust for confounders such as socio-demographic variables and cardio-vascular risk factors. The initial Univariate models with all the socio-demographic characteristics and cardiovascular risk factors are presented in table 7L while the result of the final model with all the statistically significant predictors from initial model are presented in table 7m. In the initial model the following 5 variables were shown to be predictors of having hypertension; age (as continuous variable), being a student, being a homemaker, self-reported diabetes status and smoking. But in the final model, only age (as continuous variable) and self-reported diabetes were true predictors of presence of hypertension in this population. I investigated the linearity of this finding through comparing the model fit with a natural log transformed age variable but this did not provide evidence of an improved model fit (for example, the reduction in AIC was not >4).

According to Harrell et al 1996, the model presented is exploratory and may be slightly over fitted as there were 179 cases of hypertension translating to an ideal 18 (i.e. 179/10) degrees of freedom to spend on the model but there were 43 degrees of freedom in the initial model in Table 7L. However, the final results for Age and diabetes were statistically strong and so unlikely to be an artefact of over fitting.

The presence of hypertension was associated with age (OR=1.04, [95%CI: 1.02 to 1.07], P=0.001). The relative odds of having hypertension is increased by 4% for every 1 year increase in age of participants.

Regarding employment status, compared to government employees, being a student reduces the odds of having hypertension significantly (OR= 0.34, 95%CI: 0.15 to 0.75). Similarly, being a homemaker (i.e. being a housewife) compared to being a government employee reduces the relative odds of having hypertension (OR= 0.15, 95%CI: 0.02 to 0.78, P=0.045).

Smoking status was also associated with presence of hypertension. Not smoking tobacco compared to smoking tobacco reduced the odds of having hypertension (OR= 0.48, 95%CI: 0.24 to 0.95, p= 0.034).

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Further, self-reported diabetes status was associated with presence of hypertension. Not having diabetes compared to having diabetes reduces the odds of having hypertension (OR=0.31, 95%CI: 0.10 to 0.88, P=0.031).

Table 7L: Logistic regression analysis of associated risk factors of hypertension-(Initial Model)

Variable	Category	ORs	SE	P	95%CI	N
Age	As continuous	1.042	0.012	0.001*	1.017-1.068	640
Sex	Male	1(Reference)				640
	Female	0.757	0.225	0.216	0.486- 1.176	
Dwelling area	Urban	1(Reference)				640
	Rural	0.872	0.232	0.557	0.551- 1.372	
Highest level of education	No formal schooling	1(Reference)				640
	Less than primary school	0.455	1.195	0.509	0.021- 3.504	
	Primary school completed	1.044	0.579	0.941	0.337- 3.319	
	Secondary school completed	2.281	0.503	0.101	0.882- 6.434	
	High school completed	1.939	0.542	0.222	0.691- 5.866	
	College/University completed	1.656	0.521	0.334	0.614- 4.811	
	Postgraduate degree completed	3.044	0.801	0.165	0.636- 1.506	
Marital status	Never married	1(Reference)				640
	Currently married	0.632	0.271	0.089	0.371- 1.073	
	Separated	0.117	1.001	0.876	0.135- 8.422	
	Divorced	0.000001	599.277	0.982	NA-4.800154e+34	
	Widowed	3.161	0.729	0.114	0.782- 14.418	
	Cohabiting	0.000001	882.743	0.988	NA-1.081551e+72	
Employment status	Government Employee	1(Reference)				637
	Non-Government Employee	0.705	0.363	0.335	0.339- 1.417	
	Self-employed	0.628	0.294	0.113	0.351- 1.111	
	Non-paid	1.193	0.690	0.798	0.280- 4.419	
	Student	0.342	0.409	0.009*	0.150- 0.752	
	Homemaker	0.153	0.939	0.046*	0.018- 0.778	
	Retired	0.980	0.860	0.982	0.185- 5.898	
	Unemployed(able to work)	0.719	0.559	0.555	0.185- 5.898	
	Unemployed(unable to work)	1.393	1.021	0.745	0.150- 9.500	
Average monthly income(Naira)	<20,999	1(Reference)				640
	21,000-60,999	0.773	0.247	0.298	0.477- 1.259	
	61,000-100,000	0.922	0.366	0.825	0.445- 1.880	
	>100,000	1.243	0.669	0.744	0.324- 4.634	
Current smoking status	Yes	1(Reference)				640
	No	0.484	0.342	0.034*	0.248- 0.952	
Harmful Alcohol use	No	1(Reference)				640
	Yes	2.104	0.885	0.400	0.376- 13.383	
Diabetes(self reported)	Yes	1(Reference)				640
	No	0.310	0.544	0.031*	0.102- 0.881	
Obese or Overweight	No	1(Reference)				640
	Yes	1.179	0.215	0.443	0.773- 1.798	
Physical inactivity	No	1(Reference)				640
	Yes	1.099	0.229	0.680	0.702- 1.726	
Inadequate fruit/vegetable	No	1(Reference)				639
	Yes	1.499	0.241	0.092	0.941- 2.421	

OR=odds ratio; SE= standard error; CI= confidence interval, * p value <0.05

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Table 7m: Logistic regression analysis of associated risk factors of hypertension- (Final Model)

Variable	Category	ORs	SE	P	95%CI	N
Age	**As continuous**	1.037	0.009	0.00005 *	1.019-1.055	**640**
Diabetes(self reported)	**Yes**	1(Reference)				**640**
	No	0.234	0.485	0.003 *	0.085-0.589	

OR=odds ratio; SE= standard error; CI= confidence interval, * p value <0.05

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7.7 EQ5D Analysis

The frequency of EQ5D dimensions and distribution with age are presented in table 7n. Figure 7c presents a description of frequency of reported problems for the sample by dimension and age-group. About 90% of the sample reported no problems (i.e. level 1) on all dimensions. Further, it was noted that the older age groups reported more problems (i.e. level 2 to 5) on all dimensions compared to younger age groups. Also the domain with the most reported problems among 60 years and older was "pain". However, on the self-care EQ-5D dimension it was noted that those 60 years and older reported nothing higher than level 2 problems.

Table 7n: Percentage of the general population sample reporting levels 1 to 5 by dimension and by age group

EQ-5D DIMENSION		18-29	30-44	AGE GROUPS 45-59	>60	TOTAL
MOBILITY	Level 1	292(95.4%)	237(93.3%)	58(89.2%)	11(73.3%)	598(93.4%)
	Level 2	11(3.6%)	14(5.5%)	6(9.2%)	3(20%)	34(5.3%)
	Level 3	2(0.7%)	1(0.4%)	1(1.5%)	1(6.7%)	5(0.8%)
	Level 4	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)
	Level 5	1(0.3%)	2(0.8%)	0(0%)	0(0%)	3(0.5%)
SELF-CARE	Level 1	292(95.4%)	242(95.3%)	60(92.3%)	12(80%)	606(94.7%)
	Level 2	12(3.9%)	11(4.3%)	4(6.2%)	3(20%)	30(4.7%)
	Level 3	1(0.3%)	0(0%)	1(1.5%)	0(0%)	2(0.3%)
	Level 4	1(0.3%)	0(0%)	0(0%)	0(0%)	1(0.2%)
	Level 5	0(0%)	1(0.4%)	0(0%)	0(0%)	1(0.2)
USUAL ACTIVITY	Level 1	286(93.5%)	228(89.8%)	57(87.7%)	11(73.3%)	582(90.9%)
	Level 2	15(4.9%)	18(7.1%)	6(9.2%)	3(20%)	42(6.6%)
	Level 3	4(1.3%)	6(2.4%)	2(3.1%)	1(6.7%)	13(2.0%)
	Level 4	1(0.3%)	0(0.0%)	0(0.0%)	0(0.0%)	1(0.2%)
	Level 5	0(0.0%)	1(0.4%)	0(0%)	0(0%)	1(0.2%)
PAIN / DISCOMFORT	Level 1	265(86.6%)	214(84.3%)	51(78.5%)	8(53.3%)	538(84.1%)
	Level 2	34(11.1%)	27(10.6%)	11(16.9%)	4(26.7%)	76(11.9%)
	Level 3	7(2.3%)	9(3.5%)	2(3.1%)	2(13.3%)	20(3.1%)
	Level 4	0%	3(1.2%)	1(1.5%)	1(6.7%)	5(0.8%)
	Level 5	0%	1(0.4%)	0%	0%	1(0.2%)
ANXIETY / DEPRESSION	Level 1	268(87.6%)	224(88.2%)	54(83.1%)	11(73.3%)	557(87.0%)
	Level 2	33(10.8%)	22(8.7%)	11(16.9%)	3(20%)	69(10.8%)
	Level 3	5(1.6%)	6(2.4%)	0%	1(6.7%)	12(1.9%)
	Level 4	0%	1(0.4%)	0%	0%	1(0.2%)
	Level 5	0%	1(0.4%)	0%	0%	1(0.2%)

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Figure 7c: Profile of proportion (%) of FCT PHC clients reporting problem
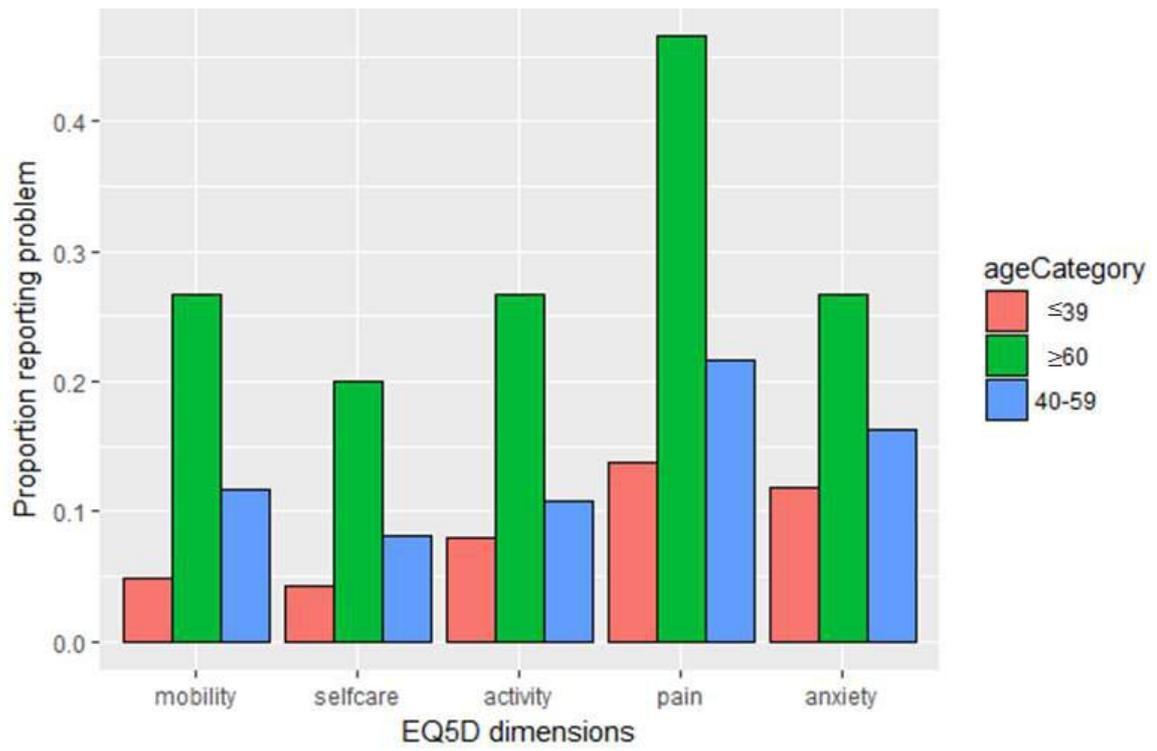
7.7.1 Hypertension status and EQ5D health state

Hypertension status and EQ5D health state cross tabulation is presented in table 7p below. A total of 50 EQ-5D health states were described by FCT PHC patients in this study. Overall 78.8% of all clients reported no problems on all 5 dimensions. Specifically, 80% of PHC clients without hypertension and 75.4% of clients with hypertension stated no problem in all the 5 domains (11111). One hypertensive patient stated level 5 problem in all the 5 domains.

