UNIVERSITY OF CAPE COAST

# PREVALENCE AND RISK FACTORS FOR HYPERTENSION AMONG RURAL DWELLERS IN SELECTED DISTRICTS OF THE EASTERN REGION, GHANA

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# PREVALENCE AND RISK FACTORS FOR HYPERTENSION AMONG RURAL DWELLERS IN SELECTED DISTRICTS OF THE EASTERN REGION, GHANA

BY

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Thesis submitted to the Department of Health, Physical Education and Recreation of the Faculty of Science and Technology Education, College of Education Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of Doctor of Philosophy degree in Health Promotion (Community Health Promotion)

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# DECLARATION

## Candidate's Declaration

I declare that this thesis is entirely my own work and represents original research conducted by me. No part of this thesis has been submitted for any other degree or qualification at this university or any other institution

Candidate' Signature: ..... Date: .....

Name: Jones Abekah Baah

## Supervisors' Declaration

We affirm that this thesis was developed and presented in compliance with the University of Cape Coast's established guidelines for thesis supervision.

Principal Supervisor's Signature: ..... Date: .....

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Co-Supervisor's Signature: ..... Date: .....

Name: Dr. Thomas Hormenu

## ABSTRACT

Hypertension is the leading cause of death among adults globally. This study assessed the burden of hypertension and its prevailing risk factors among rural dwellers in selected districts of the Eastern Region. This study adapted a quantitative cross-sectional survey while using a multistage cluster sampling technique. It also employed a closed-ended questionnaire to solicit information from 1,652 adults aged 25 years or above. Frequencies and percentages were used to assess participants' anthropometric characteristics and illness perceptions. Chi-square tests and Pearson correlation analysed associations between variables, while hierarchical logistic regression identified hypertension predictors at a 0.05 significance level and 95% confidence interval. The prevalence of hypertension among participants was 24.1%. Also, 19% of participants had high-risk waist-to-hip ratio (WHR), 72.2% and 5.4% of females and males had high risk of waist-to-height ratio (WHtR) respectively. The prevalence of overweight, obesity, and underweight were 27%, 14% and 10% respectively. Also, 34% of people living with hypertension had high threat perception. High body mass index (BMI) and increased WHR were significant predictors of hypertension among participants. The risk factors for hypertension were being a female, being aged 50 years or older, having no formal education, and regular consumption of salty meals. Having basic education, never smoking, not currently smoking, and avoiding alcohol consumption in the last 12 months reduce the risk of hypertension. Therefore, collaborative health education efforts aim to raise hypertension awareness and encourage regular check-ups should be implemented in the Eastern region of Ghana.

**KEY WORDS**

Hypertension

Risk factors

Waist-to-height ratio

Body mass index

Rural communities

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## DEDICATION

To my family and in memory of my late father.

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## LIST OF ACRONYMS

| | |
|---|---|
| AD | Akyemansa District |
| AHA | American Heart Association |
| ANCOVA | Analysis of Covariance |
| AOR | Adjusted Odds Ratio |
| BMI | Body Mass Index |
| BIPQ | Brief Illness Perception Questionnaire |
| CVD | Cardiovascular Disease |
| CDC | Centre for Disease Control and Prevention |
| CHARLS | China Health and Retirement Longitudinal Survey |
| CIPQ-R | Chinese Illness Perception Questionnaire-Revised |
| CHAG | Christian Health Association of Ghana |
| CKD | Chronic Kidney Disease |
| CI | Confidence Interval |
| CHPS | Community Health-based Planning Services |
| DM | Diabetes Mellitus |
| DBP | Diastolic Blood Pressure |
| DHIMS 2 | District Health Information Management System 2 |
| DHMT | District Health Management Team |
| ER | Eastern region |
| GHS | Ghana Health Service |
| GSS | Ghana Statistical Service |
| GBD | Global Burden of Disease |
| HPM | Health Promotion Model |
| HSB | Health-seeking behaviours |
| HIC | High-Income Countries |
| IPQ-R | Illness Perception Questionnaire |
| ISH | International Society of Hypertension |
| IASM | Inventory of Adherence to Self-Management |
| LMICs | Low- and Middle-Income Countries |

| | |
|---|---|
| MAI | Medication Adherence Inventory |
| MOH | Ministry of Health |
| MMAS-8 | Morisky Medication Adherence Scale |
| NHANES | National Health and Nutrition Examination Survey |
| NCDs | Non-Communicable Diseases |
| NGOs | Non-governmental Organisations |
| PNDC | Provisional National Defence Council |
| QUALICOPC | Quality and Cost of Primary Care |
| QOL | Quality of Life |
| RAAS | Renin-angiotensin-aldosterone system |
| RCS | Responsive Care Scale |
| SDG | Sustainable Development Goal |
| ISH | Society of Hypertension |
| SPSS | Statistical Package for the Social Sciences |
| SSA | sub-Saharan African |
| SBP | Systolic blood pressure |
| TSQM-4 | Treatment Satisfaction Questionnaire for Medication |
| UN | United Nations |
| WHR | Waist-to-hip ratio |
| WHtR | Waist-to-height-ratio |
| WC | Waist Circumference |
| WHO | World Health Organization |
| WHF | World Heart Federation |

# CHAPTER ONE

# INTRODUCTION

## Background to the Study

Hypertension, a condition marked by elevated arterial blood pressure levels, is defined by a systolic blood pressure (SBP) of 140 mmHg or higher and a diastolic blood pressure (DBP) of 90 mmHg or higher according to the report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure report in 2004 (Chobanian et al., 2003). In 2017, the American Heart Association revisited this definition, adjusting it to SBP, of 130 mmHg or higher and a diastolic blood pressure (DBP) of 80 mmHg or higher. This modification was prompted by changes in global socioeconomic variables and findings from extensive observational studies that had revealed a substantial increase in cardiovascular disease (CVD) risk even with minimal blood pressure elevation (Hanna et al., 2019).

The International Society of Hypertension (ISH), in 2020, also revised the categorisation of blood pressure levels, defining them as normal BP (less than 130/80 mmHg), high normal BP (130-139/85-89 mmHg), grade 1 hypertension (140-159/90-99 mmHg), and grade 2 hypertension (160 mmHg or higher/100 mmHg or higher) (Unger et al., 2020). It is worth noting that these classifications are subject to change, as the ISH is scheduled to release another reclassification in 2024. Lastly, the World Health Organisation (WHO) maintained 140/90 mmHg or higher as their diagnostic criteria for hypertension in their 2023 report (WHO, 2023). The diagnosis is typically confirmed by two to three successive blood

pressure measurements on different occasions using a sphygmomanometer with an appropriate cuff length (Unger et al., 2020).

It is evident that hypertension impacts both affluent and developing economies, with projections indicating that it may affect around 1.5 to 1.54 billion people globally by 2025 (Bosu & Bosu, 2021; Guwatudde et al., 2015; Simo et al., 2020). Another study estimated that approximately 31.1% of the world population had hypertension by the end of 2019, with a forecasted increase to 33% by 2025 (Carey et al., 2019). Moreover, these global studies on hypertension prevalence revealed that out of the estimated 1.39 billion adults aged 20 and older, 1.04 billion resided in Low- and Middle-Income Countries (LMICs), while 349 million in High-Income Countries (HICs) (Mills, Stefanescu & He, 2020).

Interestingly, the burden of hypertension in HICs primarily affected individuals aged 60+ years, whereas in LMICs, individuals aged 40 to 59 years bore the highest burden. According to the WHO 2023 report, roughly 1.28 billion people aged 30 – 79 years are grappling with high blood pressure, with two-thirds of this population residing in LMICs. 46% of those with the condition are unaware of their hypertension status while diagnosis and treatment reach less than 42% of individuals with hypertension, and only 1 in 5 adults (21%) with hypertension successfully manages the condition (WHO, 2023). In regions such as Western Europe, North America, Africa, and Latin America, high blood pressure remains as the foremost cause of death (Hanna et al., 2019).

Furthermore, there are varied prevalence rates reported in different countries, with rural India exhibiting the lowest rates at 3.4% and 6.8% among

men and women respectively, while South Africa and Poland demonstrate the highest rates, with over 70% respectively (Abebe, Berhane, Worku, & Getachew, 2015). Notably in Nigeria, as cited by Osuala (2017), 57 million individuals were estimated to be hypertensive with many still undiagnosed. In a systematic review and meta-analysis conducted to determine the prevalence, awareness and control of hypertension, Bosu and Bosu (2021) reported that four African countries revealed alarming prevalence rates of hypertension: Ghana (27.0%), Nigeria (28.0%), Cameroon (30.90%), and Ethiopia (19.60%). South Africa has also been identified as having the highest hypertension prevalence in Africa, ranging between 27% and 58% (Sharma et al., 2021). These studies demonstrated that the SSA region suffers the highest burden of hypertension (Okello et al., 2020).

Due to its high prevalence, hypertension holds the position as the predominant cause of morbidity and premature mortality on a global scale (Unger et al., 2020). This health concern is a significant focus for the World Health Organization (WHO) and every country, with a particular emphasis on those in the sub-Saharan African (SSA) region (Dosoo et al., 2019). This is because of the established interconnection between hypertension and the susceptibility to various complications (Chowdhury & Chakraborty, 2017). As such, a mere increase of 20/10 mmHg in BP doubles the risk of CVD, encompassing conditions like stroke, heart failure, and renal failure, among others (Chowdhury & Chakraborty, 2017).

With regard to its risk factors, Pirkle et al. (2020) identified connections between interpersonal interactions among community members, the availability of community resources, and the burden of hypertension. Factors such as

unemployment, prolonged work hours, job insecurity, low salaries, and sleep difficulties have all been allied with an elevated risk to hypertension (Landsbergis et al., 2024). Gender differences in hypertension prevalence also exist constituting a potential risk, with men generally having a higher prevalence until the age of 60, after which women surpass men (Princewel et al., 2019). A study in Brazil and Columbia found higher prevalence rates among women (34%) than men (28%) in the 40-49 age group (Pirkle et al., 2020).

On its repercussions, as of 2015, nearly 1.13 billion adults were affected by hypertension, contributing to an estimated 211.8 million disability-adjusted life years (Jongen et al., 2019). In addition, it has contributed about 54 percentage point to strokes, 47 percentage point of ischemic heart disease, causing 10.5 million deaths annually, and generating 92 million disability-adjusted life years globally (Calys-Tagoe, Nuertey, Tetteh, & Yawson, 2020).

In Ghana, the prevalence of hypertension previously considered a disease of the wealthy, now affects people across all socioeconomic backgrounds (Awuah et al., 2019). The prevalence of hypertension among adults in Ghana ranges from 19% to 48%, with an expected increase by 2025 (Bosu & Bosu, 2021). The prevalence rates are increasing, even rural communities are approaching those in urbanised areas, indicating a shifting trend (Bosu & Bosu, 2021). Examining potential factors beyond lifestyle and biomedical factors, sociocultural variables, socioeconomic status, health-seeking behaviour, illness perception, and personal characteristics have been strongly linked to hypertension (Adongo & Asaarik, 2018; Kohori, Uematsu, Wangdi, & Id, 2021; Pirkle et al., 2020). This also

includes psychosocial variables which can cause emotional stress that can trigger physiological responses that, when repeatedly stimulated, may prevent arterial blood pressure from returning to resting levels, potentially leading to hypertension (Cuevas, Williams, Norman, & Francisco, 2018).

This uptrend of prevalence rates is alarming even in rural areas of Ghana particularly the Eastern region of Ghana necessitating a further investigation into the risk factors and possible interventions that could improve the prevailing condition. In addition, the rise in hypertension prevalence poses a challenge to achieving Sustainable Development Goal 3.4, which targets a reduction in premature NCD mortalities by 2030 (Bennett, 2020). Therefore, further research on the awareness level of hypertension and its associated predictors among adults is crucial.

**Statement of the Problem**

Until recently, hypertension in Ghana was often considered a condition affecting affluent individuals in urban areas. However, there has been a notable shift, with evidence suggesting an increase in hypertension prevalence among people residing in rural communities (Williams et al., 2013). Despite the expectation that rural dwellers, who often engage in protective behaviours such as moderate-intensity physical activity and consumption of fruits and vegetables, would be shielded against NCDs, a study has revealed an upward trend in hypertension prevalence in rural areas (Atibila et al., 2021).

In spite of this, there is rather extensive literature addressing the prevalence and predictors of hypertension risk in urban settings within Ghana, while literature remains scant regarding the problem in rural areas, such as the Eastern Region of Ghana. Some studies conducted including those of Dosoo et al. (2019) recorded 37.4% prevalence of hypertension among rural communities in the Hohoe municipality and Addo et al. (2006) documented a 25.4% prevalence in four rural Ga West communities. This observation may be attributed to cultural differences, variations in dietary patterns, access to healthcare services, lifestyle factors, and the geographical location of the populations studied, which may influence hypertension risk and awareness levels (Addo, Amoah & Koram, 2006; Dosoo et al., 2019). Another reason for this rise may be the inadequate knowledge on the current trends of hypertension including its predictors among rural dwellers which could increase NCDs mortality and morbidity in Ghana.

Further, a population-based comparison study in two districts of the ER (Akuapim South, now Nsawam Adoagyiri and Lower Manya-Krobo) reported prevalence rates of 20.1% and 19.6% for males and females, respectively (Lamptey et al., 2017). In their study, although it consisted of some rural communities, was not representative for a generalization, since it largely focused on urban areas. In addition, even though their study included some rural communities, the authors failed to delineate the prevalence and specific predictors among rural residents in their study. Moreover, reports from the District Health Information Management System 2 (DHIMS 2) of GHS in the Eastern region, a digital platform for collecting, storing, analysing, and managing health data,

showed an elevation in hypertension cases in the four main rural districts (Akyemansa, Denkyembour, New Abirem and Achiase district) in the Eastern Region. For instance, hypertension cases in the Denkyembour district have experienced a sharp rise in the reported cases of hypertension over a four-year period. The district reported a total of 1973, 2207, 3097, and 7891 in 2017, 2018, 2019, and 2020, respectively (DHIMS 2, Denkyembour DHMT, 2020). The Achiase district also reported a three-year trend of hypertension cases as follows: 489, 341 and 600 for 2018, 2019 and 2020, respectively (DHIMS 2, Achiase DHMT, 2020). This shows a significant increase in hypertension warranting further studies to understand the factors at play.

The paucity of current data on the burden of the prevailing condition among rural dwellers in the Eastern Region could hinder the region's efforts towards reducing NCDs-related mortalities and morbidities to one-third by the year 2030. There is, therefore, a need for more extensive investigation to understand the specific dynamics and challenges faced by rural populations in the Eastern Region regarding hypertension.

**Purpose of the Study**

The purpose of this research was to determine the prevalence of, and risk factors for hypertension among rural dwellers in selected districts of the Eastern Region.

**Research Questions**

The study answered the following questions:

1. What is the prevalence of hypertension among rural dwellers in the selected districts of the Eastern Region?
2. What is the level of anthropometric characteristics of rural dwellers in the selected districts of the Eastern Region?
3. What is the illness perception of rural dwellers of the Eastern Region?
4. What are the factors that predict hypertension among rural dwellers in the Eastern Region?

**Significance of the Study**

The outcomes of this research could be useful to the Ministry of Health (MOH), Ghana Health Service (GHS) and other interest groups like the Ghana NCDs Alliance. Also, this study's findings will serve as the basis for the MOH/GHS to formulate national policies that will address most of the risk factors for the condition. For instance, incorporating intentional regular exercises (physical activity) such as 30 minutes of brisk walking three times weekly can help to address most of the risk factors for hypertension. Policies to increase taxes on alcoholic beverages and cigarettes among others will also help to reduce the prevalence of hypertension.

The findings could inform and guide healthcare practitioners to develop effective preventive measures for hypertension. The findings can encourage policymakers to develop policies to establish wellness centres in the communities or traditional health facilities where people aged 18 years and above can walk in just to check their blood pressure quarterly as this will help in early identification of at-risk adults for effective intervention. The findings also would inform

healthcare practitioners to place emphasis on psychosocial, cultural, and other risk factors apart from the traditional ones like the modifiable and non-modifiable risk factors that researchers have over-concentrated on in previous studies.

The academic field would benefit from this study. Much is known already about the usual risk factors (genetics, age, body mass index, excess salt and fat intake, physical inactivity among others) for hypertension. There is, however, a dearth in data on the relationship between psychosocial factors, illness beliefs, personal factors and socioeconomic factors, and development of hypertension. This study was designed to fill this existing gap. Finally, the study quantified risk factors for hypertension in order to redirect attention on targeting these factors to reduce hypertension. This could enable policy implementers like the GHS to put in adequate interventions that can curtail the increasing prevalence of hypertension in Ghana.

**Delimitations**

This study exclusively examined hypertension and its predictors including age, gender, education and lifestyle among rural residents in the Eastern Region of Ghana, utilising a cross-sectional survey design. However, the study did not examine other factors such as stress, environmental exposure etc. The study focused on selected rural areas in the Eastern region (Akyemansa and New Abirem districts) to gain targeted insights into hypertension prevalence and associated factors within the rural community.

## Limitations

In the realm of scientific inquiry, it is essential to recognise that no study is without limitations, which can be considered as constraints or shortcomings within the study that may affect the interpretation, validity, or generalisability of the findings. Identifying and acknowledging the limitations is one crucial aspect of research transparency and integrity, as it allows researchers and readers to critically assess the strengths and weaknesses of a study. Similar to other studies, this also has its own set of limitations. While this research strived to mitigate these potential biases and limitations, it is vital to acknowledge that these constraints are inherent to the research endeavour itself.

One drawback of this study lies in its cross-sectional design, which restricts the ability to infer causality between hypertension and its correlated risk factors among rural dwellers. While the study offered an insight into the burden of hypertension, it failed to account for the dynamic nature of the condition or its influencing factors over time. Also, while we can identify associations or correlations between hypertension and certain risk factors, such as lifestyle habits, we cannot determine the direction of causality. It is plausible that hypertension may lead to changes in certain risk factors, or conversely, these predictors could potentially play a role in the onset or worsening of hypertension. Additionally, there may be other unmeasured variables or confounding factors that influence both hypertension and its' determinants, further complicating the establishment of causal relationships. As such, we are unable to succinctly ascertain causation between these variables.

Also, while the quantitative nature of this study offers a significant understanding into hypertension prevalence rates and predictors, it may not have fully captured the complex interplay of cultural and social factors influencing the disease within specific communities in the selected districts in the Eastern Region. The emphasis on numerical data and statistical analysis may have overshadowed the nuanced beliefs, perceptions, and attitudes influencing the risk factors for hypertension, which are crucial for developing effective interventions. The quantitative nature of this study may not have delved deeply enough into the intricacies of experiences and behaviours, particularly in contexts where the participant's risk factors are deeply intertwined with cultural norms and social dynamics. As such the study might have overlooked the contextual nuances that may be influencing the risk factors and the burden of hypertension within these communities.

In addition, recruiting participants from these rural areas posed a challenge including access to limited infrastructure and poor road networks, which hindered transportation to remote communities. Other health-related factors such as physical limitations, age-related immobility, or chronic illnesses (COVID-19) may have prevented individuals from participating. Cultural and language differences, as well as mistrust of research activities, further complicate recruitment efforts in these settings. Additionally, social desirability bias may have influenced participants' responses, particularly regarding sensitive topics such as smoking, alcohol consumption, and dietary habits, potentially skewing the data.

Lastly, another limitation that could impact the generalisability and applicability of the findings was on conducting the study solely among rural dwellers in the Eastern Region of Ghana who were predominantly farmers, not investigating obesity rates by gender or age and the over-representation of females potentially affecting the analysis and interpretation of results. By focusing exclusively on rural populations, the study may have failed to capture important differences in hypertension prevalence, risk factors and management strategies that exist in urban areas. Urban populations often have distinct socio-economic, lifestyle, and healthcare access factors compared to rural communities. Therefore, limiting the study to rural areas may have generated findings that are not fully representative of the broader population in the region. This limitation may impact the extent to which the study's findings can be generalised and its recommendations can be applied to hypertension prevention and management strategies in both urban and rural environments.

**Definition of Terms**

**Hypertension**: Hypertension is a medical condition that is characterised by elevated blood pressure levels. In this study, hypertension will be operationally defined as systolic blood pressure (SBP) which is equal to or greater than 140 mmHg and/or diastolic blood pressure (DBP) that is equal to or greater than 90 mmHg, based on multiple blood pressure measurements that were taken during the study.

**Risk Factors**: Risk factors are characteristics or behaviours associated with an increased likelihood of developing a particular condition. Risk factors for

hypertension will be operationally defined in this study as specific variables and conditions, such as age, gender, lifestyle choices (e.g., physical activity, dietary habits), family history, and socioeconomic factors, identified through statistical associations and correlations with hypertension.

**Rural Dwellers**: Rural dwellers are individuals residing in areas characterised as rural, often with a lower population density and distinct geographical features. In the context of this study, rural dwellers will be operationally defined based on the administrative classifications of rural areas in the selected districts of the Eastern Region, Ghana.

**Cardiovascular Risk Factors**: Cardiovascular risk factors are variables or conditions that increase the likelihood of developing cardiovascular diseases. Cardiovascular risk factors in this study will be operationally defined as factors such as hypertension, hyperlipidaemia, smoking, obesity, and diabetes, which contribute to an increased risk of cardiovascular diseases.

**Non-Communicable Disease**: Non-communicable diseases (NCDs) are medical conditions not caused by infectious agents and typically have a chronic and long-duration nature. Non-communicable diseases in this study will be operationally defined as chronic health conditions, such as hypertension, diabetes, and cardiovascular diseases, that are not transmitted through infectious agents.

## Organisation of the Study

The thesis report followed a structured format consisting of five chapters. In Chapter One, the introductory section provided a comprehensive overview, covering the background, problem statement, study objectives, research questions, significance, scope, limitations, and definitions of key terms utilised throughout the study. It aimed to set the stage for the subsequent chapters by delineating the rationale and framework within which the research is situated. Chapter Two delved into an extensive review of existing literature pertinent to the study's focus on hypertension and its determinants among rural populations. Additionally, this chapter expanded its scope by examining two theoretical models and a conceptual framework that provided a theoretical foundation for understanding the complexities of hypertension within rural contexts. This section aimed to synthesise and analyse previous research findings, identify gaps in the literature, and lay the groundwork for the research methodology.

In Chapter Three, the research methodology section provided a detailed exposition of the study's design, including the study site, target population, sampling technique, data collection tools, procedures, and data analysis methods. By meticulously detailing the research process, this chapter aimed to enhance transparency and reproducibility while ensuring the rigor and validity of the study's findings. Chapter Four presented the empirical findings derived from data analysis, accompanied by a robust discussion that contextualised the results within the broader theoretical framework and existing literature. Through an in-depth

exploration of the findings, this chapter sought to elucidate patterns, trends, and relationships identified during the research process, thereby contributing to the advancement of knowledge in the field. Finally, Chapter Five encapsulated the culmination of the research journey, offering a succinct summary of the main findings, key discoveries, conclusions drawn from the study, and actionable recommendations for future research endeavours or practical interventions. This concluding chapter served as a reflective synthesis of the research endeavour, providing closure while also paving the way for further scholarly inquiry and application in real-world contexts.

# CHAPTER TWO
# LITERATURE REVIEW

## Introduction

The study assessed the prevalence and associated determinants for hypertension among rural dwellers in some selected districts of the Eastern Region of Ghana. The chapter examines various aspects of hypertension, encompassing its classification, diagnostic criteria, prevalence rates, and the key risk factors contributing to its development. Also, the chapter provides a review of various theories, concepts, and empirical foundations of the study. The literature review specifically covers:

1. Theoretical Review
    a. Pender's Health Promotion Model.
2. Conceptual Review
    a. Hypertension
3. Empirical Review
    a. Prevalence of hypertension among rural dwellers.
    b. Sociocultural and economic factors influencing hypertension.

## Theoretical Review

The various theories and models that underpin the study have been discussed in this section of the review. The theories reviewed include Pender's health promotion model.

**Pender's Health Promotion Model**

Nola J. Pender was the proponent of the health promotion model (HPM) in 1982. The model has been updated twice since 1996, most recently in 2002. The HPM elucidates an individual's multidimensional nature as they engage with their environment in pursuit of health (Chen & Hsieh, 2021). The HPM has been extensively used in numerous health and nursing research studies. The model's objective is to assist healthcare personnel in becoming more familiar with and understanding the primary health factors in order to use them as a basis for counselling to promote well-being and healthy lifestyles (Sharifirad, Kamran, Azadbakht, Mahaki, & Mohebi, 2015). Hypertension is one of several lifestyle disorders, and the HPM is well suited to this study because it has been widely utilized for identifying and modifying unhealthy behaviours while promoting overall health (Chen & Hsieh, 2021). The HPM centres on three primary purviews: Individual characteristics and experiences, reasoning and affective components of behaviour, and behavioural consequences. Individual characteristics and experiences are the model's constructs that apply to this study, as they incorporate prior related behaviour and personal factors of the individual before developing a particular disease (Aqtam & Darawwad, 2018).

As is the case with any other lifestyle-related condition, most individuals diagnosed with hypertension might have typically engaged in some unhealthy lifestyles or risky behaviours (sedentary lifestyles, poor dietary habits, smoking, and excessive alcohol consumption) that may have contributed as risk factors for developing hypertension (Bosu & Bosu, 2021). The HPM puts personal factors

into three categories including: biological, psychological, and sociocultural. Sharifirad et al. (2015) illustrated that personal biological factors encompass variables such as age, gender, and body mass index, all of which have been recognized as predictors for hypertension across various research (Adongo & Asaarik, 2018; Appiah et al., 2021). Personal psychological factors such as psychological stress both at home and the workplace have also been long linked to developing hypertension (Ford et al., 2016; Hu et al., 2015).

In the Pander's HPM, the personal socio-cultural factors component examines variables like an individual's race, level of education, and socioeconomic status. Studies have identified a significant association between developing hypertension and socioeconomic status indicators such as place of residence, income level, and educational level, among others (Appiah et al., 2021; Kohori et al., 2021; Cuevas, Williams, Norman, & Francisco, 2018). Additionally, the predominantly Black population in SSA has been associated with an increased prevalence of hypertension (Dosoo et al., 2019). Pender intended to demonstrate, through the HPM, how these earlier behaviours can directly impact an individual's health status in developing chronic diseases such as hypertension (Chen & Hsieh, 2021).

**Application of Pender's health promotion model to the study**

Educating the public about general health and specifically about preventing hypertension is especially vital in rural areas, where resources are scarce and social determinants significantly affect health outcomes. Such education is essential to raise awareness and increase engagement in health-

promoting behaviours among rural populations. The HPM developed by Nola Pender is particularly relevant to this study for its focus on enhancing health outcomes through the analysis of hypertension prevalence and the identification of risk factors, thereby facilitating prevention efforts (Chen & Hsieh, 2021). Moreover, Pender's model aligns with other health promotion theories that advocate for improving life quality by pre-empting both acute and chronic health issues before they develop.

**Strength and weaknesses of the Pender's Health Promotion Model**

Pender's model provides a robust framework for understanding the interplay of individual, social, and environmental factors that influence health behaviours, making it particularly effective for addressing lifestyle-related conditions such as hypertension. Its emphasis on proactive health promotion rather than reactive disease management allows for a holistic approach that considers biological, psychological, and sociocultural factors, facilitating targeted and adaptable interventions across diverse populations and settings, including resource-limited areas like rural communities. By empowering individuals to take control of their health, the model fosters self-efficacy and sustainable behaviour change. However, the HPM has limitations, including its reliance on self-reported data, which can introduce biases, and its potential to oversimplify the influence of structural barriers such as healthcare access and systemic inequities (Chen & Hsieh, 2021). While it emphasises individual agency, the model may inadequately address broader social and economic determinants of health and is less suited to

addressing the needs of individuals already dealing with advanced stages of chronic diseases like hypertension (Chen & Hsieh, 2021).

In addition, other related studies that used Pender's model include Adeba et al. (2023) who evaluated the effect of theory-based education intervention through intensive community leaders on the intervention mapping approach to healthy lifestyle adoption of middle-aged Nekemte dwellers. Kamran et al. (2016) also used the theory to assess the effectiveness of theory based educational intervention on fat intake, weight, and blood lipids among rural hypertensive patients. Lastly, Gorbani et al. (2020) used this model to investigate predictive factors of adherence to the hypertension control therapeutic and lifestyle recommendations.

## Conceptual Review

In the conceptual review, the main concept that guides the study is examined. The conceptual review outlines the nature of hypertension, and its associated determinants as well as treatment and management options.

### Hypertension

#### Definition, diagnosis, and types

In accordance with the comprehensive hypertension practice guidelines of 2020, as delineated by the International Society of Hypertension (ISH), hypertension, also known as elevated blood pressure (BP), is a persistent cardiovascular condition defined as persistent elevated arterial blood pressure with a systolic pressure measuring 140 mmHg and diastolic pressure at 90 mmHg

(Unger et al., 2020). The World Heart Federation (WHF) has since 2021 changed the conventional definition of hypertension to include persistent elevated office/clinic blood pressure, designated as a systolic reading of 130 mmHg and/or a diastolic reading of 80 mmHg (Jeemon et al., 2021).

Cardiologists recommend that a diagnosis of hypertension should not be made from just a single office visit, but rather based on a minimum of 2-3 office visits spaced between one and four weeks (Unger et al., 2020). However, if the blood pressure is 180/110 mmHg, a diagnosis can be established during a single office visit to avoid organ damage (Unger et al., 2020). Hypertension has been classified into several subtypes by researchers. Primary (essential) hypertension is the most prevalent kind, affecting approximately 90% - 95% of the general population (Oparil et al., 2019). While the exact aetiology of essential hypertension remains unknown, various risk factors have been identified, with kidney dysfunction being the most frequently mentioned cause of secondary hypertension (Bosu & Bosu, 2021). In 2020, the ISH classified hypertension as follows:

Table 1: Classification of Hypertension

| **Category** | **Systolic(mmHg)** | | **Diastolic (mmHg)** |
|---|---|---|---|
| Normal BP | < 130 | and | < 85 |
| High-normal BP | 130-139 | and/or | 85-89 |
| Grade 1 hypertension | 140 -159 | and/or | 90-99 |
| Grade 2 hypertension | ≥ 160 | and/or | ≥ 100 |

Source: ISH (2020)

Hypertension stands as the prime contributory condition to all-cause mortality and disability globally (Bosu & Bosu, 2021). It represents the utmost prevalent preventable determinant for a spectrum of CVDs, comprising coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation, and peripheral artery disease, along with chronic kidney disease (CKD) and cognitive impairment (Oparil et al., 2019; Unger et al. 2020). Effective hypertension prevention and treatment plays a pivotal role in the reduction of the conditions' prevalence and improving longevity across the global population (Oparil et al., 2019).

**Prevalence of Hypertension**

Global hypertension prevalence was projected to reach 1.39 billion in 2010, doubling to 4 billion by the close of 2019 (Jeemon et al., 2021). While high-income countries (HICs) saw stable hypertension rates over the previous two decades, LMICs experienced a continued rise in burden (Jeemon et al., 2021). Between 1990 and 2015, the cumulative global loss of healthy life years due to high blood pressure surged by 43% owing to factors such as urbanisation, population aging, and a 10% rise in the age-standardised prevalence of hypertension. Studies indicate that the number of persons aged 30-79 years diagnosed with hypertension escalated from 650 million to 1.28 billion over the past three decades (WHO, 2019). According to a study which was undertaken by a global network of physicians and researchers between 1990 and 2019, 82% of the over one billion persons living with hypertension are found in LMICs (Zhou et al., 2021).