Table 7p: EQ5D health of FCT PHC clients states by hypertension status

EQ5D Health State	Frequency	HYPERTENSION	
		NO n% (n=461)	YES n% (n=179)
11111	504	369(80%)	135(75.4%)
11112	12	7(1.5%)	5(2.8%)
11113	2	1(0.2%)	1(0.6%)
11121	13	6(1.3%)	7(3.9%)
11122	25	24(5.2%)	1(0.6%)
11131	1	1(0.2%)	0
11132	3	2(0.4%)	1(0.6%)
11134	1	0	1(0.6%)
11143	1	1(0.2%)	0
11211	4	4(0.9%)	0
11213	1	0	1(0.6%)
11221	9	8(1.7%)	1(0.6%)
11222	9	6(1.3%)	3(1.7%)
11233	2	1(0.2%)	1(0.6%)
11312	1	1(0.2%)	0
11341	1	1(0.2%)	0
12111	2	1(0.2%)	1(0.6%)
12121	2	1(0.2%)	1(0.6%)
12211	3	2(0.4%)	1(0.6%)
12221	1	1(0.2%)	0
12333	1	0	1(0.6%)
21111	1	1(0.2%)	0

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21112	2	2(0.4%)	0
21121	2	2(0.4%)	0
21122	3	1(0.2%)	2(1.1%)
21133	1	1(0.2%)	0
21222	2	2(0.4%)	0
21231	2	0	2(1.1%)
21232	1	0	1(0.6%)
21331	2	0	2(1.1%)
21342	1	0	1(0.6%)
22111	1	1(0.2%)	0
22112	1	1(0.2%)	0
22121	2	2(0.4%)	0
22122	1	0	1(0.6%)
22144	1	0	1(0.6%)
22211	3	2(0.4%)	1(0.6%)
22222	4	2(0.4%)	2(1.1%)
22321	1	1(0.2%)	0
22322	1	1(0.2%)	0
22333	1	0	1(0.6%)
22433	1	0	1(1.1%)
31232	1	0	1(1.1%)
32222	1	1(0.2%)	0
32231	1	0	1(1.1%)
33311	1	1(0.2%)	0
33331	1	1(0.2%)	0
52341	1	1(0.2%)	0
54332	1	1(0.2%)	0
55555	1	0	1(1.1%)

7.7.2 Self reported (EQ5D) health states and value sets

Table 7q, Table 7r and figure 7d presents characteristics of utility scores and EQVAS score among study participants.

Participants generally described well preserved health related quality of life. The highest value set score was 0.9 for the best state of state (11111) and the lowest was -0.145 for the worst state of health (55555). As stated in the methodology section this utility scores was based on the Zimbabwean national value set. The median utility score for both hypertensive and non-hypertensive was 0.9, which is the highest value that can be achieved in the Zimbabwean national value set. The

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minimum utility score for hypertensive clients was -0.145 while the lowest for non-hypertensive client was 0.1.

The median EQVAS score for hypertensive patients was 88% while the score for non-hypertensive patients was 90%. The minimum EQVAS score for hypertensive clients was 10% while that for non-hypertensive clients was 40%. Overall, the mean EQVAS score decreased with increasing age of clients. Generally across all age group females had lower EQVAS scores compared to males except in those greater than 60 years old where females had higher EQVAS compared to male participants.

Figure 7d: Mean EQVAS score of FCT PHC clients by age category and by sex
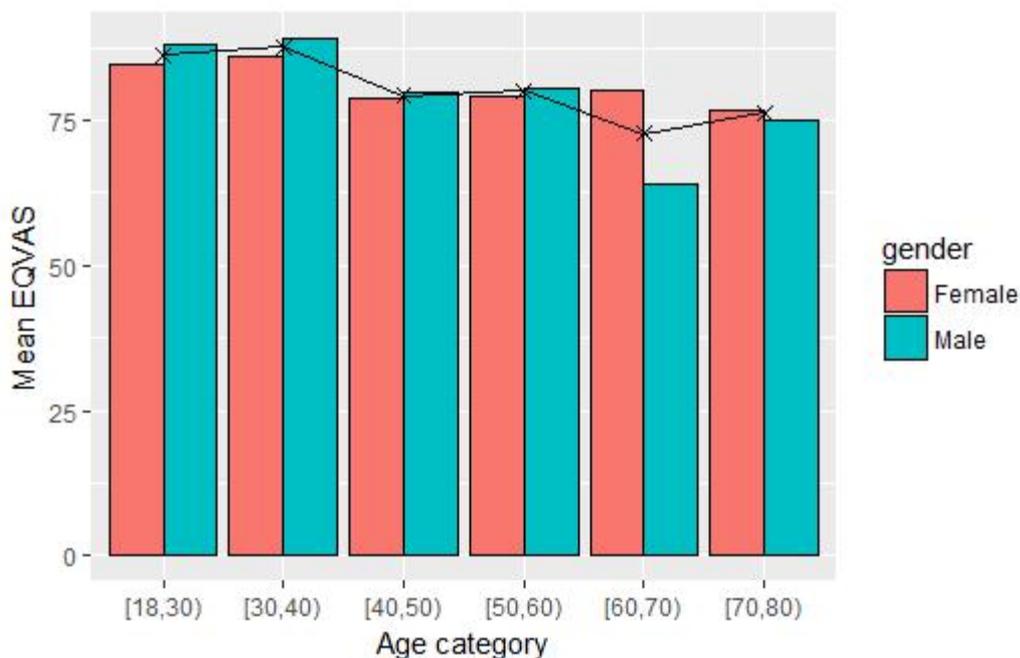
* The points on the line in fig.4 represent overall mean EQVAS score for each age category

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Table 7q: Utility score characteristics and hypertension status of FCT PHC clients

UTILTY parameters	Hypertension status	
	Yes	No
Frequency N	179	461
Median Utility score	0.9	0.9
Minimum Utility score	-0.145	0.1
Maximum utility score	0.9	0.9
25th percentile Utility score	0.882	0.9
75th percentile Utility score	0.9	0.9

Table 7r: EQVAS score characteristics and hypertension status of FCT PHC clients

EQVAS parameters	Hypertension status	
	Yes	No
Frequency N	179	461
Median EQVAS score	88	90
Minimum EQVAS score	10	40
Maximum EQVAS score	100	100
25th percentile EQVAS score	75	80
75th percentile EQVAS score	95	95

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7.8. Comments

In this chapter I presented the findings from the WHO STEPS survey and EQ5D questionnaire.

This chapter answers research question **RQ 7, 8, 9**.
(RQ7: What is the prevalence of hypertension and risk factors for CVD among FCT PHC clients?
RQ8: What is the prevalence of CVD risk score of >30% among FCT PHC clients?
RQ9: What is the health utility of hypertensive and non-hypertensive FCT PHC clients?).

The findings show that the overall prevalence of hypertension was 27.9% (95%CI: 24.5- 31.6). The population was a generally young population with a median age of 30 years old and majority between ages 18-44 years old. There was a high rate of unmet need for hypertension care among PHC FCT clients. Of the 27.9% of the study population with hypertension, only 9.5% were treated and controlled.

Regarding risk factors, the overall prevalence of current smoking among FCT PHC clients was 10.8% and prevalence was higher among males compared to females. Only 8(1.3%) of the participants in this study consumed alcohol in harmful quantity. Over half of the FCT PHC clients were inactive based on WHO criteria for physical inactivity. In this population, 6.6 out of every 10 people did not take adequate fruit and vegetable on a daily basis. Overweight or obesity was found among 4 out every 10 participants in this study and was associated with employment status and age. Self-reported diabetes was found among only 3.6% of participants of this study and was associated with age and hypertension. Clustering of risk factors was noted among participants of this study. Overall about 90% of participants had at least one risk factor for CVD(60% and 25% of the total population had 1-2 and 3-5 risk factors for CVD respectively). Moreover, 90% of the CVD risk scores of those 40 years and above was less than 10%.

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Further, only two risk factors (Age and self-reported diabetes status) were found to be independent predictors of hypertension among this population.

Participants generally described well preserved health related quality of life. The utility values and EQVAS scores were slightly lower in non-hypertensive clients compared to hypertensive clients and EQVAS score was generally lower in females compared to males except in older age groups where the reverse is the case. In the next chapter I will present the service availability and readiness assessment and qualitative findings of experiences of PHC workers with management of hypertension.

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Chapter 8- Results 3: other findings from quantitative study in Nigeria and Health care providers' experience with managing hypertension

In the last chapter I presented the principal results of the quantitative study done in Nigeria. The data presented were those collected from the WHO STEPS questionnaire and EQ5D questionnaire. In this chapter I present the result of hypertension service availability and readiness assessment (SARA) of facilities and health care providers' experience with managing hypertension.

8.1 Service-specific availability and readiness result

According to the WHO SARA reference manual **Service-specific availability** refers to "whether or not a specific service is offered in a facility" while **Service-specific readiness** refers to the "capacity the facility has to provide a service that it offers (measured through consideration of tracer items that include trained staff, guidelines, equipment, diagnostic capacity, medicines and commodities). Each service has a readiness indicator that consists of a set of domains, and each domain consists of a set of tracer items. The following four domains are used for service-specific readiness: **staff and training**, **equipment**, **diagnostics**, and **medicines and commodities**"[198]. Not all service readiness indicators include all four domains.

In the SARA questionnaire, service-specific readiness indicators are available for different services including non-communicable diseases diagnosis or management maternal, child and reproductive health among others. Since the focus of this study is on hypertension, it only collected data relating to diagnosis and management of cardiovascular disease. According to the WHO SARA document, service availability and readiness assessment for hypertension used only 3 domains as shown in table 8a below.

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Table 8a: SARA tracer items for cardiovascular conditions such as hypertension

Domains	Tracer item(% of facilities with items)
Staff & training	• Guidelines for diagnosis and treatment of chronic cardiovascular conditions • Staff trained in diagnosis and treatment of chronic cardiovascular conditions in the past two years
Equipment	• Stethoscope • Blood pressure apparatus • Adult scale
Medicines & devices	• ACE inhibitors • Thiazides • Beta blockers • Calcium channel blockers • Aspirin cap/tab • Metformin cap/tab • Oxygen cylinders/concentrators

Adapted from SARA report Serria Leone [199,200]

8.2 Service specific availability and readiness (SARA) for Hypertension

Service specific availability and readiness (SARA) for Hypertension data for the 20 PHCs used in this study are presented in table 8b below.

All the 20 PHCs used in this study asserted that diagnosis and management of hypertension was available in their facilities.

Readiness to provide health services for diagnosis and management of hypertension was assessed based on the presence of the following twelve (12) tracer items in table 8a above. All facilities in both rural and urban areas had stethoscope, blood pressure apparatus and adult scales. But none had guidelines for diagnosis and treatment of hypertension and none had staffs that had been trained in diagnosis and treatment of hypertension in the last 2 years. The number of facilities with medicines and commodities varied by type of medicine or commodity but overall was generally low. Overall only 15% and 5% of PHCs had calcium channel blockers and beta blockers respectively stocked as at the time of this study. There were more PHCs in urban areas compared to rural areas who had beta blockers (10% versus 0% diff=10%

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[95%CI: -8.6 to 28.6]) and calcium channel blockers (20% versus 10% diff=10% [95%CI: -20.9 to 40.9]). All PHCs(rural and urban) had at least 1 drug except for 1 rural PHC that had no drug because it was undergoing renovations at the time and offering only few health services in the meantime.

Table 8b: Proportion of PHCs with tracer items for hypertension in 2017

Tracer items	Total N (%) N= 20	Urban, n(%;95%CI) n=10	Rural, n(%;95%CI) n=10	Difference btw Urban/rural Diff%(95%CI)	P value
Trained staff	0 (0%)	0 (0%)	0 (0%)	0	-
Guidelines	0 (0%)	0 (0%)	0 (0%)	0	-
Adult scales	20(100%)	10(100%;69.2 to100)	10(100%;69.2 to 100)	0	1
Stethoscope	20(100%)	10(100%;69.2 to100)	10(100%;69.2 to 100)	0	1
BP apparatus	20(100%)	10(100%;69.2 to100)	10(100%;69.2 to 100)	0	1
Aspirin	6(30%)	5(50%;18.7 to 81.3)	1(10%;0.3 to 44.5)	40%(3.9 to 76)	0.141
Beta-blockers	1(5%)	1(10%;0.3 to 44.5)	0(0%)	10%(-8.6 to 29)	1
Calcium channel blockers	3(15%)	2(20%;2.5 to 55.6)	1(10%;0.3 to 44.5)	10%(-21 to 41)	1
Metformin	6(30%)	5(50%;18.7 to 81.3)	1(10%;0.3 to 44.5)	40%(3.9 to 76)	0.141
Oxygen	8(40%)	3(30%;6.7 to 65.2)	5(50%;18.7 to 81.3)	20%(-22 to 62)	0.649
Thiazides	3(15%)	2(20%;2.5 to 55.6)	1(10%;0.3 to 44.5)	10%(-21 to 41)	1
Ace-inhibitors	3(15%)	2(20%;2.5 to 55.6)	1(10%;0.3 to 44.5)	10%(-21 to 41)	1

The following section presents qualitative results of health workers experience with managing hypertension.

8.3 Health care providers' work experience with managing hypertension

PHC workers revealed a variety of positive and negative experiences with the management of hypertension in primary health care facilities. Their experiences could be summarised under the following themes: "high prevalence of hypertension" ,"unavailability of resources", "competency", "enthusiasm for broader job description", , "referral system" and "team work".

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8.3.1 High prevalence of hypertension

Many PHC workers revealed that in the last few years there have been increases in the number of hypertensive patients they see in their facilities. When asked to give an estimate of the number of hypertensive patients seen in a day, many of them said about 10- 30% of patient attendance is due to hypertension. One PHC worker said:

"In our area of practice, honestly speaking, in a day, you have to record one or two patients" (P12:I).
Another worker said:

"I see a lot at least in a day out of thirty (30) patients, you see like ten (10) cases of hypertension"(P2:I).

8.3.2 Unavailability of resources

The majority of PHC workers said that there were inadequate resources for the care of hypertension in their facilities in terms of skills, equipments and drugs.

"No, not at all. We don't have adequate resources to manage hypertension effectively at this level"(p27:I).

A few said they had requisite skills in terms of personnel but lacked equipments and drugs. Others felt that they had skills in terms of personnel but the knowledge base of personnel needed to be improved to be able to tackle hypertension appropriately. Some said they had equipments like sphygmanometers but that they were substandard and only functioned for a little while before becoming unusable. Regarding availability of drugs,most PHC clients were of the opinion that most essential drugs were not always in stock. There were no specific mention of drugs that were always available or not always available.

"There is room for improvement but we do not know if those equipment they are providing now, are fake or original because if you use; manometer, just give it one to three (1-3) months, the thing begins to develop fault and however, breaks easily"(P1:I)

"In terms of skills yes, equipment and drugs no, because when you look at the drugs list of primary health care, those drugs are not always in stock. Equipment, I have not seen any primary health care centre that has been given physiotherapy equipments that we would be using, all these exercising things that will at least help them, I have not seen it. I think it the only thing we have is just the weighing scale and that will not help in their exercise. But for skills, trust, we have skilled personnel but we don't have the drugs and equipment"(P1:FG).

In terms of availability of IEC materials for hypertension, majority of PHC workers said they had not seen or used them since they have been working in their facility. Majority of the PHC workers also said that they had not gone for any training on management hypertension since they started working in the facility.

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8.3.3 Competency

Many of the non physician PHC workers cadre (JCHEW, CHEWS AND CHOs) felt that they lacked competence to manage hypertension. However, some felt capable because they had worked with doctors and nurses and have gained valuable knowledge on how to manage hypertension but are being restricted by the standing order guidelines.

"Yeah, seriously, the truth always remains the truth, we have the skill already, and we were taught in the school, worked under some doctor for over three years. I think we have gathered these skills to manage hypertension if we have a guideline that will guide us, we can do it"

8.3.4 Enthusiasm for broader job description

All non-physician PHC workers cadre (JCHEW, CHEWS AND CHOs) expressed a desire for increased role in the management of hypertension by expanding the scope of the standing order.

"Really and if the authorities can improve or update the standing order because, the standing order has not been updated; it has been here since the 1970s. They feel the community health workers of those days are still the same with those of today. If the curriculum of community health students is reviewed and updated in colleges of health technology, how much more of the standing order? I think that standing order should be updated and then most health workers are pursuing their academics, many of our colleagues have gone to other field."(P20:I).

Most physician health care workers (Doctors) agree with the request for broader job description but would still encourage supportive supervision.

"I know of recent, a lot of things has been done, as regards task shifting and then of course, guided task shifting so I believe it will go a long way in helping patients at those levels. However, a lot of work needs to be done because, for the CHEWS and J. CHEWS that were not trained in the schools to manage most of these things there have to be some level of capacity building from time to time. Supportive supervision has to be carried out periodically, to find out how well they are doing before they can be limited to a particular level of operation. And that has to be done with caution just for the safety of the patient. I think this is a good idea and something that could be appraised"(P27:I)

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8.3.5 Referral system

All PHC workers confirmed that a 2 way referral system existed for hypertension management and other conditions but is not effective most of the time. One major complaint was that when clients are referred to higher levels of care, most of them do not go. Some of the reasons advanced for this include distance barriers, feelings of hopelessness, prolonged waiting times and financial barriers. Sometimes when a client was very ill, a PHC worker may accompany such ill patients to the referral centres but continuous follow up thereafter was many times non-existent.

"Half of them do not go. If you ask them to go to the teaching hospital, you have to beg them to go and assure them that they would not waste their time; if you go to teaching hospital, they would worsen the situation, you wait from 8 a.m. to 3 pm. Just to see the doctor, so that frustration makes them not to want to go there, you have to beg them, with this paper, they will speed up but some of them will go while others will come back"(P20:I).

8.3.6 Team work

Most of the non-physician health care workers said they felt like being part of a team when working in their facilities alongside other cadre of health workers such as doctors and nurses. This concept was not expressed by physician health care workers and nurses.

"We collaborate as a team. Because I am working with a doctor, so,… we interact then he will now give the best ones to go for at a particular time.."(P2:I).

8.4 Comments

In this chapter, I presented the result of SARA questionnaire and findings from qualitative research conducted on health workers regarding experience with managing hypertension. Overall, although all PHCs said hypertension care was available at their facilities, they were generally lacking in skills and materials needed for hypertension care. This was corroborated by findings from the qualitative study on PHC workers.

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But all PHC workers interviewed were happy to take on new or improved role in hypertension management if given the opportunity. This findings answers research question **RQ 5**(What are the beliefs and experiences of FCT PHC health workers about hypertension and care for hypertensive patients?) and **RQ 6** (What are types and levels of services available for hypertension in the selected health facilities in FCT?). Overall, staff training and guidelines were completely lacking in all facilities. Also most facilities were lacking in 2 more essential medicines and devices for hypertension. The qualitative study on PHC workers highlighted positive and negative experiences with management of hypertension in primary care. Overall they were willing to take on extra roles in hypertension care. In the next chapter I will discuss the findings from qualitative and quantitative studies in Nigeria in a complementary manner to form an overall interpretation of how the primary health care system currently manages hypertension and how to improve the system.

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Chapter 9: Discussion

In the last chapter, I presented quantitative findings about service availability and readiness assessment of primary care facilities used in this study. Also I presented qualitative findings from primary health care workers regarding their experiences with managing hypertension. In this chapter I will discuss the findings from both quantitative and qualitative studies in Nigeria. Then implications of these findings and suggestions on how to improve the system will be presented in chapter 10.

9.1 Introduction

The burden of chronic conditions like hypertension is increasing globally. However, this burden is unequally distributed with developing countries being the most affected [6]. Developing countries like Nigeria share a substantial amount of this burden because of its large population of over 180 million people [6]. Although, there are different categories of health care providers in Nigeria (private, traditional and Government), Government owned primary health care facilities are usually the only formal and affordable organised health care available in many rural and urban areas. But with the current structure of healthcare delivery in primary care many primary health care clients with hypertension often go undetected and untreated. Also, national, regional and state data regarding prevalence of hypertension, its risk factors and beliefs about hypertension among primary care clients and workers are largely unavailable. Recent government commitment to health care resulted in the passing of a National Health Bill into law which promises more direct funding for primary health care in Nigeria. Eliciting important data regarding hypertension in primary care will help provide evidence for planning, prioritizing and spending of increased primary care resources.

This study sought to address the gaps identified above by investigating the following specific questions about hypertension in primary care in Nigeria:

RQ1: What is the current prevalence pattern of hypertension in Nigeria?

RQ2: What is known about beliefs of the population in Nigeria regarding hypertension?

RQ3: What are the beliefs about hypertension among Nigerian immigrants to the United Kingdom?

RQ4: What are the beliefs and experiences of FCT PHC clients about hypertension?

RQ5: What are the beliefs and experiences of FCT PHC health workers about hypertension and care for hypertensive patients?

RQ6: What are types and levels of services available for hypertension in the selected health facilities in FCT?

RQ7: What is the prevalence of hypertension and risk factors for CVD among FCT PHC clients?

RQ8: What is the prevalence of CVD risk score of >30% among FCT PHC clients?

RQ9: What is the health utility of hypertensive and non-hypertensive FCT PHC clients?

The study used a multi-level triangulation mixed methods design [168] to answer the above questions by using both methods-qualitative and quantitative to examine different levels of the primary care system (PHC client level= those who use the services and PHC workers level= those who provide the services). The following paragraphs will now discuss findings of this study (i.e. qualitative and quantitative findings) in a complementary manner (integrating and comparing data) using the side-by-side approach [168] to form an overall understanding of hypertension in primary care settings in Nigeria.

9.2 Prevalence of hypertension

The overall prevalence of hypertension for FCT PHC clients was 27.9%. This was corroborated by the qualitative findings from PHC workers who stated that, on a daily basis, about 1 in 3 clients seen have high blood pressure. This finding agrees with the overall prevalence of hypertension, 28.9%, from the systematic review conducted by Adeloye et al [47] and some other community based studies conducted in FCT [201] and other parts of Nigeria [52,56,59]. However, my review of current prevalence of hypertension [202] identified that the prevalence of hypertension in

Nigeria may be higher ranging between 2.1% to 47.2%. It is plausible that the overall prevalence of hypertension in Nigeria may be higher because most of the studies used to arrive at this conclusion were community-based studies with broader population socio-demographic characteristics. But the focus of this study was on clients who use primary health care centres. To the best of my knowledge, as at the time of writing this thesis there were no comparable studies on hypertension conducted in government primary health care centres in Nigeria. However, the estimate of prevalence of hypertension from this study was very similar to hypertension studies conducted on clients of tertiary health institutions in Nigeria [53, 70].

9.3 Hypertension and selected socio-demographic characteristics

9.3.1 Age and Hypertension

In this study, quantitative data showed that, unsurprisingly, the prevalence of hypertension increased significantly with age. Similarly, qualitative data from some PHC clients corroborated this finding but explained this finding as due to stress from increased responsibilities of old age rather than as a result of hemo-dynamic and cardiovascular changes with age. Association of age with hypertension has been demonstrated in many other studies on Nigerians [203-205] as well as among other nationalities [206-208].Further, explaining hypertension in old age as a result of stress was also demonstrated in the study by Akinlua et al [209] on Nigerian immigrants to the United Kingdom. But this finding was not elicited in a similar qualitative study conducted on Nigerian hypertensive patients in a tertiary hospital in Lagos Nigeria [47].It is difficult to explain the absence of this finding from hypertensive clients in tertiary hospitals. This could be because clients of tertiary hospitals are more enlightened or exposed to better health information.

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9.3.2 Income and hypertension

With regards to association between income levels and prevalence of hypertension, quantitative data from this study showed increased prevalence of hypertension with increased income but was not statistically significant. However, other studies on hypertension in Nigeria [204-205] showed significantly higher prevalence of hypertension with increased income. The absence of this association in this study could be explained by absence of income information from a large proportion of study participants. Conversely, qualitative data from hypertensive PHC clients suggest that clients believed that hypertension caused poverty among those diagnosed with hypertension because a substantial amount of money is spent on buying drugs and paying for hospital bills. The fact that hypertension impoverished hypertensive patients has been demonstrated in other studies on hypertensive patients in Nigeria [47,146]

9.3.3 Sex and Hypertension

The association of hypertension with sex has been an issue of contention in many epidemiological studies. Diverse conclusions have been reported in studies on different populations in Nigeria [47, 201, 203, 210]. But in this study males had a significantly higher prevalence of hypertension compared to females. Information regarding sex of an individual and prevalence of hypertension did not emerge from the qualitative part of this study. This is consistent with other qualitative studies on hypertension in Nigerians [47]. It is possible that adequate probes in this regard were not employed during the interviews and focus groups.

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9.3.4 Dwelling area and Hypertension

Conventionally, prevalence of hypertension has been shown to be higher in urban areas compared to rural areas in many Nigerian studies on hypertension [47,92, 202]. Conversely, in this study although, prevalence of hypertension was higher in urban compared to rural areas this was not statistically significant. This could be because the confidence interval for this estimation was very wide and the precision of the study was not commensurately high for this comparison. Further, the absence of a true difference could be explained by the fact that across rural and urban areas, about 90% of participants in this study were between ages 18-44years old who generally have lower blood pressure. The qualitative data in this study did not contain any information regarding relationship of hypertension and dwelling area. This is consistent with other qualitative studies on hypertension in Nigeria [47,146].

9.3.5 Ethnic group and Hypertension

Ethnic group variations of meaning/definitions and prevalence of hypertension in Nigeria have not been widely researched in Nigeria.

In this study, there was no association between ethnic group and prevalence of hypertension. Most ethnic groups had similar rates of prevalence. However, this does not agree with findings from a large previous hypertension study in Nigeria conducted by Murthy G and colleagues [90] which showed significantly higher prevalence among the "Fulani" ethnic group compared to others. This discordance could be explained by the difference in methodology employed in our study compared to the study by Murthy G and colleagues [90]. The Murthy G et al study was community based and sampled many Fulani ethnic group members from their main dwelling area in the northern part of Nigeria, whereas, our study, a clinic based study, was conducted in a cosmopolitan area, the Federal Capital Territory, with a few number of Fulani participants.