Evidence suggests that approximately 580 million people living with hypertension are undiagnosed, as they have never received a formal diagnosis (Zhou et al., 2021). According to findings from the Global Burden of Disease (GBD) study, hypertension remains the foremost single risk factor driving the global burden of disease and all-cause mortality. It is responsible for an estimated 9.4 million fatalities annually, in addition to 212 million diminished healthy life years, constituting 8.5 percent of the total global burden (Oparil et al., 2019). Canada and Peru have the lowest prevalence for hypertension for both sexes (Zhou et al., 2021). Others include Taiwan, Spain, South Korea, Japan, as well as a few African and Asian countries, specifically Bangladesh, Eritrea and Solomon Islands (Zhou et al., 2021). In regions such as Central and Eastern Europe, Central Asia, Oceania, and Latin America, hypertension prevalence has been documented to exceed 50% among women in two countries and among men in nine countries (Zhou et al., 2021). The prevalence of hypertension exhibits substantial heterogeneity across countries and regional blocks (Jeemon et al., 2021).

In 2015, hypertension affected 20% of men in the high-income Asia Pacific region, whereas in Central and Eastern Europe, the prevalence was 33% (Jeemon et al., 2021). The prevalence rates among women fluctuated from 11% in the affluent Asia Pacific region to 28% in SSA (Jeemon et al., 2021). Between 1990 and 2019, hypertension prevalence increased by 10–13 percentage points in some LMICs, including Kiribati, South Africa, Argentina, Uzbekistan, and Paraguay. In contrast, HICs such as Germany, Spain, Singapore, Italy, Austria, Sweden, and the United Kingdom saw a decline of 10–18 percentage points during

the same period (Chu & Singh, 2021). The worldwide prevalence of hypertension is worrying. In just one year, the disease claimed the lives of 10.8 million individuals around the world and resulted in 235 million disability-adjusted life years (Mohammed et al., 2021). Hypertension causes 50% of other cardiac illnesses and strokes in LMICs compared to HICs, and this happens in younger people in their productive age (Mohammed et al., 2021).

The epidemiological transitions associated with hypertension have not been kind to those living in the Middle East and Asia. Hypertension is prevalent in over 30% of the Saudi Arabian population, while over 60% are unaware that they have the condition (Aljuraiban et al., 2021). Southeast Asian (SEA) countries such as Malaysia, Thailand, Singapore, and Indonesia have approximately 27% of their adult population living with hypertension, resulting in 1.5 million fatalities per year (Mohammed et al., 2021). In 2010, around 325 million hypertensive cases were diagnosed among Chinese adults aged 18 years or older, a figure that had more than tripled in less than a decade (Azian et al., 2021). A recent study in Thailand revealed that one in every four Thai people has hypertension, while the same study in Malaysia indicated 30% prevalence of hypertension (Azian et al., 2021).

Furthermore, a recent study in Canada discovered a countrywide prevalence of hypertension of 23%, placing it among the few countries worldwide with the lowest prevalence (Garies et al., 2019). A study conducted in the United States reported a national prevalence of hypertension among adults at 29% (Fryar, Ostchega, Hales, Zhang, & Kruszon-Moran, 2015). Within the same period, the

study concluded that men (30.2%) had a higher prevalence than women [27.7%] (Fryar et al., 2015). Two years after Fryar et al. (2015) reported a 29% prevalence of hypertension in the U.S. population, the prevalence rose to 36.1%, affecting 45.4% of individuals in the United States by 2017 (Ostchega, Fryar, Nwankwo, & Nguyen, 2020).

The findings of a recent study highlighted the significant impact of hypertension, particularly among individuals aged 60 and above, where three-quarters are identified as hypertensive, with significant cases observed in men compared to women (Ostchega et al., 2020). Notably, the burden of hypertension has shown a substantial increase over the last two decades, with SSA countries experiencing the most significant impact. In Africa, the prevalence of hypertension surged from 54.6 million individuals in 1990 to 92.3 million in 2000, and then experienced a remarkable 70% increase to reach 130.2 million by 2010 (Okello et al., 2020). This contrasts with a 2.6% decrease in hypertension prevalence in HICs between 2000 and 2010, while LMICs experienced a 7.7% increase during the same period (Zhou et al., 2021).

A systematic and meta-analytic review on specific African nations, conducted by Bosu, Reilly, Aheto, and Zucchelli (2019), revealed that 57% of individuals aged 50 or older and 30.0% - 30.8% of younger adults in sub-Saharan Africa are affected by hypertension. Without the implementation of sustainable measures, projections indicate that prevalence rates could escalate to 216.8 million by 2030 (Okello et al., 2020). The prevalence of hypertension exhibits significant variations across the diverse regions of Africa indicating the need for

implementing targeted interventions and healthcare strategies to effectively address this escalating health issue. (Zhou et al., 2021).

The prevalence of hypertension across selected African countries reveals varying degrees of impact, with South Africa exhibiting the highest national prevalence at 54.1% (Muhihi et al., 2020; Okello et al., 2020). In Namibia, a southern African nation with a population just over 2 million, 38.0% of the inhabitants live with hypertension (Craig, Gage, & Thomas, 2018). East African nations, like Uganda, have observed a prevalence of 26.5% (Ndejjo et al., 2021), while Tanzania and Kenya report similar rates of 25.9% and 24.5%, respectively (Muhihi et al., 2020). Despite these figures, awareness and control levels remain low in both Tanzania and Kenya, with only 15% and 29% of adults being aware of their hypertension status, respectively (Muhihi et al., 2020).

Ethiopia, the second most populous country in Africa, has a hypertension prevalence of 14% to 19.7% (Haye & Agama, 2020). In Nigeria, the most populous nation in Africa, prevalence rates vary slightly, with Zhou et al. (2021) reporting 38.1% and Adeloye et al. (2021) reporting 35.6%. However, awareness and control levels are notably low, with only 29% of the 35.6% prevalence being aware of their hypertension status, and a mere 2.8% having the condition under control (Adeloye et al., 2021). In West African nations such as Burkina Faso and Côte d'Ivoire, prevalence rates stand at 11% and 10.4%, respectively (Sackou et al., 2019). Ghana, a faces varying prevalence rates across urban and rural areas, with hypertension being the second most common cause of outpatient sickness in individuals aged 45 and older, contributing to over half of all medical

hospitalisations in Ghana's adult wards (Addo, Charles, Medisch, & Universiteit, 2012; Agyei-Baffour, Tetteh, Quansah, Boateng, & Boateng, 2018).

A population-based study conducted in 2017 sheds light on the prevalence of hypertension in Ghana, revealing a range from 25% to 48%, with the capital city, Accra, reporting a prevalence of 34% (Amelor et al., 2016). Across Ghana's middle and southern belts, three separate studies highlighted rural and urban prevalence rates spanning the range from 19% to 48% (Agyei-Balfour et al., 2018; Atibila, Hoor, Donkoh, Wahab, & Kok, 2021; Bosu & Bosu, 2021; Dosoo et al., 2019). Notably, findings from a systematic analysis underscore the significant escalation of hypertension in Ghana, with adult prevalence escalating from less than 5% around 30 years ago to the current estimate of 30.3%, signifying that approximately one in every three adults in Ghana now has hypertension (Atibila et al., 2021).

Considering a United Nations (UN) report from 2020 which indicates that Ghana's adult population (18 years and over) was approximately 19.54 million, constituting about 62.9% of the total population, applying the 30.3% prevalence in 2021, results in an estimated 5,862,000 Ghanaians living with hypertension (Bosu & Bosu, 2021). A population-based comparative study in two districts of the Eastern Region (Akuapim South, now Nsawam Adoagyiri, and Lower Manya-Krobo) reported prevalence rates of 20.1% and 19.6% for males and females, respectively (Lamptey et al., 2017). In the Birim Central Municipality of the Eastern Region, a community survey conducted in 2019 found a lower prevalence

than the national average, with figures of 13.5% and 17.0% for men and women, respectively (Nomah, 2019).

The GHS directorate in the ER documented a four-year trend analysis of hypertension in the Eastern Region as follows: 63,393; 72,329; 60, 504, and 67,269 for 2017, 2018, 2019, and 2020 respectively. This current study took place in two selected rural districts of the ER, namely Akyemansa, and Brim North. Reports from the District Health Information Management System 2 (DHIMS 2) used by the district health management teams (DHMT) in the GHS in these four districts show an increase in the number of cases of hypertension. The hypertension cases that reported by the DHMT in the Denkyembour district pointed to a sharp rise in the reported cases of hypertension over a four-year period. The district reported a total of 1973; 2207; 3097, and 7891 in 2017, 2018, 2019, and 2020, respectively (DHIMS 2, Denkyembour DHMT, 2020).

**Risk Factors for Hypertension**

The Centre for Disease Control and Prevention (CDC) in the United States defines risk factors as "components of human behaviour or lifestyle, environmental exposures, or hereditary characteristics associated with an increased occurrence of a specific disease, injury, or other health condition" (CDC, 2012). Hypertension, characterised by its complexity, is influenced by a plethora of risk factors, as evidenced by multiple studies (Mohammed et al., 2021; Mucci et al., 2016; Sharma et al., 2021). These risk factors are typically classified as modifiable and non-modifiable (Mohammed et al., 2021). Modifiable factors are subject to change, encompass a broad range of variables, including an

unhealthy diet, physical inactivity, excessive alcohol consumption, tobacco smoking, obesity, as well as socioeconomic, psychosocial, personal, sociocultural, and community factors (Cuevas et al., 2018). Non-modifiable factors, which are not easily reversible, include age, race, sex, heredity, and the presence of comorbidities like diabetes and chronic kidney disease (Mohammed et al., 2021).

Research consistently links unhealthy diet, sedentary lifestyle, excessive alcohol intake, tobacco smoking, obesity, and psychosocial factors to the onset of hypertension (Amelor et al., 2016; Obirikorang et al., 2018). Studies by different research teams confirm the positive association between psychosocial factors such as anxiety, stress, depression, and sleep deprivation with the development of hypertension (Afrifa-Anane Agyemang, Codjoe, Ogedegbe, & Aikins, 2015; Mucci et al., 2016). Moreover, evidence from various studies suggest a significant relationship between low socioeconomic status and hypertension, with factors such as poor housing, low income, low educational attainment, limited access to health care, and inadequate wages playing crucial roles (Adongo & Asaarik, 2018; Cuevas et al., 2018; Mohammed et al., 2021; Mucci et al., 2016).

**Empirical Review**

This aspect of the literature review covers the empirical evidence in relation to this study. The empirical review encompasses previous research studies that have been done in relation to hypertension, its prevalence and risk factors. The empirical review was conducted in alignment with the objectives of this study to outline where previous researchers concur and where they do not.

**Prevalence of hypertension among rural dwellers**

Hypertension is a serious medical condition that significantly increases the risk of complications such as kidney disease, heart problems, and brain disorders. The question about the prevalence of hypertension among rural dwellers has also become one of the most alarming situations, since it helps policy makers to formulate policies that will help their citizenry in the fight against hypertension and the other severe effects it exposes individuals to. For this research, few of such studies were reviewed in order to get a grasp, as to whether hypertension is more prevalent in the rural areas or not.

Azubuike and Kurmis's (2014) exploration of hypertension awareness, practices, and prevalence among rural Nigerian women, with a 24.2% prevalence rate, revealed varying knowledge levels and practices. Risk factor awareness, including the recognition of excessive salt intake (77.4%), was at 65.4% (Azubuike & Kurmis, 2014). The study highlighted inadequate knowledge affecting practices, leading to delayed treatment presentations due to the asymptomatic nature of hypertension. Despite a fair overall knowledge level, factors like occupation and education influenced awareness inadequacies, indicating the need for targeted interventions. Limitations included potential bias from post-natal clinic attendees and the absence of simple random sampling, yet the study forms a robust foundation for future research.

In comparison, Helelo, Gelaw and Adane (2014) delved into hypertension prevalence and related determinants in Durame town, Southern Ethiopia. Their community-based cross-sectional study revealed a high prevalence of 22.4%, with

almost 40% newly screened patients due to asymptomatic onset. Limited awareness underscored the necessity for regular education on risk factors. Risk factors identified included male sex, older age, poor dietary habits, physical inactivity, family history, and overweight/obesity. The prevalence was more pronounced in males (26.2%) than females (19.4%), possibly influenced by sex-specific genetic and hormonal factors. This study recommended community-level interventions, emphasising lifestyle modifications for prevention. Acknowledging the cross-sectional limitation, the study provided valuable insights into hypertension in the population.

Comparatively, Azubuike and Kurmi's (2014) study reported a lower prevalence rate than a community-based cross-sectional study in Sudan (Omar, Musa, Osman, & Adam, 2020), highlighting potential regional differences. The variations may be attributed to methodological disparities, settings, and age differences in the study populations. Furthermore, gender-specific disparities in hypertension prevalence aligned with a an Ethiopian study (Zekewos, Egeno & Loha, 2019), suggesting a nuanced interplay of genetic and hormonal influences. Both studies underscore the importance of tailored interventions for specific populations and contribute to the collective understanding of hypertension in diverse settings.

Adeloye and Basquill (2014) conducted an extensive systematic review and meta-analysis to assess the prevalence and quantify the number of hypertension cases in Nigeria, using the criterion at least 140/90 mmHg. Their objective was to enhance awareness, control, and policy responses related to

hypertension in the country. Through a meticulous search of Medline, EMBASE, and Global Health spanning a period from January 1980 to December 2013, they identified 27 studies from a pool of 2260 publications that met their selection criteria. Utilising epidemiological modelling, their review estimated approximately 20.8 million hypertension cases among individuals aged 20 years or older in 2010. The prevalence was calculated at 28.0% overall, with 30.7% among men and 25.2% among women. The review highlighted the impact of poor health, socioeconomic factors, and health system challenges on the high prevalence of hypertension in Nigeria. Additionally, it emphasised the low overall awareness of raised blood pressure, indicating insufficient public knowledge about risks, symptoms, and the importance of regular blood pressure monitoring. Despite the review's aim to offer an enhanced continent-wide estimate of hypertension prevalence in Africa, it faced significant limitations, notably the age-dependent nature of the modelling approach. Moreover, the study did not account for other crucial social and health determinants that could have led to divergent estimates. Furthermore, all studies incorporated into their modelling utilised a blood pressure threshold of 140/90 mmHg. This limitation arises from the fact that other studies employed diverse designs and blood pressure measurement protocols, potentially impacting the accuracy of the present estimates.

Qin et al. (2023) supported these findings by underlining the contribution of poor health, socioeconomic factors, and health system challenges to lifestyle-related factors that ultimately lead to hypertension. These factors are particularly prominent in developing countries, contributing to the observed high prevalence

in Nigeria. The study by Adeloye and Basquill stands as a critical resource, shedding light on the pressing need for targeted public health programmes to tackle the significant burden of hypertension in the Nigerian population. Interventions should focus on improving education regarding the aetiologic factors, symptoms, and the significance of regular blood pressure monitoring, with particular attention to mitigating lifestyle factors that contribute to hypertension, especially in urban settings.

Angaw, Dadi, and Alene (2015) conducted an institutional-based cross-sectional study in Addis Ababa, Ethiopia, specifically targeting civil servants of the Federal Ministry, with the aim of assessing the prevalence and factors associated with hypertension. The study aimed to advocate for a workplace-screening programme. Carried out from February through April 2014, the study employed a simple random sampling technique, enrolling a total of 655 participants. Data collection was done using a survey adapted from the WHO STEPwise tool. Hypertension was characterised by a mean systolic blood pressure and diastolic blood pressure of above 140/90 mmHg, which also encompassed individuals undergoing regular drug therapy for hypertension.

The study found a hypertension prevalence of 27.3%, with civil servants aged 48 years and above showing a higher likelihood of hypertension. This explains the need for institution-based hypertension-screening programmes, particularly concentrating on individuals aged 28 years and older, obese individuals, those with diabetes mellitus (DM), and cigarette smokers. A comparable prevalence of 24.5% was noted in a study in the Sidama zone

(Badego, Yoseph & Astatkie, 2020), while another Ethiopian study found a lower prevalence of 16% (Bayray et al., 2018). Differences in urban and rural settings and study populations may contribute to these variations. Significantly associated factors with hypertension from the study comprised cigarette smoking, a family history of hypertension, self-reported DM, and a body mass index (BMI) exceeding 25 kg/m$^2$. Increased age consistently emerged as a significant factor for hypertension, possibly due to age-related physiological changes in blood vessels. Individuals with a family history of hypertension were 3.26 times more likely to have hypertension. Similarly, civil servants who self-reported DM were 13.56 times more likely to be hypertensive, agreement with findings from studies conducted in Lebanon (Saade, 2020).

Contrary to some study reports, the study by Badego et al. (2020) did not find associations between hypertension and marital status, sex, education level, alcohol consumption, dietary habits, chat chewing, or physical activity. These differences may be attributed to variations in study populations, settings, sample sizes, and socio-economic and cultural factors. The study acknowledges limitations, including its cross-sectional nature hindering the establishment of temporal relationships, focusing on an institutional setting limiting generalisability, and being restricted to behavioural and physical measurements without including biochemical tests and analysis.

Shah, Shah, and Shah (2018) conducted a meta-analysis focusing on the prevalence and burden of hypertension among adolescents in Pakistan sought to compute the combined prevalence of hypertension among the Pakistani

population. Their review conducted a thorough literature search utilising databases such as PubMed, Google, and Scopus. Additionally, manual searches of bibliographies in articles published between 1990 to 2017 were performed to ensure comprehensive coverage. The inclusion criteria required studies to define hypertension as BP readings equivalent to or exceeding 140/90 mmHg and include participants aged 15 years and older. Out of the overall 1240 articles screened, 18 involving 42,618 individuals met these criteria. The comprehensive analysis revealed an overall pooled prevalence of hypertension at 26.34%. A subgroup analysis further revealed an increased prevalence within urban settings at 26.61%, compared to rural dwellers at 21.03%. This urban-rural difference highlights the disparities in hypertension prevalence within the Pakistani population.

The review by Shah et al. (2018) did not only uncover a substantial prevalence of hypertension among adult Pakistanis but also juxtaposed its findings with available literature in both local and international journals, revealing a higher prevalence of 23.32%. Particularly noteworthy was the observation of an increased prevalence within urban settings and among males. The researchers concluded that, based on the comparison with previous studies in Pakistan, it is anticipated that the prevalence of hypertension will likely escalate over time, emphasising the necessity for good quality, longitudinal studies to enhance the understanding of hypertension. Such studies would play a crucial role in implementing effective programmes to curtail the emerging incidence of hypertension in the Pakistani population.

Lemogoum et al. (2018) embarked on a comprehensive study that explored the prevalence, awareness, treatment, and control of hypertension across both rural and urban communities in Cameroon's far northern region. The primary objective was to investigate the burden and determinants of hypertension, including the awareness, treatment, and control rates within an area where these had not been previously explored. The cross-sectional study involved 889 individuals 18 years and older, selected through a multistage cluster sampling method. Data collection took place in both Maroua (urban setting) and Tokombere (rural setting) over the period from November 2014 to May 2015. The study revealed a hypertension prevalence of 37.8%, with variations between rural (34%) and urban (41.2%) areas and between men (38.8%) and women (37.9%). Factors associated with hypertension included urban environment, age over 70 years, male sex, abdominal obesity, and high blood sugar. Despite the high prevalence, only 39.6% of participants with high blood pressure were cognizant of their situation. Among those aware, treatment rates were relatively low, with 29.3% receiving treatment, and BP control rates were even lower at 16.3%.

Lemogoum et al. (2018) reported hypertension prevalence consistent with global trends in SSA (Osunkwo et al., 2020; Achampong et al., 2019) but lower than the 86.2% prevalence found in a study at Yaoundé Central Hospital and Etoug-Ebe Baptist Health Centre in Cameroon. The authors attributed these variations to different guidelines, ongoing epidemiologic transitions, and lifestyle changes such as physical inactivity and altered dietary practices. Correlates of hypertension included dwelling in an urban setting, increasing age, diabetes, and

high waist circumference, consistent with previous surveys in Cameroon. The study also highlighted the prevalence of cardiovascular determinants, both behavioural and physiological, being higher in urban settings as compared to rural areas, aligning with epidemiological transitions observed in other African countries.

In Ghana, Solomon et al. (2017) carried out a population-based cross-sectional study within the Hohoe Municipality, to explore the prevalence and awareness of hypertension among adults living in urban and rural areas. The study included 350 participants, comprising 162 (46.3%) from urban areas and 188 (53.7%) from rural settings. Data collection was done through face-to-face interviews, blood pressure measurements, and anthropometric assessments with the aim to identify aetiologic factors contributing to hypertension and assess awareness and control rates in different settings. Hypertension prevalence at the time of the survey was 25.4%, with 23.5% and 27.1% urban and rural areas respectively. Uncontrolled hypertension exhibited a lower prevalence among urban adults in contrast to their rural counterparts. Additionally, undiagnosed hypertension was high but similar in both settings, with 18.5% in urban areas and 18.4% in rural areas. Adults aged 40 years and above were found to be significantly more likely to have hypertension. Tertiary education was reported to be significantly associated with a 69% lower likelihood of being hypertensive, while obese adults were 3.42 times more likely to be diagnosed with hypertension. The study highlighted a constructive association between age and BMI with hypertension.

Despite a higher prevalence in rural areas, the study did not find a statistically significant association between age and hypertension. The prevalence reported by Solomon et al. (2017) aligns with studies in Nigeria, suggesting a higher incidence of hypertension in rural societies, potentially due to lower awareness and limited access to health care. The study emphasised age, educational level, obesity, and awareness as crucial predictors of hypertension in both rural and urban communities. Findings revealed an overall prevalence of 39.2% hypertension cases among adults, including those on treatment. The study concluded that the increment in hypertension prevalence among rural adults was attributed to higher rates of uncontrolled and undiagnosed hypertension in this group. Solomon et al. (2017) recommended periodic screening and increased awareness to enhance prevention and management of hypertension among rural inhabitants living in the Hohoe Municipality. However, Solomon et al. (2017) acknowledged limitations, including the reliance on a single sitting with three blood pressure measurements for hypertension diagnosis, potentially impacting the overall prevalence. Respondent bias was also identified as a limitation.

Peltzer and Pengpid (2018) conducted a cross-sectional population-based national survey in Indonesia to explore the prevalence and social determinants of hypertension among adults. Employing the Indonesia Family Life Survey (IFLS-5), the research involved 29,965 individuals aged 18 years and older, with an average age of 43.3 years. The aim of the study was to assess the occurrence and factors influencing hypertension, encompassing sociodemographic characteristics, body weight status, health practices, and risk factors associated

with psychosocial stress and support. The study revealed a hypertension prevalence of 33.4%, slightly higher in females (35.4%) than males (31.0%). This gender difference may be attributed to age-related factors and disparities in the onset of hypertension, which tends to occur at an older age in women. The study suggested the importance of regular blood pressure screenings for women, particularly as they age, to enhance awareness and early detection.

Interestingly, the reduced hypertension prevalence pattern contradicted findings by Defianna et al. (2021), who reported an overall prevalence of 40%, with 42% in males and 38% in females. The variation could be linked to age differences between the study populations. Among those identified with hypertension, 42.9% were aware, 11.5% received treatment, and 14.3% had their hypertension controlled. Between both sexes, older age, lower education levels, overweight or obesity, and recent outpatient health facility visits were associated with hypertension. The study highlighted linear relationships between the outcome (hypertension) and age and BMI. Notably, among men, quitting tobacco use and experiencing depressive symptoms were positively linked to hypertension. On the other hand, current tobacco use showed a negative association, possibly due to its appetite-suppressant effects.

For women, lower subjective economic status was identified to be associated with hypertension, suggesting a relationship between economic stress and increased hypertension risk (Defianna et al., 2021). The study emphasised the high prevalence of hypertension, low awareness, and limited treatment and control. Given the asymptomatic nature of early-stage hypertension, public health

interventions were deemed crucial for improving diagnosis, treatment, and control. However, the study acknowledged limitations, such as reliance on self-reported data, potentially leading to over- or under-reporting of certain behaviours. Additionally, essential factors contributing to hypertension, such as serum fasting blood surge, Low-Density Lipoprotein, total cholesterol, salt intake, and excessive alcohol consumption, were not assessed. As a cross-sectional study, causal relationships between determinants and onset of hypertension were challenging to establish, requiring cautious interpretation of the results.

Zechariah, David, Temitope, Awe and Iyanuoluwa (2020) conducted a cross-sectional community-based survey to assess the prevalence of hypertension among rural adults in the Abimbola community, Ayedaade local government area, Osun State, Nigeria. The study sought to offer valuable perspectives on the burden of hypertension within a remote rural community in southwestern Nigeria and assess the existing services for monitoring and managing hypertension. The study utilised a purposive sampling method to sample 138 adults from approximately a population of 500 rural residents, with data analysis conducted employing both descriptive and inferential statistical techniques.

The study reported a mean age of 45.96 (SD=16.89) years among respondents, primarily engaged in farming (52.2%) and trading (26.1%). The burden of hypertension in the rural community was recorded at 26.8%, consistent with findings by Wada et al. (2020) in a similar rural setting. Notably, recent studies conducted in specific rural regions have revealed elevated levels of hypertension prevalence. The study observed an increased prevalence among

women (30.0%) than in men (20.8%), possibly influenced by hormonal changes or proactive health-seeking behaviours among women.

Statistically significant associations were found between respondents' age and systolic and diastolic blood pressure, attributed to vascular ageing and loss of vascular elasticity (Zechariah et al., 2020). Age, a recognised risk factor for hypertension, was linked to a higher prevalence among married respondents, possibly due to the association of marital status with stress levels. Stress, particularly in troubled relationships, may contribute to elevated systolic blood pressure. While no statistically significant relationships between sex and blood pressure were observed, discrepancies with other studies were acknowledged. The absence of mechanisms for monitoring and managing hypertension in the village, coupled with the lack of a functioning primary healthcare facility and pharmacy, highlighted significant gaps in health infrastructure.

Zechariah et al. (2020) concluded by emphasising the necessity for far-reaching health interventions in rural communities, urging support from federal and state governments, non-governmental organisations, and private entities. The researchers underscored the importance of allocating essential resources for ensuring effective health monitoring and management. However, the study acknowledged limitations, including single-time blood pressure readings due to outreach conditions, with subsequent readings conducted at intervals for respondents with high systolic or diastolic blood pressure to verify results, in adherence to American Heart Association recommendations.

Opreh et al. (2021) conducted a descriptive cross-sectional study to investigate the prevalence and predictors contributing to hypertension among rural community inhabitants in a local government area in Southwest Nigeria. The study, comprising 1012 individuals across 16 rural communities, aimed to assess the current pattern and correlates of hypertension in this population. The findings indicated that among the participants, 45.6% had hypertension, with 47.1% classified as having stage 1 hypertension and 52.9% with stage 2 hypertension. A systematic review by Akinlua et al. (2015) on the prevalence of hypertension in Nigeria acknowledged wide variations in reported values across studies, attributing these differences to methodological variations, particularly in the age composition of the studied population.

Opreh et al. (2021) identified increasing age, higher waist circumference, and overweight/obesity as significant predictors of hypertension. These predictors align with similar findings in studies on hypertension in western Kenya (Andale et al., 2021). The increase in systolic, diastolic, and mean arterial blood pressures as individuals was attributed to the loss of vascular elasticity, reducing artery's ability to expand and contract. This phenomenon results in elevated systolic blood pressure and an increase in pulse pressure Notably, systolic blood pressure exhibited the most robust correlation with age, closely linked to the loss of vascular elasticity. Waist circumference emerged as the most robust correlate of diastolic blood pressure, influencing the activation of the renin-angiotensin-aldosterone system (RAAS), a hormonal system regulating blood pressure and contributing to elevated diastolic blood pressure.

Despite the rural setting, the researchers reported a much higher hypertension prevalence, contrasting findings from other studies suggesting that rural dwellers engage in more physical activities than their urban counterparts, which is considered a protective factor. However, the study acknowledged limitations, including the cross-sectional nature preventing the establishment of causal relationships and the exclusion of possibly confounding factors such as socio-economic status, lifestyle factors, and comorbidities like diabetes, impacting the definiteness of the conclusions.

The prevalence of hypertension in rural areas, as evidenced by multiple studies, indicates a noteworthy health concern among rural dwellers. Studies conducted in Nigeria and Ethiopia reveal hypertension rates ranging from 22.4% to 45.6%, challenging the perception that rural populations are less susceptible to hypertension due to presumed higher physical activity levels. Contrary to the belief that rural lifestyles might be protective, these findings suggest that factors contributing to hypertension are pervasive, affecting both urban and rural settings. The higher prevalence observed in some studies among women, older individuals, and those engaged in specific occupations underscores the need for targeted interventions addressing diverse demographic groups.

The implications of high hypertension prevalence in rural areas are multifaceted. Firstly, it emphasises the urgency of implementing comprehensive public health strategies tailored to rural communities. Health education programmes should be designed to expand understanding about hypertension, its predictors, and the importance of regular monitoring. Additionally, interventions

should focus on lifestyle modifications, considering the identified risk factors for example poor dietary habits, physical inactivity, and obesity. The absence or limited access to healthcare infrastructure in rural areas, as highlighted by some studies, underscores the need for improved health facilities and primary care services. Governments, non-governmental organisations, and private entities should collaborate to provide the necessary resources and support for effective health monitoring and management in rural communities.

Moreover, the prevalence of hypertension in rural areas challenges conventional assumptions about urban-rural health disparities. While urban areas often face higher rates due to lifestyle factors, the observed rates in rural settings suggest that health challenges are more complex and widespread. The findings underscore the importance of context-specific health interventions, recognising that the determinants of hypertension can vary across different populations. Overall, addressing hypertension in rural areas requires a holistic approach that combines awareness campaigns, lifestyle modifications, and improvements in healthcare infrastructure to effectively mitigate the impact of this widespread health issue.

**Sociocultural and economic factors that influence hypertension**

Scholars for the past decades have tried to establish some of the factors that influence hypertension, and they have all come out with some interesting findings. But the economic and sociocultural factors were the most prominent if not critical of all those factors. Economic and sociocultural factors appear as

constant determinants of disparity in the analysis of a cross-section of a particular population with specific diseases. Thus, because these two factors are very important in as much as any disease is concerned, few of those studies will be reviewed for this study and insofar as this subject is concerned.

Cois and Ehrlich's (2014) research in South Africa delved into the socioeconomic determinants of hypertension, particularly exploring the relationship between education, income, and blood pressure. In the context of the National Income Dynamics Study, encompassing over 15,000 adults, the study aimed to understand whether sociocultural factors play a role in hypertension and whether bio-behavioural risk factors mediate this association. The findings, however, presented an unexpected result in the case of men. Contrary to the common belief that higher education and income are associated with healthier lifestyles, improved healthcare access, higher health literacy, and reduced exposure to environmental factors impacting blood pressure, the study revealed that, even after adjusting for age, race, and antihypertensive treatment, elevated education and income levels were significantly linked to elevated diastolic blood pressure among men.

This unexpected correlation challenges traditional assumptions about the relationship between socioeconomic status and hypertension. The study suggests that other factors, potentially occupational in nature, may contribute to the observed prevalence in men. The role of occupation, which was not explicitly considered in the study, could play a crucial role, especially in the context of men who are often primary breadwinners and may engage in strenuous work to provide

for their families. This research emphasises the complexity of the factors influencing hypertension, suggesting that the relationship between socioeconomic status and blood pressure is intricate and may vary based on specific demographic and occupational considerations. Further exploration of these factors is crucial for a comprehensive understanding of hypertension and the development of targeted interventions.