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Further, qualitative data yielded information on meaning of hypertension. While all of PHC workers' perspectives centred on biomedical definitions of the disease, most PHC clients expressed ideas around cultural explanations and social aspects of life. Lay beliefs on the understanding of hypertension in terms of social related stressors are not new. Similar findings have been shown in studies on beliefs of hypertension in Nigeria [47,211,212] and in other places [36-38]. However, description of meaning of hypertension among Nigerians in terms of cultural understanding is relatively new and was only recently described in a similar study conducted by Akinlua et al [209] on Nigerian immigrants to the United Kingdom. Interestingly, new cultural meanings such as- hypertension meaning a "disease that is in-curable and dangerous"-different from those highlighted in Akinlua et al [209] were elicited in this study.

In agreement with the findings from Akinlua et al [209], some PHC clients also held multiple beliefs about meaning of HTN at the same time. However, there was no evidence of a major overriding belief among those who had multiple understandings. Although this has not been reported in other studies, it is pertinent that PHC workers understand this fact to guide counselling sessions appropriately. Interestingly, the study showed that PHC workers were already contextualizing the explanation of HTN in relation to cultural understanding.

9.4 Cascade of hypertension care

Quantitative data from this study showed a high rate of unmet need for hypertension care among PHC FCT clients. Of the 27.9% of the study population with hypertension, only 9.5% were treated and controlled. Further, 36.2% were unscreened and undiagnosed, 33.6% were screened but undiagnosed, 41.6% were diagnosed but untreated and 62.2% were treated but uncontrolled (Refer to figure 7a). This indicates that 90.5% of FCT PHC clients had unmet hypertension care needs. Similarly, qualitative study findings from PHC workers reported a substantial gap in the care of hypertension in primary care. These findings are consistent with other major Nigerian studies with unmet hypertension care need of 97%, 91% and 90% respectively [60,79,213]. But these studies were community based studies assessing population based unmet needs.

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First, the hypertension care cascade among FCT PHC clients revealed that important gaps hindering primary care management of hypertension include timely screening and diagnosis. The number of those with BP≥140/90 who had never been screened (3.6 in 10 PHC clients) is quite alarming. Because hypertension may be asymptomatic there is a lost opportunity for diagnosing those who may have the condition. Unsurprisingly, in the qualitative data, no PHC client believed hypertension to be asymptomatic. This was also reported in the studies among Nigerian immigrants in the UK [209]. This finding is quite important in that it could affect health seeking behaviour among lay people. Moreover, this was further corroborated by qualitative study findings from PHC workers who reported that although they had blood pressure measuring apparatus, most were not durable which leaves them with nothing to measure blood pressure on many occasions. Similar findings of low quality or unavailability of basic equipment was reported in another major primary care service availability and readiness study in Nigeria [214].

Furthermore, there is a substantial difference between the measurement of blood pressure and the diagnosis of hypertension among FCT PHC clients. It is possible that some of those with hypertension had their blood pressure measured before developing hypertension but those screened and undiagnosed had their blood pressure measured within the last 12 months. This could suggest that they were screened but did not receive a diagnosis. The reason for this gap is not easily explained but findings from qualitative study on PHC workers showed that there was disagreement among PHC workers as to the appropriate cut-off point for hypertension. This disparity could partially explain this gap. In addition, ineffective communication between PHC clients and workers could be the reason for non-diagnosis. Moreover, disagreement between cut-off points for hypertension among health workers is not new as this has been demonstrated in other studies [40, 41]. This is may be due to the use of different guidelines among health workers.

Apart from low rates of screening and diagnosis, the care cascade analysis also revealed gaps in the treatment rate for hypertension among FCT PHC clients. Several possible reasons were advanced for this gap from PHC workers qualitative

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studies. They include poverty and beliefs about treatment on the part of the PHC client. Other reasons are provider related. One of the main reasons advanced for low treatment rate is the current chronic disease management structure which restricts the role of non-physician health care workers (CHEWs, JCHEWS and CHOs). According to the structure when diagnosis is made by the non-physician health care worker, referral is made to a primary care facility where there is a doctor or to a secondary care facility. However, many of the clients do not follow up with these referrals for reasons such as: long waits to see doctors, distance from primary care to secondary care facilities, cost of transportation and prohibitive cost of medications. Other reasons elicited for poor rates of treatment include; ineffective referral system and lack of requisite skills among PHC workers for chronic disease management. Low rates of treatment among hypertensive patients have been demonstrated in other studies in Nigeria [60,79,213].

At the end of the cascade, a substantial gap also exists in the rate of control of hypertension among FCT PHC clients. Similarly, reasons for this gap were elicited from qualitative studies on PHC clients and workers. On the part of the client, adherence to medications and lifestyle modifications would go a long way in determining the outcome of treatment. In this study, although there was congruence in beliefs about treatment between PHC client and workers, many PHC clients believed that spiritual help could be an adjunct to use of drug. However, many times in Nigeria, spiritual healers tend to down play the effectiveness of drugs. This may result in loss of trust in medications and in turn reduce frequency of use of medication leading to poor control of hypertension. Further, many clients declared that high cost of drugs was prohibitive. Provider related reasons for poor control rate include; lack of knowledge on the part of the PHC worker, unavailability of hypertensive drugs in primary care centers and restrictive job roles. Low hypertension control rates have also been reported in other studies in Nigeria [60,79,213].

Ultimately, the end result of large unmet needs in the cascade of care for hypertension in primary care is that a substantial number of clients go unscreened and undiagnosed or diagnosed and untreated or treated and uncontrolled leading to unwanted cardiovascular outcomes such as stroke, heart attack and untimely death.

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9.5 Hypertension and its risk factors

9.5.1 Smoking

The overall prevalence of current smoking among FCT PHC clients was 10.8% and prevalence was higher among males compared to females. These findings are consistent with the 2003 NCD south west regional survey prevalence report of 9.8% and other studies conducted in Nigeria [201,203,204]. Also in this study, hypertension was strongly associated with smoking. This has also been reported by other independent researches [201, 203, 204, 215]. But interpretations of these results could differ. For example Primatesta et al [215] reported that the effect of smoking on BP is usually acute and lasts for a short period of time but any independent prolonged effect of smoking on blood pressure will be small and might be exaggerated by complex interactions between other known risk factors such as sex, age, BMI and alcohol intake. In the qualitative data, there was agreement between PHC clients and workers as to the important role smoking plays in developing hypertension and other CVDs. This was corroborated by a high rate of awareness (about 65%) of the danger of smoking in the 2003 NCD south west regional survey [92].

9.5.2 Alcohol Consumption

Only 8 (1.3%) of the participants in this study reported consuming alcohol in harmful quantities. This result is in agreement with findings from other studies conducted in Nigeria [204,216] However, our result was less than 33% reported by Brisibe et al among rural dwellers in Bayelsa state Nigeria. Although FCT is a cosmopolitan area with people from different ethnic groups in Nigeria, it is not the norm to drink too much alcohol unlike in Bayelsa state where this is culturally acceptable [217]. Qualitative data from this study corroborated this finding as most clients and workers believed that excessive alcohol was harmful to health. However, one PHC client expressed that excessive alcohol intake reduces stress and in-turn hypertension. It may be noted that, as reported in chapter 6 of this study, stress was a recurring

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theme among clients and workers as a cause of hypertension. Further analysis revealed that this PHC client was from the predominant "Ijaw" ethnic group in Bayelsa state. This further validates the role of cultural norms in fuelling hypertension prevalence as expressed by Brisibe et al [217].

9.5.3 Physical inactivity

Although, qualitative data revealed that most participants believed that physical inactivity was a cause of hypertension this was not matched with action as quantitative data showed that over half of the FCT PHC clients were inactive based on WHO criteria for physical inactivity. Also there were more inactive participants in urban compared to rural areas. These findings are similar to previous studies [203, 216] in Nigeria but conflicts with a higher prevalence of 81% reported in study by [204]. This disparity might have been due to the difference in the age distribution of participants in the two-studies. About 90% of participants in this study were between ages 18-44 years old whereas majority of the participants in the Idowu et al [204] study were between the ages 41-60 years old. Young people are generally more physically active than older people hence this may have accounted for this disparity.

9.5.4 Inadequate intake of fruits and vegetables

Daily and adequate intake of fruits and vegetables has been shown to protect against hypertension and non communicable diseases [7]. Similar to the findings on physical activity, beliefs of majority of PHC clients that low fruit and vegetable intake caused hypertension did not translate to action as, 6.6 out of every 10 people did not take adequate fruit and vegetable on a daily basis. This finding has been demonstrated in other studies in Nigeria [60,64,90]. Also it should be noted that prevalence of low intake of vegetable and fruits were higher in those with high income in our study. This is contrary to the finding of Olawuyi et al [205] where lower income groups consumed less compared to higher income groups. One possible explanation for this trend among high income earners in our study could be the effect

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of urbanization/westernization with dietary transition from traditionally high fibre diet to fast foods laden with fat and salt.

9.5.5 Obese or Overweight

Overweight or obesity was found among 4 out every 10 participants in this study and was associated with employment status and age. This finding is consistent with other similar studies in Nigeria [60,64,90] but lower compared to studies conducted on civil servants in Lagos and Ibadan, Nigeria [218,219]. However, our study showed a higher prevalence of obesity and overweight among government workers. The difference between prevalence of overweight/obesity in the study on civil servants and overall prevalence of overweight/obesity in this study may be explained by differences in the employment status distribution of the 2 studies. More than half of the participants in this study were students or self-employed. Generally, students and those self-employed are more likely to be active compared to civil servants with job roles that are sedentary. Hence there is reduced risk of being overweight among students or those self-employed.

9.5.6 Diabetes

Self-reported diabetes was observed among only 3.6% of participants of this study and was associated with age and hypertension. This is similar to overall prevalence rate of 5.7% from systematic review conducted by Adeloye et al [220]. Qualitative data from PHC workers revealed that they believed that diabetes and hypertension can occur simultaneously but none said that it could be a cause of hypertension. This is similar to the findings from similar study conducted on Nigerian immigrants to the United Kingdom [209].

9.5.7 Salt Intake

Unfortunately, the quantitative part of this study did not collect information on salt intake because this was not addressed in the questionnaire booklet. However, excessive salt intake was believed by both PHC workers and PHC clients to be

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major causes of hypertension. This is consistent with other studies on Nigerians [47,211] and in other parts of the world [153,154,155]. However, the study by Beune et al [153] showed that beliefs about causes of hypertension differed between health workers and lay people with hypertension. Notably, among some PHC workers, the idea that food seasoning such as *Maggi(a food seasoning containing salt and other inngredients)* is not salt and that cooked salt is less harmful than uncooked salt has not been reported in other studies.

9.6 Clustering of risk factors

Clustering of cardiovascular risk factors is a predictor of poor disease progression and outcome. It is the reason why an integrated total risk comprehensive approach is advocated for the control of NCDs instead of tackling individual risk factors [7,221]. Clustering of risk factors was noted among participants of this study. Overall about 90% of participants had at least one risk factor for CVD. This is similar to findings from the other studies conducted on Nigerians [204,205]. But the prevalence of clustering in this study was higher than the findings from Oluyombo et al (47%) [74] and Oladapo et al (12.9%)[140]. The explanation for this wide difference is not immediately apparent. However, in both studies clustering of risk factors increased with age similar to findings in our study.

9.7 Cardiovascular disease risk levels

Cardiovascular disease risk assessment is an important tool for holistic and total-risk approach to management of NCDs. Qualitative findings from this study showed that as at the time of writing this thesis, cardiovascular risk assessment is not done in FCT PHCs and there are no national guidelines on cardiovascular risk assessment. The major reason advanced for not assessing cardiovascular risk in primary care in Sub-Saharan Africa is the cost of laboratory testing for some risk factors like cholesterol [221]. But removal of cholesterol from the prediction model for cardiovascular risk tools does not preclude the ability to predict cardiovascular risk [222].

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The ideal risk prediction tool is one that is derived from the population in which it is being used. But because of limited national population based cohort studies there is inconsistent use of different instruments. Hence, in this study, a simple non-laboratory based risk assessment tool, WHO CVD risk prediction chart for WHO west Africa region, was used to assess cardiovascular risk among participants 40 years and older.

It was noted that majority (94.4%) of the participants above 40 years old had less than 10% risk of developing cardiovascular events. Only about 5.6% had cardiovascular risk of between 10%-20%. This result was not unexpected because the prevalence of smoking and self- reported diabetes was very low among this sample. Moreover, the number of those above 40 years old was very small compared to the whole population thereby limiting generalizability of findings. Further, five (5) risk factors were used in the WHO chart which includes: smoking, diabetes status, sex, age and systolic blood pressure. However, the WHO risk chart did not include factors like obesity/overweight, family history of premature CVD and diet and therefore has the potential to underestimate CVD risk. But the benefits of screening far outweighs the risk of a cardiovascular event occurring. The threshold for intervention should be based on resources available locally.

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9.8 Other important findings

9.8.1 Health state Utilities

The aim of using the EQ-5D-5L questionnaire was to assess the health status of hypertensive and non-hypertensive patients in this sample. Our value set was based on the Zimbabwean population norms as there were no Nigerian population norms.