Contrastingly, the study added that, in females, greater levels of education were associated with reduced diastolic and systolic blood pressure, while increased income was linked to lower systolic blood pressure. In both sexes, BMI played a significant role as a mediator, contributing to an adverse indirect impact of socioeconomic status on blood pressure. In conjunction with physical activity, alcohol consumption, smoking habits, and resting heart rate, body mass index played a significant role in mediating the observed relationship in men. Conversely, in females, factors that were unmeasured exerted a more pronounced influence. Cois and Ehrlich (2014) inferred that in countries experiencing epidemiological shifts, the impact of socioeconomic status on blood pressure might differ by sex. Consequently, in women, factors beyond those mentioned previously might significantly mediate the correlation and therefore warrant further examination. These factors not accounted for indicate that there may be underlying socio-cultural or biological factors peculiar to women that contribute to the association between the socioeconomic status and blood pressures (Guo et al., 2022). These likely include gender-specific experiences, societal roles or

health behaviours among others that warrant further investigation to understand comprehensively what the exact factors are.

The study faces limitations stemming from its cross-sectional design, hindering the establishment of temporal relationships. Unmeasured confounding variables, like undernutrition, and reliance on self-reported data for factors such as exercise and alcohol use, introduce potential biases such as recall bias and social desirability bias. Adjusting for variables like race and medication may not fully account for their roles as effect modifiers or mediators. The unique socio-economic dynamics of the study area (South Africa) limits the ability to generalise the findings. This, therefore, warrants replication of the study in settings with similar epidemiologic transitions.

Norman (2014) in a doctoral dissertation, examined the sociocultural underpinnings of hypertension epidemiology in inhabitants of Ogun State. The mixed-methods study aimed to explore sociocultural and economic influences, including lifestyle behaviours, awareness, and attitudes concerning hypertension risks and prevention among residents of Ogun State, Nigeria, involving a sample size of 79 individuals. The study's conceptual framework centred on elucidating the impact of awareness, attitudes, and practices on dietary habits, behaviours, and, consequently, blood pressure levels. Additionally, the research employed the PEN-3 model as its model to provide a structured approach to understanding the sociocultural factors influencing health behaviours and outcomes related to hypertension. In the quantitative analysis, the general linear regression model, along with sums of squares and Pearson's product correlation, was employed to

examine the relationships among diet, BP, educational achievement, height, physical activity, and weight, aiming to identify predictive factors for hypertension. The findings indicated that age, BMI, and educational attainment emerged as the primary predictors of hypertension.

Significant limitations that could impact the reliability and broader applicability of the study's findings arise from the study. Firstly, unavailability of medical records prevents the confirmation of reported blood pressure conditions, casting doubts on the reliability of health-related information obtained during the study. Moreover, the presence of incomplete surveys and the unintended use of snowball recruiting methods introduced potential biases into the study's sample composition. These factors may skew the representation of the study population and undermine the generalisability of the findings. With a relatively small population size of 79 participants, the study's ability to draw meaningful conclusions applicable to broader populations becomes very limited.

Furthermore, the impact of community-specific health education efforts on participants' health behaviours and conditions in the study cannot be overlooked. These localised interventions may influence the observed health outcomes, potentially complicating the interpretation of the study results. Additionally, the relocation of the data collection venue due to safety concerns poses challenges, as the change in environment may have affected participants' stress levels and blood pressure readings during the study. Finally, despite efforts to clarify the researcher's role, some participants still expected medical advice or prescriptions, highlighting potential misinterpretations or miscommunications

regarding the study's objectives. These discrepancies underscore the importance of clear communication and participant understanding in research settings.

In addition, Leng, Jin, Li, Chen and Jin (2015) researched socioeconomic status and hypertension through a meta-analysis. The objectives of the review were to ascertain whether socioeconomic status (SES) has any relation with hypertension. A thorough and detailed systematic search was carried out across databases such as PubMed, ProQuest, and Cochrane, that were published in English up to March 2014. Hypertension was classified as meeting one of the following criteria: having an average systolic BP reading of 140 mmHg or more, an average diastolic BP reading of 90 mmHg or more or being under treatment for hypertension. To aggregate the risk estimates obtained from each individual study, the inverse variance statistical approach was employed. This method incorporates a random-effects model, allowing for the consideration of variability across studies. Data retrieval was independently carried out by two authors. Upon analysis of the results, it was found that out of the 2404 references initially identified, 51 studies met the predefined criteria to be included.

A general increase hypertension risk was observed in individuals with the least SES, as indicated by income, occupation, and education levels. In high-income countries, the associations were found to be significant, particularly regarding the hypertension risks among individuals in the least groups of all SES markers. This trend was notably pronounced among adult females, while men displayed less reliable relationships. The study resolved that there exists a link between low SES and elevated BP, with education level being a particularly

notable factor in this association. The study later emphasized the significance of identifying and monitoring hypertension to mitigate any threats of the condition among the most susceptible groups across various communities, countries and globally.

While the results of the study are congruent with Norman's (2014) and Cois and Ehrlich's (2014) studies, it is not without setbacks. The use of the odds ratio as the means of measuring the relationships between SES and hypertension presents a limitation in capturing the full extent of the relationship between SES and hypertension. Also, the study's reliance on existing literature and data from other studies may have introduced the biases and limitations inherent in those original studies. Again, there is no evidence of appraisal of the research used in the meta-analysis. This raises doubts about the quality of the methodology and analysis used in those studies. This may have affected the outcome of the analysis.

Abankwah (2016) conducted a study focusing on socioeconomic disparities in the quality of life among adult hypertensive patients receiving care at the outpatient department of the Eastern Regional Hospital in Ghana. The objective of the study was to investigate the quality of life among these individuals, identify predictors influencing their quality of life, and explore the underlying motives for any observed disparities. The study employed a cross-sectional design to conduct a quality of life (QOL) survey, collecting numerical data. A total of 352 patients diagnosed with hypertension, aged 18 years and above, who were receiving care at the Eastern Regional Hospital, were sampled utilising a simple random sampling. Data collection was done through participant

interviews, utilising a structured questionnaire, which was adapted from the Ghana Demographic Health Survey and the WHO Quality of Life - BREF tools. The questionnaire comprised 26 items aimed at assessing various aspects of their quality of life.

Following the analysis, education, income, and employment status emerged as important SES indicators influencing both QOL and hypertension. The study's findings indicated diminished SES and QOL within the purview of social relationships compared to other purviews. Moreover, variations in QOL were observed across patients' background variables and health practices. Consequently, the researchers recommended interventions such as increased engagement in physical activities, higher fruit intake, and improved adherence to treatment to enhance patients' QOL.

Again, Lili (2016) conducted a cross-sectional study focusing on the determinants of blood pressure among rural hypertensives living in China with the aim to ascertain the relationship between demographic factors, health-related characteristics, illness perception, medication adherence, self-management, and blood pressure levels. Leventhal's Self-Regulation Model was used as the conceptual framework for the study conducted among 163 hypertensive adults living in two rural communities within Zhejiang province. Structured questionnaires, such as the Chinese Illness Perception Questionnaire-Revised (CIPQ-R), the Medication Adherence Inventory (MAI), and the Inventory of Adherence to Self-Management (IASM), were employed to gather self-report data. Supplementary data encompassed demographics, health-related variables,

weight, height, and blood pressure measurements. Following the analysis, the results showed gender, age, and annual household income as significant predictors of diastolic blood pressure, collectively accounting for 23% of the variance in the regression model. Furthermore, an understanding of the illness, referred to as illness coherence, contributed an additional 2% to the model. The low contribution of the illness coherence to the differences in blood pressure could be because only 30.1% of the adults had more than six years of education.

While the results of the study were insightful and corroborate other studies, it is not without setbacks. The descriptive data of the demographics suggest that the number of adults with no or low level of education was more than half. Hence, the responses to the instrument may have affected the accuracy of the information since understanding might have been difficult for those individuals. Also, the study used a correlational method that describes relationships between personal characteristics and how people perceive illness. It found some connections, but it could not predict how well personal attributes explain the perception of illness. A longitudinal study, in this case, will be very helpful in understanding this phenomenon.

Cuschieri, Vassallo, Calleja, Pace, and Mamo (2017) conducted a study that investigated the impact of socioeconomic predictors on the onset hypertension within a cardiometabolic at-risk European country. The study aimed to ascertain the burden of hypertension and examine the associations with socioeconomic variables among the adults in Malta. A nationwide representative cross-sectional health examination study was carried out over the period from 2014 to 2016, with

validated questionnaires employed to collect comprehensive sociodemographic and clinical record data, while meticulous blood pressure measurements were conducted. Subsequently, prevalence rates of known hypertensives, freshly diagnosed hypertensives, and global hypertensives were meticulously estimated based on the collected data. Inferential statistics was conducted using logistic regression modelling conducted to assess the relationship between sociodemographic variables and hypertension.

The findings from the analysis revealed that hypertension was prevalent in 30.12% of the study population, with a predominance observed among males. The study revealed that majority of identified cases were known hypertensive, with only three-quarters on medication. Their conclusion underscored hypertension as a notable concern in Malta, particularly among males, and associated with advancing age and higher body mass index. Interestingly, education did not emerge as a significant determinant for hypertension, contrary to existing data. Additionally, habitat was found to play a role in the onset of hypertension. Habitat, or where a person lives, has been known to influence the development of hypertension due to various factors such as air pollution, access to health care, availability of healthy food options, levels of physical activity, social determinants of health and stressors in the environment (Sharma et al., 2021).

The study grappled with several limitations necessitating careful consideration. Principally, the response rate for the health examination was notably suboptimal, likely influenced by the invasive nature of the requisite blood measurements, thereby potentially exerting an effect on the validity of the

findings. Furthermore, reliance on self-reported demographic data and lifestyle habits by participants increased the susceptibility to human bias or inaccurate recall of information, introducing a potential source of error. Again, blood pressure measurement, a critical aspect of the study, is sensitive and subject to various factors such as participant behaviour, environmental conditions, and the accuracy of the sphygmomanometer device used, despite regular calibration. Observer errors during auscultation might have occurred, involving systematic errors during the auscultation method, potentially influencing the accuracy of blood pressure readings, although fieldworkers received training, and their measurements were verified by experienced practitioners.

Additionally, Tandstad (2017) conducted research on hypertension and its correlation with socioeconomic characteristics among rural Nepalese. The study aimed to assess the burden of hypertension within a rural village in Nepal, while concurrently exploring the intricate relationship between SES factors such as income, education, and occupation, and the occurrence of hypertension. The study employed a cross-sectional approach, carried out among a cohort of 260 participants at Kirneter Health Center situated in the Dolakha district of Nepal and spanned from October to December 2016. Data on demographic characteristics, lifestyle choices, nutritional practices, and other medical histories of each participant were meticulously gathered utilizing a standardized questionnaire. Systolic and diastolic BP readings were obtained twice for everyone, and subsequently, the mean blood pressure for each patient was estimated as a metric for defining hypertension. The findings revealed a hypertension prevalence rate

of 19.2% within the study population. Interestingly, participants with advanced educational attainment, greater income levels, and those employed exhibited higher odds of hypertension compared to individuals with lower education, lower income, or those engaged in farming activities. However, these results did not achieve statistical significance. Tandstad (2017) noted the absence of definitive evidence supporting a positive correlation between advanced SES and hypertension among clients from Kirnetar Health Center. Consequently, the researcher recommended that other studies should be conducted using larger sample sizes to validate and replicate these findings.

Subsequently, Wu and Wang (2019) delved into the role of SES in the onset of hypertension among middle-aged and elderly individuals in China with objective to establish the relationship between hypertension and SES. The study utilized data from the China Health and Retirement Longitudinal Survey, which was released in May 2017. A comprehensive sample of 21,126 individuals aged 45 years and above, living in various provinces across China participated in the questionnaire survey. Hypertension status was ascertained based on the response to the relevant entry in CHARLS, specifically asking participants: “Do you have doctor-diagnosed hypertension?” Basic demographic and SES data were also collected alongside. The researchers employed multivariate logistic regression analysis to assess the characteristics associated with hypertension. The concentration index served as the metric to evaluate the inequality in the incidence of hypertension among participants. Notably, individuals in the lowest quintile of society support were found to be more susceptible to hypertension. However, the

results from the concentration index indicated that there was no significant inequality observed in hypertension incidence across different income groups. The study highlighted advanced age, male sex, overweight status, presence of diabetes, and insufficient societal assistance as factors associated with hypertension incidence among middle-aged Chinese individuals.

The findings from the study need to be inferred with restraint due to the following limitations. Firstly, the small sample size of 260 makes it difficult to make precise estimates and generalisation. Also, because most participants were clinic visitors, they might over-represent hypertension cases. Secondly, data accuracy relies on participant responses, which can be influenced by memory and social factors, especially regarding sensitive topics like alcohol consumption. Finally, using ethnicity alone to determine socioeconomic status may not be accurate, as most participants were from the high-caste Brahmin/Chhetri group. This limits the study's ability to capture socioeconomic diversity.

Furthermore, Assari (2019) researched the socioeconomic predictors of systolic blood pressure, specifically addressing the phenomenon of minorities' reduced returns. The study aimed to elucidate racial and ethnic disparities in the intricate interplay between SES encompassing both educational achievement and household income, and systolic blood pressure among adults in the United States. The National Health and Nutrition Examination Survey study conducted between 2005 and 2006 included a population of 4773 individuals aged 20 years and above. Predictor variables included education attainment and household income, while systolic blood pressure was the outcome variable. Covariates encompassed age

and gender, with race/ethnicity serving as the effect modifier. Multiple linear regression models were applied to both the aggregated dataset and each racial/ethnic subgroup.

In the aggregated sample, elevated levels of education attainment and household income were linked to decreased systolic blood pressure, independent of race, ethnicity, age, and gender. An analysis stratified by race and ethnicity showed a protective association between educational level and household income with high systolic blood pressure (SBP) among Non-Hispanic whites. Additionally, household income exhibited a protective effect for other Hispanics, while no significant protective effects of educational achievement or household income were observed for other racial and ethnic groups. The researchers concluded that the health benefits associated with SEP, specifically education attainment and household income, were more pronounced among socially and economically advantaged groups, particularly non-Hispanic Whites, while being attenuated for individuals from diverse racial and ethnic backgrounds.

Whereas the results of the research complement to the understanding of how race and SEP shape SBP pattern, there are several limitations that affect how the results should be interpreted. Firstly, its cross-sectional design precludes drawing causal conclusions. Although SEP can exert an influence on enduring health conditions, it's important to recognize that illnesses themselves can contribute to downward social mobility and alterations in SEP, thereby introducing the potential for reverse causation. This makes it difficult to ascertain whether SEP is really a determinant of hypertension. Additionally, the research

depended on self-reported SEP data, which carries the risk of introducing measurement bias. Although widely used, the accuracy of self-reported SEP may vary among different racial and ethnic groups. Moreover, the study does not show any evidence of controlling confounders, as SEP encompasses more than just education attainment and household income. Granular data on individual income and education were lacking, and certain ethnic groups collapsed, potentially overlooking ethnic heterogeneity. The study did not consider contextual and neighbourhood factors, which could elucidate the varying effects of SEP on systolic blood pressure. Lastly, the unequal distribution of sample sizes among racial and ethnic categories might influence the statistical power.

Finally, Sharma et al. (2021) conducted a recent study to investigate the prevalence of hypertension and its predictors within a rural black population residing in Mthatha town, South Africa. The primary objective was to assess the prevalence and determinants of hypertension among the black rural African population of the eastern Cape Province's Mthatha town. The research design employed in this study was a cross-sectional, wherein individuals aged 18 years and above were randomly selected for screening utilising a World Health Organization stepwise questionnaire. The collected data encompassed sociodemographic characteristics, anthropometric measurements, fasting blood glucose levels, and blood pressure readings measured independently three times. Blood pressure values were categorized following the guidelines outlined by the American Heart Association. The study employed both univariate and multivariate analyses to identify significant determinants of hypertension among

the study participants. Among the cohort of 556 individuals that participated in the study, approximately 71% exhibited blood pressure readings falling within the hypertensive range.

The univariate analysis revealed that, variables including age, adherence to a westernized diet, level of educational attainment, income level, diabetic status, as well as overweight or obese status demonstrated a positive association with the prevalence of hypertension. However, the multivariate logistic regression analysis exclusively revealed that age, BMI, diabetic status, and adherence to a Westernised diet exhibited statistically significant associations with an elevated risk of developing hypertension. Moreover, factors such as gender, age, and BMI emerged as potential determinants significantly associated with hypertension treatment. Sharma et al. (2021) concluded that there is an increased burden of hypertensives within the black rural African community of Mthatha town. They identified gender, age, adherence to a westernized diet, educational attainment, income level, diabetic status, as well as overweight or obese status as the most influential determinants of hypertension within this population. Rural populations were traditionally not associated with overweight and obesity. However, the trend has changed in recent times due to urbanisation (Ajayi, Alli, Oluwadare, & Omojola, 2015).

While the study addresses the critical need for policy makers to recognise the potential determinants and treatment of hypertension, there are some limitations with it. Firstly, the male gender was underrepresented, and this affects the results, especially in understanding the contribution of gender in the

prevalence of hypertension. Also, the research did not account for the impact of dietary behaviours and bodily activities; hence, the results need to be inferred with great deal of caution.

Numerous studies have assessed the impact of socioeconomic and sociocultural factors on hypertension, revealing complex relationships that challenge conventional assumptions. Cois and Ehrlich's (2014) South African research highlighted an unexpected correlation between higher education and income and elevated diastolic blood pressure in men, underscoring the intricate nature of this association and the potential role of occupational factors. Other studies across different regions, including Nigeria, Malta, China, Nepal, the United States, and South Africa, contributed insights into factors such as age, BMI, educational attainment, and societal support affecting hypertension prevalence.

These findings collectively emphasise the need for tailored public health interventions that account for the multifaceted nature of these influences. The implications of these studies suggest that addressing hypertension requires a nuanced understanding of diverse socioeconomic and sociocultural factors. Public health interventions should consider occupational factors, local contextual influences, and gender-specific dynamics. Moreover, efforts to combat hypertension should be mindful of potential disparities across different racial factions as demonstrated in the US. Policymakers and healthcare practitioners should focus on developing targeted interventions that account for these complexities, ultimately working towards more effective and equitable strategies

to prevent and manage hypertension across diverse populations. However, the limitations in study designs and sample sizes underscore the need for further research to enhance the generalisability and robustness of these findings.

**Illness Perception Associated with Hypertension**

Illness perception refers to the cognitive representations and beliefs individuals hold about their illness. Over the past decades, researchers have sought to establish and identify the illness perceptions associated with hypertension, uncovering intriguing findings. These investigations delve into the ways patients conceptualise and understand their condition, shedding light on the psychological factors that influence their experiences and control of hypertension. For the objective of this study, a few of those studies were reviewed for us to grasp some of the most important illness perceptions that come with and/or are associated with hypertension.

For instance, Norfazilah et al. (2013) researched the perceptions of illness among Malaysians living with hypertension at the primary care centre of the University of Kebangsaan Malaysia Medical Centre. The study aimed to assess how these patients perceive their hypertension and to identify the factors influencing their perceptions. A cross-sectional study was carried out involving 250 hypertensive patients who were randomly selected at the Primary Care Centre of Hospital between October 2011 and January 2012. Each participant completed a self-administered questionnaire that consisted of three sections. The questionnaire was divided into three sections: collecting socio-demographic characteristics, measuring the perception of illness using the Malay report of the

Brief Illness Perception Questionnaire (BIPQ), and evaluating depression and anxiety levels with the Malay version of the Hospital Anxiety and Depression Scale (HADS). This structured approach allowed for a comprehensive examination of respondents' perceptions of illness and their psychological well-being

The findings indicated that the aggregate illness perception score exhibited a statistically significant elevation among the Malay participants (mean score: 5.13), individuals with a positive family history of hypertension (mean score: 5.43), and respondents reporting symptoms of anxiety (mean score: 8.56). Additionally, it was observed that a family history of hypertension was linked with a higher total illness perception score. This result aligns with the results of a cohort study conducted in Egypt with the association possibly stemming from the fact that these respondents have received information about hypertension from their own family members, who possess knowledge about the disease.

This finding by this study contrasts that of a study by Berhane and Worku (2022) who determined that illness perception was not associated with family history. This finding holds significance as the perception of illness has been correlated with adhering to medication among people living with hypertension. Other studies such as those of Knowles et al. (2019) showed that an important variable that is associated with the patent's illness perception is anxiety. This is because individuals with higher anxiety levels may engage in a cognitive appraisal process where they perceive health threats more intensely. Anxiety can amplify the perceived severity of an illness, making it appear more threatening than it may

objectively be. The findings indicated that patients who exhibit non-adherence to hypertension self-care recommendations may harbour beliefs about hypertension that diverge from medically endorsed perspectives of the condition. To enhance the treatment and management of blood pressure, healthcare providers should evaluate patients' beliefs about hypertension.

Notwithstanding the strength of the study, it was constrained by its sampling method, which limits the generalisability of the results to the broader population. Additionally, the cross-sectional design of the study precludes making causal inferences. Furthermore, the relatively short duration of illness experienced by respondents suggests that illness perception may evolve over time. These variations are particularly pertinent, especially in a condition like hypertension. Nevertheless, the findings can serve as foundational data for future research endeavours, particularly in investigating the factors linked with each domain of illness perception.

Rajpura and Nayak (2014) utilised a cross-sectional study design to examine treatment adherence patterns among adult individuals grappling with hypertension. The study intricately delved into unravelling the influence exerted by illness perceptions, treatment beliefs, and the burden of illness on medication adherence within this demographic cohort. Employing rigorously validated instruments, the researchers meticulously evaluated illness perceptions, perceived illness burden, treatment beliefs, and treatment adherence. Their study revealed that individual illness perception, the perceived burden of illness, and beliefs regarding treatment collectively wielded a noteworthy influence in predicting

treatment adherence. Notably, perceptions characterised by a sense of threat regarding illness and stronger convictions regarding the necessity of medications significantly contributed to fostering positive adherence behaviours.

The findings underscored the significance of recognising the illness perception among patients and medication in influencing adherence behaviour among elderly individuals with hypertension. Positive beliefs about medication benefits were identified as crucial for adherence, and the study highlighted the need for interventions to consider these factors. However, the study's cross-sectional design and judgemental sampling methodology were acknowledged as limitations, introducing potential biases, and impacting the generalisability of the results. Despite these limitations, the insights gained from this research offer valuable considerations for developing targeted programmes to enhance medication adherence in elderly hypertensive patients. Future research with more robust methodologies could further validate and extend these findings.

Pickett, Allen, Franklin, and Peters (2014) conducted a study focusing on illness beliefs among African Americans with hypertension, aiming to elucidate the relationship between perceptions of hypertension (illness representations) and self-care practices for blood pressure management. Using Leventhal's common-sense model of illness representations, their study explored the association between beliefs about hypertension and the self-care practices essential for BP management among 111 African American individuals residing in the community and diagnosed with hypertension. Study participants were tasked with completing the revised Illness Perception Questionnaire, the BP Self-Care Scale, and a

comprehensive demographic data sheet, in addition to undergoing blood pressure measurements as part of the research protocol.

Pickett et al. (2014) reported disparities in beliefs concerning the origins of hypertension, particularly influenced by gender and educational attainment. Notably, attributions of hypertension to stress-related factors contributed significantly, explaining 34.7% of the variance in hypertension beliefs. Participants endorsing stress or external factors as causal agents for hypertension demonstrated lower likelihoods of adopting healthy self-care behaviours. The findings from this study underscore the significance of understanding patients' beliefs of hypertension and their corresponding behavioural reactions, thereby pinpointing potential intervention areas conducive to enhancing patient outcomes. Notably, perceiving hypertension as a chronic ailment was linked with adhering to doctor appointments and complying with antihypertensive treatment regimens. Such adherence emerged as the most prevalent practice for blood pressure management within this sample.

These results come as no surprise, considering that approximately two-thirds of the participants had been dealing with hypertension for over five years, implying a certain level of awareness regarding the chronicity of the condition. However, it is noteworthy that contrary to the findings of their study, Biddle, Edwards, Gray, and Sollis (2020) found that personal effort was a pivotal predictor of adherence to self-care management behaviours, while belief in medical treatment was correlated with treatment adherence (Chan, Cooper, Lycett & Home., 2020). The study's results indicated that individuals who exhibit non-

adherence to hypertension self-care could be harbouring beliefs about hypertension that diverge from medically endorsed perspectives of the condition. Therefore, to mitigate this and ensure a more effective treatment and management of BP, providers need consider the beliefs of patients on hypertension, provide them relevant information to increase their awareness and debunk any misinformation.

The study's cross-sectional design constrained the ability to establish causal relationships. Furthermore, the relatively small nonprobability sample, predominantly comprising low-income African Americans, restricts the generalisability of these findings to other demographic groups. Additionally, relying on self-reported data precluded verification of the frequency of engagement in self-care behaviours. A further constraint of this study was related to the identified low internal consistencies across various subscales of the IPQ-R and the BP Self-Care Behaviour scale. Furthermore, owing to the exploratory nature of the data analysis, no adjustments were undertaken to account for multiple comparisons concerning the hypertension beliefs and individual self-care behaviour scores.

Kamran, Azadbakht, Sharifirad, Mahaki and Sharghi (2014) also delved into sodium consumption, dietary awareness, and perceptions of illness among controlled and uncontrolled rural hypertensive patients. The primary objective was to ascertain the correlation between illness perceptions and participants' knowledge about the impact of salt consumption on hypertension among rural inhabitants living with hypertension. Using a cross-sectional design, the study

sampled 671 hypertensive patients employing a meticulous multistage random sampling technique from rural Ardabil city, Iran, in 2013. Data collection involved using a comprehensive questionnaire with four distinct sections, and data analysis done employing Pearson correlation and multiple linear regressions, facilitated through SPSS-18 software. Following the analysis, the findings revealed that the average sodium consumption among uncontrolled hypertensives was 3599 ± 258 mg $day^{-1}$, markedly surpassing that of the controlled group (2654 ± 540 mg $day^{-1}$). Moreover, both knowledge and illness perceptions collectively accounted for 47.2% of the variability observed in sodium consumption among the uncontrolled group.

A noteworthy inverse association emerged between the knowledge levels and illness perceptions of uncontrolled hypertensives regarding their sodium consumption. Given the significant predictive capacity of patients' dietary awareness and illness perceptions on their sodium consumption, the imperative of enhancing patients' knowledge and perceptions pertaining to hypertension cannot be overstated, particularly among uncontrolled hypertensive individuals. Further, when stratified by education, income, and gender, no statistically significant disparity in sodium consumption was observed between the two cohorts. In this study by Kamran, Azadbakht, Sharifirad, Mahaki, and Sharghi (2014), women receiving higher sodium intake than men align with consistent findings from prior research potentially reflecting dietary patterns or physiological factors associated with gender (Mills, Stefanescu, & He, 2016).

This study encountered some limitations, primarily stemming from its cross-sectional design, which constrained the findings to examining correlations rather than allowing for the deduction of causal relationships. Secondly, the model only accounted for the variability in sodium intake, thus underscoring the necessity for future research to broaden its scope to investigate additional factors that could potentially mediate the relationship between socio-demographic factors and sodium consumption, including self-efficacy, attitudes, and salt taste perception. Lastly, despite employing random sampling methods, there was female over-representation, posing another limitation to the study. This discrepancy was attributed to the higher compliance and preparedness among women to partake in the study.

Pérez (2015) conducted a study on the intricate nexus of acculturation, health literacy, and illness perceptions of adult Hispanics on hypertension. The study sought to unravel the multifaceted interrelationships among these variables within the Hispanic demographic. The research utilized a cross-sectional correlational method, enrolling 144 Hispanic adults who self-reported being diagnosed with hypertension. The study employed the Short Acculturation Scale for Hispanics, the Newest Vital Sign instrument for evaluating health literacy, and the Brief Illness Perception Questionnaire to collect data from participants. The findings revealed a significant association among acculturation, health literacy, and various illness perceptions such as symptoms, management, consequences, and emotions. Additionally, the results suggested that both acculturation and

health literacy might exert an influence on hypertension control perception within the Hispanic community.

Alba et al. (2019) posit that increasing levels of acculturation and health literacy are associated with increased perceptions of personal control over hypertension. Furthermore, Sany et al. (2020) observed that persons with decreased health literacy levels exhibited lower rates of BP management. Also, age appears to play a significant role in shaping illness perceptions of hypertension among Hispanics. In their study, as participants aged, there was a marked tendency for them to regard hypertension as a more persistent and chronic condition. Additionally, older participants reported an enhanced sense of personal control over managing their hypertension, perceiving their treatment regimens as more efficacious, and demonstrated a deeper understanding of the illness.

This divergence in their study may originate from differences in sample characteristics, study populations, or research methodologies. Overall, these results suggest that Hispanics with reduced levels of acculturation and health literacy might need more extensive and thorough intervention, along with improved educational initiatives for the control of hypertension and its related complexities effectively. Implementing clinical intervention programmes that customise educational materials based on the individual's level of acculturation and health literacy could prove advantageous for this demography. However, despite identifying significant determinants concerning acculturation and illness perceptions of hypertension among Hispanics, it is crucial to acknowledge several limitations inherent in interpreting these findings. Participants for this study were

obtained using a convenience sample, primarily recruited from churches following Spanish-language religious services or masses. This recruitment approach might account for the relatively low mean acculturation level observed in the sample, given that language proficiency and social gathering preferences were key variables assessed by the acculturation instrument employed in this study. Moreover, the recruitment sites utilized in this study may restrict the generalisability of findings to other segments of the Hispanic population with hypertension who do not have affiliations with religion.

Also, Saarti et al. (2016) examined the relationship that exist between treatment adherence and satisfaction, and how patients with hypertension perceive their illness. The study aimed to explore the relationship between these variables sampling participants from physicians' practices and community pharmacies in Beirut through a cross-sectional design recruiting patients who had undergone hypertension treatment for a minimum of three months to complete the three questionnaires: the 8-item Morisky Medication Adherence Scale (MMAS-8), the Treatment Satisfaction Questionnaire for Medication (TSQM-4), and the Brief Illness Perception Questionnaire (BIPQ). Blood pressure measurements were also taken and recorded. Out of the 117 participants enrolled, 29.1% demonstrated inadequate adherence to their antihypertensive medication, as indicated by MMAS-8 scores falling below 6.

The results also showed that patients with higher medication adherence had 3.5 times higher odds of achieving well-controlled hypertension compared to those with poor adherence. Furthermore, individuals with good adherence

reported significantly greater treatment satisfaction. However, none of the socio-demographic, disease-related, or drug-related variables of participants showed a significant association with treatment adherence. Regarding their perceptions of their condition, while the mean BIPQ score was lower among individuals that adhered to their medications compared to non-adherent ones, this difference was statistically insignificant. The study concluded that treatment satisfaction is a significant predictor to medication adherence. The results suggest that patients' commitment to their medication regimen is associated with effective blood pressure management and is positively influenced by satisfaction with treatment, whereas there was no notable association with their illness perception.

Their study revealed a paucity of literature addressing the intersection of medication adherence in hypertensive patients and their satisfaction with prescribed treatments as no prior studies delved into the relationship among medication adherence, illness perception, and treatment satisfaction in this context. However, some other existing studies across various medical conditions and pharmacotherapies have consistently shown a positive association between treatment satisfaction and medication adherence (Uchmanowicz et al., 2019). Satisfaction with treatment fosters increased motivation for adherence, particularly over extended periods and with medications for chronic conditions, while dissatisfaction may undermine adherence.

The study had a few limitations, with a notable one being its reliance on a relatively small convenience sample. All individuals who met the inclusion criteria and consented to participate in the study between March and September

2014, present in physician's practice offices and pharmacies were included, potentially raising concerns about the representativeness of the sample. Consequently, larger-scale studies were recommended to validate these findings. The researchers recognized that recruiting patients from both physicians' offices and pharmacies may have introduced bias into the study. Also, blood pressure was assessed utilising a standardized method; nonetheless, it is pertinent to acknowledge that clinical practice commonly employs a less rigorous protocol for BP measurement with readings obtained in clinic settings tending to register higher values than those acquired through the use of a mercury sphygmomanometer. Lastly, the study depended on self-reported questionnaires, which introduced the potential for reporting and social desirability biases. Participants may have omitted relevant details, or their responses could have been influenced by a desire to conform to social norms or present themselves in a favourable light. This could result in either overestimation or underestimation of certain factors to avoid disclosing sensitive information.

Furthermore, Taheri-Kharameh et al. (2017) conducted a study to examine how patients with hypertension perceive their illness and adhere to treatment plans. The study aimed to ascertain the association between their perception on their illness and adherence to medication regimens among this patient population. A cross-sectional design involving 140 participants selected through convenience sampling was conducted at two teaching hospitals in Qom, Iran in 2016. The data collection involved a questionnaire comprising three sections: socio-demographic and clinical variables, the brief illness perception questionnaire, and the Hill-Bone

Compliance to High Blood Pressure Therapy Scale. Statistical analysis requiring descriptive and analytical procedures as well as linear regression analyses, was conducted using SPSS-16 for data assessment. The findings revealed that the mean age of participants was 60.4 years (SD = 11.21), with 57% of them being female. Additionally, 35% of the participants exhibited adherence to treatment regimens scoring higher than the mean. The multiple linear regression analyses revealed that both personal control and disease awareness were positively correlated with greater adherence to treatment regimens, with β coefficients of 0.25 and 0.22, respectively. Based on the findings, enhancing patients' perception of their condition, particularly focusing on improving personal control and disease awareness, emerged as a vital strategy within educational interventions aimed at bolstering adherence to treatment. This study was limited by its cross-sectional nature and sampling bias since a convenient sampling technique was adopted for the study.

Subsequently, Eke (2018) investigated the relationship between illness perception and adherence to antihypertensive medication among Black adults diagnosed with hypertension in primary care settings. The main objective was to explore the association between how Black adults aged 35 to 65 diagnosed with hypertension perceive their condition and their adherence to medication in primary care environments. The theoretical framework for this cross-sectional study was based on the Common-Sense Model of Illness Perception and Self-Regulation. A non-random sampling technique was used to select 118 Black adults living with hypertension, aged 35 to 65, from four primary care clinics. The

study employed the revised IPQ-R and the Hill-Bone Blood Pressure Therapy Compliance Scale to gather data. The sample exhibited a middle-aged demographic profile, with a mean age of 53.9 years and a standard deviation of 7.9 years. Approximately 52.5% of the participants were male, while a substantial proportion boasted higher levels of education, with 51% possessing a four-year college degree or beyond. Principal components factor analysis revealed the emergence of two factors, collectively elucidating 40.8% of the variance in hypertension causal attributions. Subsequently, employing multiple regression analysis while controlling for other variables, three IPQ-R subscales collectively accounted for 23.9% of the variance in medication adherence. However, among these subscales, only 'Consequences' exhibited a statistically significant relationship with medication adherence ($p = .022$).

Employing ANCOVA, Eke (2018) found that among the nine subscales, only one exhibited a significant association. Specifically, men demonstrated higher adjusted mean scores with $p = 0.034$ than females regarding the perception that hypertension stems from factors associated with unhealthy lifestyle choices and external factors beyond the person's control. The analysis revealed the emergence of two reliable factors concerning causal attributions. Notably, among these factors, the perception of hypertension imposing a burden on one's life (Consequences) emerged as the singular predictor significantly associated with treatment adherence. Furthermore, gender comparisons indicated minimal disparities between males and females regarding their perceptions of hypertension. Additional observations from the study indicated that both age and

educational attainment exhibited statistically significant predictive associations with treatment adherence. This is because older individuals may have accumulated more health knowledge and awareness over time, which can positively influence their understanding of the importance of medication adherence together with higher educational attainment which is generally associated with better health literacy. Individuals with advanced education levels might have an enhanced knowledge of medical information, prescription instructions, and the importance of medication adherence.

The findings reported by Eke (2018) highlight importance for clinicians and nurse educators to regularly evaluate perceptions of patients regarding their hypertension, providing education and addressing any misconceptions they may harbour. Delving into patients' perspectives on hypertension provides clinicians with a valuable chance to address any misunderstandings about the condition. Furthermore, it allows clinicians to identify persons susceptible to adverse outcomes from hypertension sooner, thus enabling the prompt initiation of interventions. The study's limitations were related to the potential misclassification of treatment adherence or illness perceptions, attributed to the utilisation of self-report questionnaires for assessing hypertension beliefs and treatment adherence. Such questionnaires may result in participants overestimating adherence, introducing recall bias, and predisposing respondents to providing socially desirable responses. As a results of the use of a cross-sectional design in this study, it precludes the determination of causality between variables. Additionally, a significant limitation pertains to the study's incapacity

to investigate the impact of acculturation on perceptions of hypertension and medication adherence, particularly among foreign-born Black individuals. This implies that this study cannot be generalisable to Black hypertensive adults aged between 35 and 65 years, the majority of whom possessed a high school education or beyond, were included in primary care settings.

Another study was conducted by Shakya et al. (2020) on the perceived illness and adherence to hypertension treatment among hypertensives visiting a Kathmandu tertiary hospital in Nepal. The research focused on examining the perceptions of illness and the adherence to treatment among patients with hypertension at a major hospital in Kathmandu. Utilizing a descriptive correlational design, the study was carried out in the outpatient department of the Manmohan Cardiothoracic Vascular and Transplant Center in Kathmandu, Nepal. Utilising a purposive non-probability sampling method to select participants for this study, a face-to-face interview was carried out from September through December 2018. The structured questionnaire used for these interviews comprised socio-demographic variables, the revised Illness Perception Questionnaire, and the Hill-Bone Compliance to High Blood Pressure Therapy Scale. The data were analysed using the chi-square test and Spearman rank correlation.

Shakya et al. (2020) reported that within the cohort of 204 participants, males accounted for 51%, while 77% were deemed literate. Approximately 72% reported experiencing headaches, with an overwhelming 88% attributing their symptoms to hypertension. Notably, behavioural, and psychological factors were discerned as the predominant influencers of hypertension within this population.

Approximately 63% of the participants perceived hypertension as a significantly ominous ailment. Elevated scores in the timeline (acute/chronic), personal control, and treatment control domains indicated a belief among patients that hypertension was a long-lasting condition, with a heightened sense of personal and medication control. Regarding adherence to treatment, the average score was 16.58, with a 14.7% of participants demonstrating perfect treatment adherence. This means that interventions are needed to improve perfect adherence, taking into consideration the period of diagnosis and length of intervention. This results closely mirror a study on illness perception, which indicated a discreetly ominous perspective (Maharjan, Chinnawong & Kritpracha, 2017). A noteworthy positive correlation was observed between illness perception and treatment adherence, signifying a significant association between the two variables.

Some limitations of this study include the use of a cross-sectional design, which measured illness perception and treatment adherence among patients at a single point in time. Consequently, the study could not assess any changes or trends in these variables over an extended period. Additionally, the study employed a non-probability sampling technique, which may limit the generalisability of the findings. Since participants were not randomly selected, there is a potential for selection bias, which could affect the representativeness of the sample and, consequently, the overall validity of the study's conclusions. Furthermore, the study population was recruited exclusively from a hospital setting, which could introduce a bias towards higher treatment adherence. This recruitment method might have skewed the findings, potentially explaining why

the data did not fit the logistic regression model effectively. The hospital-based sample might not be representative of the broader population, as individuals who seek hospital care may have different adherence behaviours compared to those who do not. Fourth, the tool employed for assessing treatment adherence was a self-reporting instrument, which introduces the risk of reporting bias and social desirability bias. Participants might have overestimated their adherence levels or responded in a manner they perceived to be more socially acceptable, potentially compromising the accuracy and reliability of the data.

Finally, Salome Oyiela and Deborah Kemunto (2021) examined how hypertensive patients' perceptions of their illness influenced their adherence to medication regimens at a county referral hospital in Kenya. The objective of the study was to determine the impact of illness representation on treatment adherence in this patient population. Implementing a quantitative research design, a simple random sampling method was utilized, with data collected through the Brief Illness Perception Questionnaire. Bivariate analysis employed the chi-square and Mann-Whitney U tests, while multivariate analysis utilised binary logistic regression. Data from 96 participants, comprising 55% females and 58% aged over 65 years, were analysed. No statistically significant relationships were observed between medication adherence and any of the socio-demographic variables, as determined by chi-square test analysis. However, treatment adherence exhibited a significant positive correlation with stronger attitudes of personal control, while weaker perceptions of emotional representation emerged as predictive factors for adherence. Based on their study's findings, the researchers

suggested that healthcare professionals should develop interventions geared towards enhancing perceptions of personal control and minimizing perceptions of emotional representation. This approach aims to bolster adherence among patients.

The reviewed studies consistently highlight the significance of illness perception in individuals with hypertension, with key factors such as their beliefs about medication, accessibility to health centres, and preferred methods of treatment. The influence of familial and social advice on treatment decisions also emerged as a notable theme. However, it is crucial to note that some studies provided limited insights into illness perception, possibly due to the primary focus of the research or other undisclosed factors.

A notable limitation is the geographical concentration of the studies in Asia, making it challenging to generalise findings globally. The cultural, socioeconomic, and healthcare system variations across regions may impact the universality of the conclusions drawn from these studies. Therefore, there is a compelling necessity for more studies, especially in diverse contexts, to strengthen our understanding of illness perception associated with hypertension.

Conducting studies in the local context would not only fill gaps in the existing literature but also contribute to making more informed and context-specific claims. Bridging the disparity in literature on this subject requires a concerted effort to explore illness perceptions in different populations, considering their unique sociocultural and economic contexts. This approach would contribute significantly to the advancement of knowledge in hypertension

management and pave the way for targeted interventions tailored to specific populations.

**Factors influencing Health-Seeking Behaviour**

Abdul-Aziz's (2017) research delved into the intricacies of healthcare-seeking behaviour among adolescents attending elementary schools within the locality of Yamoransa sheds light on various factors influencing and affecting their health-seeking patterns. The study utilised a descriptive cross-sectional design, revealing that a significant majority (66.7%) of respondents preferred visiting modern health facilities when unwell, emphasising the recognition of the importance of seeking treatment from trained healthcare providers rather than relying solely on home remedies or self-medication.

Key factors influencing adolescent healthcare seeking behaviour included a negative attitude of healthcare providers (49.2%), long distances to health facilities (45%), the cost of healthcare (52%), and long queues (45.3%). These findings resonate with challenges commonly observed in LMICs. The barriers identified, such as long queues at healthcare facilities (61.8%) and high treatment costs (28.5%), underscore the intricate web of factors shaping the health-seeking behaviours of adolescents. Comparable challenges have been noted in other studies, emphasising the complexity of addressing healthcare access issues in this demographic.

The identified factors highlight the need for comprehensive approaches to enhance healthcare systems, ensuring that they cater to the specific needs of adolescents and facilitate timely access to essential medical services. By

addressing these challenges, policymakers and healthcare providers can contribute to improving health outcomes among adolescents, fostering a healthcare environment that aligns with the unique requirements and inclinations of this demographic.

The study is faced with some limitations which cannot be overlooked. Firstly, some of the respondents had to wait to complete the questionnaire before going home and this has the potential to affect the results of the study. This is because the time of data collection may have been inconvenient to some of the participants; hence, they may have hastily responded to the questionnaire without reading to understand it. Also, some respondents who had primary education may have not understood the items in the instrument and may have provided inaccurate answers. All these factors affect the ability of the findings to be generalised although the study provides insight into health-seeking behaviours which are peculiar to adolescents.

Additionally, Yousaf, Grunfeld, and Hunter (2015) conducted a systematic review exploring the myriad factors linked to delays in seeking medical and psychological assistance among men. The objective was to provide an overarching perspective to inform health psychologists about the obstacles hindering the adoption of adaptive health behaviours, such as timely help-seeking, which could contribute to theoretical advancements and the crafting of targeted interventions aimed at promoting prompt help-seeking behaviours among men. They systematically evaluated both quantitative and qualitative empirical studies

focusing on factors linked to delays in men's help-seeking behaviour, encompassing both medical and psychological domains.

About fifty percent of these studies employed qualitative methodologies, specifically semi-structured interviews and focus groups, while an equivalent proportion utilized quantitative methodologies, predominantly employing questionnaires. From the pool of 41 papers analysed, they identified several recurrent cognitive, emotional, health-service-related, and socio-demographic factors or predictors linked to help-seeking behavior. Notably, the most prominent barriers encompassed a disinclination to articulate emotions or health concerns, feelings of embarrassment, anxiety, and fear, as well as deficient communication with healthcare professionals. The disinclination to express emotions not only hinders effective communication with healthcare professionals but also undermines the ability to address health concerns promptly.

Brandes (2017) reported that among people with chronic diseases like cancer and hypertension, there is a lack of interest to discuss health concerns with healthcare professionals. The lack of interest is persistent even when there is a need for such discussions. Also, according to Subu et al. (2021), embarrassment as a challenge may be due to societal stigma, cultural beliefs, or personal discomfort. This reluctance to seek help because of embarrassment can result in delayed or inadequate treatment, exacerbating health problems and reducing overall well-being (Subu et al., 2021). The systematic review is faced with some limitations which include the fact that there is no evidence of appraisal of the included studies. This makes it difficult to ascertain the credibility and robustness

of the included studies, potentially compromising the validity of the synthesised findings.

Furthermore, Hom, Stanley, and Joiner (2015) explored determinants and interventions shaping help-seeking behaviours and the utilisation of mental health services among individuals living with suicidal ideation. The overarching objective of the review was to provide a critical discourse on the existing literature regarding help-seeking behaviours and the utilisation of mental health services among individuals facing heightened risk of suicide. Additionally, it aimed to delineate challenges encountered in this domain and suggest potential avenues for future research endeavours. Across various studies, the utilisation rate of mental health services among individuals reporting past-year suicide ideation, plans, and/or attempts averaged approximately 29.5% based on weighted averages. Key barriers to seeking care included a perceived lack of need for services, a preference for self-management, apprehension regarding hospitalisation, and structural factors such as time constraints and financial considerations. To counteract the prevailing low rates of help-seeking and address the encountered barriers to care, a multitude of interventions have been formulated. These include the development of psychoeducation-based programs, the implementation of peer and gatekeeper training initiatives, and the adoption of screening-based approaches.

In rural areas, addressing hypertension among the population may parallel some of the challenges highlighted in the assessment by Hom et al. (2015) regarding help-seeking behaviour between individuals susceptible to suicide. While the contexts differ, the barriers to seeking healthcare services and the need

for effective interventions resonate across health conditions. Like suicide susceptible individuals, people in rural areas facing hypertension may encounter barriers such as unavailability of perceived need for medical services, inclination for self-treatment, fear of hospitalisation, and structural factors like limited access to healthcare facilities, transportation issues, and financial constraints. These barriers can significantly impede the timely diagnosis, management, and treatment of hypertension, contributing to poor health outcomes and increased risk of complications.

Interventions aimed at improving hypertension management and reducing cardiovascular risk in rural populations may draw lessons from the strategies proposed in the review. Psychoeducation-based programmes, peer and gatekeeper training, and screening-based approaches can be adapted to promote hypertension awareness, encourage regular blood pressure monitoring, and facilitate early detection and intervention. Furthermore, engaging community stakeholders, healthcare providers, and policymakers in both the design and execution of interventions can bolster their relevance, acceptability, and long-term sustainability, particularly in rural settings (Hom et al., 201).

However, as highlighted in the review by Hom et al. (2015), the utility of interventions is contingent on rigorous evaluation and outcome measurement. Therefore, efforts to address hypertension in rural areas must prioritise robust evaluation methods to evaluate the effect of interventions on behavioural outcomes, blood pressure control, and overall cardiovascular health. By integrating evidence-based strategies, engaging stakeholders, and evaluating

intervention outcomes, healthcare systems can better address the unique challenges of hypertension management in rural populations and improve health outcomes for individuals living in these underserved areas. While the review provides valuable insights, there are some limitations of concern. The review's restriction to papers published in western countries such as the US, Canada, the UK, and Australia limit the generalisability of the study. As such, the results may not truly capture the unique socio-cultural, economic, and healthcare dynamics in rural areas in Africa.

Thompson et al. (2016) conducted a Quality and Cost of Primary Care (QUALICOPC) study, aiming to elucidate the nuanced interplay between gender and diverse patient characteristics concerning healthcare-seeking behaviour. The primary aim of the research was to scrutinize the healthcare-seeking behaviour of Canadians pertaining to both physical and mental health issues, leveraging data from the international QUALICOPC survey administered in Canada during the year 2013. In this study, a cross-sectional design was adopted, leveraging the Patient Experiences Survey administered to a substantial cohort of 7260 patients distributed across 759 practices spanning 10 Canadian provinces, as part of the comprehensive QUALICOPC study. Moreover, to assess healthcare-seeking behaviour across a spectrum of health conditions, a Responsive Care Scale (RCS) was meticulously constructed, encompassing 11 distinct health parameters.

Employing multiple regression analyses, the researchers investigated the influence of several patient attributes as independent variables. According to

patients' self-reported data, discernible gender differences in healthcare-seeking behaviour emerged, with women exhibiting a notably greater inclination to seek primary care provider visits compared to men, across both physical and mental health. This confirms what is known in literature. For example, a study conducted by Matheson, Smith, Moineddin, Dunn and Glazer (2014) to examine sex disparities in the development of mental health service utilisation among individuals living with physical illness including hypertension, corroborates that finding. The authors reported that females living with physical illness like hypertension were slightly faster to utilise mental illness services (6.4 months earlier). The gender gap in the timing of service utilisation carries various implications. If women initiate the use of services for mental health issues six months earlier than men, it may suggest a positive trend where women are proactively seeking assistance sooner, potentially resulting in improved mental health outcomes. Conversely, this difference might be viewed negatively for men who delay seeking care for several months. Alternatively, such findings may suggest that symptoms manifest more severely among women, prompting them to seek care earlier than men.

In the study conducted by Thompson et al. (2016), patients exhibited a decreased likelihood of seeking care for mental health issues when juxtaposed with physical health concerns. The regression analyses yielded significant insights for both genders, revealing that factors such as age, emphasis on illness prevention, trust in physicians, and the presence of chronic conditions played pivotal roles in elucidating healthcare-seeking behaviours pertaining to mental

health concerns. While the study used an adequate sample size, it is not representative of the population in Canada. Also, the location where the research was carried out presents another limitation especially in the interpretation and application of the findings in LMICs like Ghana.

Samal (2016) conducted a systematic review focusing on health-seeking behaviour among tuberculosis patients in India. The review aimed to comprehensively explore health-seeking behaviour, associated delays, and the knowledge and attitudes concerning tuberculosis (TB) and the healthcare services associated with it. Employing a manual search strategy, PUBMED and Google Scholar search engines were meticulously navigated to select research papers pertinent to the research objective. From an initial pool of 113 articles identified, a discerning selection process culminated in the inclusion of 10 full-text articles for thorough review and analysis. Out of the 10 studies identified, the outcomes were stratified into 7 thematic domains, comprising the understanding and attitudes of TB patients toward TB and the associated healthcare services, the intricacies of delay in seeking assistance, patterns of health-seeking behaviours observed within healthcare facilities, the multifaceted rationales underlying the decision-making process concerning care-seeking or delay, geographical disparities in health-seeking tendencies spanning rural and urban settings, socio-cultural factors intricately interwoven with health-seeking behaviour, and the nuanced gender-specific dimensions of health-seeking conduct. The thematic areas identified by Samal (2016) can be applied to the management of hypertension as well. For instance, understanding patients' knowledge and

perceptions of hypertension and its treatment options can inform education and awareness programmes targeted at improving health literacy and promoting early interventions.

According to Samal (2016), health-seeking behaviour and the associated delays hold paramount significance in TB care from two critical vantage points: firstly, TB necessitates prompt treatment initiation, and secondly, it entails a prolonged treatment duration. The management of hypertension also requires prompt treatment, and often requires prolonged management and monitoring to manage blood pressure level and reduce cardiovascular events. A requisite level of knowledge and adoption of positive health behaviours play pivotal roles in facilitating patients' timely access to appropriate healthcare facilities. The study, however, has some limitations despite the valuable insights. Firstly, the review only included articles published from 2000 to 2015. The articles published before 2000 may have had valuable insights regarding health-seeking behaviours. Also, the review only included studies conducted in parts of India and may not be generalisable to the whole country and other countries as well.

Han, Batterham, Calear and Randall (2018) explored the topic, “factors influencing professional help-seeking for suicidality”. The primary objective of the study was to evaluate the myriad factors influencing the professional help-seeking behaviours associated with suicidality. Employing a rigorous systematic approach using the PRISMA guidelines, an exhaustive review of both quantitative and qualitative studies sourced from the Medline and PsycInfo databases was conducted. Subsequently, a total of 55 pertinent studies were meticulously

identified and integrated into the analysis. Among these, 15 studies delved into the professional help-seeking intentions concerning perceived suicidal ideation, traversing individuals both with and without prior histories of suicidality. Additionally, 21 studies looked at professional help-seeking behaviours within the population contending with suicidality, while a further 19 studies probed the nuances health service utilisation among individuals who tragically succumbed to suicide. Several salient barriers of potential significance were determined, comprising heightened proclivities towards self-reliance, a perceived lack of necessity for treatment, and the pervasiveness of stigmatizing attitudes towards suicide, mental health afflictions, and the pursuit of professional therapeutic intervention. The coexistence of suicidality and mental health concerns was observed to typically diminish the inclination towards seeking assistance for perceived suicidal ideation, albeit concurrently facilitating tangible utilisation of services. Additionally, the provision of social support and informal assistance from familial and peer networks emerged as pivotal influencers in fostering professional help-seeking behaviours.

While the discussion initially pertains to mental health issues and suicidality, parallels can be drawn to other health conditions, such as hypertension, which also involve complex dynamics of recognition, help-seeking, and social support. Hypertension, characterised by high blood pressure, shares similarities with mental health concerns in terms of the internal and external factors that influence individuals' behaviours and attitudes towards seeking assistance.

Firstly, individuals with hypertension may experience internal barriers like those faced by individuals with mental health issues. They may downplay or ignore symptoms, rationalise elevated blood pressure readings, or fear the consequences of acknowledging their condition. Like mental health stigma, there may be a societal normalisation of hypertension as a natural consequence of ageing or lifestyle, which can deter individuals from seeking medical attention until symptoms become severe or complications arise.

Conversely, the recognition of hypertension and its potential health risks can also prompt individuals to seek medical intervention. Awareness campaigns, educational initiatives, or personal experiences of witnessing the consequences of uncontrolled hypertension may motivate individuals to take proactive steps towards managing their condition. Like mental health awareness efforts, public health campaigns can play a critical role in empowering individuals to prioritise their cardiovascular health and seek timely medical evaluation and treatment.

Latunji and Akinyemi (2018) conducted a study aimed at elucidating the multifaceted factors underpinning the health-seeking behaviours among civil servants domiciled in Ibadan, Nigeria. The principal objective of their scholarly work was to identify the primary determinants guiding the nuanced decision-making processes of civil servants as they seek-help. Using a descriptive cross-sectional design, the study sampled 337 civil servants stationed at the Federal Secretariat in Ibadan, Nigeria. An interviewer carefully administered a semi-structured questionnaire, meticulously crafted to elicit responses from the participants. The analysis employed chi-square tests to assess associations, while

binary logistic regression tests were utilised to ascertain predictors. All statistical analyses were meticulously conducted at a predetermined 5% level of significance to ensure robustness and accuracy. The findings from the analyses showed a noteworthy disparity, indicating that individuals within the lowest quartile of socioeconomic status exhibited a sixfold higher likelihood of exhibiting inappropriate health-seeking behaviours compared to their counterparts in the highest quartile. Moreover, the predominant avenue pursued for healthcare was visits to hospitals or clinics, accounting for a notable 62.2% of the respondents' healthcare-seeking endeavours. Subsequently, 33.0% of respondents reported consulting chemists, and 4.3% sought assistance from traditional healers. Moreover, a notable proportion, exceeding one-third (34.5%) of the respondents, emphasised that good service delivery was the most critical determinant shaping their health-seeking behaviours. Following this, proximity to healthcare facilities was cited by 23.9% of respondents as an important factor, followed by affordability (20.4%), prompt attention (8.8%), and the availability of drugs (7.1%). Additionally, individuals with only basic education and those relying on out-of-pocket payments were less likely to seek healthcare from formal sources.

The researchers deduced that while civil servants generally exhibited appropriate health-seeking behaviours, there exists a critical need to specifically target lower cadre employees and individuals with lower educational attainment during the formulation of health policies. This targeted approach aims to enhance and optimize health-seeking behaviours within these demographics. As shown in the findings of the study, factors influencing health-seeking behaviour encompass

a variety of considerations. The emphasis on good service delivery among other factors underscores the importance of patient experience in healthcare utilisation. Individuals prioritise facilities that offer efficient, respectful, and patient-centred care.

The study, while informative, is not without its limitations. One notable setback is the focus on civil servants from the Federal Secretariat in Ibadan, Nigeria. This narrow sample may not fully represent the broader population, restricting the generalisability of the results to other occupational regions. Additionally, employing a cross-sectional design offers only a temporal snapshot of health-seeking behaviours, thus complicating the establishment of causal relationships and hindering the ability to observe dynamic changes over time. Relying on self-reported data obtained via semi-structured questionnaires presents a significant risk of response bias, as participants may offer socially desirable responses or struggle to accurately remember their health-seeking behaviours, thus potentially undermining the validity and reliability of the study's outcomes. Furthermore, the study does not delve into the specific health conditions or types of illnesses for which participants sought health care. Variations in health-seeking behaviour may exist based on the nature of the health issue, and a more detailed exploration of specific health concerns could have yielded more targeted and nuanced findings.

Moreover, Musinguzi et al. (2018) undertook a study to investigate the multifaceted factors influencing compliance and health-seeking behaviours pertaining to hypertension within the locales of Mukono and Buikwe in Uganda.

Employing a qualitative research approach, individuals diagnosed with hypertension were subjected to in-depth interviews aimed at elucidating the factors impacting compliance and health-seeking behaviours.

Data analyses involved a semantic thematic analysis, revealing a nuanced multifaceted landscape of care-seeking behaviours among individuals managing hypertension. The findings underscored a diverse of approaches, including self-medication practices, procurement of antihypertensive medications, both with and without prescription—and the utilization of herbal remedies. The prevalence of self-medication and access to antihypertensive drugs without prescriptions reflect underlying challenges within the healthcare system. Limited access to formal healthcare facilities, long waits and perceived barriers to obtaining prescriptions may drive patients to self-medicate or seek medications through alternative channels. The regular surveillance of blood pressure emerged as an uncommon practice among the study cohort.

Health-seeking behaviours (HSB) was intricately intertwined with various factors pertaining to both the healthcare systems and the socioeconomic and structural environment of the patients. Key systemic challenges revolved around issues concerning the availability and attitudes of healthcare personnel, as well as shortages in essential supplies and medications. Patient-related factors encompassed a spectrum of variables including awareness levels, perceived severity of the condition, efficacy perceptions regarding therapy, concerns over potential adverse effects, and apprehensions regarding prolonged dependence on medication. Moreover, the socioeconomic status of patients emerged as a

significant determinant, alongside the influence of traditional medicine marketing practices.

The use of herbal medicines for hypertension also highlights the cultural and traditional beliefs that influence healthcare practices in Uganda. Many individuals may trust in the efficacy of traditional medicine or perceive it as more accessible and affordable than conventional treatments. Cultural norms and beliefs surrounding illness and healing play a significant role in shaping individuals' attitude towards healthcare-seeking behaviours and treatment modalities. Their conclusion underscored the diverse avenues through which patients seek care for hypertension, highlighting the necessity for comprehensive strategies aimed at addressing the multifaceted factors influencing health-seeking behaviours. Such initiatives are imperative for enhancing hypertension management and control within the population.

In conclusion, the predictors of health-seeking behaviour are diverse, encompassing issues related to individual attitudes, healthcare facility conditions, and socioeconomic factors. Challenges in accessing healthcare are exacerbated by issues such as hesitancy to disclose health concerns, the availability and attitude of healthcare personnel, and deficiencies in the availability of essential medical resources and medications (Musinguzi et al., 2018). Furthermore, patient-related factors, including awareness levels, perceived severity of conditions, assessments of therapy efficacy, concerns about adverse effects, and anxieties regarding prolonged reliance on medications, assume pivotal significance. Socioeconomic

factors like educational level and income status were also identified as influential factors in shaping health-seeking behaviour.

Despite shedding some light on the subject, most reviewed studies did not focus on health-seeking behaviour, resulting in limited literature on the topic. The scarcity of information emphasises the need for more research, particularly longitudinal studies, to provide comprehensive perceptions into the determinants of health-seeking behaviour. Such studies would not only enhance our understanding but also contribute to shaping future policies addressing healthcare disparities. Closing the existing gaps in literature would lead to a more informed approach in developing strategies that promote effective health-seeking behaviour among individuals.

**Conceptual Basis of the Study**

*Figure* one shows the conceptual framework that underpinned this study. The conceptual framework was guided by Calys-Tagoe et al. (2020) and Carey et al. (2019). The conceptual framework illustrates the incidence of hypertension as influenced by demographic characteristics of people, lifestyle, and health condition/status of people. Besides, background characteristics such as sex, age, marital status, income level, occupation, and number of people in a household could influence hypertension status among people. Also, lifestyle of people such as having ever smoked, currently smoking, taking smokeless tobacco, consuming alcohol, moderate to high intensity PA and dietary habits of people could expose them to or protect them against hypertension. Further, being diagnosed diabetic,

BMI, waist-to-hip-ratio (WHR) and waist to height ratio (WHtR) of people could put people at risk of hypertension (see *figure* 1).

**Conceptual Basis of the Study**

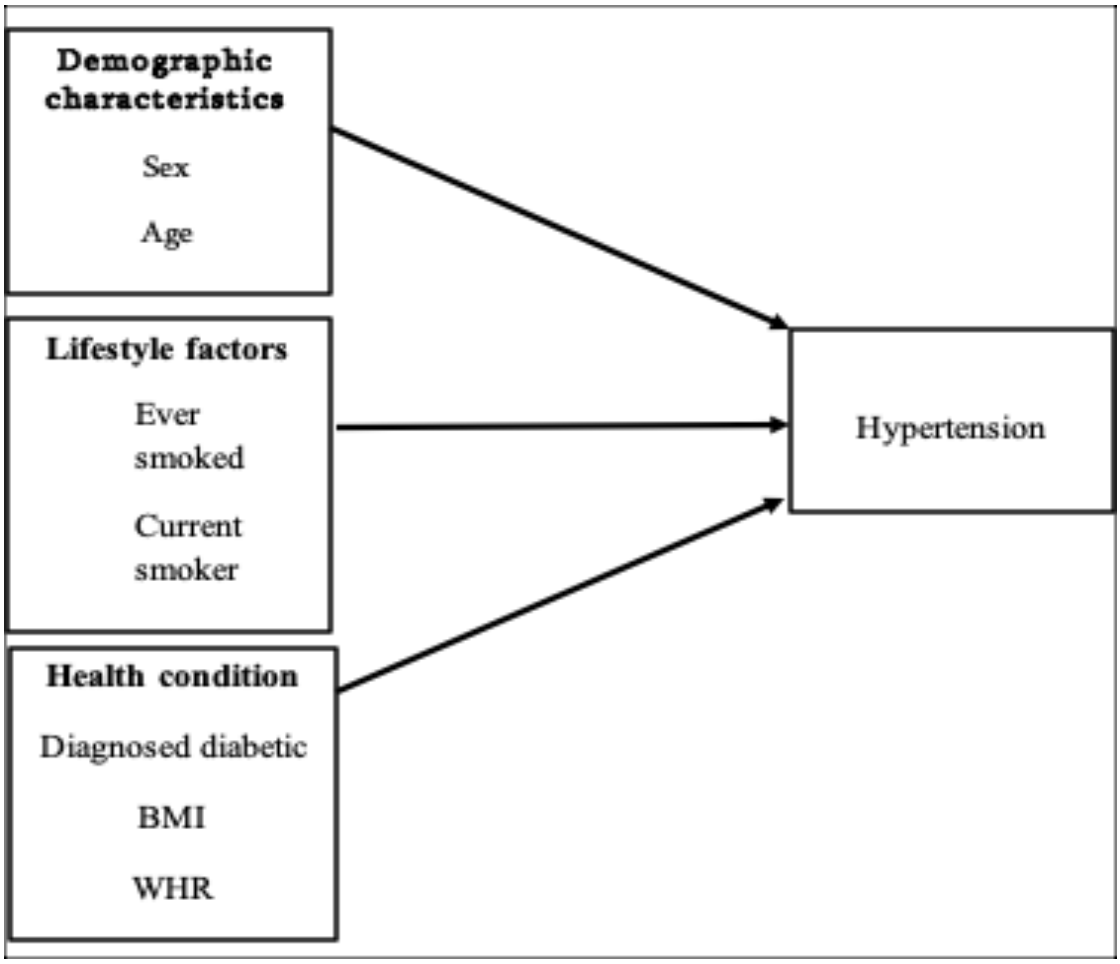


Figure 1: Figure 1: Conceptual framework on predictors of hypertension (Calys-Tagoe et al., 2020; Carey et al., 2019)

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**Chapter Summary**

In this literature, the prevalence and associated risk factors of hypertension were explored. Literature on the Pender's health promotion models was examined. Conceptual literature on hypertension, its prevalence, and diagnosis as well as

how it can be managed was also reviewed. In the review, studies revealed diverse prevalence rates of hypertension across different populations and settings. These findings of the review were notwithstanding the differences in approach and instruments and tools. It was again found that the major determinants of hypertension were several including gender, socio-economic factors, alcohol consumption, physical inactivity and nicotine use.