To the best of my knowledge, as at the time of writing this thesis, no study had been done on Nigerians with hypertension using the EQ-5D-5L tool. However, only one study investigated health utility of hypertensive patients using the health utility index 3[223]. Our findings revealed that the median utility scores were the same for both hypertensive and non-hypertensive clients. However the minimum utility score was recorded among those that were hypertensive. A similar non-significant difference was recorded for EQ-VAS scores. This finding is not unexpected since many times hypertension is asymptomatic therefore there is no difference in health utility compared to others without hypertension. But, once someone has a stroke or heart attack there will be a difference in health utility.

When compared to the other study on hypertensive patients in Nigeria, my study showed a higher utility score. This difference may be because a different tool was used or may be due to chance. Also case mix differences could account for this difference as the study was conducted in the south-eastern part of Nigeria with predominantly Igbo ethnic group, whereas my study had people from over 40 ethnic groups.

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9.9 Comments

In this chapter, I discussed the finding of this study in the context of other studies and attempted an explanation for differences and similarities in findings.

Overall, there is a substantial unmet need for hypertension management in primary care.

Although the study population is quite young, there is a high rate of clustering of risk factors among them. Low cardiovascular risk scores among this population using WHO/ISH charts does not diminish the importance of routine total risk assessment of clients as clustering of cardiovascular risk factors increases with age resulting in greater morbidity and mortality from hypertension. Hence, adopting proven cost effective total comprehensive risk approach in primary care in Nigeria will help reduce morbidity and mortality from hypertension.

The implications and suggestions for bridging this gap will be discussed in the next chapter, and then recommendations will be made for future implementation and research.

Chapter 10: Implications and conclusions

In the last chapter, I discussed the results of this study in context of other studies. In this chapter I will discuss implications of these findings for practice, policy and research on hypertension in primary care in Nigeria, and draw appropriate conclusions.

10.1 Implications for practice

The findings from this study demonstrate significant missed opportunity for detection, treatment and control of hypertension among PHC clients. The high prevalence of hypertension and significant unmet need for care may have significant implications for morbidity and mortality from cardio-vascular diseases at both individual and population level in FCT, Nigeria. For adequate prevention of cardiovascular diseases, strategies employed for control at individual level must complement population control measures.

At the individual level, for prevention of cardiovascular outcomes such as stroke and heart attack, health care interventions should be targeted at those with a high cluster of cardiovascular risk factors or those with single risk factors above recommended benchmarks such as hypercholesterolemia and hypertension [7]. But, the high cluster or total risk approach is more cost effective than the single risk factor approach in reducing cardiovascular events. Interestingly, it has been shown that the high cluster or total risk factor approach is feasible in primary care settings of low-income countries and can be carried out by non-physician health care workers [7].

In addition, for secondary prevention of CVDs in those who already have hypertension, treatment with medications such as aspirin, beta-blockers, angio-tensin-converting enzyme inhibitors and statins are necessary and could potentially be prescribed in primary care by non-physician health care workers [224]. Patients could also be managed in primary care by non-physician healthcare workers under remote control of a physician [224]

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According to Beaglehole et al in developed countries "multidimensional intervention packages that incorporate several distinct features of chronic-disease management seem to be most effective, including both pharmacological and psychosocial interventions, collaboration between different members of the primary care team, involvement of patients and families together with a stepped-care approach and clear referral pathways, and appropriate supervision depending on response to intervention and severity of disease" (pg 941)[11]. There is encouraging and increasing evidence from low and middle income countries on the success of similar intervention strategies [225-228].

Findings from the qualitative aspect of this study demonstrate a substantial opportunity for task sharing among physicians in primary and secondary care and non-physician healthcare workers. This is especially true because, according to this study, many non-physician health care workers are already "unofficially" managing patients with hypertension under guidance from limited number of physicians in primary care. Moreover, our study revealed that non-physician health care workers are happy to take on extra roles in cardiovascular risk assessment and treatment of hypertension.

Further, studies from Nigeria and other African countries have shown that task-sharing can successfully help solve complex problems of health care delivery across different areas including mental health, HIV/AIDS care and maternal and child health problems with remote guidance of a physician when required [229-231]. However, there have been concerns that once non-physician health care workers acquire certain advance skill set, they will drift towards private hospitals where they will be paid more. This could easily be countered by improving welfare package of non-physician health care workers and ensuring ongoing training and re-training of non-physician health workers to fill up existing vacancies.

Therefore, it is recommended that the proven total cardiovascular risk approach be adopted. According to my study findings, more than 90% of clients had at least 1 risk factor hence; every client who uses these primary care facilities (health post, primary health clinic and primary health centres) should be assessed for all risk factors for cardiovascular diseases. A quick risk assessment tool like WHO/ISH colour chart or

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a mobile app risk calculator could be used to assess risk. Then measures instituted to help reduce the risk factors identified. If high blood pressure is detected, non-physician health care workers should be trained to follow NICE guidelines for diagnosis, treatment and monitoring of hypertension under the remote control of a nearby physician. However, this will require innovative means like the use of m-health which has been proven to be cost-effective in bridging gaps of unavailability of skilled health care personnel [224].

Also, it was noted that in this study blood pressure cut-off points differed among non-physician health-care workers. In order, to ensure uniformity and comparability in future research data from PHCs in Nigeria, it is important that the next review of the manual for operations of PHCs in Nigeria emphasizes a uniform blood pressure cut-off.

Furthermore, at the individual level those who have been identified to have behavioural risk factors should receive counselling [7]. Notably, counselling and health education is a core function of non-physician health care workers in Nigeria and most are well trained in this area.

However, research has shown that at the individual level differences in beliefs about an ailment between health care provider and client could affect management and control of the ailment [44,45,46].This study highlighted important similarities and differences in beliefs about hypertension among PHC clients and PHC workers that have significant implications for management of hypertension in primary care settings in Nigeria.

Although PHC clients and PHC workers had areas where they differed, it is evident that there are many areas where beliefs about hypertension were similar. PHC clients not known to have hypertension tend to generally have similar beliefs with those diagnosed with hypertension except that only those who live with the disease were able to explain certain consequences such as financial stress of treatment. Understanding these similarities and differences in beliefs is important to developing a shared understanding of the condition that is necessary to develop good practice at the client-healthcare worker level. In practical terms, during a consultation, patients's ideas and concerns about their illness should be explored and interventions are tailored to improve outcome.

Specifically, the act of contextual explanation of hypertension by PHC workers should be encouraged. In addition, cultural competence training should be included as part of the curriculum for healthcare workers ,especially in the non-physician healthcare worker training program as they form more than 90% of the PHC workforce in Nigeria.

Furthermore, health program designers should design programs for health care workers that reinforce the attitude of working with the beliefs that are present in any culture to develop a constructive therapeutic relationship.

10.2 Implications for research

This study highlights important areas for further research that might help reduce cardiovascular diseases both at the individual and population levels.

Although research about task-sharing among non-physician health care workers in Nigeria have been conducted in areas of maternal and child health and mental health, there is a dearth of studies in the area task-sharing for cardiovascular diseases. It is important that studies which trial this approach across different geographical region are done and quality performance are evaluated. Results of these studies will help inform and guide policy makers. I look forward to conducting further research in this area after my PhD.

Furthermore, generally, there is a dearth of primary care research on hypertension and cardiovascular diseases in Nigeria. This study highlights important findings about hypertension in primary care that could be replicated across all states of Nigeria to generate knowledge required for improvement.

Moreover, this study showed that in this population the most important predictors of hypertension were age and self reported diabetes status. However, further studies need to be done in FCT to confirm these findings.

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10.3 Implications for policy

According to the global non-communicable diseases (NCDs) monitoring framework of the World Health Organisation, it was stated that in order to reduce the burden of NCDs globally, "governments are urged to (i) set national NCD targets for 2025 based on national circumstances; (ii) develop multi-sectoral national NCD plans to reduce exposure to risk factors and enable health systems to respond in order to reach these national targets in 2025; and (iii) measure results, taking into account the Global Action Plan" [232]. Table 10a presents the set of Nine (9) voluntary global targets that was put forward to guide WHO member countries' plans for NCD control.

Table 10a: definition of targets for NCD control

Target 1: A 25% relative reduction in the overall mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases
Target 2 : At least 10% relative reduction in the harmful use of alcohol, as appropriate, within the national context
Target 3 : A 10% relative reduction in prevalence of insufficient physical activity
Target 4 : A 30% relative reduction in mean population intake of salt/sodium
Target 5: A 30% relative reduction in prevalence of current tobacco use in persons aged 15+ years
Target 6: A 25% relative reduction in the prevalence of raised blood pressure or contains the prevalence of raised blood pressure, according to national circumstances
Target 7: Halt the rise in diabetes and obesity
Target 8: At least 50% of eligible people receive drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes
Target 9: An 80% availability of the affordable basic technologies and essential medicines, including generics, required to treat major NCDs in both public and private facilities

In order meet these targets (1-9) in Nigeria, policy approaches to improve both individual level and population level care need to be implemented.

The suggestion for practice and research as itemised above will require strong political will and funding to ensure that PHC workers are trained and task-sharing strategy for total risk approach is piloted and scaled up if proven to be effective.

Another important policy implication of the findings of this study is that there is a need to upgrade the standing order and curriculum for training of non-physician

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health care workers to reflect the additional role in hypertension and risk factor management.

Also, implementing population-wide policies to reduce behavioural risk factors including harmful alcohol use, tobacco smoking, physical inactivity, overweight and excessive salt intake will help reduce the incidence of hypertension. According to Oladimeji et al [233], Nigeria has comprehensive policies targeted at risk factors according to NCD action plan best buys in areas of tobacco control but harmful use of alcohol and unhealthy diet are only partially addressed. However, there is no policy for physical inactivity in Nigeria [233].

10.4 Study strengths and limitations

10.4.1 Qualitative studies

This Nigerian qualitative study is first of its kind in Nigeria highlighting the beliefs of both PHC clients and workers about hypertension. It explored the beliefs of hypertension among both PHC clients and PHC workers across a wide range of ethnic groups in Nigeria.

The background of JA who is medical doctor with a Yoruba ethnic Nigerian background who has worked in the Nigerian primary care may have influenced the interpretation of these data. JA had also conducted similar research among highly educated Nigerian immigrants in the UK, which may have influenced the interpretation. However, the immersion in the data may have facilitated both the elucidation of beliefs from participants in this study as well as influencing the interpretation of the data. JA conducted all the interviews but JA and IB moderated the focus group discussions and the interpretations of the data were discussed with other members of the research team and a final thematic framework agreed upon.

Member checking was also done. Although focus groups discussion have limited value in exploring complex beliefs, semi-structured in-depth interviews which are best suited for this purpose was also used. The use of these two different methods of data collection also ensured triangulation.

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Although some clients in rural areas may not be able to speak English, all the participants of the study were able to speak English. This may have meant that we didn't access beliefs held by those that didn't speak English.

As it is commonly experienced in focus group discussions, some participants were very vocal while others were more passive. To ensure the ideas of everyone was captured, vocal participants were encouraged to give others a chance to talk first.

Only two focus groups were conducted due to limited resources and time constraints.

10.4.2 Quantitative study

This study is one of the very few studies that have highlighted unmet needs of hypertension care in primary care in Nigeria. It is also the first conducted on PHC facilities in FCT, Nigeria.

Although response rate was high for this study (98%), 10 questionnaires were unusable because of errors encountered during administration by research team. This could have been averted by more rigorous on-going supervision during data collection.

Further, unknowingly, this study did not collect information on salt intake because the corresponding sheet was missing. This was discovered after the research was concluded. It was impossible to go back and collect this data due to cost constraints and difficulty in identifying particular clients that had been recruited into the research study. However, this did not limit our conclusions in that qualitative findings yielded important information about salt intake from both PHC clients and PHC workers.

Moreover, mastering the software tool for analysis(R) took a considerable amount of time thereby prolonging time of write up but the skills gained will be helpful in future work.

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10.5 Conclusions

There is a substantial unmet need for hypertension management in primary care in Nigeria which will grow with an ageing population.

Eliciting prevalence of hypertension, its risk factors, beliefs and experiences about hypertension among service users and service providers is very important as this could help identify important areas that need change and ultimately result in improvement of service provision.

Task sharing by non-physician health care workers with remote physician supervision may provide a possible alternative to achieving the total risk control strategy thereby improving individual level control in primary care.

Given that beliefs are constructs of culture, environment and personal experiences, this study identifies many beliefs about hypertension that may be amenable to change and more importantly facilitates shared understandings necessary for achieving success in the control of hypertension at the individual and population level.

With increased funding for primary care in Nigeria, there is a need for further research to guide spending on the most cost-effective strategies for hypertension and NCD control.