It was further revealed that there are conflicting views on how illness perception influences hypertension. Thus, while some studies concurred that illness perception is related to hypertension, other researchers had divergent views. It must, however, be emphasised that, the majority of these empirical studies, in relation to the purpose of this current study, were organised outside Ghana. There seems to be a paucity of empirical evidence in Ghana on prevalence rates of hypertension, its risk-factors, and how hypertension is influenced by socio-economic factors and illness perception. Furthermore, the research available sparsely focuses on individuals in rural areas. Against this backdrop, the current study (dissertation) was undertaken to evaluate the prevalence and associated risk factors of hypertension, focusing particularly on rural inhabitants in Ghana.

# CHAPTER THREE
# RESEARCH METHODS

This study assessed the prevalence and predictors of hypertension among rural dwellers residing in selected districts within the Eastern Region of Ghana. This chapter delineates the methodological framework underpinning the study, elaborating on the chosen research methods, and offering pertinent justifications for their appropriateness and applicability. The methodology comprehensively addresses the research approach and design, the geographical scope of the study, the target population, sampling techniques, and sample size. It also details the research instruments employed, the procedures for data collection, and the analytical methods utilized to process and interpret the collected data.

## Research Philosophy

The researcher's philosophical approach is rooted in positivism, which emphasises the use of objective, observable, and measurable evidence to understand phenomena. Positivism assumes that reality is external and can be systematically studied through empirical investigation, relying on structured methodologies to generate reliable and generalisable findings. In the context of this study, the positivist paradigm underpins the use of quantitative research methods to assess the prevalence and predictors of hypertension among rural dwellers in the Eastern Region of Ghana.

## Research Design

Scientific inquiry requires the application of a strategy that integrates the several independent parts of the research in a clear and coherent manner, thus warranting that the research problem is efficiently addressed (Kazdin, 2021). This strategy is known as the research design and it constitutes the scheme for collecting, measuring, and analysing data (Kazdin, 2021). This study employed a descriptive cross-sectional study design. In this framework, the researcher collected and analysed data from the population, examining both the prevalence of hypertension and its associated risk factors among the participants at a single point in time (Burkholder, Cox, Crawford, & Hitchcock, 2019; Creswell & Creswell, 2017).

Compared with other descriptive designs, the cross-sectional design has an overall capability of representing a much larger population (Babbie, 2005) and are capable of producing data and information that accurately reflect the characteristics of the larger population, thereby enhancing the representativeness and generalisability of the study findings. Moreover, the high representativeness of cross-sectional designs enhances their statistical significance, facilitating the identification of statistically meaningful findings and thereby improving the validity and reliability of the study's conclusions.

Furthermore, the descriptive cross-sectional design was selected due to its ability to minimise bias while allowing the examination of a broad spectrum of variables, thereby providing a comprehensive snapshot of the population under study (Ghauri, Grnhaug, & Strange, 2020). These features of a descriptive cross-

sectional survey design helped the current study to provide more reliable data for policy and practice. Moreover, the cross-sectional study design is the best design for a study such as this because the prevalence and risk factors for hypertension in the selected districts were determined simultaneously. Again, since the cross-sectional design is lauded for its adaptability in terms of asking questions and analysing responses, it allowed the current study to measure multiple outcomes and exposures concurrently (Zangirolami-Raimundo, Echeimberg & Leone, 2018). The application of the cross-sectional design in previous studies on the epidemiology of hypertension by Wang et al. (2018) justifies the application of this design in this study.

Although the cross-sectional design was suitable for this research, there were some criticisms that highlighted the design's flaws. Employing cross-sectional survey in the current study might have given room for participants to offer dishonest responses. To address this flaw, validity and reliability checks were implemented to certify that the data and responses gathered were reliable to diminish the biases related with the use of cross-sectional survey designs. Moreover, the researchers ensured adequate privacy for participants and guaranteed them of security of their data. This reduced the biases associated with cross-sectional survey design. Cross-sectional studies perfectly align with the positivism paradigm of research which emphasises the application of scientific methods in unveiling truth about a phenomenon.

## Study Area

The study was carried out in two rural districts in the Eastern Region of Ghana, positioned in the southern part of the country. This administrative zone, one among the sixteen delineated regions of Ghana, is geographically boarded by Lake Volta to its eastern border, the north by the Bono East and Ashanti Regions, to the west by the Ashanti Region. To its southern periphery lie the Central and Greater Accra Regions. The Eastern Region of Ghana is predominantly inhabited by the Akans, with other ethnic groups such as the Ewe, Krobo, and Hausa also residing in the area. Koforidua functions as the administrative capital of the Eastern Region.

The Eastern Region, home to the Akosombo dam, boasts a thriving economy primarily driven by its significant electricity generation capacity. Encompassing an expansive area of 19,323 square kilometres, this region comprises approximately 8.1% of Ghana's total landmass. The region has over 50 second cycle institutions and a dozen tertiary institutions including Kibi Presbyterian College of Education and University College of Agriculture and Environmental Studies. The Eastern Region's political structure follows a decentralized approach, managed through the local government system. This system divides the region into 33 Municipal and District Assemblies, consisting of 13 Municipal and 20 District Assemblies. This administrative framework facilitates effective governance and public service delivery across the region. In each District or Municipal Assembly, governance is overseen by a Chief Executive appointed by the central government. The Assembly, led by a presiding

member elected from its members, is responsible for local administration and decision-making.

The region is predominantly a farming region as a good number of the populations are into agriculture. The study was carried out in two districts in the Eastern Region: Akyemansa, and Birim North Districts. These two districts were specifically chosen for their rural characteristics as defined by the GSS in its 2021 population and housing census report. Thus, they suit the nature of the study, which focuses on hypertension in rural dwellers. The two districts' key characteristics are explained in detail below. Particularly, these areas were selected because the Eastern Region of Ghana is experiencing a notable rise in hypertension cases among rural populations, as evidenced by sharp increases reported in districts such as Denkyembour and Achiase (Lamptey et al., 2017).

**Akyemansa district**

Akyemansa District (AD) is one of the ER's 33 administrative districts. It was created in 2008 as part of the government's decentralisation programme. Akyem Ofoase serves as the district capital. As per the 2021 Population and Housing Census report, the district encompasses a land area spanning 611.80 square kilometres, constituting approximately 3.4 percent of the total land area of the ER, with a total population of 91,038 and has 96 communities. Meanwhile, the rural population of the Akyemansa district is 59,732. Data from the 2021 Ghana population census shows that about 73% of the adult population is married and has a literacy rate of 56.3%. The district of Akyemansa is conveniently placed between two important commercial centres, Akyem Oda and Nkawkaw.

Additionally, it is located near a significant mining town, New Abirem (GSS, 2021). It is bounded on the north by Birim North district, Asante Akyem South district, Amansie East district, and Adansi South district, all of which are in the Ashanti Region, on the west by Birim Central district, on the south by Birim Central district, and on the east by Atiwa and Kwaebibirem districts.

The Akyemansa district is situated in a moist semi-equatorial climatic zone with year-round significant rainfall. Around 78% of settlements in the district are rural, with only three peri-urban centres, notably Ofoase, Ayirebi, and Akokoase. Agriculture, the primary occupation, employs over 80% of the population, who cultivate cash crops such as cocoa, oil palm, and rice, as well as subsistence crops such as maize, plantain, and cassava. There are a few small-scale agro-processing companies, including companies engaged in oil palm extraction and gari processing. According to the District Health Management Team's (DHMT) 2020 report, the district has 29 health facilities composed of 21 Community Health-based Planning Services (CHPS) compounds, six health facilities, one of which is operated by the Christian Health Association of Ghana (CHAG), and one private clinic and maternity home. There is no hospital in the district, forcing residents to seek specialised care from surrounding district hospitals in Akim Oda, Akwatia, and New Abirem.

**Birim North district**

The second district in which the research was conducted is Birim North. It was formed in 1987 from the then-existing Birim district council as part of the Provisional National Defence Council (PNDC) government's effort to bring local

governance and rural development closer to the people. To its north lies the Kwahu West Municipality, while its western border is shared with the Asante Akim South and Adansi South districts of the Ashanti Region. On the southern front, it is adjacent to the Akyemansa district, and to the east, it is bordered by the Atiwa and Kwaebibirem districts. The district's natural geography is predominantly rugged and hilly, and it has a population of 82, 662 people, with a rural population of 56,035 and is made up of 30 communities. Around 90% of the district is rural, with few social services like schools, markets, healthcare facilities, telecommunications, and inadequate transportation networks. Furthermore, according to the Ghana 2021 Population Census, about 62% of the adult population is married, and has a literacy rate of 58.2%.

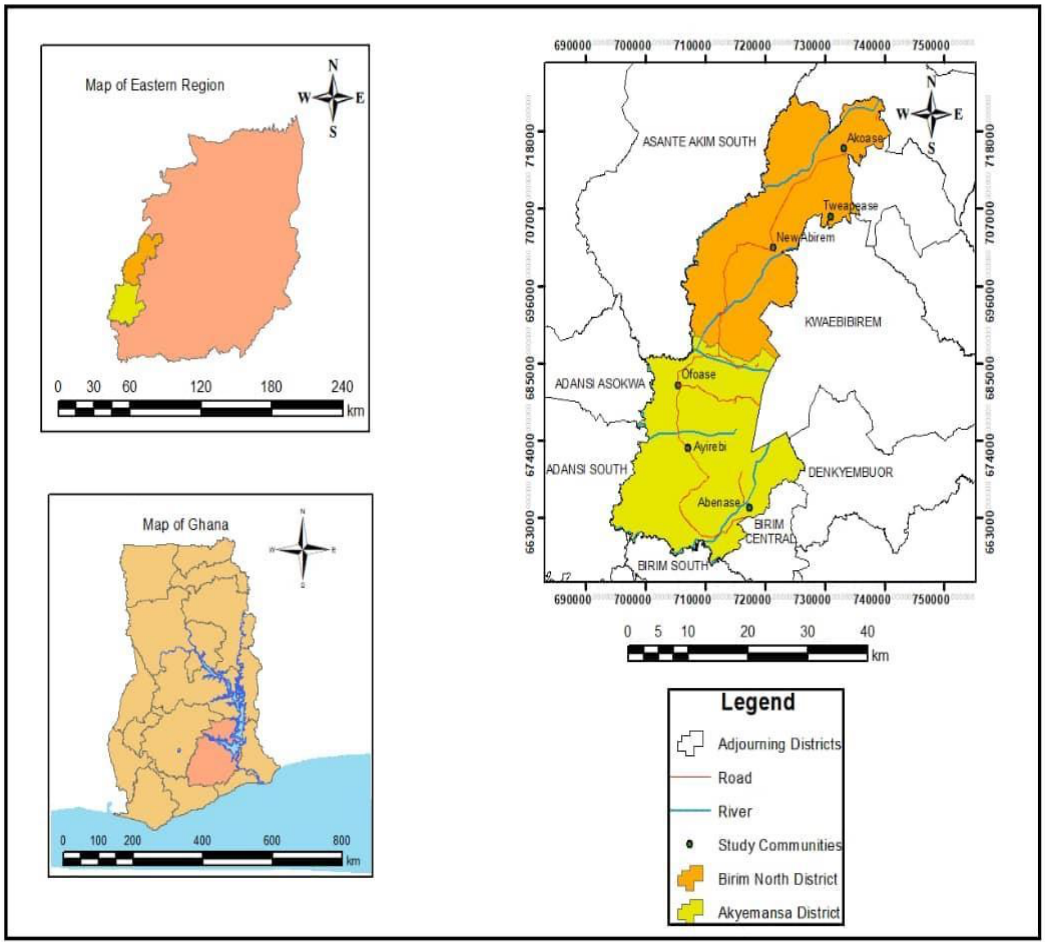


Figure 2: Figure 2: Study map of Birim North and Akyemansa districts

Agriculture is the district's primary industry, employing more than 75% of the population (Ghana Statistical Service, 2021). The district capital is New Abirem, which is also home to the Newmont Akyem mines. Mining activities have resulted in the influx of several expatriates who work in both community and controlled mining. The Akans (Akyems) make approximately 75% of the population, while other ethnic groups such as the Krobos, Ewe, Ga-Adangbe, and northern tribes are minorities. There is one district hospital in New Abirem, the district capital, which serves as a referral centre for the district's 22 CHPS

compounds and three health centres. The district has two senior high schools and about 48 elementary schools.

**Population**

A population in a study is the entire collection of subjects that are the primary focus of the scientific investigation. In general, the objects or individuals in a specific study population share certain mutual features and characteristics. There are two types of research populations: target populations and accessible populations. The target population for this current research consisted of adults living in Akyemansa and New Abirem districts of the Eastern Region. These districts were chosen because of the relatively large populace which could increase the accuracy of representation. In addition, the population accessible for this study was adult rural dwellers in Ghana's Eastern Region.

The accessible population includes four rural districts in the Eastern Region which is considered representative of the broader rural populace. According to the 2021 PHC, Akyemansa district has a total population of 59,732 (29,885 males and 29,907 females), the Denkyembour district has a total population of 24,410 (12,264 males and 12,146 females), Akyem Achiase district with a population of 27,926 (13,819 males and 14,107 females), and Birim North district with a household population of 56,035 (28,035 males and 27,558 females). Based on this, the study's total accessible population size was 168,168 adults. The study's sample was drawn from this population.

**Sampling Procedure**

This study comprised a sample size of 1,652 participants, based on the proportion of the population used for similar studies with a targeted population of over 100,000 on the prevalence rates and predictors for hypertension among adult rural dwellers (Kishore, Gupta, Kohli & Kumar, 2016; Opreh et al., 2021). Furthermore, the rationale behind calculating effect sizes apriori rests on the assumption of normal sample distribution (Selya, Rose, Dierker, Hedeker & Mermelstein, 2012), which would be challenging to determine at the data collection stage of the study. Moreover, the sample size of 1,652 suitably denotes the population, making the findings from this study reliable (Araujo & Froyland, 2007).

A multistage cluster sampling technique was used in sampling participants. This is because it allows for a systematic and comprehensive approach to selecting participants from a large and diverse rural population. This method also allowed the researcher to apply different sampling techniques at various stages, ensuring equal representation and proportionality across districts, sub-districts, and communities (Wu & Thompson, 2020). At the initial phase of the sampling, simple random sampling was used to select two districts (Akyemansa and Birim North district) from the list of the four rural districts in the Eastern Region. The strength of the simple random sampling procedure is that all the quartet rural districts in the Eastern Region were given equivalent possibilities of being chosen (Etikan & Bala, 2017). The simple random sampling procedure was conducted by writing the names of all the rural districts in the Eastern Region

on pieces of paper, folded to conceal their identity, placed in a basket, and shaken to mix thoroughly. An individual was blindfolded to pick two districts, one at a time, from the basket. After the first pick, an empty paper was folded and mixed with the other folded papers in the basket where a second pick was made. This was done to give each of the districts an identical chance of being chosen.

Babbie's (2005) formula was utilised to compute the sample size proportional to the size of each community. The formula is given as: K/N x n

Where: K = Population of adults 25 years and above in the sample districts, N = Total population of adults 25 years and above in all the sampled communities (N= 115,827), n=Sample size (1,600).

Akyemansa: 59,792/115,827 x 1,600= 826 participants.

Birim North: 56,035/115,827 x 1,600= 774 participants.

Following the initial phase of sampling, the subsequent stage involved the implementation of the stratified sampling technique. The use of the stratified sampling technique facilitated the researcher in dividing the population into homogeneous groups, wherein each group comprised individuals with similar characteristics. Subsequently, proportional sampling was conducted from each subgroup (Cohen et al., 2017; Harrison, Reilly & Creswell, 2020; Smith, 2019). The stratification was done following the already established sub-districts by the District Health Directorate of each of the sampled districts. Further, the selection of three sub-districts for the study was achieved through a simple random sampling technique employing the lottery method (Ayirebi, Ofoase and Abenase). The use of simple random sampling techniques helped the researcher to give each

of the communities an equal chance to be selected (Etikan & Bala, 2017). Using Babbie's (2005) formula for proportionate sampling, a sample size proportional to the population size of each sub-district was assigned to the selected sub-districts.

The distribution of the sample size proportional to the population of each community is demonstrated below:

Ayeribi: x 825 =378

Ofoase: x 825 = 215

Abenase: x 825 =232

Hence, 378, 215 and 232 participants were selected from Ayeribi, Ofoase and Abenase, respectively. Moreover, the simple random sampling technique using the lottery method was used to select one community from each of the sampled sub-districts for the study.

Similarly, Birim North was stratified into six sub-districts (New Abirem, Akoase, Amuna Praso, Nkwateng, Afosu and Tweapease). The simple random sampling technique using the lottery method was used to select three sub-districts (Akoase, New Abirem and Tweapease) for the study. Further, using Babbie's (2005) formula for proportionate sampling, a sample size proportional to the population of each sub-district was assigned to the selected sub-districts. The distribution of the sample size proportional to the population size of each community is demonstrated below:

Akoase: x 774 =236

New Abirem: x 774 = 323

Tweapease: x 774=215

Hence, 236, 323 and 215 participants were selected from Akoase, New Abirem and Tweapease, respectively. In each of the sampled communities, households were targeted for the study.

The WHO 2005 extended programme on immunisation (EPI) cluster sampling of household procedure was followed to select households and participants (Bostoen & Chalabi, 2006). The WHO EPI cluster sampling of household procedure is used in instances where it is difficult to determine the number of households in a particular cluster (Bostoen & Chalabi, 2006). Households were selected by identifying a location closer to the centre of each community. A random direction was determined by spinning a pen and all the households in the direction of the tip of the pen were recruited for the study. Within the selected households, any adult aged 25 years or above who consented to the study was recruited for the study. Adults 25 years or above were selected for this study because, the WHO classifies these groups to be at higher risk of HTN than young adults below 25 years (WHO, 2020). In a situation whereby a household did not satisfy the inclusion criteria, the next closest household was recruited for the study. The process was repeated in the communities until the allocated sample size was met.

**Inclusion criteria**

1. Adults aged 25 years and above who consented to the study.

**Exclusion criteria**

1. Pregnant women
2. Post-partum mothers

**Demographic characteristics**

The majority (51.1%) of the study's participants were aged <50 years. Also, the majority (58.7%) of the participants were females and most (56.1%) of them were married. Further, most (58.0%) of the participants had received basic education as their highest level of education. The vast majority (79.4%) of the participants were Christians and few (8.8%) were Muslims. Akans were the most dominant tribe among the study's participants (79.5%) with Ewes forming the second dominant tribe. Also, the majority (79.4%) of the participants were self-employed.

**Data Collection Instruments**

The study used a questionnaire for data collection. The choice of a questionnaire as a tool for data collection was appropriate because it is suitable for addressing sensitive research issues. It also provides anonymity for respondents, and it is also suitable for a large population sample (Williams, Brick, Edwards & Giambo, 2020). There are some limitations to using questionnaires irrespective of its advantages; these include a lower response rate and limited possibility for the researcher to provide ample explanations about the research topic that respondents will not be aware of (Beatty et al., 2019). The questionnaire for this study contained 52 items. Additionally, the instrument was divided into four sections (section A, B, C and D).

Section A collected data on background information about the participants using six items. The items under this section were sex of participants, educational status, marital status, occupation, number of people in participant's household and

household income. Participants were asked to indicate their age, estimated income and number of people in the household by writing in the appropriate space provided by the researcher on the questionnaire. Also, participants were provided options to select from regarding their gender, marital status, educational status and occupation.

Section B measured hypertension-related risk factors among participants using 40 items. Besides, these items were adapted from the WHO STEPwise Manual to NCD Risk Factors Surveillance. The WHO STEPwise Approach to NCD Risk Factor Surveillance (STEPS) is a standardised instrument for collecting, analysing, and disseminating data on significant and specific NCD risk factors (WHO, 2015).

The instrument contained eight items on Tobacco use, five items on alcohol use, six items on physical activity, and eight items on dietary habits. Some of the questions asked on tobacco use were:

1. *Do you currently smoke any tobacco products, such as cigarettes, cigars or pipes?*
2. *Do you currently smoke tobacco products daily?*
3. *How old were you when you first started smoking?*
4. Do *you currently use any smokeless tobacco products such as [snuff, chewing tobacco, betel]?*

Also, some questions on alcohol use were:

1. *Have you ever consumed any alcohol such as beer, wine, spirits?*
2. *Have you consumed any alcohol within the past 12 months?*

3. *During the past 12 months, have you had family problems or problems with your partner?*

Further, some questions on dietary habits were:

1. *In a typical week, how many days do you eat fruit?*
2. *How many servings of fruit do you eat on one of those days?*
3. And h*ow often do you eat processed food high in salt? (Salty snacks, canned salty food including pickles and preserves etc).*

Moreover, some items on physical activity habits were:

1. *Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like (carrying or lifting heavy loads, digging or construction work] for at least 10 minutes continuously?),*
2. *Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?*
3. *How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?*

Also, other components of the WHO STEPwise instruments on risk factors of hypertension were history of high BP and history of diabetes. Participants were provided an option to select from whereas participants were in some instances asked to respond by writing in the spaces provided (see appendix 1).

Section B of the questionnaire further recorded the anthropometric measurements of participants. The section measured the weight of participants using the electronic body composition monitor scale, Omron Karada Scan body composition monitor. The electronic body composition monitor scale has been

used in other studies to measure the weight of participants (Hiremath, Kumar, Huchchannavar, & Ghodke, 2023; Kitchlew, Chachar, & Latif, 2017; Utami, Ayuningtyas, & Hariyono, 2020).

Height was measured with a wall-mounted stadiometer, accurate to the nearest 0.1 cm. Similarly, other studies also used the wall-mounted stadiometer to measure the height of their participants (Czont et al., 2023; Ekström et al., 2023; Gandham et al., 2023). Moreover, the retractable REIDEA body measure tape (60inch [150cm]) was utilised to compute the waist circumference of individuals with accuracy to the nearest 0.1 cm. Likewise, other researchers also used similar tape measures to measure waist circumference of their participants (Tawfik, 2018; Wang et al., 2022).

The WHO STEPwise manual is a widely accepted instrument and has been used in several studies. Tripathy, Thakur, Jeet, Chawla, and Jain (2017) reported that the WHO STEPwise manual has an internal consistency (Cronbach's alpha) of .88 and a high test-retest validity (r = .81). Gebreyes et al. (2018) also suggested that the WHO STEPwise manual has a Cronbach's alpha of .92, while Houehanou et al. (2021) also stated that the instrument has an internal consistency of .86, and a construct validity of .83. The psychometric properties demonstrate that the scale is appropriate and reliable.

An adapted version of the Brief IPQ was used in assessing illness perception among respondents of the study. Developed by Broadbent, Petriea, Maina and Weinman (2006), the Brief IPQ is an eight-item self-report inventory designed to rapidly assess illness perception in three domains [cognitive illness, emotional

representation, and illness comprehension] (Broadbent et al., 2006; Machado et al., 2019). The Brief IPQ is assessed on a 10-point score scale, with a range of 0 to 10; with 0 as the lowest score and 10 as the highest score (Broadbent et al., 2006).

The instrument is a revised form of the Illness Perception Questionnaire, which extended the original scale by including several items, dividing the control dimension on personal and treatment control, and integrating a cyclical timeline dimension (Broadbent, et al., 2015). It also included an overall illness comprehension aspect as well as a factor on emotional presentation (Broadbent, et al., 2015). According to Kuiper, van Leeuwen, Stolwijk-Swüste, and Post (2022), in scoring the IPQ, the items are rated on a scale of 0-10 each. Also, all the items are summed up to obtain a total score illness perception for each participant. The score classifications are delineated as follows: Scores less than 42 indicate low experienced threat, those falling between 42 and 49 signify moderate experienced threat, while scores equal to or greater than 50 indicate high experienced threat. The scale has demonstrated a high test-retest reliability among clinical and non-clinical respondents (r= 0.71) (Machado et al., 2019). Also, the scale has a Cronbach's alpha ranging from 0.70 to 0.83 (Machado et al., 2019). This implies that the scale is reliable and can be applied to clinical and non-clinical samples. Given that the respondents were rural farmers, ensuring the accessibility of the data collection tools was a critical consideration. To address potential language barriers and enhance comprehension, the questionnaire and adapted tools such as the WHO STEPwise manual and the Brief IPQ were translated into

the predominant local languages spoken in the study area, including Akan and Krobo. The translation process involved local translators to ensure accuracy and cultural relevance.

***Sphygmomanometer***

Blood pressure of respondents was measured with the sphygmomanometer. The sphygmomanometer, commonly referred to as a blood pressure monitor, is a medical apparatus designed to assess blood pressure levels. It operates by employing an inflatable cuff to compress and subsequently release the artery situated beneath the cuff in a controlled manner, enabling the measurement of blood pressure (Tao, Sokha & Yuan, 2019). This is done by a mechanism for inflation which may be operated manually by a bulb and valve or an electrically operated pump (Myers, & Valdivieso, 2012). It also has a mercury or aneroid manometer for pressure measurement. A stethoscope is used with manual sphygmomanometers (Tao et al., 2019). The sphygmomanometer is a widely accepted medical device and has been approved by several medical and scientific bodies like the WHO and National Institute of Healthcare Management for the measurement of blood pressure.

**Tape measures**

The retractable REIDEA body measure tape (60inch [150cm]) was used to measure the WC of participants. The retractable REIDEA body measure tape (60inch [150cm]) is used by asking the participant to stand upright with their feet shoulder-width apart and participants should be relaxed and not sucking in their stomach (should be done while the participant is breathing naturally) (Wang et al.,

2022). The waist of the participant is typically the narrowest part of the torso between the lower edge of the rib cage and the upper part of the hip bones. The tape measure is wrapped around the waist at the level of the navel. Also, the tape should be in direct contact with the skin or over lightweight clothing if preferred by the participant. The WC reading is taken at the point where the zero end of the tape measure meets the rest of the tape. The measurement is recorded in inches or centimetres (Tawfik, 2018). The retractable REIDEA body measure tape (60inch [150cm]) has been used by other researchers (Tawfik, 2018; Wang et al., 2022).

**Validity and Reliability of the Instrument**

Prior to the commencement of data collection, this study took necessary measures to verify the reliability and validity of the instruments employed. This step was crucial as certain items in the study were adapted from standardised instruments and utilised in a distinct setting. The study initially ensured the face validity of the instruments. This was done by giving the instruments to three colleague Ph.D. candidates to check for grammatical errors, clarity, appropriateness, and comprehensiveness of the instruments. This was necessary because it helped to provide initial judgement of the comprehensiveness and appropriateness of the instruments before conducting further validity assessments (Laver-Fawcett, Brain, Brodie, Cardy, & Manaton, 2016). Secondly, content validity of the instruments was ensured by giving them to the project supervisors to review to guarantee that the items truly assess what they are intended to measure (Heale, & Twycross, 2015). Thirty adults, 25 years or above, from Kyeremase in the Asene Manso Akroso district were selected conveniently for pretesting of the

study's instrument. The Kyeremase community was a rural community in the Eastern Region with similar characteristics to the target districts and communities in this study.

The anthropometric measurements of the participants were taken by the research assistants whereas the questionnaires were given to participants to respond to them for a period of 20-30 minutes. Nonetheless, the questionnaire was administered by research assistants to participants who lacked proficiency in reading or understanding English. Participants were encouraged to report any ambiguity and any problem they faced in responding to the questionnaire. The collected questionnaires underwent screening, coding, and analysis using the Statistical Package for the Social Sciences (SPSS) software. The internal consistency reliability, Cronbach Alpha, of the items on the WHO STEPwise manual was found to be 0.78 and that of illness perception was 0.80.

Following the pretesting of the questionnaires in the Kyeremase community, revisions were made to enhance clarity, accuracy, and comprehensiveness based on participant feedback and observations by the research team. Ambiguities identified during the pretesting were addressed by rephrasing questions for better understanding, particularly for respondents with limited literacy skills. For example, complex or technical terms were simplified to ensure accessibility to participants from rural settings. Additionally, certain response options were adjusted to reflect the local context more accurately, ensuring cultural relevance and appropriateness. Feedback from research assistants, who administered the questionnaire to participants unable to read

English, highlighted areas requiring further explanation or guidance, leading to improvements in question instructions and formatting. These refinements helped ensure that the final instrument was well-suited to the target population, reliable, and valid for collecting accurate data.

**Data Collection Procedures**

The study adhered to the ethical principles outlined in the Helsinki Declaration and received approval from the Institutional Review Board at the University of Cape Coast (ID: UCCIRB/CES/2023/03). With the ethical clearance in hand, entry permission was sought from community heads: chiefs and Assembly members from the sampled communities involved. Before the data collection, an informed consent form was presented to the selected participants for a period of seven days prior the start of the data collection. In each household, the researchers explained to participants what the study was about, why the participants had been selected, the role of the participants in the study and procedures that they needed to follow in the data collection process. Also, the possible risks associated with the study were explained to the participants. Again, participants were provided with assurance regarding the confidentiality of their participation. Additionally, participants were duly informed that their involvement in the study was entirely voluntary, thus they had the freedom to withdraw from the study at any point without facing any repercussions. They were further directed on where they could access the results from the study and given the contacts of people that they could call for further information or questions on the study. It took participants about 30 minutes to respond to the questionnaire.

The questionnaires were distributed to selected participants, and blood pressure levels were taken and recorded at the preferred and comfortable places in the homes of participants to ensure that their privacy was protected. Participants who were unable to complete the questionnaire on their own were assisted by research assistants by interpreting the questionnaire into the participant's local language. All information gathered was kept confidential. The questionnaire provided did not require any personal identification information; hence, participants completed the questionnaire anonymously.

To effectively complete the questionnaire and collect all necessary information, research assistants needed to spend ample time with the respondents. Ten individuals were enlisted and provided with training to serve as research assistants for the data collection process. The research assistants were: five diploma nursing students, two dieticians, one M.Phil. health education student and two-degree nurses. The research assistants were trained for a period of two days on the objective of the study, ethical concerns regarding the conduct of the study, and the administration of the study's instruments. Also, the District Public Health at the Birim Central Municipal Health Directorate was invited to train the research assistants on BP measurements using the automated electronic sphygmomanometer, interpretation of the BP recordings, calibration of the weighing scale, measuring weight using the electronic scale, measuring height using stadiometer and calculating BMI of participants.

All the research assistants took part in pretesting the instruments. This helped them to familiarise themselves with the study's instruments. More

importantly, whilst the research assistants were engaged in the data collection on the field, the principal investigator of the study supervised the entire data gathering process. This was to ensure that the research assistants were adhering to the ethical principles guiding the study. Also, the principal investigator was available on the field to attend to any challenges faced by the research assistants as well as supply extra data collection tools to participants in case of any damage to any of the instruments. The data collection for this study lasted for 28 days.

**Data Processing and Analysis**

The data obtained from the survey underwent organisation and categorisation utilising the Statistical Package for Social Science (SPSS). This involved screening the entered data for any missing values, as well as identifying univariate and multivariate outliers through the examination of frequency distributions and box plots. In addressing missing data, the serial means technique was implemented to substitute missing values in continuous data, while for categorical variables, a procedure involving the determination of the median of proximate data points was employed for replacement. The best suitable statistics to replace missing values in interval and/or ratio data like illness perception is serial means (the average) (Huck, 2008). On the other hand, Babbie, Halley, and Zaino (2007) advocated for replacing missing values in categorical data such as educational, marital, and employment status with the median of neighbouring data points. Normality of the dataset was assessed through histograms overlaid with normal curves to ensure its adherence to Gaussian distribution (see Appendix A). The aggregate score of responses across the different inventories was computed

in accordance with the interpretations delineated within the respective scales. Statistical analysis was done using both descriptive and inferential analysis research question by research question.

**Research Question 1: What is the prevalence of hypertension among rural dwellers in the selected districts of the Eastern Region?**

Research question one aimed to determine the prevalence of hypertension among rural dwellers. Analysis of the data pertaining to this question was conducted using frequencies and percentages, with the findings illustrated via a bar graph presentation. Three categories of hypertension using systolic and diastolic blood pressure were computed to answer this research question based on the WHO manual. The classifications are delineated as follows: (1) Normal, with readings below 130/80 mmHg, (2) Pre-hypertension, denoting values falling within the range of 130-139/80-89 mmHg, and (3) Hypertensive, characterised by readings equal to or surpassing 140/90 mmHg, in accordance with the benchmarks outlined by WHO (2021).

**Research question two: What is the level of anthropometric characteristics of rural dwellers in the selected districts of the Eastern Region?**

This research question aims to assess anthropometrics of the rural dwellers. Three anthropometric characteristics (Waist-to-hip ratio, waist-height-ratio and body mass index [BMI]) were assessed. Waist-to-hip ratio (WHR) was categorised into three groups (low risk, moderate risk and high risk) based on the benchmarks recommended by the WHO. WHR for females are ≤ 0.80 (low risk), 0.81-0.85 (moderate risk) and ≥ 0.86 (high risk) and for males are (≤ 0.95 (low

risk), 0.96-0.99 (moderate risk) and ≥ 1.00 (high risk). Also, waist-to-height ratio (WHtR) of the participants was grouped into three: low risk (<0.50), moderate risk (0.50 - 0.59) and high risk (≥ 0.60). The BMI of the rural dwellers was grouped as underweight (< 18.5 $kgm^2$), normal weight (18.5-24.9 $kgm^2$), overweight (25-29.9 $kgm^2$) and obese (30 $kgm^2$). Frequencies and percentages were computed based on the various categories and presented using a pie chart. This was done to give a quick impression of the data.

**Research question 3: What is the illness perception of rural dwellers of the Eastern Region?**

This research question aimed at assessing hypertensive patients in rural communities' illness perception on their hypertension condition. The items in the illness perception scale were rated on a scale of 0 - 10 each. Further, illness perception scores were generated by summing the responses for each of the items. Items were scored by summing up to obtain a composite score for illness perception for each participant. The scores were classified as follows: <37= low experienced threat, 37-44 = moderate experienced threat, and ≥45= high experienced threat (Kuiper et al., 2022). Descriptive analysis using frequencies and percentages was used to analyse the data and presented using a pie chart.

**Research question 4: What are the factors that predict hypertension among rural dwellers in the Eastern Region?**

Research question four seeks to assess the predictors of hypertension among rural dwellers in the Eastern Region of Ghana. The independent variables were sociodemographic characteristics (age, sex, level of education, income level,

occupation, etc.), lifestyle factors (dietary habits, alcohol consumption, cigarette smoking, etc.) and anthropometric factors and history of illness of participants. The dependent variable in this research question is the hypertension (systolic and diastolic BP levels) which was transformed into two levels, hypertensive and non-hypertensive. With the dependent variable being a binary variable, binary logistic regression analysis was conducted. Specifically, two hierarchical multiple binary logistic regression was conducted for systolic and diastolic blood pressure levels of the rural dwellers. The essence was to understand the unique contribution of socio-demographic factors, lifestyle factors and anthropometric and history of illness. Before conducting the logistic regression, bivariate analysis of predictors of hypertension was conducted, so only predictors that were significant in predicting hypertension were moved into the regression model. This was done to ensure that multicollinearity issues are not introduced in the regression model as well as issues with sporous relationships.

# CHAPTER FOUR
# RESULTS AND DISCUSSIONS

The purpose of the study was to identify the prevalence and predictors of hypertension among two selected rural districts in the Eastern Region of Ghana. This chapter delineates the findings and offers an in-depth discussion of the results, organised around the research questions that guided this study.

**Research Question One: What is the prevalence of hypertension among rural dwellers in the selected districts of the Eastern Region?**

This research question assessed the burden of the outcome of interest among rural dwellers in the selected districts. Three distinct blood pressure measurements were recorded at five-minute intervals, with the average reading indicating whether a participant should be classified as normotensive, pre-hypertensive or hypertensive. Following the analysis, the current study found that 24.1% of its participants were living with hypertension (Figure 3).

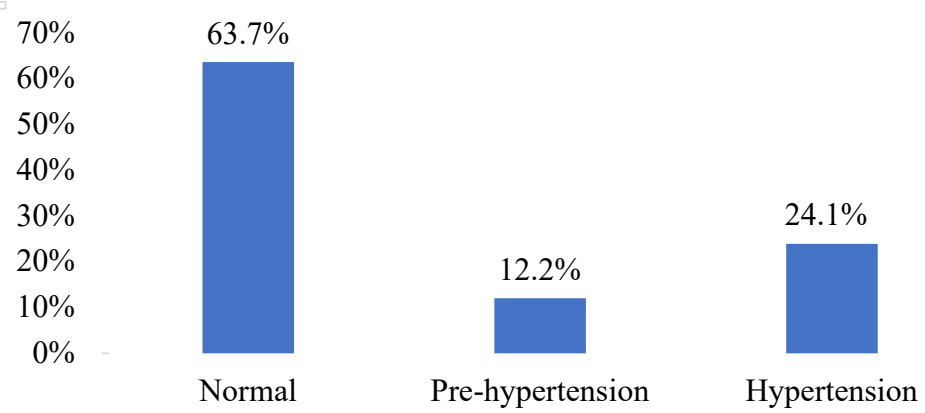


Figure 3: Prevalence of hypertension among study sample (N=1,652)

This finding means that about a quarter of the population in the sampled rural communities in the Eastern Region are hypertensive. A similar result was

observed by Solomon et al. (2017) in a cross-sectional study in Hohoe Municipality of Ghana who recorded a prevalence of 23.5% among rural villages. This high prevalence of hypertension, noted at 24.1% among the rural populace, can be ascribed to a myriad of contributing factors such as unhealthy lifestyles, limited healthcare access, lack of awareness, genetic predisposition, socioeconomic differences and other possible external stressors. Cultural practices, ageing populations, comorbid conditions, and changing demographics could also play critical roles in exposing people to hypertension (Tan et al., 2019). Moreover, considering that the data was collected during the COVID-19 pandemic, disrupted healthcare services, reduced access to medical facilities, and altered health-seeking behaviours due to lockdowns and movement restrictions may have influenced the prevalence. This complex interplay of factors, compounded by the pandemic's impact on health care, underscores the need for targeted interventions addressing dietary habits, physical activity, health education, and improved healthcare access to effectively manage and reduce hypertension rates in rural communities.

The study carried out in rural villages in the Hohoe Municipality of Ghana also which recorded a hypertension prevalence of 23.5% (Solomon et al., 2017) share similarities with the outcomes of this study and could be partly justified by the similarities in the method used in both studies. Both studies adopted a cross-sectional survey design that employed household surveys in soliciting responses from participants. Also, possibly the two-study areas share similar demographic characteristics and lifestyles such as age distribution, dietary patterns and overall

health behaviours which might have impacted their hypertension status. Furthermore, there are similarities in the availability and accessibility of health care facilities in both study areas, which might have impacted the process of diagnosing and managing hypertension in the two study areas. Also, the current finding is agrees with studies conducted in Nigeria where the prevalence of hypertension among rural dwellers in four different studies ranged from 26% to 27.4% (Egbi, Ahmed, & Madubuko, 2021; Olawade, Afolalu, Wada, & Barka, 2020; Wada, Olawade, Afolalu, Oluwatofarati, & Akinwalere, 2020). Also, 27.3% prevalence of hypertension has been reported among rural dwellers in Ethopia (Angaw, Dadi, & Alene, 2015). The similarities in the findings could be explained by the similarities in the study design and the approach employed by these studies.

In contrast, a similar study carried out in Nigeria identified a hypertension prevalence of 45.6% among rural dwellers (Opreh et al., 2021). The differences in their results could be partially related to the differences in the geographical area and the demographic characteristics of the participants. The risk factors for hypertension among rural dwellers in some parts of Nigeria and Ghana differ, hence, the disparity in the findings. Also, another study in Nigeria contrasts the current findings where they recorded 51.6% prevalence of hypertension among their participants (Ebirim et al., 2018). However, Ebirim et al.'s study included only adults 40 years or above, unlike the current study that included adults 25 years or above. Besides, studies show that the risk of hypertension is higher among adults 40 years or above than those aged below 40 years (Kohler, Sudharsanan, Bandawe, & Kohler, 2022; Gupta, Gaur, & Ram, 2019). Also, a similar study in

Cameroon (34%) (Lemogoum et al., 2018) and Indonesia, 33.4% (Peltzer, & Pengpid, 2018) recorded higher prevalence rates of hypertension than the current study. Nevertheless, it could be inferred from the current findings and the available literature that the current prevalence of hypertension among rural dwellers is relatively high.

The high prevalence of hypertension recorded in the current study is worrying because recording about a quarter of a population who are hypertensive could burden the Ghanaian healthcare system, especially a rural healthcare system which is already compromised with inadequate infrastructure and human resource (Galiè et al., 2019). This is because hypertension is a long-lasting disease, requiring continuous medical treatment (Galiè et al., 2019). Given the substantial prevalence of hypertension within the population, there will be a potential surge in the demand for healthcare services, including regular check-ups, medication administration, and blood pressure monitoring. This situation poses the risk of overburdening the rural healthcare system, depleting healthcare resources, and straining the existing health infrastructure in Ghana.

Moreover, the management of hypertension among the considerable number of identified hypertensive patients in the present study has the potential to escalate healthcare costs for both individuals and the Ghanaian government. The treatment of hypertension and its related complications could present significant expenses, encompassing medication costs, medical consultations, diagnostic procedures, and hospital stays. Consequently, this cumulative financial impact could exert pressure on public healthcare budgets and exert financial hardships,

particularly on rural residents who lack comprehensive health insurance coverage (Zahirian Moghadam, Raeissi, & Jafari-Sirizi, 2019). Again, the cost associated with hypertension could further increase poverty and worsen the health of rural dwellers, hence, impeding Ghana's efforts towards eradicating poverty and ensuring good health among all individuals in Ghana (United Nations, 2023).

Further, the current relatively high prevalence of hypertension among rural dwellers may contribute to higher rates of cardiovascular disease morbidity and mortality among such populations in Ghana (Kjeldsen, 2018). Besides, hypertension-related morbidities and disabilities could have a negative bearing on the patient's productivity and quality of life due to its associated fatigue, difficulty concentrating, and reduced physical stamina, which can affect work performance (Bhandari, Bhusal, Takma, & Lawot, 2016). This can result in decreased productivity levels in the workforce, potentially impacting economic growth and development. Therefore, there is the need for public health initiatives aimed at prevention, early detection, and management of the condition. These initiatives may include awareness campaigns, screening programmes, health education, and access to affordable and effective healthcare services.

The identification of a 24.1% prevalence of hypertension among the rural residents in selected districts in the Eastern Region carries significant implications for achieving specific SDGs in the Eastern Region of Ghana, as well as for broader national targets. SDG 3 specifically endeavours to guarantee equitable access to healthcare services and foster holistic well-being across all age groups. The relatively high prevalence of hypertension could hinder progress towards this

goal. Thus, uncontrolled hypertension can lead to various health complications and reduced overall well-being. Furthermore, this prevalence poses threats to realizing SDG 1 (No Poverty) and SDG 2 (Zero Hunger) due to the potential economic burden of managing hypertension and its subsequent impact on the livelihoods of the rural dwellers.

**Research Question Two: What is the level of anthropometric characteristics of rural dwellers in the selected districts of the Eastern Region?**

This research question assessed the anthropometric characteristics that are important risk factors for hypertension. Three anthropometric characteristics of WHR, WHtR and BMI were assessed. They were obtained using tape measure and stadiometer to measure waist circumferences, heights and hips of the participants and ratio calculated. Waist-to-hip ratio was categorised into three groups: low risk, moderate risk and high risk. For females, waist-to-hip ratio (WHR) thresholds indicative of risk levels are categorised as follows: ≤ 0.80 for low risk, 0.81-0.85 for moderate risk, and ≥ 0.86 for high risk. Correspondingly, for males, the thresholds are ≤ 0.95 for low risk, 0.96-0.99 for moderate risk, and ≥ 1.00 for high risk. The results on levels of WHR are presented in *Figure* 4. It revealed that females, 72.2% (n=700), had higher WHR compared to males, 5.4% (n=37), of participants in the selected districts.

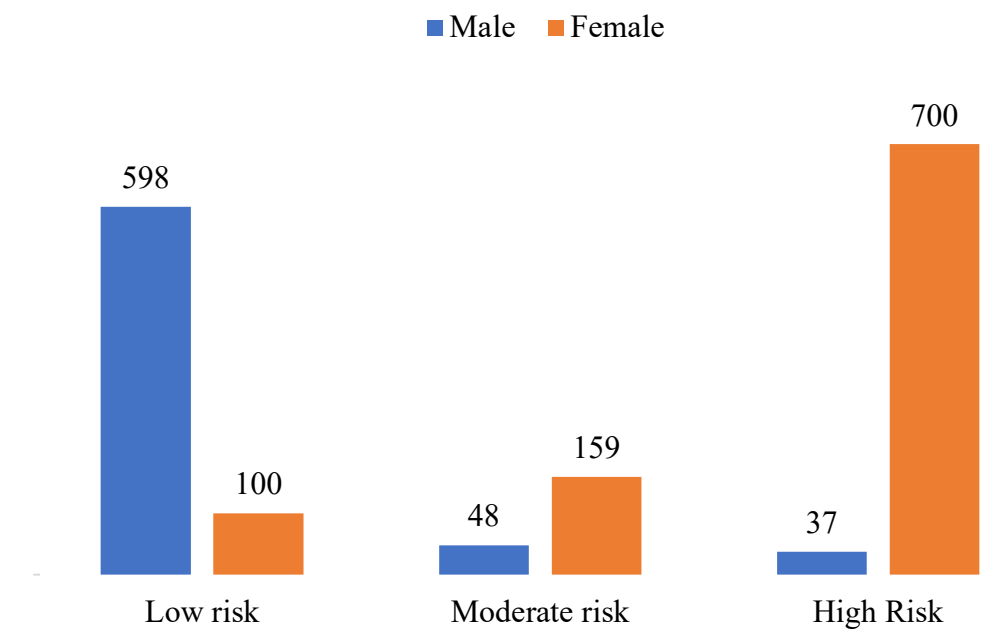


Figure 4: Categories of WHR of participants (Female =969, Male = 683)

In *Figure 5* waist-to-height ratio of the participants was computed. The categories comprise low risk (<0.50), moderate risk (0.50 - 0.59) and high risk (≥ 0.60). The results showed 46% (n=159) and 19% (n=48) of the participants identified with moderate and high-risk anthropometric characteristics of WHtR respectively.

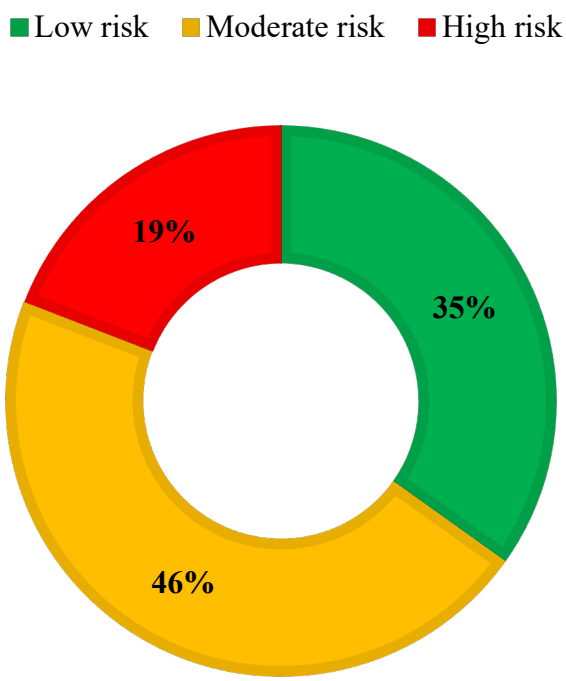


Figure 5: Categories of WHtR of participants (N= 1652)

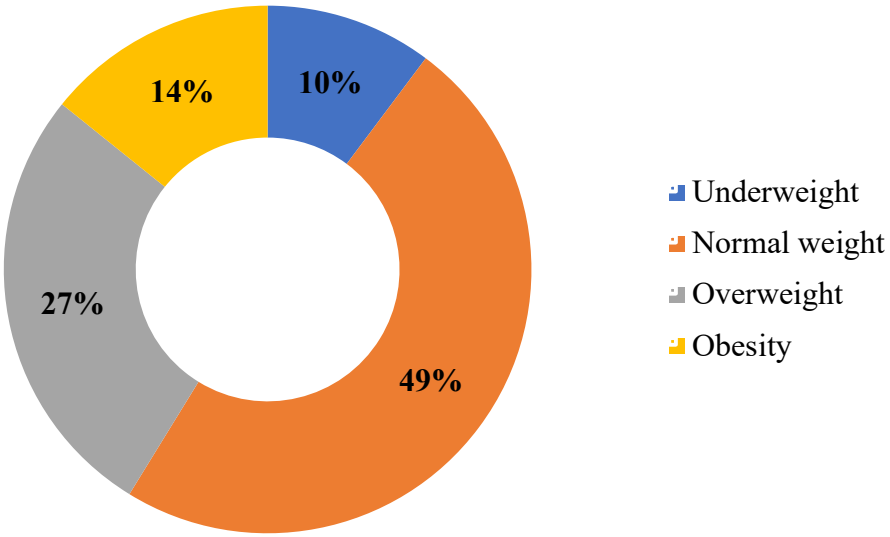


Figure 6: Categories of BMI of participants (N=1652)

Finally, body weight and height were computed to calculate BMI of the participants. Results were categorised as underweight (< 18.5 $kgm^2$), normal weight (18.5-24.9 $kgm^2$), overweight (25-29.9 $kgm^2$) and obese (30 $kgm^2$); these results are presented in *Figure* 6. The results indicated that 49% (n=802) of the participants had normal weight, 27% (n=446) were overweight and 14% (n= 235) were obese among the rural dwellers in the selected districts in the region. Also, 10% (n=169) were diagnosed with underweight.

This study found overweight and obesity to be prevalent among 27% and 14% of participants, respectively. This finding means that about a quarter and one-tenth of rural dwellers in the Eastern Region are overweight and obese respectively. The low prevalence of obesity in this study may be attributed to the participants' farming lifestyles, which involve vigorous physical activities such as weeding and walking long distances to farms, common in typical Ghanaian farming communities (Aniah, Kaunza-Nu-Dem, & Ayembilla, 2019). In typical Ghanaian farming communities, daily activities such as weeding, planting, and harvesting crops, combined with the frequent need to walk long distances to and from farms, contribute to high levels of physical activity (Quainoo & Loeffler, 2023; Quainoo, 2021). In addition, dietary habits, particularly the frequent consumption of fruits and vegetables, which are often readily available in farming communities may have contributed to this low prevalence. These lifestyles not only help in maintaining a healthy body weight but also serves as a protective factor against obesity-related conditions such as hypertension (Meouchy et al., 2022; Hall et al., 2021). Unlike urban settings where sedentary behaviours are more prevalent due to

mechanized jobs and modern conveniences, rural farming communities often rely on manual labour for livelihood. These physical demands inherently promote calorie expenditure, which may explain the relatively lower obesity rates despite the lack of structured exercise routines or formal fitness interventions in these areas. Likewise, other studies also recorded low levels of obesity among rural dwellers which may be as a result of their regular physical activity such as walking long distance and their physically demanding jobs (Ajayi et al., 2015; Kirunda, Fadnes, Wamani, Van den Broeck, & Tylleskär, 2015; Little, Humphries, Patel, & Dewey, 2016; Umuerri et al., 2017).

However, other studies also found otherwise. For instance, a study in the United States of America recorded an obesity prevalence of 35.6% among rural dwellers (Trivedi et al., 2015). The USA study attributed their findings to the fact that most rural dwellers in the study do not engage in leisure physical activity and most of them consume less fibre and fruits but higher intake of sugar-sweetened beverages (Trivedi et al., 2015). However, the current study found higher physical activity and higher fruits and vegetable intake among the rural dwellers in the current study. This might have influenced the relatively low prevalence of obesity among rural dwellers than that of those in the USA.

Also, another study in Trivandrum also reported an obesity prevalence of 40.7% among rural dwellers (Bindhu et al., 2019). Whereas the current study employed a household survey design in guiding the study, the Trivandrum study used a community screening approach. Despite the relatively lower prevalence of obesity recorded in the current study, recording a 14% prevalence of obesity

among rural dwellers could threaten Ghana's efforts to ensure good health and well-being for all (United Nations, 2023). Also, the obese participants in the current study could be exposed to CVDs and other NCDs such as stroke, heart attack, and diabetes (Hay, & Global Burden of Disease, 2015). There is a need for obesity prevention intervention specifically designed for rural dwellers.

Further, the current study recorded 26% of overweight among its participants. This finding means that rural dwellers in the Eastern Region are gaining extra weight that could expose them to NCDs including CVDs. Also, this finding means that about a quarter of the rural dwellers in the current study may become obese if adequate measures are not put in place. Similarly, other studies have also reported a high prevalence of overweight of 20-27% among rural dwellers (Bindhu et al., 2019; Little, Humphries, Patel, & Dewey, 2016; Umuerri, Ayandele, & Eze, 2017). However, the prevalence of overweight among rural dwellers in the current study is higher than that of a study in Uganda (Kirunda et al., 2015), probably because of the differences in geographical area of the study.

The implication of being overweight, especially when it leads to obesity, is that rural dwellers will be at increased risk of developing a range of health issues such as CVDs (heart disease, stroke), type 2 diabetes, hypertension, certain cancers, and musculoskeletal problems (Mohajan, & Mohajan, 2023). These conditions may precipitate a reduction in quality of life, augmented healthcare expenditures, and elevated mortality rates (Hay, & Global Burden of Disease 2015; Obesity Collaborators, 2017).

A higher prevalence of overweight individuals in rural areas can strain healthcare systems, as it requires more resources to provide medical care, treatment, and preventive measures. This burden can disproportionately affect rural healthcare facilities that may already have limited resources and healthcare professionals (Ferrari et al., 2022). Also, overweight individuals may experience decreased productivity and have higher rates of absenteeism due to health-related issues (Rozjabek, Fastenau, LaPrade, & Sternbach, 2020). This can impact the overall economic productivity of rural communities, hindering their development and growth.

It is also worth noting that about 10% of the rural dwellers in the current study were underweight, which means that about one-tenth of the participants were undernourished. The current finding is in line with another study among rural and resource-constrained communities in Africa where an underweight prevalence of 9.1% was recorded (Chigbu, Parhofer, Aniebue, & Berger, 2018). However, the prevalence of underweight recorded in this study is lower than the 14.9% prevalence of underweight reported in India (Little et al., 2020). The Indian study attributed its finding to high levels of poverty and people living in extremely rural communities. The difference in the finding could be attributed to the difference in the geographical area and a possible difference in the level of poverty among the participants of the two studies.

Studies have linked the high prevalence of being underweight among rural dwellers in recent times to the growing poverty level among rural dwellers, reliance on subsistence farming, inadequate crop yields leading to insufficient

food production, and crop failure (Chigbu et al., 2018; Little et al., 2020). However, the current study did not measure the factors leading to the high prevalence of underweight among rural dwellers; therefore, further research is required to identify the underlying factors influencing underweight among rural dwellers in the Eastern Region of Ghana.

The current prevalence of underweight among rural dwellers in the Eastern Region is worrying. This is because underweight individuals may have lower physical stamina and endurance, which can limit their ability to engage in agricultural and manual labour, affecting productivity and income-generating activities (Asenso-Okyere, Aragon, Thangata, & Andam, 2019). Also, underweight women may experience irregular menstrual cycles, hormonal imbalances, and reduced fertility, pregnancy complications including low-birth weight and preterm birth (Sun et al., 2022). Underweight adults, particularly women of childbearing age, are more likely to give birth to underweight babies, perpetuating the cycle of undernutrition across generations (Arlinghaus, Truong, Johnston, & Hernandez, 2018).

The study's results revealed that 46% (n=159) of participants exhibited moderate-risk and 19% demonstrated high-risk anthropometric characteristics of WHtR, suggesting a substantial prevalence of potential health concerns. Specifically, 72.2% of female rural dwellers displayed higher WHR, in contrast to a mere 5.4% of male participants within the selected districts. This observation can be attributed to a combination of factors such as distinct physical activity patterns influenced by traditional gender roles, variations in body composition

driven by biological factors, dietary behaviours, cultural perceptions of body image, and hormonal influences (Ahmadpanah et al., 2019; Stojcic, Dong, & Ren, 2020; Vasquez, Correa-Burrows, Blanco, Gahagan, & Burrows, 2019). The interaction of these factors explains the complexity of the gender disparity in WHR among rural communities and emphasises the importance of tailored interventions that promote equitable health outcomes by addressing these multifaceted contributors.

The high prevalence of overweight and obesity could hinder the progress toward SDG 3 (Good health and well-being), as these conditions are associated with an increased risk of cardiovascular diseases, type 2 diabetes, hypertension, and other non-communicable diseases (Elagizi et al., 2018; GBD, 2015). This could strain healthcare systems, increase healthcare costs, and lead to reduced quality of life and productivity, thereby affecting SDG 1 (No Poverty) and SDG 8 (Decent work and economic growth). In addition, the 10% prevalence of underweight rural dwellers raises concerns about achieving SDG 2 (Zero Hunger) and SDG 3. Underweight individuals may experience reduced physical health and lower agricultural productivity which impact both poverty reduction and overall well-being (Siddiqui, Salam, Lassi, & Das, 2020). Hence, addressing these nutritional challenges is essential for promoting good health, eliminating poverty, and advancing sustainable development efforts in the Eastern Region of Ghana, aligning with the broader United Nations' SDG agenda.

**Research Question Three: What is the illness perception of rural dwellers of the Eastern Region?**

The purpose of this question was to measure the illness perception of participants who have been diagnosed with hypertension. The scores on the illness perception were categorised into three: low threat, moderate threat and high threat (Kuiper et al., 2022); the results are presented in *Figure* 7. The results indicated that 34% (n=116) of the participants diagnosed with hypertension perceived the condition as a high threat to their life. However, 42% (n=144) and 24% (n=82) of those diagnosed with hypertension perceived hypertension as posing low and moderate threats to their life, respectively.

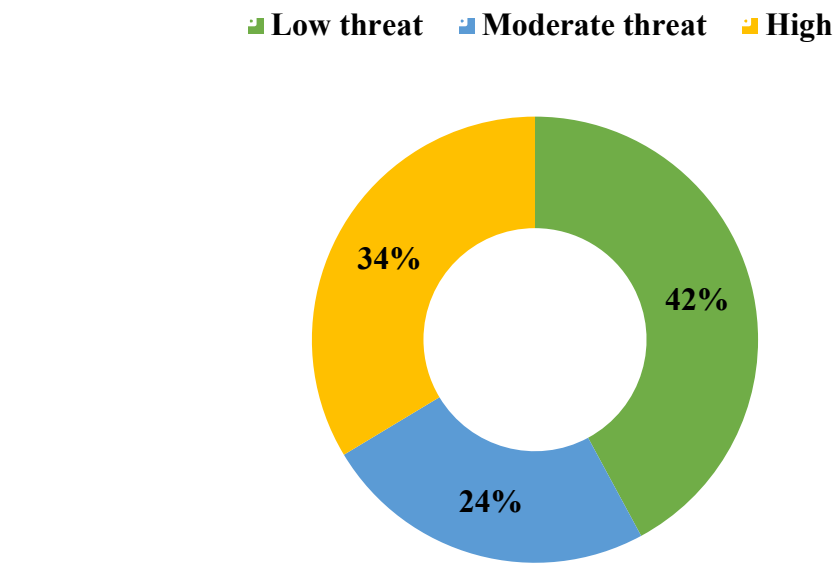


Figure 7: Illness perception of participants diagnosed with hypertension

This study found that 34% of the participants diagnosed with hypertension perceived the condition to be posing a high threat to their lives, whereas 42% and 24% perceived hypertension as posing low and moderate threats to their lives,

respectively. That 34% perceive high threat means that about one-third of the participants see hypertension to be a condition that could have severe consequences on their lives. This means that about one-third of the participants diagnosed with hypertension may engage in healthy behaviours such as adherence to hypertension medication and consumption of healthy diets (Yazdanpanah et al., 2019). Likewise, a study in Northern Ghana also recorded a similar level of hypertension threat among rural dwellers (Nyaaba, Masana, Aikins, Stronks, & Agyemang, 2018). In addition, a qualitative study conducted in rural Nigeria (Osuala, Oluwatosin, Osuala, & Ibe, 2016) revealed that approximately one-third of their respective participants expressed a significant perception of vulnerability regarding their hypertension condition. The similarities in the findings could be attributed to the similarities in the demographic characteristics of participants. These hypertension management behaviours may also be influenced by cultural beliefs, social support, and access to healthcare since misconceptions, lack of support, and limited resources hinder effective management, highlighting the need for a broader understanding of these factors (Bhattarai et al., 2023; Charchar et al., 2024).

However, the observation could also be attributed to social desirability bias which is an inherent limitation in a cross-sectional study of this nature. Regardless of this possible bias, the result is supported by the health belief model, which postulates that when hypertensive patients perceive that their health condition poses a high threat to their life, they are more likely to take the necessary action to manage their condition (Ma & Hi, 2018). This was further observed in a

qualitative study conducted by Noor et al. (2024) among 30 hypertensives in Pakistan. Conversely, a study in Nepal revealed that majority participants perceived hypertension as a less serious illness, which correlated with inadequate knowledge and potentially lower adherence to treatment (Bashyal & Thapa, 2020). In addition, Dhungana et al. (2021) conducted a systematic review on hypertension care and highlighted that inadequate awareness and perceived low severity of hypertension were significant barriers to health behaviours including adherence and treatment. In addition, Rupakheti et al. (2024) showed in a tertiary healthcare setting in Nepal, that patients with lower awareness of hypertension severity exhibited poorer adherence to prescribed medications and health-related quality of life.