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Appendix 1: Search Strategy for **EMBASE (ovidSP) and MEDLINE (ovidSP) in chapter 2**

1. exp epidemiologic methods/ or exp data collection/ or exp health surveys/ or exp health care surveys/ or exp vital statistics/ or exp life expectancy/ or exp life tables/ or exp morbidity/ or exp incidence/ or exp prevalence/ or exp mortality/

2. exp clinical medicine/ or exp community medicine/ or exp global health/ or exp hospital medicine/ or exp internal medicine/ or exp paediatrics/ or exp public health/ or exp epidemiology/ or exp preventive medicine/

3. exp Hypertension/

4. exp Nigeria/

5. (Prevalence$ or incidence$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

6. (Epidemiology or "vital statistics").mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

7. (Blood adj3 pressure).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

8. hypertension.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

9. ("high blood pressure" or "increased blood pressure").mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

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10. Nigeria$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

11. 1 or 2

12. 5 or 6

13. (7 or 8) not 9

14. 11 or 12

15. 3 or 13

16. 4 or 10

17. 14 and 15 and 16

18. limit 17 to humans

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Appendix 2: POTENTIAL STUDIES EXCLUDED in chapter 2

	POTENTIAL STUDIES EXCLUDED		
NO	**First Author**	**Year of study**	**Reason for Exclusion**
1	Ahaneku et al	2011	sample size < 400
2	Adeloye, D et al	2015	editorial and review
3	Tovagirumukiza,M et al	2011	editorial and review
4	Opie, L et al	2005	editorial and review
5	Hult, M et al	2000	point prevalence not calculated
6	Bello, M et al	2013	editorial and review
7	Ekwunife, I et al	2011	editorial and review
8	Ordinioha, B et al	2011	sample size < 400
9	Adamu, U. et al	2013	point prevalence not calculated
10	Oduwole,A et al	2012	point prevalence not calculated
11	Ogunmola, O. et al	2013	sample size < 400
12	Mezue, K et al	2014	editorial and review
13	Adediran, O.et al	2013	point prevalence not calculated
14	Forester,T et al	1998	editorial and review
15	Din-Dzietham, R et al	2007	editorial and review
16	Ejike, C et al	2008	point prevalence not calculated
17	Balogun,I et al	1990	point prevalence not calculated
18	Hamidu,L et al	2000	point prevalence not calculated
19	Akinkugbe, F et al	1999	point prevalence not calculated
20	Kaufman, J et al	1996	point prevalence not calculated
21	Cooper, R et al	1998	editorial and review
22	Bosu,W et al	2010	editorial and review for Ghana
23	Oghagbon, C et al	2008	sample size < 400
24	Kearney,P et al	2004	editorial and review
25	Oghenekaro,G et al	2012	sample size < 400
26	Taylor,G et al	1996	point prevalence not calculated
27	Boutayeb,A et al	2006	editorial and review
28	Unwin,N et al	2001	editorial and review
29	Ekere, A et al	2005	point prevalence not calculated
30	Ike, S et al	2008	sample size < 400
31	Sani, M et al	2010	sample size < 400
32	Ofuya, I	2007	sample size < 400
33	Addo, J et al	2007	editorial and review

Appendix 3: Search strategy for identification of all types of studies (Medline) in chapter 3

	Searches	Results
1	exp Perception/	350145
2	beliefs.mp. or exp Culture/	150141
3	exp Attitude to Health/ or exp Health Knowledge, Attitudes, Practice/ or "lay health belief".mp.	315630
4	"Attitude of Health Personnel"/ or exp Attitude to Health/ or exp Attitude/ or attitude.mp.	460017
5	exp Adult/ or exp Adolescent/ or meaning.mp.	6405511
6	exp Aged/ or exp Health Behavior/ or exp Models, Psychological/ or exp Health Knowledge, Attitudes, Practice/ or exp Patient Compliance/ or exp Middle Aged/ or exp Adult/ or exp Attitude to Health/ or "health belief".mp.	6059398
7	exp Health Status/ or exp Adult/ or exp Attitude to Health/ or exp Health Behavior/ or exp Adolescent/ or "health behaviour".mp. or exp Middle Aged/	6555847
8	(health adj1 belief$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	3727
9	Nigeria$.mp. or exp Nigeria/	29307
10	exp Aged/ or exp Blood Pressure/ or exp Hypertension/ or exp Middle Aged/ or hyperten$.mp.	4467617
11	"high blood pressure".mp. or exp Hypertension/	224241
12	exp Adolescent/ or exp Middle Aged/ or exp Diabetes Mellitus, Type 2/ or exp Adult/ or exp Metabolic Syndrome X/ or exp Antihypertensive Agents/ or exp Blood Pressure/ or exp Hypertension/ or "elevated blood pressure".mp. or exp Cardiovascular Diseases/	7566136
13	exp Aged/ or exp Adult/ or exp Coronary Disease/ or exp Obesity/ or exp Middle Aged/ or exp Antihypertensive Agents/ or exp Blood Pressure/ or exp Hypertension/ or "raised blood pressure".mp. or exp Cardiovascular Diseases/	7144915
14	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8	6908258
15	10 or 11 or 12 or 13	7684406
16	9 and 14 and 15	14102
17	limit 16 to humans	14007
18	limit 17 to (full text and humans)	1773
19	remove duplicates from 18	1750

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Appendix 4: sensitive search strategy specifically for qualitative studies (Medline) in chapter 3

	Searches	Results
	Searches	**Results**
1	Qualitative Research/	23815
2	Nursing Methodology Research/	15759
3	Questionnaires/	326469
4	exp Attitude/	281076
5	Focus Groups/	18584
6	discourse analysis.mp.	1053
7	content analysis.mp.	13897
8	ethnographic research.mp.	582
9	ethnological research.mp.	7
10	ethnonursing research.mp.	29
11	constant comparative method.mp.	1010
12	qualitative validity.mp.	11
13	purposive sample.mp.	2007
14	observational method$.mp.	491
15	field stud$.mp.	10954
16	theoretical sampl$.mp.	398
17	phenomenology/	0
18	phenomenological research.mp.	297
19	life experience$.mp.	3403
20	cluster sampl$.mp.	4563
21	or/1-20	590727
22	hypertension/	200888
23	Nigeria$.mp. or exp Nigeria/	29307
24	21 and 22 and 23	59
25	Remove duplicates from 24	59

Appendix 5: quality appraisal of qualitative studies in chapter 3

Study, Year	Clear statement/ aim of research described	Qualitative methodology appropriate	Research design appropriate to address aims of research	Recruitment strategy appropriate to aims of research	Data collected in a way that addressed research issue	Reflexivity of the account(i.e. recognition of researcher bias)	Ethical issues taken into consideration	Data analysis sufficiently rigorous	Clear statement of findings	How valuable is the research
Taylor et al 2012	Yes	yes	yes	yes	Yes	No	yes	Yes	yes	Yes
Odusola et al 2014	Yes	yes	yes	yes	Yes	Yes	yes	Yes	yes	Yes

Appendix 6: quality appraisal of quantitative studies in chapter 3

Study, Year	Study sample represents population of interest on key characteristics, sufficient to limit potential bias to results	Response rate (%)	Are measurements appropriate (clear origin, or validity known, or standard instrument)?	Is the sampling strategy relevant to address the quantitative research question	Controlled for confounding (if applicable)
Atulomah et al 2010	YES	Not available	YES	YES	Not available
Oke et al 2004	YES	68.3	NO	YES	Not available
Azubike et al, 2014,	YES	100	YES	YES	Not available
Familoni et al 2004	YES	100	NO	YES	Not available
Okwuonu et al 2014(a)	YES	64	YES	YES	Not available
Okwuonu et al 2014(b)	YES	Not available	YES	YES	Not available
Ike et al 2010	YES	Not available	YES	YES	Not available
Oladapo et al 2013	YES	Not available	NO	YES	Not available
Salaudeen et al 2014	YES	100	NO	YES	Not available
Adamu et al 2012	YES	100	NO	YES	Not available
Adeniyi et al 2015	YES	100	YES	YES	Not available

Appendix 7: quality appraisal of mixed methods studies in chapter 3 using MMAT (adapted from MMAT-Version 2011) see original tool from MMAT website below

Methodological quality criteria	Osamor et al, 2010	Osamor et al, 2011	Osamor, 2011
SCREENING QUESTIONS 1) Are there clear qualitative and quantitative research questions (or objectives*), or a clear mixed methods question (or objective*)?	Yes	Yes	Yes
2) Do the collected data allow /address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components).	Yes	Yes	Yes
QUALITATIVE 1)Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question(objective)?	Yes	Yes	Yes
2) Is the process for analyzing qualitative data relevant to address the research question (objective)?	Yes	Yes	Yes
3) Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?	Yes	Yes	Yes
4) Is appropriate consideration given to how findings relate to researchers' influence, e.g., through	No	No	No
QUANTITATIVE DESCRIPTIVE 1) Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?	Yes	Yes	Yes
2) Is the sample representative of the population understudy?	No	Yes	No
3) Are measurements appropriate (clear origin, or validity known, or standard instrument)?	Yes	Yes	Yes
4) Is there an acceptable response rate (60% or above)?	Yes	Yes	Yes

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MIXED METHODS 1) Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the Qualitative and quantitative aspects of the mixed methods question (or objective)?	Yes	Yes	Yes
2) Is the integration of qualitative and quantitative data (or results*) relevant to address the research question (objective)?	Yes	Yes	Yes
3) Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results*) in a triangulation design?	Yes	Yes	Yes

* These two items are not considered as double-barrelled items since in mixed methods research,

(1) there may be research questions (quantitative research) or research objectives (qualitative research), and (2) data may be integrated, and/or qualitative findings and quantitative results can be integrated

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Appendix 8: Examples of beliefs statements on hypertension per EM among qualitative studies in chapter 3

Explanatory Model	Some examples of Lay Healthcare providers belief statements	Some Examples of Lay Persons (hypertensive and non-hypertensive)beliefs statements	Some Examples of Health Care provider beliefs
Definition & Causes	*- "Hypertension is poor man's sickness. The stress in people's lives is too much; people are fighting and quarrelling with each other and placing cause on them or using witchcraft. All these are the cause of this disease that western medicine cannot cure and it is in our blood and body"(CAM practitioner belief) (Osamor)* *- "Hypertension is caused by too much blood in the body. That is why they call it high blood pressure sometimes. This causes the patient to always have headache and make the heart to beat too fast. It is this too much blood that sometimes make people to paralyze and unable to talk or walk. It is a serious illness and only western medicine cannot treat it" (CAM practitioner belief) (Osamor)*	-"Eh…it's high blood pressure but eh… eh… medical term for it is hypertension as I Understand"(Taylor) - "Yeah, thinking, if, if, if your brain is too loaded, with so many things, thinking of it, it can cause it [HTN]"(Taylor) - "I quite know that environment in Nigeria does not make it possible for somebody to…of eh…our…somebody of our age to have normal pressure"(Taylor) - hypertension is something that brings death in different forms; one can be working and suddenly fall down and slump or become paralyzed. It is called 'kosibale okan'in Yoruba meaning 'there's no peace of mind'.(Odusola) - I don't get hypertension before…one of my pickin [children] come die…so that's Why(Taylor)	*-'Hypertension is not like many other sicknesses like malaria that is easy to manage and cure. You just take your medicine for a couple of days and you feel better.(Osamor)*
Course and Symptoms	-"Hypertension is curable. It is like every other sickness that you take medicine and you are cured, and it can reoccur later. For example, if you have malaria and you take iba medicine, it will go. Does that mean that person will not have malaria again?	**-** No, it won't come back by the Grace of God (Taylor) - "First, I don't fear about it because with God, all things are possible. I don't fear about it. I know God can heal. I think you understand? I don't…I don't think am… much about	**NA**

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	That is what I am saying. It is the same thing with hypertension. It can be cured"

- "I really do not know if we can cure hypertension because there are some people that have been taking English and traditional medicine for years and they are still taking it. They still come to us to complain and some are dead. So I do not know if the sickness is cured. We just give them medicine to help them reduce the sickness and make them feel better for sometime" | it. But what I know is that eh…my drugs, I take it. When I get money I buy it and take it, not always oh. I don't take it every time (Taylor) | |
| **Treatment** | *"Hypertension is curable. It is like every other sickness that you take medicine and you are cured, and it can reoccur later. For example, if you have malaria and you take iba medicine, it will go. Does that mean that person will not have malaria again? That is what I am saying. It is the same thing with hypertension. It can be cured"(CAM practitioner belief) (Osamor)*

- "I really do not know if we can cure hypertension because there are some people that have been taking English and traditional medicine for years and they are still taking it. They still come to us to complain and some are dead. So I do not know if the sickness is cured. We just give them medicine to help them reduce the sickness and | **-** "…mix it together then we begin to drink, we call it Agbo in Yoruba area here. Yes…that means concoction…mixtures of some leaves, then all those things we mix it together. Then cook it, and then we drink it. A times it work, a times when it a very hard thing, then we turn to the orthodox doctors"(Taylor)
- can't say... I can't say all that… it's the doctor that will say: this is the type of the drug that you are going to take…because I'm not a doctor (Taylor)
- "…mix it together then we begin to drink, we call it Agbo in Yoruba area here. Yes…that means concoction…mixtures of some leaves, then all those things we mix it together. Then cook it, then we drink it. A times it work, a times when it a very hard thing, then we turn to the orthodox | **NA** |