However, other studies disagree with the current findings. For instance, a study in China (Yang, Winslow, Huang, & Zhou, 2021) and Thailand (Nagarkar, Gadhave, Gund, Sharma, & Choure, 2013) found that only a few of their participants perceived that hypertension posed a threat to their health. The difference in the findings could be explained by the difference in the geographical area. In addition, in China there were misconceptions about HTN perception among rural adults in the villages demonstrating low level of awareness which could have resulted in their observation. In Thailand, participants considered having personal control over their illness and thought their antihypertensive medication was more helpful in controlling their illness thus may have downplayed their perception of hypertension threat. Lastly, it is known that

countries like China and Thailand have a stronger health system for hypertension management than Ghana, hence, reducing the threat perception among its citizens.

This finding has implications for healthcare interventions in rural contexts in Ghana. It presents the necessity of targeted health education campaigns to raise awareness about hypertension and its short- and long-term potential consequences. Such campaigns should be context- and culturally sensitive and consider the unique challenges faced by rural populations in the Eastern Region of Ghana. It is also essential to deal with the perceived threat of hypertension through improving access to healthcare services and medications. These can be done along with promoting regular health screenings and can play a pivotal role in mitigating the perceived threat of hypertension.

In terms of theoretical frameworks, this finding aligns with Pender's health promotion model. Pender's model emphasises individual perceptions of health threats and benefits as critical factors influencing health-promoting behaviours (Chen & Hsieh, 2021). The participants' varying perceptions of threats and their potential consequences correspond to this model's emphasis on how personal factors shape health-related decision-making. Thus, the model highlights the importance of addressing multiple levels of influence when designing interventions to improve health outcomes.

The finding that 34% of the rural dwellers diagnosed with hypertension perceive it as a significant threat underscores the gravity of the issue. This finding has far-reaching implications for SDGs, particularly in rural areas and within Ghana. Specifically, this underscores the importance of targeted health education

campaigns aligned with SDG 3 for better awareness, SDG 10 to reduce health disparities, and SDG 17 for collaborative efforts. In rural Ghana, addressing this perception demands localised health promotion, improved healthcare accessibility, community engagement, and policy alignment. These insights can guide context-specific interventions that not only mitigate the perceived threat of hypertension but also contribute to the advancement of SDGs, fostering healthier rural communities and enhancing overall well-being.

**Research Question Four: What are the factors that predict hypertension among rural dwellers in the Eastern Region?**

This research question aimed to identify the risk factors for hypertension among rural dwellers in selected districts in the Eastern Region. Hypertension (systolic and diastolic blood pressure) was dichotomised into normal (coded 0) and hypertensive (coded 1). First, bivariate correlations using chi-square statistics were computed to determine the categorised factors that were associated with the hypertension status of the rural dwellers. Second, the risk factors that were significant at the bivariate phase were placed in the hierarchical multiple binary logistic regression model for analysis. This was done for several reasons.

Variables that showed a significant correlation with the dependent variable in bivariate analysis help to ensure that the variables considered have a meaningful relationship with the hypertension status of the rural dwellers based on current data (Kalnins, 2018). Besides, variables that did not significantly correlate with hypertension status may not contribute to the model's predictive power (Kalnins, 2018). Also, adding non-significant variables to the logistic regression model can

contribute to multicollinearity issues which may affect the model's prediction relevance and ability (Fujikoshi, Ulyanor & Shimizu, 2011). Finally, adding non-significant variables to the logistic regression model could introduce spurious relationships and this may lead to misleading interpretations (Fujikoshi et al., 2011; Kalnins, 2018). Based on these reasons, the researcher decided to include only significant variables in the bivariate analysis in the logistic regression.

Sex ($\chi^2$=143.05, p<0.001), age ($\chi^2$=263.91, p<0.001), education level ($\chi^2$=19.30, p<0.001), and marital status ($\chi^2$=59.49, p<0.001) were the socio-demographic factors significantly associated with hypertension. Also, lifestyle factors such as the history of smoking ($\chi^2$=553.40, p<0.001), current smoking status ($\chi^2$=45.24, p<0.001), the use of smokeless tobacco ($\chi^2$=608.71, p<0.001), history of alcohol intake ($\chi^2$=156.95, p<0.001), current alcohol use ($\chi^2$=308.17, p<0.001), moderate intensity sport ($\chi^2$=6.187, p<0.05) were the lifestyle factors (smoking history) significantly associated with hypertension. Finally, history of diabetes diagnosis ($\chi^2$=5.61, p<0.05), BMI ($\chi^2$=20.81, p<0.001) and WHtR ($\chi^2$=37.13, p<0.001) were significantly associated with hypertension. See Table 2 for details on bivariate analysis of results.

Hierarchical multiple binary logistic regression was conducted because it allows for the stepwise inclusion of variables in different models. This procedure enables the unique contribution of each model while controlling for the effect of other variables in the model. Hence, by introducing variables into the model in a stepwise order, the confounding variables can be accounted for and assessed for the incremental predictive power of each set of variables. Also, the hierarchical

multiple binary logistic regression was used to break down the analysis into simple and meaningful steps to examine their individual and combined effects. In this study, risk factors for hypertension were categorised into three groups: socio-demographic variables, lifestyle variables and history of diseases/anthropometric characteristics of participants. Hierarchical multiple binary logistic regression was computed for hypertension.

Table 3 presents the results of the hierarchical multiple binary logistic regression of predictors of hypertension. In model 1, sex, age, education status and marital status of the rural dwellers were put in the model. These variables together explained 47% variance in the regression model (Nagelkerke R square of .470) and the model was considered fit (Hosmer and Lemeshow = .355). The addition of lifestyle variables (history of smoking, current smoking status, the use of smokeless tobacco, history of alcohol intake, current alcohol use, moderate intensity sport, frequency of adding salt, frequent intake of salty seasoning, and frequent intake of processed foods) were significantly associated with hypertension. Thus, the socio-demographic and lifestyle variables together explained 87.5% of the variance in levels (Nagelkerke R square of .875) and model fit was sustained (Hosmer and Lemeshow = .947). The addition of the diabetes diagnosis history, BMI and WHtR explained an additional 0.8% of the variance in hypertension. Thus, the final model (Model 3) explained 88.3% of the variance in hypertension (Nagelkerke R square of .883) and Hosmer and Lemeshow >0.05 (0.953).

The hierarchical multiple binary logistic regression showed robustness and revealed stable findings across the three models. The significant variables in Model 1 were significant in the second and the third model. Also, the significant variables in model 2 were significant in the final model. This suggests that the relationships between the variables and the outcome is robust and holds even after adjusting for other variables in the model. This consistency provides confidence in the validity and reliability of the observed effects in the results (Halabi, Kenett, & Sacerdote, 2018).

The utilisation of hierarchical multiple binary logistic regression and the consistent significance of variables across the three models enhance the robustness and reliability of the study's findings. The fact that significant variables in the initial model retained their significance in subsequent models, and those identified as significant in the second model maintained their importance in the final model, underscores the stability of the relationships between the variables and the outcome. This internal validation process strengthens the confidence in the observed effects, indicating that the identified associations are not spurious but are most likely genuine and resilient.

The hierarchical approach in logistic regression, where variables are added in stages, helps control for potential confounding factors and provides a more nuanced understanding of the relationships under consideration. The stability of results across models suggests that the identified variables maintain their impact on the outcome even when accounting for the influence of other variables. This consistency in the statistical significance of predictors enhances the internal

validity of the study, implying that the observed associations are likely to be generalisable beyond the specific sample and are less likely to be artefacts of the modelling process. The hierarchical multiple binary logistic regression approach, coupled with the consistent significance of variables across models, contributes to the overall robustness, reliability, and credibility of the study's findings (Halabi, Kenett, & Sacerdote, 2018).

In the final model (Table 3), female (AOR =16.55, CI = 2.42-113.47, $p<0.05$) rural dwellers and dwellers who are 50 years and older (AOR = 6.46, CI = 1.21-34.47, $p<0.05$) were significantly more likely to be diagnosed with hypertension. Compared to rural dwellers without formal education, those with basic education (AOR=.192, CI= .04-.99, $p<0.05$) were significantly less likely to be diagnosed with hypertension. Furthermore, the results showed that rural dwellers who had never smoked (AOR = .071, CI = .01-.69, $p<0.05$), not currently smoking (AOR= .116, CI = .02-.76, $p<0.05$) and less exposed to smokeless tobacco (AOR = .04, CI = .01-.22, $p<0.001$) were significantly less likely to be diagnosed with hypertension. Rural dwellers who had not taken alcohol 12 months before data collection were less likely to be diagnosed with hypertension (AOR =.15, CI = .03-.75, $p<0.05$). Finally, the results revealed that rural dwellers who regularly added salts to their meals were significantly more likely to be diagnosed with hypertension (AOR =3.40, CI = 1.28-9.01, $p<0.05$).

Table 2: Bivariate Association of Risk Factors of Hypertension

| Variable | Categories | Blood pressure | | |
|---|---|---|---|---|
| | | Normal | Hypertensive | $X^2$ |
| Sex | Males | 626(37.9%) | 57(3.5%) | 143.05*** |
| | Females | 644(39%) | 325(19.7%) | |
| Age | <50 years | 788 (47.7%) | 56(3.4%) | 263.91*** |
| | 50≥0 years | 482(29.2%) | 326(19.7%) | |
| Education | No formal | 292(17.7%) | 130(7.9%) | 19.30*** |
| | Basic | 766(46.4%) | 192(11.6%) | |
| | Secondary | 156(9.4%) | 44(2.7%) | |
| | Tertiary | 56(3.4%) | 16(1%) | |
| Marital status | Married | 738(44.7%) | 189(11.4%) | 59.49*** |
| | Divorced | 177(10.7%) | 80(4.8%) | |
| | Widowed | 130(7.9%) | 82(5%) | |
| | Never married | 225(13.6%) | 31(1.9%) | |
| Income | <GHS500 | 529(32%) | 157(9.5%) | 4.81 |
| | GHS500-1000 | 598(36.2%) | 187(11.3%) | |
| | GHS1001-2000 | 100(6.1%) | 33(2%) | |
| | >GHS2000 | 43(2.6%) | 5(0.3%) | |
| Household people | ≤3 people | 467(28.3%) | 133(8.1%) | 0.40 |
| | 4-5 people | 473(28.6%) | 125(7.6%) | |
| | ≥6 people | 330(20%) | 124(7.5%) | |
| Ever smoked | Yes | 20(1.2%) | 160(9.9%) | 553.40*** |
| | No | 1250(77.5%) | 183(11.3%) | |
| Currently smoking | Yes | 91(30.6%) | 111(37.4%) | 45.24*** |
| | No | 82(27.6%) | 13(4.4%) | |
| Smokeless Tobacco | Yes | 55(3.3%) | 222(13.4%) | 608.71*** |
| | | 1215(73.5%) | 160(9.7%) | |
| Ever drunk alcohol | Yes | 6755(40.9%) | 339(20.5% | 156.95*** |
| | No | 595(36%) | 43(2.6%) | |
| Recent alcohol intake | Yes | 155(17.8%) | 286(32.9%) | 308.17*** |
| | No | 396(45.6%) | 32(3.7%) | |
| Vegetal intake days | 1 day | 102(6.2%) | 27(1.6%) | 4.07 |
| | 2 days | 175(10.6%) | 68(4.1%) | |
| | 3 days | 451(27.3%) | 134(8.1%) | |
| | ≥4 days | 542(32.8%) | 153(9.3%) | |
| Fruits servings | 1 serve | 244(14.9%) | 68(4.2%) | 4.85 |
| | 2 serve | 326(20%) | 112(6.9%) | |
| | 3 serve | 411(25.2%) | 131(8%) | |
| | ≥4 serve | 275(16.8%) | 66(4%) | |
| Vigorous work activity | Yes | 733(44.4%) | 222(13.4%) | 0.02 |
| | No | 537(32.5%) | 160(9.7%) | |

| Variable | Categories | Blood pressure | | |
|---|---|---|---|---|
| | | Normal | Hypertensive | $X^2$ |
| *Table 2 continued* | | | | |
| Moderate intense sport | Yes | 980(59.3%) | 271(16.4%) | 6.187* |
| | No | 290(17.6%) | 111(6.7%) | |
| Diagnosed of diabetes | Yes | 35(2.1%) | 20(1.2%) | 5.61* |
| | No | 1235(74.8%) | 362(21.9%) | |
| BMI | Underweight | 128(7.7%) | 41(2.5%) | 20.81*** |
| | Normal weight | 654(39.6%) | 148(9%) | |
| | Overweight | 323(19.6%) | 123(7.4%) | |
| | Obese | 165(10%) | 70(4.2%) | |
| WHtR | Low risk | 477(28.9%) | 99(6%) | 37.13*** |
| | Moderate risk | 588(35.6%) | 172(10.4%) | |
| | High risk | 205(12.4%) | 111(6.7%) | |

*****p<0.001, **p<0.01, *p<0.05**

Table 3: Hierarchical Multiple Binary Logistic Regression of Predictors of Hypertension

| Variables | Categories | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|---|
| | | AOR | 95% CI | AOR | 95%CI | AOR | 95%CI |
| **Socio-demographic Factors** | | | | | | | |
| Sex | Males | Ref | Ref | Ref | Ref | Ref | Ref |
| | Females | 7.20*** | 2.99-17.33 | 16.15** | 2.55-102.25 | 16.55** | 2.42-113.47 |
| Age | <50 years | Ref | Ref | Ref | Ref | Ref | Ref |
| | 50≥50 years | 8.93*** | 3.96-20.13 | 7.557** | 1.66-34.33 | 6.46* | 1.21-34.47 |
| Education | No formal | Ref | Ref | Ref | Ref | Ref | Ref |
| | Basic | .409* | .18-.92 | .20* | .040-1.00 | .192* | .04-.99 |
| | Secondary | .552 | .14-2.20 | .12 | .01-2.80 | .15 | .04-5.96 |
| | Tertiary | .463 | .08-2.62 | .60 | .05-8.08 | .88 | .06-13.44 |
| Marital status | Married | Ref | Ref | Ref | Ref | Ref | Ref |
| | Divorced | 2.15 | .84-5.47 | 1.45 | .23-9.25 | 1.20 | .15-9.55 |
| | Widowed | 1.76 | .71-4.33 | 1.89 | .37-9.63 | 1.90 | .36-10.07 |
| | Never married | 1.52 | .42-5.56 | 1.61 | .08-32.99 | 1.47 | .04-55.13 |
| **Lifestyle factors** | | | | | | | |
| Ever smoked | Yes | - | - | Ref | Ref | Ref | Ref |
| | No | - | - | .135* | .02-.80 | .071* | .01-.69 |

| Variables | Categories | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|---|
| | | AOR | 95% CI | AOR | 95%CI | AOR | 95%CI |
| *Table 3 Continued* | | | | | | | |
| | Yes | - | - | Ref | Ref | Ref | Ref |
| Currently smoking | | | | | | | |
| | No | - | - | .122* | .02-.66 | .116* | .02-.76 |
| Smokeless Tobacco | Yes | - | - | Ref | Ref | Ref | Ref |
| | No | - | - | .049*** | .01-.22 | .04*** | .01-.22 |
| Ever drunk alcohol | Yes | - | - | Ref | Ref | Ref | Ref |
| | No | - | - | .289 | .04-2.36 | .29 | .03-2.82 |
| Recent alcohol intake | Yes | - | - | Ref | Ref | Ref | Ref |
| | No | - | - | 1.168* | .04-.78 | 1.15* | .03-.75 |
| Moderate intensity sport | Yes | - | - | Ref | Ref | Ref | Ref |
| | No | - | - | .335 | .07-1.56 | .27 | .05-01.55 |
| Adding salt to meals | | - | - | 3.294* | 1.31-8.26 | 3.40* | 1.28-9.01 |
| Salty seasoning | | - | - | .589 | .24-1.45 | .59 | .22-1.62 |
| Processed food | | - | - | 2.10 | .93-4.76 | 1.90 | .81-4.45 |

| Variables | Categories | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|---|
| | | AOR | 95% CI | AOR | 95%CI | AOR | 95%CI |
| | | | - | | | | |
| *Table 3 Continued* | | | | | | | |
| **Diseases history and anthropometrics** | | | | | | | |
| Diagnosed of diabetes | Yes | - | - | - | - | Ref | Ref |
| | No | - | - | - | - | .33 | .02-67.78 |
| BMI | Underweight | - | - | - | - | Ref | Ref |
| | Normal weight | - | - | - | - | 1.86 | .12-28.05 |
| | Overweight | - | - | - | - | .78 | .04-15.31 |
| | Obese | - | - | - | - | 2.43 | .08-77.44 |
| WHtR | Low risk | - | - | - | - | | |
| | Moderate risk | - | - | - | - | 3.12 | .49-20.07 |
| | High risk | - | - | - | - | 3.12 | .34-28.60 |
| **Hosmer and Lemeshow test** | | **$\chi^2$ (7) =7.75, p = .355** | | **$\chi^2$ (8) =2.79, p = .947** | | **$\chi^2$ (8) =2.67, p = .953** | |
| **Nagelkerke R square** | | **.470** | | **.875** | | **.883** | |

*****p<0.001, **p<0.01, *p<0.5**

The current finding shows that female rural dwellers were very likely to have hypertension than males. This means that female rural dwellers are more exposed to hypertension than males. The current findings could be partly explained by the gender roles that assign fewer intensive tasks to females while males are assigned more intensive and vigorous tasks in the Ghanaian context (Azumah, Onzaberigu, & Adongo, 2022). It seems that these tasks are serving as a protective factor for males against hypertension. Also, women in rural settings might have limited opportunities for physical activity due to household and caregiving responsibilities, leading to sedentary lifestyles and weight gain (Azumah et al., 2022). Meanwhile, studies show that males are less likely to go to the hospital for hypertension diagnoses than females (Rahman, Williams, & Al Mamun, 2017). Hormonal fluctuations, particularly during the menstrual cycle and menopause, can impact blood pressure regulation in women. These hormonal changes can lead to higher blood pressure levels, increasing the likelihood of hypertension development (Smith, Koepp, Berg, Akinsanya, & Olson, 2019). In addition, the over-representation of females in the study may have skewed the findings, potentially overestimating the influence of vigorous physical activities predominantly performed by males in farming communities.

In many cases, women tend to have a higher percentage of body fat than men (Choi et al, 2018). Excess body fat, especially around the waist, correlates with an escalated susceptibility to hypertension. (Moschonis & Karatzi, 2020). This difference in body composition can lead to the increased prevalence of hypertension among female rural dwellers. Women in rural settings might have limited access to

diverse and nutritious diets, leading to higher consumption of calorie-dense, processed foods (Shafiee et al., 2022).

Poor dietary habits, including excessive salt intake, can contribute to hypertension development (Shafiee et al., 2022). Women often face unique stressors, including socio-economic challenges, caregiving responsibilities, and societal pressures (Griendling et al., 2021). Griendling et al. (2021) have reported that chronic stress and mental health issues could elevate blood pressure levels and increase the risk of hypertension. Hypertension can also develop during pregnancy, a condition known as gestational hypertension or preeclampsia. These pregnancy-related conditions can increase the overall prevalence of hypertension among women (Phoswa & Khaliq, 2021).

An Ethiopian study agrees with the current findings where they also recorded higher prevalence of hypertension among females more than male rural dwellers (Teshome et al., 2022). Furthermore, a similar study conducted in rural villages in the Hohoe Municipality reported a higher risk for hypertension among females than males (Dosoo et al., 2019).

The possible reason for the similarities in the findings could be attributed to a possible similarity in the demographic characteristics of females in the Hohoe Municipality and the current study area. However, a study in Ethiopia contrasts the current findings (Wachamo, Geleta, & Woldesemayat, 2020). The Ethiopian study rather recorded a higher risk of hypertension among males than females. The difference in the findings could be partly explained by the fact that their study determined undiagnosed hypertension unlike the current study that looked at both

diagnosed and undiagnosed. Further, another study in Cameroon also contrasts the current findings, as they recorded a higher risk for hypertension among males than females (Princewel et al., 2019). Cameroon's study included more males in their study than females compared to the current study that included more females than males.

The implications of high risk of hypertension among females are that there could be an increase in pregnancy complications like stillbirth and increase in maternal death during pregnancy (Antza, Cifkova, & Kotsis, 2018). If adequate measures are not put in place to protect females against hypertension, Ghana's efforts towards ensuring good health for all people will be impeded. Hence, there is a need for gender-specific interventions that will target females towards reducing their risk of hypertension.

This disparity presents the need for gender-specific interventions, aligning with SDG 5, which targets gender equality and empowering women and girls. Implementing initiatives that warrant unbiased access to healthcare, education, and resources for women in rural areas could help address the higher risk of hypertension women face. Furthermore, addressing the gendered distribution of tasks, as identified in the study, is essential in promoting women's health and well-being.

Addressing inequalities is a central theme of SDG 10, and the study underscores the presence of health disparities between genders and age groups. The results highlight the significance of targeted programmes to curtail factors such as unequal workloads, limited education, and uneven healthcare access. Such

interventions can work towards levelling the playing field and ensuring that all rural dwellers, regardless of gender or age, have equal access to resources that support better health outcomes. Furthermore, the study's findings have implications for maternal health, connecting with both SDG 3 and SDG 5. The increased hypertension risk among female rural dwellers has potential consequences for pregnancy-related complications, including preeclampsia, eclampsia, and stillbirth. Addressing hypertension in this population becomes pivotal in improving maternal health outcomes and aligns with the broader objectives of ensuring good health, gender equality, and well-being.

Also, the current study found the risk of developing hypertension to be higher among adults 50 years or older (Bonarjee, 2018). The reason for the current finding could be that, as people age, their veins become more hardened, hence, impeding the flow of blood through the veins (Hisamatsu et al., 2020). Also, as people age, their blood vessels tend to become less elastic and more rigid. This can precipitate an increased in blood pressure as the heart undergoes augmented exertion to propel blood through vessels that have become less pliant. (Bonarjee, 2018; Laurent & Boutouyrie, 2020). The kidneys serve as pivotal regulators of blood pressure, overseeing fluid equilibrium and electrolyte concentrations within the body. As people age, the efficiency of kidney function may decline, affecting blood pressure regulation (Johnson, 2019; Wang et al., 2020). Similarly, other studies also found an increased susceptibility to hypertension among older adults than younger adults (Bonarjee, 2018; Hisamatsu et al., 2020).

The implication of having an older adults' population who are at risk of hypertension is that they are more likely to develop heart disease, stroke, and other cardiovascular conditions (Petrie, Guzik, & Touyz, 2018). Older adults with hypertension are at a higher risk of experiencing these complications, which can lead to reduced quality of life and increased healthcare needs (Johnson, 2019; Wang et al., 2020). The costs associated with hypertension management, including doctor visits, medications, and potential hospitalisations, can impose a financial burden on older adults and their families. Families may face financial strain due to the costs of managing hypertension in older adults, especially if healthcare expenses are not adequately covered by insurance or social programmes.

Furthermore, the current study found the risk of hypertension to be lower among participants who had basic education than those who had no formal education. The current finding means that people who have no level of formal education are more exposed to hypertension than those who have formal education. The discovery of a lower risk of hypertension among participants with basic education, in contrast to those with no formal education, can be attributed to various factors associated with education and health awareness. Basic education often imparts essential health knowledge, promotes health literacy, and facilitates access to health-related information and resources (Aljassim & Ostini, 2020).

Educated individuals are better equipped to make informed decisions about their well-being, enabling them to adopt healthier behaviours and engage in preventive healthcare practices. Moreover, education's correlation with higher income and socioeconomic status can lead to improved living conditions, access to

nutritious foods, and reduced stress, all of which contribute to a decreased risk of hypertension (Aljassim & Ostini, 2020). This finding underscores the role of education not only in fostering individual empowerment and informed health choices but also in addressing health disparities and promoting better overall health outcomes.

Other studies have also reported lower risk of hypertension among people with high levels of formal education than those with low or no level of formal education (Assari, 2019; Sharma et al., 2021). The commonest reason behind the low level of hypertension recorded among participants in these studies was that people with higher education engage in healthy lifestyles such as healthy eating and engage in regular medical checkups (Sharma et al.,2021; Tandstad, 2017). The increased risk of hypertension among rural dwellers with no level of education is worrying. This is because more adults in rural communities would develop hypertension if adequate measures were not put in place to reduce their risk of hypertension (Kishore, Gupta, Kohli, & Kumar, 2016).

The study's findings directly relate to SDG 3, which centres on ensuring good health and well-being for all. The factors contributing to the prevalence of hypertension including lifestyle behaviours, education, and healthcare access are crucial to achieving this goal. By targeting these factors through health promotion programmes, policy changes, and education campaigns, the health of rural dwellers can be improved, aligning with the overarching objective of healthy lives and well-being.

Again, it was realised that participants who had never smoked cigarettes, not currently smoking, and those who are less exposed to second-hand smoking were less likely to develop hypertension than current smokers. This finding means that current tobacco smokers are more exposed to hypertension than non-smokers. Studies show that nicotine found in cigarette smoke constricts the blood vessels in its users, leading to elevated blood pressure levels (Pitzer, Aboaziza, O'Reilly, Mandler & Olfert, 2023; Whitehead, Erwin & Yue, 2021). Further, smoking interferes with the normal functioning of the endothelium, a crucial role in regulating blood pressure by producing substances that control blood vessel dilation and constriction. Smoking can impair endothelial function, leading to difficulties in maintaining normal blood pressure levels (Gallucci, Tartarone, Lerose, Lalinga, & Capobianco, 2020). Smoking can lead to increased arterial stiffness, which means the blood vessels lose their flexibility and become less able to expand and contract to accommodate blood flow changes, hence, contributing to elevated blood pressure among tobacco users (Wölkart et al., 2019).

In line with the current findings, other studies have recorded a high risk of hypertension among cigarette smokers (Kondo, Nakano, Adachi & Murohara, 2019). The similarities in the findings could be explained by the similarities in the study design used in these studies. On the contrary, other studies contrast the current finding. For instance, a study in rural Bangladesh found no significant association between tobacco smoking and the risk of hypertension among participants (Khanam, Lindeboom, Razzaque, Niessen, & Milton, 2015). The possible reasons for the disparities in the finding could be attributed to the differences in the sample

size used in the two studies. Whereas the current study included 1,600 participants, the latter included 6,094 participants.

The current findings call for an intervention that aims at protecting rural dwellers against smoking or becoming exposed to cigarette smoking. Moreover, the current findings imply that when adequate measures are put in place to protect people against cigarette smoking, the prevalence of hypertension and its associated morbidities and mortalities will reduce in the Eastern Region of Ghana. Also, Ghana's effort towards ensuring good health and well-being among all people would be attained if effective measures toward reducing the use and exposure to cigarette smoke are put in place.

Again, the risk of hypertension was low among non-alcohol consumers and those who do not add salt to their food after they have been served. The finding means that the non-consumption of alcohol and the practice of not adding salt to already served foods could protect rural dwellers against hypertension among rural dwellers. According to Okojie, Javed, Chiwome, and Hamid (2020), drinking alcohol can result into a short-term rise in BP whereas a constant increase in blood pressure could lead to hypertension. Also, excessive salt intake, on the other hand, could lead to arterial stiffness which makes blood vessels resistant to blood flow, consequently increasing blood pressure (Gao, Akban & Wang, 2022). Likewise, other similar cross-section studies reported a higher risk of hypertension among alcohol consumers and those who add salt to their already-served foods (He et al., 2022; Nan et al., 2021). Upon entering the bloodstream, alcohol exerts its influence on the sympathetic nervous system, which is responsible for regulating involuntary

functions such as heart rate and the constriction of blood vessels. (Okojie et al., 2020),

Further, this study found that rural dwellers who do not engage in moderate-intensity sporting activities were at elevated risk of being diagnosed with hypertension as compared to those who engage in moderate-intensity sporting activities. This finding means that engaging in moderate-intensity physical activity could protect people against hypertension. Besides, studies show that regular moderate-intensity sporting activities, including brisk walking, cycling, or swimming, can improve cardiovascular fitness. This leads to a more efficient heart that pumps blood with less effort, contributing to healthier blood pressure levels (Shakoor et al., 2023). Also, sporting activities help in managing weight or achieving weight loss goals. Sustaining a healthy weight lessens the burden on the cardiovascular system, thus decreasing the likelihood of hypertension. (Budreviciute et al., 2020). Moreover, exercise promotes the dilation of blood vessels, leading to improved blood flow and reduced resistance in the arteries, which contributes to lower blood pressure levels (Norling et al., 2020). Similarly, the role of physical activity in reducing the risk of hypertension among rural dwellers is well established in published work (Khanam et al., 2015; Princewel et al., 2019).

The current findings imply that interventions towards increasing physical activity and encouraging moderate-intensity sporting activities in rural communities in the Eastern Region could reduce the prevalence of hypertension among its inhabitants. Moreover, encouraging moderate physical sporting activities in rural societies in the Eastern Region could propel Ghana's effort towards reducing non-

communicable diseases. Hence, the Ghanaian ministry of health should adopt effective measures that promote moderate-intensity sporting activities in the Eastern Region of Ghana.

Overall, the conceptual framework, guided by Calys-Tagoe et al. (2020) and Carey et al. (2019) and Pender's Health Promotion Model (HPM), closely aligned with the study findings by highlighting the various factors influencing hypertension. The framework emphasizes demographic characteristics, lifestyle factors, and health conditions, which were reflected in the study's identification of higher hypertension risk among females, older adults, and individuals with no formal education, as well as the protective role of behaviours such as non-smoking, avoiding alcohol, and limiting salty meals. The associations between hypertension and anthropometric measures like BMI, WHR, and WHtR further validate the framework's relevance. Similarly, Pender's HPM aligns with the findings by emphasizing the interplay of biological, psychological, and sociocultural factors, as well as reasoning and affective components influencing behaviour.

The study also holds implication for mental health and community engagement in addressing hypertension among rural populations. For instance, chronic stress, socio-economic pressures, and caregiving responsibilities, particularly among women, contribute to elevated blood pressure levels, emphasizing the need for mental health support as part of hypertension prevention strategies. Community engagement can also play a role in addressing these issues by fostering social support networks and promoting awareness of healthy behaviours. Initiatives such as community-led health education programs, peer

support groups, and stress management workshops can help reduce the psychological burden of rural dwellers while encouraging lifestyle changes like increased physical activity, healthier diets, and reduced alcohol and tobacco use. These interventions can become more effective and culturally relevant, enhancing their impact on reducing hypertension risk and improving overall well-being in rural areas.

Lastly, the importance of healthy lifestyles is emphasised by both SDG 3 and SDG 12, which aims to promote responsible consumption and production. The findings of the study highlight the importance of behaviours like engaging in physical activity, avoiding tobacco and alcohol consumption, and maintaining a balanced diet in preventing hypertension. By promoting healthy lifestyles through education, community initiatives, and policy changes, rural dwellers' hypertension risk can be reduced, aligning with the goals of both SDGs 3 and 12.

# CHAPTER FIVE
# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The primary aim of this research was to determine the prevalence rates of hypertension and to identify the various risk factors contributing factors among rural populations in some selected districts of the Eastern Region. This chapter provides a summary, outlines the main findings, presents the conclusions, and offers recommendations derived from the study.

## Summary

Hypertension, characterised by elevated blood pressure, has become a global health concern with significant implications for cardiovascular diseases and non-communicable diseases. Its prevalence has been gradually increasing, particularly in LMICs, including those in sub-Saharan Africa. This shift in the disease pattern, from primarily affecting urban and affluent populations to impacting rural communities, presents a critical public health challenge. Despite the emerging body of scientific studies on hypertension in urban areas of Ghana, there is a limited understanding of its prevalence and determinants among rural dwellers in Ghana. This study aimed to address this knowledge deficit by assessing the hypertension prevalence and the factors contributing to its development in rural districts of the Eastern Region, contributing valuable insights to inform public health interventions and reduce the burden of NCDs in Ghana.