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	make them feel better for sometime"(CAM practitioner belief) (Osamor) *- 'When I give them medicine, I ask them to go to the community health centre once in a while to check their blood pressure. I do not refer them. I treat them myself and some are well and cured.' (CAM practitioner belief) (Osamor)* *- Many of our customers come to us for help. In fact, from my records, I have about 12 customers that I am currently treating on hypertension. Majority of them come to us when they are sick and cannot afford to go to UCH. They prefer coming to us because we are within the community and we are easy to reach".(Osamor CAM healer)* *-"Some of these people do not like going to the hospital because there is too much wahala [*too much trouble].*It takes time to see the doctor and when they write drugs for them, it is not in the hospital and when they go out to buy, it is more expensive. Hence they sometimes come to us because we can treat on credit. No hospital will take credit".(Osamor CAM healer)*	doctors"(Taylor) - apart from the pills given to me by my doctor, I also take 'bitter leaf water'; it is said to be good for hypertension (Odusola) - I am into herbs and I have used them severally in the past but they did not work like the white man's medicine(Odusola) - I use only the drugs prescribed to me, but ordinarily, as a member of Christ Apostolic Church Christian faith, I really do not use drugs if not that this is really important; I believe in faith healing.(Odusola)	

NA=not available

Appendix 9: detailed study characteristics of quantitative Studies in chapter 3

Study, Year, Participants	Region	Ethnic Groups	Recruitment site	Study focus	population
Atulomah et al 2010, Lay persons(patients)	South-west	NA	Univ. Teaching hospital, Ogun	to collect information about perceived severity and threat to life from poor treatment response and medication adherence in hypertensive patients	Diagnosed and treated for HTN
Oke et al 2004, Lay persons (patients)	South-west	NA	Medical out -patient clinics in 5 hospitals	study of the misconceptions of hypertension by hypertensive patients	Diagnosed and treated for HTN
Azubike et al, 2014,Lay persons(patients)	North west	Nandu,nimzon, Fulani,hausa, Jaba, others	Primary health care center	To determine the level of knowledge of hypertension and its associated factors, attitudes, practices, and prevalence among rural Nigerian women	Women attending post-natal clinic
Familoni et al 2004,lay persons(patients)	South-west	NA	Medical out -patient clinics in Univ. teach. Hosp. Ogun	to assess the knowledge and level of awareness of the disease among hypertensive patients	Diagnosed and treated for HTN
Okwuonu et al 2014(a),Lay persons (patients)	South-east	NA	Olokoro Community	To assess the level of awareness and practice of lifestyle modification among hypertensive adults in a semi-urban community	Diagnosed and treated for HTN
Okwuonu et al 2014(b),Lay persons (patients)	South-east	NA	Olokoro Community	To identify patient-related barriers to control of hypertension among adults with hypertension in a semi-urban community	Diagnosed and treated for HTN
Ike et al 2010, Lay persons(patients)	South-east	NA	Cardiac clinics in Univ. teach. Hosp. Enugu	To evaluate the perception, knowledge and practices of Nigerian hypertensive patients regarding hypertension and lifestyle modification measures	Diagnosed and treated for HTN
Oladapo et al 2013, lay persons(patients)	South-west	NA	Egbeda Local Government area	To assess the level of awareness, basic knowledge and management of hypertension and CV risk factors among people living in rural south western Nigeria	Community Dwellers

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Salaudeen et al 2014,lay persons(patients)	South-west	NA	Ilorin town	To assess the level of knowledge of risk factors among respondents and to compare the blood pressure pattern of bankers and traffic wardens	Bankers and traffic wardens
Adamu et al 2014, HCP	North-central	NA	Continuing medical education program ,Bida	To assess the knowledge, attitude and practices of medical offi cers on systemic hypertension in the North-Central region of Nigeria	Medical officers(HCP)
Adeniyi et al 2015, lay persons(patients)	North Central	NA	University teach. hospital, Jos	To assess hypertension related knowledge levels among hypertensive patients attending tertiary healthcare facilities	Diagnosed and treated for HTN

Appendix 10: detailed study characteristics of Mixed Methods Studies in chapter 3

Study, Year, Participants	Region	Ethnic groups	Recruitment site	Study Focus	Population
Osamor et al, 2010 , Lay persons (patients & CAM practitioners),	South-west	Yoruba, Ibo, Isoko	Idikan Community	-To investigate the frequency and factors associated with use of CAM among hypertensive subjects in an urban Nigerian community -To obtain Perspectives about the management of hypertension from CAM practitioners in the community.	- CAM practitioners - Diagnosed and treated for HTN
Osamor et al, 2011, Lay persons(patients)	South-west	Yoruba, Ibo, Isoko	Idikan Community	To describe treatment-compliance patterns among hypertensive subjects in a Nigerian community and investigates the factors associated with good compliance, including demographic factors, beliefs about hypertension, and the availability of social support	Diagnosed and treated for HTN
Osamor, 2011, **- Lay persons (patients, traditional healers & PMV)** **- Health Care Practitioners (HCP)**	South-west	Yoruba, Ibo, Isoko	Idikan Community	To study care seeking behavior for hypertension in an urban Nigerian community.	-Diagnosed and treated for HTN - Patent Medicine Vendors(PMV) -Health Care Practitioners

Appendix 11: detailed study characteristics of qualitative studies in chapter 3

Study, Year, Participants	Region	Ethnic groups	Recruitment site	Study Focus	Population
Taylor et al,2012,Lay persons (patients)	South-West	Yoruba, Ibo, others	Lagos University Teaching Hospital	To elicit patients' beliefs regarding the meaning, causes, symptoms and treatment of HTN using explanatory model	Diagnosed and treated for HTN
Odusola et al, 2014, Lay persons (patients)	North-Central	Yoruba, Nupe, Others	Ogo-Oluwa Hospital	to explore patients' perceptions on inhibitors and facilitators for adhering to hypertension treatment	Diagnosed and treated for HTN

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Appendix 12: Link to the WHO STEPS SURVEY VERSION 2.1 used in the quantitative studies in Nigeria

https://www.who.int/ncds/surveillance/steps/STEPS_Instrument_v2.1.pdf

Appendix 13: Link to Service Availability and readiness assessment questionnaire used in the quantitative studies in Nigeria

https://www.who.int/healthinfo/systems/SARA_Reference_Manual_Full.pdf

Appendix 14: Link to EQ-5D-5L questionnaire used in the quantitative studies in Nigeria

https://euroqol.org/wp-content/uploads/2016/10/Sample_UK__English__EQ-5D-5L_Paper_Self_complete_v1.0__ID_24700.pdf

Appendix 15: CONSENT FORM for Nigeria quantitative Study

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Project: "*Prevalence of hypertension and beliefs concerning hypertension and its management among Primary Health Center clients and health workers in Federal Capital Territory Abuja, Nigeria"*

This study has been approved by the UCL Research Ethics Committee: (ID 7811/002)

Thank you for your interest in taking part in this research. Before you agree to take part, the person organising the research must explain the project to you. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you to decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

Participants' statement

Please tick the box beside each question:

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.

3. I consent to the processing of my personal information for the purposes of this research study

4. I understand that the information I have submitted will be published as a report and I will be sent a copy if I so desire. Confidentiality and anonymity will be maintained and it will not be possible to identify me from any publications according to the provisions of data protection act 1998

5. I agree that the research project named above has been explained to me to my satisfaction and I agree to take part in the above study

Name of Participant   _____

Date   _____

Signature   _____

Name of person taking consent ------------------------------- Date ------------------------------------

Signature -------------------------------

Appendix 16: Focus Group Schedule for PHC Clients

Explain the focus group process

Ask if participants have any questions

Ask the participants to sign the consent forms

Remind any participant that they do not have to answer all questions, and can stop the interview at any point

Collect demographic data from participants

State Rules and ensure name tags are worn

Check tape

Turn Tape on

Start focus group discussion

Eliciting patients' explanatory models
•*Attitude*: non-judgmental interest in patients' point of view

•*Technique*: 8 recommended patient interview questions

1. What do you call your problem? What name does it have?
2. What do you think has caused the problem?
3. Why do you think it started when it did?

4. What does your sickness do to you? How does it work?

5. How severe is it? Will it last a long or short time?

6. What do you fear most about your sickness?

7. What are the chief problems your sickness has caused for you?

8. What kind of treatment do you think you should receive? What are the most important results you hope to receive from the treatment? (Kleinman 1980: 106)

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Appendix 17: Focus Group Schedule for PHC workers

Explain the focus group process

Ask if participants have any questions

Ask the participants to sign the consent forms

Remind any participant that they do not have to answer all questions, and can stop the interview at any point

Collect demographic data from participants

State Rules and ensure name tags are worn

Check tape

Turn Tape on

Start focus group discussion

Eliciting patients' explanatory models
•*Attitude*: non-judgmental interest in patients' point of view

•*Technique*: 8 recommended patient interview questions

1. What do you call your problem? What name does it have?
2. What do you think has caused the problem?
3. Why do you think it started when it did?

4. What does your sickness do to you? How does it work?

5. How severe is it? Will it last a long or short time?

 6. What do you fear most about your sickness?

 7. What are the chief problems your sickness has caused for you?

 8. What kind of treatment do you think you should receive? What are the most important results you hope to receive from the treatment? (Kleinman 1980: 106)

9. Have you ever managed a patient with high blood pressure?
10. What is your experience with management of hypertension?
11. Do you feel competent to manage hypertension?

12. Do you think you have available resources to manage hypertension in your center (skills, equipment, drugs)
13. Are you happy to take on an extra role on top of your current work schedule

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Appendix 18: **Interview Schedule for PHC workers**

Explain the interview process

Ask if participant has any questions

Ask the participant to sign the consent form

Remind the participant that they do not have to answer all questions, and can stop the interview at any point

Collect demographic data from participants

Check tape

Turn Tape on

Start interview

Eliciting patients' explanatory models
•*Attitude*: non-judgmental interest in patients' point of view

•*Technique*: 8 recommended patient interview questions

1. What do you call your problem? What name does it have?
2. What do you think has caused the problem?
3. Why do you think it started when it did?

4. What does your sickness do to you? How does it work?

5. How severe is it? Will it last a long or short time?

 6. What do you fear most about your sickness?

 7. What are the chief problems your sickness has caused for you?

 8. What kind of treatment do you think you should receive? What are the most important results you hope to receive from the treatment? (Kleinman 1980: 106)

9. Have you ever managed a patient with high blood pressure?
10. What is your experience with management of hypertension?
11. Do you feel competent to manage hypertension?
12. Do you think you have available resources to manage hypertension in your center (skills, equipment, drugs)
13. Are you happy to take on an extra role on top of your current work schedule

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Appendix 19: Interview Schedule for PHC clients

Explain the interview process

Ask if participant has any questions

Ask the participant to sign the consent form

Remind the participant that they do not have to answer all questions, and can stop the interview at any point

Collect demographic data from participants

Check tape

Turn Tape on

Start interview

Eliciting patients' explanatory models
•*Attitude*: non-judgmental interest in patients' point of view

•*Technique*: 8 recommended patient interview questions

1. What do you call your problem? What name does it have?
2. What do you think has caused the problem?
3. Why do you think it started when it did?

4. What does your sickness do to you? How does it work?

5. How severe is it? Will it last a long or short time?

6. What do you fear most about your sickness?

7. What are the chief problems your sickness has caused for you?

8. What kind of treatment do you think you should receive? What are the most important results you hope to receive from the treatment? (Kleinman 1980: 106)

Reference

1. Kleinman, A., 1980. Patients and Healers in the Context of Culture. Berkeley, CA: Univ of California Press.

2. Weiss MG. Explanatory Model Interview Catalogue (EMIC): framework for comparative study of illness experience. Transcultural psychiatry. 1997; 34:235–263.

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Appendix 20: PARTICIPANTS INFORMATION SHEET

Research Title: *"Prevalence of hypertension and beliefs concerning hypertension and its management among Primary Health Center clients and health workers in Federal Capital Territory Abuja, Nigeria"*

You are being invited to take part in a research study as part of a student project. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Please ask if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. If you cannot read or write in English, an interpreter will carefully read this information to you.

Thank you for reading this.

Who will conduct the research?

Dr. Akinlua J.T.

Work Address: PhD student at the Department of Primary Care and Population Health, University College London Medical School (Royal Free Campus) Rowland Hill street, London NW3 2PF

Who has reviewed the study?

This study has been approved by the UCL Research Ethics Committee (Project ID Number) : 7811/002. This approval will elapse on: dd/mm/yyyy .

What is the purpose of the study?

Nigeria with a population of over 170million people forms a substantial part of the burden of hypertension in sub Saharan Africa. Primary health facilities are usually the first and only formal health facility available to many people in Nigeria. In order to improve service provision for hypertension in primary health care centres, it is important to understand both clients and health workers beliefs about the illness as this will help with planning of

appropriate programs. Consequently, the aim of this study is to find out from PHC clients and PHC workers their beliefs about the meaning, causes, course, symptoms and treatment of hypertension.

Why have I been chosen?

As a client using the PHC or PHC worker in the PHC, you are from the community that is the focus of this study.

What happens if I do not want to take part or if I change my mind?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time without giving a reason and without detriment to yourself

What would I be asked to do if I took part?

If you do decide to take part, I will contact you to fix up a day and time that suits you in order for me to come to talk with you. I will be happy to meet with you in the PHC facility. The meeting will last between 30 and 45 minutes, and I will ask you to talk about your beliefs and experiences about hypertension. With your permission, I would like to tape record our conversation. That is so I can then make notes from our conversation afterwards. This will help us to explore beliefs about hypertension among Nigerians so that we can then produce a report. I would like to emphasise again that you can withdraw from the research study at any time, even during our meeting and conversation.

What are at the possible disadvantages and risks of taking part?

It is possible that during our conversation, you may start thinking about the topic and become concerned about your health. If this is the case then we will measure your blood pressure and other parameters and decide if you are at risk of any cardiovascular disease. If you are at risk we will encourage you to start treatment and follow you up for up to 1 month so as to ensure you are fine. You will also be handed over to a competent health care worker to look after you. If you wish we will not continue the interview and the tape recorder will be switched off.

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What are the possible benefits of taking part?

You, along with other people taking part in this research study, will have an opportunity to inform healthcare professionals about your beliefs on hypertension. This will allow healthcare professionals in Nigeria to evaluate the effectiveness of current services for control of hypertension, and, if possible, improve them.

Will my taking part in this study be kept confidential?

First, all data will be collected and stored in accordance with the Data Protection Act 1998. Although, with your permission, the conversation will be recorded, only members of the research team will have access to the tape recording and transcripts of your recording. These will be kept in an encrypted file and will be destroyed at the end of the research study, once the report has been written. Your own names will not be used and no personal information about yourself will be given in the final report.

What will happen to the results of the research study?

The results of the research study will be collected together and a report written. As mentioned in the paragraph above, you will not be identified in this report. Everyone who takes part in the research will be sent a copy of the results. Results from the research will be submitted for publication in professional medical and nursing journals, and will also be presented at professional conferences, in order that people from other countries will be able to learn from the results.

Who is organising and funding the research?

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The research has been organised by Dr. Akinlua J.T in partial fulfilment of his PhD studies at UCL. Funding for the research has come from the Nigerian Universities Commission/Tertiary Education Trust Fund Nigeria (NUC/TETFUND).

Contact for Further Information

If you have any further questions or wish further information, then please contact the researcher:

Dr J.T. Akinlua

Department of Primary Care and Population Health, University College London Medical School (Royal Free Campus) Rowland Hill street, London NW3 2PF .(Email: ███████████████)

I would like to take this opportunity to thank you for taking the time to read this information sheet and, whether or not you decide to take part in the research, to thank you for considering it.

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Appendix 21: WHO/ISH Prediction charts

WHO/ISH Risk prediction charts
for 14 WHO epidemiological sub-regions

Figure 3. WHO/ISH risk prediction chart for AFR D. 10-year risk of a fatal or non-fatal cardiovascular event by gender, age, systolic blood pressure, smoking status and presence or absence of diabetes mellitus.

Risk Level: <10% | 10% to <20% | 20% to <30% | 30% to <40% | ≥40%

AFR D People with Diabetes Mellitus

AFR D People without Diabetes Mellitus

This chart can only be used for countries of the WHO Region of Africa, sub-region D, in settings where blood cholesterol CANNOT be measured (see Table 1).

KNOW THE FACTS ABOUT

High Blood Pressure

What is high blood pressure?

Blood pressure is the force of blood against your artery walls as it circulates through your body. Blood pressure normally rises and falls throughout the day, but it can cause health problems if it stays high for a long time. High blood pressure can lead to heart disease and stroke—leading causes of death in the United States.[1]

Are you at risk?

One in three American adults has high blood pressure—that's an estimated 67 million people.[2] Anyone, including children, can develop it.

Several factors that are beyond your control can increase your risk for high blood pressure. These include your age, sex, and race or ethnicity. But you can work to reduce your risk by eating a healthy diet, maintaining a healthy weight, not smoking, and being physically active.

[1]CDC: Deaths: Final Data for 2009. *www.cdc.gov/nchs/ data/nvsr/nvsr60/nvsr60_03.pdf*

[2]CDC: Vital signs: awareness and treatment of uncontrolled hypertension among adults—United States, 2003–2010.

www.cdc.gov/mmwr/preview/ mmwrhtml/mm6135a3.htm

What are the signs and symptoms?

High blood pressure usually has no warning signs or symptoms, so many people don't realize they have it. That's why it's important to visit your doctor regularly. Be sure to talk with your doctor about having your blood pressure checked.

How is high blood pressure diagnosed?

Your doctor measures your blood pressure by wrapping an inflatable cuff with a pressure gauge around your arm to squeeze the blood vessels. Then he or she listens to your pulse with a stethoscope while releasing air from the cuff. The gauge measures the pressure in the blood vessels when the heart beats (systolic) and when it rests (diastolic).

How is it treated?

If you have high blood pressure, your doctor may prescribe medication to treat it. Lifestyle changes, such as the ones listed above, can be just as important as taking medicines. Talk with your doctor about the best ways to reduce your risk for high blood pressure.

Division for Heart Disease and Stroke Prevention

High Blood Pressure

What blood pressure levels are healthy?

To determine whether your blood pressure is normal, your doctor examines your systolic and diastolic pressures, which the gauge measures in millimeters of mercury (abbreviated as mmHg).

	Blood Pressure Levels
Normal	systolic: less than 120 mmHg diastolic: less than 80 mmHg
At risk (prehypertension)	systolic: 120–139 mmHg diastolic: 80–89 mmHg
High	systolic: 140 mmHg or higher diastolic: 90 mmHg or higher

Can high blood pressure be prevented?

You can take several steps to maintain normal blood pressure levels:

- Get your blood pressure checked regularly.

- Eat a healthy diet. Tips on reducing saturated fat in your diet are available on the Web site for CDC's Division of Nutrition, Physical Activity, and Obesity. *http://www.cdc.gov/nutrition/ everyone/basics/fat/saturatedfat.html*

- Maintain a healthy weight. CDC's Healthy Weight Web site includes information and tools to help you lose weight. *http://www.cdc.gov/healthyweight/ index.html*

- Be physically active. Visit CDC's Physical Activity Web site for more information on being active. *http://www.cdc.gov/physicalactivity/ index.html*

- Limit alcohol use. See CDC's Alcohol and Public Health Web site for more information. *http://www.cdc.gov/alcohol*

- Don't smoke. CDC's Office on Smoking and Health Web site has information on quitting smoking. *http://www.cdc.gov/tobacco*

- Prevent or manage diabetes. Visit CDC's Diabetes Public Health Resource for more information. *http://www.cdc.gov/diabetes*

For More Information

Learn more about high blood pressure at the following Web sites:

- Centers for Disease Control and Prevention's Division for Heart Disease and Stroke Prevention: *http://www.cdc.gov/dhdsp/index.htm*

- American Heart Association: *http://www.americanheart.org*

- National Heart, Lung, and Blood Institute: *http://www.nhlbi.nih.gov*

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The STEPS survey of noncommunicable disease (NCD) risk factors in [country/site name] was carried out from [insert month and year] to [insert month and year]. [country/site name] carried out Step 1, Step 2 [and Step 3 if applicable]. Socio demographic and behavioural information was collected in Step 1. Physical measurements such as height, weight and blood pressure were collected in Step 2. Biochemical measurements were collected to assess blood glucose and cholesterol levels in Step 3. The survey was a population-based survey of adults aged 18-69 [adjust as necessary]. A [insert type of sampling design] sample design was used to produce representative data for that age range in [insert country/site name]. A total of [insert sample size] adults participated in the survey. The overall response rate was [insert response rate (x%)]. A repeat survey is planned for [insert year] if funds permit.

Results for adults aged 18-69 years (incl. 95% CI) *(adjust if necessary)*	Both Sexes	Males	Females
Step 1 Tobacco Use			
Percentage who currently smoke tobacco	**77.1%** (66.2 – 88.1)	**77.2%** (66.2 – 88.1)	**77.4%** (66.2 – 88.1)
Percentage who currently smoke tobacco daily			
For those who smoke tobacco daily			
Average age started smoking (years)			
Percentage of daily smokers smoking manufactured cigarettes			
Mean number of manufactured cigarettes smoked per day (by smokers of manufactured cigarettes)			
Step 1 Alcohol Consumption			
Percentage who are lifetime abstainers			
Percentage who are past 12 month abstainers			
Percentage who currently drink (drank alcohol in the past 30 days)			
Percentage who engage in heavy episodic drinking (6 or more drinks on any occasion in the past 30 days)			
Step 1 Diet			
Mean number of days fruit consumed in a typical week			
Mean number of servings of fruit consumed on average per day			
Mean number of days vegetables consumed in a typical week			
Mean number of servings of vegetables consumed on average per day			
Percentage who ate less than 5 servings of fruit and/or vegetables on average per day			
Percentage who always or often add salt or salty sauce to their food before eating or as they are eating			
Percentage who always or often eat processed foods high in salt			
Step 1 Physical Activity			
Percentage with insufficient physical activity (defined as < 150 minutes of moderate-intensity activity per week, or equivalent)*			
Median time spent in physical activity on average per day (minutes) (presented with inter-quartile range)			
Percentage not engaging in vigorous activity			

* For complete definitions of insufficient physical activity, refer to the GPAQ Analysis Guide (http://www.who.int/chp/steps/GPAQ/en/index.html) or to the WHO Global recommendations on physical activity for health (http://www.who.int/dietphysicalactivity/factsheet_recommendations/en/index.html)

Results for adults aged 18-69 years (incl. 95% CI) *(adjust if necessary)*	Both Sexes	Males	Females
Step 1 Cervical Cancer Screening			
Percentage of women aged 30-49 years who have ever had a screening test for cervical cancer			
Step 2 Physical Measurements			
Mean body mass index - BMI (kg/m^2)			
Percentage who are overweight (BMI ≥ 25 kg/m^2)			
Percentage who are obese (BMI ≥ 30 kg/m^2)			
Average waist circumference (cm)			
Mean systolic blood pressure - SBP (mmHg), including those currently on medication for raised BP			
Mean diastolic blood pressure - DBP (mmHg), including those currently on medication for raised BP			
Percentage with raised BP (SBP ≥ 140 and/or DBP ≥ 90 mmHg or currently on medication for raised BP)			
Percentage with raised BP (SBP ≥ 140 and/or DBP ≥ 90 mmHg) who are not currently on medication for raised BP			
Step 3 Biochemical Measurement			
Mean fasting blood glucose, including those currently on medication for raised blood glucose [choose accordingly: mmol/L or mg/dl]			
Percentage with impaired fasting glycaemia as defined below • plasma venous value ≥6.1 mmol/L (110 mg/dl) and <7.0 mmol/L (126 mg/dl) • capillary whole blood value ≥5.6 mmol/L (100 mg/dl) and <6.1 mmol/L (110 mg/dl)			
Percentage with raised fasting blood glucose as defined below or currently on medication for raised blood glucose • plasma venous value ≥ 7.0 mmol/L (126 mg/dl) • capillary whole blood value ≥ 6.1 mmol/L (110 mg/dl)			
Mean total blood cholesterol, including those currently on medication for raised cholesterol [choose accordingly: mmol/L or mg/dl]			
Percentage with raised total cholesterol (≥ 5.0 mmol/L or ≥ 190 mg/dl or currently on medication for raised cholesterol)			
Mean intake of salt per day (in grams)			
Cardiovascular disease (CVD) risk			
Percentage aged 40-69 years with a 10-year CVD risk ≥ 30%, or with existing CVD**			
Summary of combined risk factors • current daily smokers • overweight (BMI ≥ 25 kg/m^2) • less than 5 servings of fruits & vegetables per day • raised BP (SBP ≥ 140 and/or DBP ≥ 90 mmHg or • insufficient physical activity currently on medication for raised BP)			
Percentage with none of the above risk factors			
Percentage with three or more of the above risk factors, aged 18 to 44 years			
Percentage with three or more of the above risk factors, aged 45 to 69 years			
Percentage with three or more of the above risk factors, aged 18 to 69 years			

** A 10-year CVD risk of ≥30% is defined according to age, sex, blood pressure, smoking status (current smokers OR those who quit smoking less than 1 year before the assessment), total cholesterol, and diabetes (previously diagnosed OR a fasting plasma glucose concentration >7.0 mmol/l (126 mg/dl).

For additional information, please contact:
STEPS country focal point [name, email addresses]