Understanding the evolving landscape of hypertension in rural Ghana is vital for healthcare planning and intervention efforts. The Eastern Region, with its distinct cultural and geographical factors, may have unique risk factors contributing to hypertension in its rural population. The rising cases of hypertension in the rural

districts of Akyemansa, Denkyembour, New Abirem, and Achiase, as reported in the DHIMs, underscore the urgency of this study. By identifying the proportion of the population living with hypertension and risk factors for their condition in these rural areas, this research aims to provide data-driven insights for healthcare workers, policymakers and implementers, and researchers to design directed interventions for preventing and managing hypertension, ultimately leading to the global goal of reducing NCD-related mortality and morbidity by 2030.

The study employed a cross-sectional design to investigate hypertension-related risk factors among rural adults 25 years and above in selected districts in the Eastern Region of Ghana. The target population comprised individuals in four rural districts, with a total accessible population of 168,168 people. A multistage sampling technique was employed, involving simple random and stratified sampling, to select participants from sub-districts within the target districts. Data were collected using a questionnaire with 52 items, focusing on background information, hypertension risk factors, anthropometric measurements, and illness perception. Blood pressure measurements were taken using a sphygmomanometer, and waist circumference was assessed with tape measures. The instruments were validated for reliability and validity through face validity, content validity, and pretesting. This comprehensive methodology ensured the ethical collection of data, with informed consent and privacy protection for participants. Trained research assistants conducted the data collection, and the principal investigator supervised the process. Frequencies and percentages as well as logistic regression analysis were carried out to answer the research questions.

## Main Findings

The following findings were revealed from the results:

1. The study identified a comparatively high prevalence of hypertension among rural dwellers in the Eastern Region of Ghana, with approximately 24% (n=399) of participants diagnosed with hypertension.
2. The anthropometric measures included WHR, WHtR, and BMI. WHR results indicated that 46% of participants had moderate-risk WHR, and 19% had high-risk WHR. WHtR revealed that 72.2% of female participants had a high-risk ratio, while only 5.4% of male participants fell into the high-risk category. BMI findings showed that 27% of participants were overweight, 14% were obese, and 10% were underweight.
3. Approximately 34% of participants diagnosed with hypertension perceived it as a high threat to their lives, while 42% considered it a low threat, and 24% viewed it as a moderate threat.
4. Factors significantly related with a higher risk of being living with hypertension included being female, being 50 years or older, having no formal education, and regular consumption of salty meals. On the other hand, factors linked to a lower likelihood of hypertension diagnosis were having basic education, never smoking, not currently smoking, and avoiding alcohol consumption in the last 12 months.

## Conclusions

Considering the results from this research, it becomes imperative to distil the implications of these results into meaningful conclusions. This study not only uncovers a significant public health concern but also paves the way for targeted interventions and policy recommendations that are crucial for the welfare of these communities.

The finding of a 24% prevalence rate of hypertension within these rural populations signals a pressing public health dilemma. Such a substantial proportion of the community being affected by hypertension is not merely a statistic but a clear indication of the potential for increased incidences of cardiovascular diseases (CVDs), which could lead to a higher rate of morbidity and mortality within these districts. This scenario paints a concerning picture for the future, where, without intervention, the community could face a significant health and economic burden. It emphasises the urgent need for health strategies that specifically cater for rural populations, taking into account their unique socioeconomic, cultural, and environmental contexts to effectively manage and mitigate the risks associated with hypertension.

Furthermore, the research highlights a worrying trend in the prevalence of hypertension and its accompanying precipitating factors, such as elevated WHR and a high incidence of overweight and obesity. These anthropometric measures are critical indicators of cardiovascular risk, suggesting a looming escalation in the burden of CVDs if left unaddressed. This potential rise in CVD incidence underlines the importance of integrating regular screening for these risk factors into routine

healthcare practices in rural settings. Early identification and management of at-risk individuals could play a pivotal role in curtailing the impending increase in CVD-related health issues.

Although cultural norms regarding diet were not captured as a risk factor in this study, other behaviours such as never smoking, not currently smoking, and avoiding alcohol consumption were significant protective factors. This demonstrates that lifestyle modifications focused on reducing harmful behaviours and promoting protective practices can play a role in mitigating hypertension risk. Such findings highlight the potential for targeted health interventions that emphasize behaviour change while addressing cultural and social determinants of health.

A particularly striking finding from the study is the apparent lack of awareness among hypertensive individuals regarding the severity of their condition. Many participants diagnosed with hypertension perceived it as a low threat to their health, indicative of a significant gap in health literacy and awareness. This gap poses a considerable obstacle to effective disease management and control, as misconceptions and underestimations of the disease's severity can lead to neglect of proper care and treatment. Therefore, there is a critical necessity for comprehensive educational crusades designed for rectifying these misconceptions and promoting a more accurate understanding of hypertension and its potential consequences. Such initiatives are essential for motivating individuals to adopt healthier lifestyles and adhere to treatment regimens, ultimately reducing the risk of severe hypertension-related complications.

Lastly, the associations identified between hypertension risk and demographic including lifestyle factors — such as gender, age, education level, and dietary habits — offer invaluable insights for public health interventions. These results underscore the necessity for health programmes that are not merely broad reaching but also specifically tailored to address the needs and characteristics of at-risk groups. For instance, interventions aimed at dietary modifications, smoking cessation, and alcohol consumption reduction must be designed with an understanding of the local culture, beliefs, and practices to ensure their effectiveness and acceptance.

**Recommendations**

The following recommendations were made based on the conclusions:

1. To combat the concerning prevalence of hypertension among rural dwellers in the Eastern Region of Ghana, the Ministry of Health, in collaboration with local healthcare providers and non-governmental organisations (NGOs), should establish community health education programmes. These programmes should engage local health workers and community leaders in educating residents about hypertension, its risks, and the importance of regular check-ups. Additionally, the Ministry of Health should work with pharmaceutical companies to ensure the reliable supply of affordable hypertension medications in rural areas. Mobile clinics and local health centres can be utilised for routine health screenings to identify individuals with hypertension and provide timely care.
2. Local health authorities and NGOs, with support from the Ministry of Food and Agriculture, should launch community-based nutrition and exercise

programmes to promote healthy lifestyles and weight management. These programmes should encourage healthier eating habits and regular physical activity tailored to the local culture and resources. Women's groups and community leaders can play a crucial role in facilitating these initiatives, ensuring that they are culturally sensitive and accessible to all residents.

3. Public awareness campaigns should be organised by the Ministry of Information and local community development committees, with the involvement of healthcare professionals and local media outlets. These campaigns should emphasise the seriousness of hypertension and its consequences. Community workshops and seminars led by local health educators and community health workers can provide practical knowledge about hypertension, its risk factors, and how to manage and prevent it. These workshops should be held in collaboration with local community centres and churches, making them easily accessible to residents.
4. Gender-specific health programmes aimed at women should be developed in collaboration with women's organisations and the Ministry of Women and Gender. These programmes should focus on women's health, nutrition, and lifestyle choices. Adult education programmes should be established in partnership with local schools and adult education centres to provide basic health literacy and awareness for those lacking formal education. Dietary guidance promoting reduced salt consumption can be delivered through collaborations with local chefs and cooks. Smoking cessation and alcohol awareness programs should be coordinated with the Ministry of Education,

Ministry of Youth and Sports, and local youth organisations to help individuals to quit smoking and reduce alcohol consumption.

5. There is also the need to increase capacity of local health facilities such as improved infrastructure and well-equipped local health centres to ably deliver their services to the rural people and beyond.

**Suggestions for Future Research**

The following are proposed for future studies:

1. Longitudinal studies are needed to track the progression of hypertension and associated risk factors over time among rural dwellers. This will provide a better understanding of how these factors evolve and their long-term impact on the rural population's health.
2. Supplementing quantitative data with qualitative research to explore the cultural and social factors influencing hypertension prevalence would be a cutting-edge study. Understanding the community's beliefs, perceptions, and attitudes toward hypertension can inform more culturally tailored interventions.
3. Comparative studies with urban and rural populations in the Eastern Region of Ghana to identify unique risk factors and strategies for hypertension prevention and management are needed.

## REFERENCES

Bustami, M., Matalka, K. Z., Mallah, E., Abu-Qatouseh, L., Dayyih, W. A., Hussein, N., ... & Arafat, T. (2021). The prevalence of overweight and obesity among women in Kpando. *Journal of Multidisciplinary Healthcare, 14*, 1533-1541.

Fenta, E. T., Tiruneh, M. G., & Anagaw, T. F. (2023, March). Exploring enablers and barriers of healthy dietary behavior based on the socio-ecological model, a qualitative systematic review. *Nutrition and Dietary Supplements*, *15*, 13–23. https://doi.org/10.2147/nds.s395444

Kilanowski, J. F. (2017). Breadth of the socio-ecological model. *Journal of Agromedicine*, *22*(4), 295–297.

Layous, K., & Nelson-Coffey, S. K. (2021). The effect of perceived social support on personal resources following minor adversity: An experimental investigation of belonging affirmation. *Personality and Social Psychology Bulletin*, *47*(7), 1152-1168.

Abankwah, D. (2016). *Socio-economic differences in the quality of life of adult hypertensives attending the outpatient clinic at the Eastern Regional Hospital*. Retrieved January 21, 2024 from: https://afribary.com/works/socio-economic-differences-in-the-quality-of-life-of-adult-hypertensives-attending-the-out-patient-clinic at-the-Eastern-Regional-hospital citework

Abdul-Aziz, S. (2017). Healthcare seeking behaviour among adolescents in basic schools in Yamoransa. *Proceedings of the 2017 ACM on Conference on Information and Knowledge Management*, *6*, 1–66. https://doi.org/10.13140/RG.2.2.21709.18404

Abebe, S. M., Berhane, Y., Worku, A., & Getachew, A. (2015). Prevalence and associated factors of hypertension: A cross-sectional community based study in Northwest Ethiopia. *PLoS ONE*, *10*(4), 1–11. https://doi.org/10.1371/journal.pone.0125210

Abraham, C., & Sheeran, P. (2015). The health belief model. *Predicting Health Behaviour: Research and Practice with Social Cognition Models*, *2*, 30-55.

Acheampong, K., Nyamari, J. M., Ganu, D., Appiah, S., Pan, X., Kaminga, A., & Liu, A. (2019). Predictors of hypertension among adult female population in Kpone-Katamanso District, Ghana. *International journal of hypertension*, *2019*(1), 1876060.

Ackerman, B., Schmid, I., Rudolph, K. E., Seamans, M. J., Susukida, R., Mojtabai, R., & Stuart, E. A. (2019). Implementing statistical methods for generalizing randomized trial findings to a target population. *Addictive Behaviours*, *94*, 124-132.

Addo, J., Amoah, A. G., & Koram, K. A. (2006). The changing patterns of hypertension in Ghana. *Ethnicity & Disease*, *16*(4), 894-899.

Addo, J., Agyemang, C., Smeeth, L., Aikins, A. D. G., Adusei, A. K., & Ogedegbe, O. (2012). A review of population-based studies on hypertension in Ghana. *Ghana medical journal*, *46*(2), 4-11.

Adeba, A., Dessalegn, T., & Tefera, B. (2023). Theory-based lifestyle educational intervention through intensive community leaders' affects healthy lifestyles adoption of middle-aged Nekemte populations: A quasi-experimental control study. *Medicine*, *102*(5), e31414.

Adeloye, D., & Basquill, C. (2014). Estimating the prevalence and awareness rates of hypertension in Africa: A systematic analysis. *PLoS ONE*, *9*(8). https://doi.org/10.1371/journal.pone.0104300

Adeloye, D., Owolabi, E. O., Ojji, D. B., Auta, A., Dewan, M. T., Olanrewaju, T. O., … Harhay, M. O. (2021). Prevalence, awareness, treatment, and control of hypertension in Nigeria in 1995 and 2020: A systematic analysis of current evidence. *Journal of Clinical Hypertension*, *23*(5), 963–977. https://doi.org/10.1111/jch.14220

Adongo, W. B., & Asaarik, M. J. A. (2018). Health seeking behaviors and utilization of healthcare services among rural dwellers in under-resourced communities in Ghana. *International Journal of Caring Sciences*, *11*(2), 840–850.

Afrifa-Anane, E., Agyemang, C., Codjoe, S. N. A., Ogedegbe, G., & De-Graft Aikins, A. (2015). The association of physical activity, body mass index and the blood pressure level among urban poor youth in Accra, Ghana. *BMC Public Health*, *15*(1), 1–9. https://doi.org/10.1186/s12889-015-1546-3

Agyei-Baffour, P., Tetteh, G., Quansah, D. Y., Boateng, D., & Boateng, D. (2018). Prevalence and knowledge of hypertension among people living in rural communities in Ghana: a mixed method study. *African Health Sciences*, *18*(4), 931–941. https://doi.org/10.4314/ahs.v18i4.12

Ahmadpanah, M., Arji, M., Arji, J., Haghighi, M., Jahangard, L., Sadeghi Bahmani, D., & Brand, S. (2019). Sociocultural attitudes towards appearance, self-esteem and symptoms of body-dysmorphic disorders among young adults. *International Journal of Environmental Research and Public Health*, *16*(21), 4236.

Ajayi, K., Alli, Y., Oluwadare, T., & Omojola, S. T. (2015). Prevalence of obesity among urban and rural dwellers in Nigeria. *Journal of Nutritional Health & Food Engineering*, *3*(1), 54-66

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.

Aljassim, N., & Ostini, R. (2020). Health literacy in rural and urban populations: a systematic review. *Patient Education and Counseling*, *103*(10), 2142-2154.

Aljuraiban, G. S., Al Slail, F. Y., Aldhwailea, S. K., Badawi, A. A., Beaney, T., Clarke, J., & Poulter, N. R. (2021). May measurement month 2019: an analysis of blood pressure screening results from Saudi Arabia. *European Heart Journal Supplements*, *23*(Supplement_B), B128–B130. https://doi.org/10.1093/eurheartj/suab029

Amelor, S., Kweku, M., Agboli, E., Agbemafle, I., Takramah, W., Tarkang, E., … Binka, F. (2016). Risk factors associated with hypertension among adults in the Hohoe Municipality, Ghana. *British Journal of Medicine and Medical Research*, *18*(4), 1–12. https://doi.org/10.9734/bjmmr/2016/29463

Andale, T., Orango, V., Lwande, G. O., Mwaura, G. W., Mugo, R., Limo, O. K., ... & Kamano, J. H. (2021). Anthropometric measurements as predictors of hypertension in Busia, Vihiga, Trans Nzoia and Siaya counties of Western Kenya. *medRxiv*, 2021-07.

Angaw, K., Dadi, A. F., & Alene, K. A. (2015). Prevalence of hypertension among federal ministry civil servants in Addis Ababa, Ethiopia: A call for a workplace-screening program. *BMC Cardiovascular Disorders*, *15*(1), 1–6. https://doi.org/10.1186/s12872-015-0062-9

Angaw, K., Dadi, A. F., & Alene, K. A. (2015). Prevalence of hypertension among federal ministry civil servants in Addis Ababa, Ethiopia: a call for a workplace-screening program. *BMC Cardiovascular Disorders*, *15*, 1-6.

Aniah, P., Kaunza-Nu-Dem, M. K., & Ayembilla, J. A. (2019). Smallholder farmers' livelihood adaptation to climate variability and ecological changes in the savanna agro ecological zone of Ghana. *Heliyon*, *5*(4). e01492.

Antza, C., Cifkova, R., & Kotsis, V. (2018). Hypertensive complications of pregnancy: a clinical overview. *Metabolism*, *86*, 102-111.

Appiah, F., Ameyaw, E. K., Oduro, J. K., Baatiema, L., Sambah, F., Seidu, A. A., … Budu, E. (2021). Rural-urban variation in hypertension among women in Ghana: insights from a national survey. *BMC Public Health*, *21*(1). https://doi.org/10.1186/s12889-021-12204-7

Aqtam, I., & Darawwad, M. (2018). Health promotion model: An Integrative Literature Review. *Open Journal of Nursing*, *08*(07), 485–503. https://doi.org/10.4236/ojn.2018.87037

Araujo, P., & Frøyland, L. (2007). Statistical power and analytical quantification. *Journal of Chromatography B*, *847*(2), 305-308.

Arlinghaus, K. R., Truong, C., Johnston, C. A., & Hernandez, D. C. (2018). An intergenerational approach to break the cycle of malnutrition. *Current Nutrition Reports*, *7*, 259-267.

Asenso-Okyere, K., Aragon, C., Thangata, P., & Andam, K. S. (2019). Health interaction with farm labor productivity: final report to the Bill & Melinda Gates Foundation. *Gates Open Res*, *3*(1032), 1032-1048.

Assari, S. (2019). Socioeconomic determinants of systolic blood pressure; minorities' diminished returns. *Journal of Health Economics and Development*, *1*(1), 1–11. Retrieved August 2023 from http://www.ncbi.nlm.nih.gov/pubmed/31428747%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC6699161

Atibila, F., Hoor, G. ten, Donkoh, E. T., Wahab, A. I., & Kok, G. (2021). Prevalence of hypertension in Ghanaian society: A systematic review, meta-analysis, and GRADE assessment. *Systematic Reviews*, *10*(1), 1–15. https://doi.org/10.1186/s13643-021-01770-x

Awuah, R. B., de-Graft Aikins, A., Dodoo, F. N. A., Meeks, K. A., Beune, E. J., Klipstein-Grobusch, K., ... & Agyemang, C. (2019). Psychosocial factors and hypertension prevalence among Ghanaians in Ghana and Ghanaian migrants in Europe: The RODAM study. *Health Psychology Open*, *6*(2), 2055102919885752.

Azian, N., Zaki, M., Ambak, R., Othman, F., Wong, N. I., Man, C. S., … Baharudin, A. (2021). The prevalence of hypertension among Malaysian adults and its associated risk factors: Data from Malaysian Community Salt Study ( MyCoSS ). *Journal of Health, Population and Nutrition*, *40*(Suppl 1), 4–9. https://doi.org/10.1186/s41043-021-00237-y

Azubuike, S., & Kurmi, R. (2014). Awareness, practices, and prevalence of hypertension among rural Nigerian women. *Archives of Medicine and Health Sciences*, *2*(1), 23. https://doi.org/10.4103/2321-4848.133791

Azumah, F. D., Onzaberigu, N. J., & Adongo, A. A. (2022). Gender, agriculture and sustainable livelihood among rural farmers in northern Ghana. *Economic Change and Restructuring*, 1-23.

Babbie, E. (2005). Truth, objectivity, and agreement. *The production of reality: essays and readings on social interaction*, *36*(9).

Babbie, E., Halley, F., & Zaino, J. (2007). *Adventures in social research: data analysis using SPSS 14.0 and 15.0 for Windows*. Pine Forge Press.

Badego, B., Yoseph, A., & Astatkie, A. (2020). Prevalence and risk factors of hypertension among civil servants in Sidama Zone, south Ethiopia. *PloS ONE*, *15*(6), e0234485.

Bashyal, S. P., & Thapa, N. (2020). Knowledge and perception regarding hypertension among hypertensive patients at a tertiary hospital in Kathmandu, Nepal. *Journal of Advanced Academic Research*, *7*(1), 51-62.

Bayray, A., Meles, K. G., & Sibhatu, Y. (2018). Magnitude and risk factors for hypertension among public servants in Tigray, Ethiopia: A cross-sectional study. *PloS ONE*, *13*(10), e0204879.

Bell, E., Bryman, A., & Harley, B. (2022). *Business research methods*. Oxford university press.

Bennett, J. E., Kontis, V., Mathers, C. D., Guillot, M., Rehm, J., Chalkidou, K., ... & Ezzati, M. (2020). NCD Countdown 2030: pathways to achieving Sustainable Development Goal target 3.4. *The Lancet*, *396*(10255), 918-934.

Berhane, Y., & Worku, A. (2022). Illness representation and associated factors among hypertensive patients in Central Ethiopia. *Ethiopian Journal of Health Sciences*, *32*(2).

Bhandari, N., Bhusal, B. R., Takma, K. C., & Lawot, I. (2016). Quality of life of patient with hypertension in Kathmandu. *International Journal of Nursing Sciences*, *3*(4), 379-384.

Bhattarai, S., Bajracharya, S., Shrestha, A., Skovlund, E., Åsvold, B. O., Mjolstad, B. P., & Sen, A. (2023). Facilitators and barriers to hypertension management in urban Nepal: findings from a qualitative study. *Open Heart*, *10*(2), e002394.

Biddle, N., Edwards, B., Gray, M., & Sollis, K. (2020). Hardship, distress, and resilience: The initial impacts of COVID-19 in Australia.

Bindhu, A. S., Thankam, K., Jose, R., Benny, P. V., Beevi, N., & Haran, J. C. (2019). Prevalence of obesity and overweight among adults in a rural area in Trivandrum-A cross sectional study. *Kerala Medical Journal*, *12*(2), 31-34.

Bonarjee, V. V. (2018). Arterial stiffness: a prognostic marker in coronary heart disease. Available methods and clinical application. *Frontiers in Cardiovascular Medicine*, *5*, 64.

Bostoen, K., & Chalabi, Z. (2006). Optimization of household survey sampling without sample frames. *International Journal of Epidemiology*, *35*(3), 751-755.

Bosu, W. K., & Bosu, D. K. (2021). Prevalence, awareness and control of hypertension in Ghana: A systematic review and meta-analysis. In *PLoS ONE* (Vol. 16). https://doi.org/10.1371/journal.pone.0248137

Bosu, W. K., Reilly, S. T., Aheto, J. M. K., & Zucchelli, E. (2019). Hypertension in older adults in Africa: A systematic review and meta-analysis. *PLoS ONE*, *14*(4), 1–25. https://doi.org/10.1371/journal.pone.0214934

Brandes, K. (2017). *Communicating about concerns in oncology*. Universiteit van Amsterdam.

Broadbent, E., Petrie, K. J., Main, J., & Weinman, J. (2006). The brief illness perception questionnaire. *Journal of Psychosomatic Research*, *60*(6), 631-637.

Broadbent, E., Wilkes, C., Koschwanez, H., Weinman, J., Norton, S., & Petrie, K. J. (2015). A systematic review and meta-analysis of the Brief Illness Perception Questionnaire. *Psychology & Health*, *30*(11), 1361-1385.

Budreviciute, A., Damiati, S., Sabir, D. K., Onder, K., Schuller-Goetzburg, P., Plakys, G., ... & Kodzius, R. (2020). Management and prevention strategies for non-communicable diseases (NCDs) and their risk factors. *Frontiers in Public Health*, *8*, 788.

Buford, T. W. (2016). Hypertension and aging. *Ageing Research Reviews*, *26*, 96–111. https://doi.org/10.1016/j.arr.2016.01.007

Burkholder, G. J., Cox, K. A., Crawford, L. M., & Hitchcock, J. H. (Eds.). (2019). *Research design and methods: An applied guide for the scholar-practitioner*. Sage Publications.

Callahan, K. (2014). Assessing the social and ecological factors that influence childhood overweight and obesity. *College of Public Health East Tennessee State University*, (December).

Calys-Tagoe, B., Nuertey, B. D., Tetteh, J., & Yawson, A. E. (2020). Individual awareness and treatment effectiveness of hypertension among older adults in Ghana: Evidence from the world health organization study of global ageing and adult health wave 2. *Pan African Medical Journal*, *37*(264), 1–16. https://doi.org/10.11604/pamj.2020.37.264.24526

Carey, R. M., Muntner, P., Bosworth, H. B., & Whelton, P. K. (2019). Prevention and Control of Hypertension. *JACC Health Promotion Series*. *72*(11), 1278–1293. https://doi.org/10.1016/j.jacc.2018.07.008.Prevention

Centres for Disease Control and Prevention. (2012). *Overview of non-communicable diseases and related factors*. Retrieved July 12, 2023 fromhttps://www.cdc.gov/globalhealth/healthprotection/fetp/training_modules/new-8/overview-of-ncds_ppt_qa-revcom_09112013.pdf

Chan, A. H. Y., Cooper, V., Lycett, H., & Horne, R. (2020). Practical barriers to medication adherence: what do current self-or observer-reported instruments assess? *Frontiers in Pharmacology*, *11*, 532114.

Charchar, F. J., Prestes, P. R., Mills, C., Ching, S. M., Neupane, D., Marques, F. Z., ... & Tomaszewski, M. (2024). Lifestyle management of hypertension: International Society of Hypertension position paper endorsed by the World Hypertension League and European Society of Hypertension. *Journal of hypertension*, *42*(1), 23-49.

Chen, H. H., & Hsieh, P. L. (2021). Applying the pender's health promotion model to identify the factors related to older adults' participation in community-based health promotion activities. *International Journal of Environmental Research and Public Health*, *18*(19). https://doi.org/10.3390/ijerph18199985

Chigbu, C. O., Parhofer, K. G., Aniebue, U. U., & Berger, U. (2018). Prevalence and sociodemographic determinants of adult obesity: a large representative household survey in a resource-constrained African setting with double burden of undernutrition and overnutrition. *Journal Epidemiology and Community Health*, *72*(8), 702-707.

Chobanian, A. V., Bakris, G. L., Black, H. R., Cushman, W. C., Green, L. A., Izzo, J. L., Jones, D. W., Materson, B. J., Oparil, S., Wright, J. T., Roccella, E. J., Lenfant, C., Carter, B. L., Cohen, J. D., Colman, P. J., Cziraky, M. J., Davis, J. J., Ferdinand, K. C., Gifford, R. W., … Karimbakas, J. (2003). The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure: The JNC 7 report. *JAMA*, *289*(19), 2560–2571. https://doi.org/10.1001/JAMA.289.19.2560

Choi, J. R., Ahn, S. V., Kim, J. Y., Koh, S. B., Choi, E. H., Lee, G. Y., & Jang, Y. E. (2018). Comparison of various anthropometric indices for the identification of a predictor of incident hypertension: the ARIRANG study. *Journal of Human Hypertension 2018 32:4*, *32*(4), 294–300. https://doi.org/10.1038/s41371-018-0043-4

Chowdhury, S., & Chakraborty, P. pratim. (2017). Universal health coverage - There is more to it than meets the eye. *Journal of Family Medicine and Primary Care*, *6*(2), 169–170. https://doi.org/10.4103/jfmpc.jfmpc

Chu, D. T., & Singh, V. (2021). Obesity and hypertension in Asia: Current status and challenges. *The Lancet Regional Health - Western Pacific*, *15*, 100243. https://doi.org/10.1016/j.lanwpc.2021.100243

Cois, A., & Ehrlich, R. (2014). Analysing the socioeconomic determinants of hypertension in South Africa: a structural equation modelling approach. *BMC Public Health*, *14*, 1-11.

Committee, C. (2011). Principles of community engagement. Retrieved August 27, 2023 from: http://www.cdc.gov/ phppo/pce/.

Craig, L. S., Gage, A. J., & Thomas, A. M. (2018). Prevalence and predictors of hypertension in Namibia: A national-level cross-sectional study. *PLoS ONE*, *13*(9), 1–14. https://doi.org/10.1371/journal.pone.0204344

Creswell, J. W., & Sinley, R. C. (2017). Developing a culturally-specific mixed methods approach to global research. *KZfSS Kölner Zeitschrift Für Soziologie Und Sozialpsychologie*, *69*(S2), 87–105. https://doi.org/10.1007/s11577-017-0453-2

Cuevas, A. G., Prevention, C., Fellow, P., Sciences, B., Williams, D. R., Norman, F. S., … Francisco, S. (2018). *HHS Public Access*. *35*(2), 223–230. https://doi.org/10.1016/j.ccl.2016.12.004.

Cuevas, A. G., Williams, D. R., & Albert, M. A. (2017). Psychosocial factors and hypertension: a review of the literature. *Cardiology Clinics*, *35*(2), 223-230.

Cuschieri, S., Vassallo, J., Calleja, N., Pace, N., & Mamo, J. (2017). The effects of socioeconomic determinants on hypertension in a cardiometabolic at-risk European country. *International Journal of Hypertension*, *2017*(1), 7107385. https://doi.org/10.1155/2017/7107385.

Czont, A., Freyer, T., Bodor, Z., Mara, G., Sandor, J., & Miklossy, I. (2023). Position-based anthropometric characteristics and g eneral physiological performance of national level, U18 ice hockey players. *Sportis. Scientific Journal of School Sport, Physical Education and Psychomotricity*, *9*(1), 81-97.

Darsini, D., Hamidah, H., Notobroto, H. B., & Cahyono, E. A. (2020). Health risks associated with high waist circumference: A systematic review. *Journal of Public Health Research*, *9*(2), 94–100.

De Alba, A., Britigan, D. H., Lyden, E., & Johansson, P. (2019). Assessing the prevalence and association of acculturation and health literacy levels in Spanish-speaking Hispanic patients at midwestern community health centers in the USA. *Journal of Racial and Ethnic Health Disparities*, *6*, 701-706.

De Oliveira, B. L. C. A., Lima, S. F., Costa, A. S. V., Da Silva, A. M., & De Britto E Alves, M. T. S. S. (2021). Social participation and self-assessment of health status among older people in brazil. *Coletiva*, *26*(2), 581–592. https://doi.org/10.1590/1413-81232021262.20342019

Defianna, S. R., Santosa, A., Probandari, A., & Dewi, F. S. T. (2021). Gender differences in prevalence and risk factors for hypertension among adult populations: A cross-sectional study in indonesia. *International Journal of Environmental Research and Public Health*, *18*(12). https://doi.org/10.3390/ijerph18126259

Dhungana, R. R., Pedisic, Z., Pandey, A. R., Shrestha, N., & de Courten, M. (2021). Barriers, enablers and strategies for the treatment and control of hypertension in Nepal: a systematic review. *Frontiers in Cardiovascular Medicine*, *8*, 716080.

Dosoo, D. K., Nyame, S., Enuameh, Y., Ayetey, H., Danwonno, H., Twumasi, M., ... & Asante, K. P. (2019). Prevalence of hypertension in the middle belt of Ghana: A Community-Based Screening Study. *International journal of hypertension*, *2019*(1), 1089578. https://doi.org/10.1155/2019/1089578

Ebirim, C. I. C., Udujih, O. G., Dozie, U. W., Agbaka, C. A., Orji, S. M., & Anaele, C. (2018). Prevalence of hypertension among adults aged 40 years and above in Ahiazu Mbaise, IMO state, Nigeria. *Arch Community Med Public Health*, *4*(1), 013-016.

Egbi, O. G., Ahmed, S. D., & Madubuko, R. (2021). Prevalence and biosocial determinants of hypertension in a rural population in Edo State, Southern Nigeria. *African Journal of Primary Health Care & Family Medicine*, *13*(1), 1-7.

Eke, S. (2018). Digitalcommons @ tmc association of hypertension perceptions and antihypertensive medication adherence among black hypertensive adults in primary care settings. Retrieved July 12, 2023 from: https://digitalcommons.library.tmc.edu/uthson_etd/52/

Ekström, S., Andersson, N., Kull, I., Georgelis, A., Ljungman, P. L., Melén, E., & Bergström, A. (2023). Changes in lifestyle, adiposity, and cardiometabolic markers among young adults in Sweden during the COVID-19 pandemic. *BMC Public Health*, *23*(1), 1-11.

El Meouchy, P., Wahoud, M., Allam, S., Chedid, R., Karam, W., & Karam, S. (2022). Hypertension related to obesity: pathogenesis, characteristics and factors for control. *International Journal of Molecular Sciences*, *23*(20), 12305.

Elagizi, A., Kachur, S., Lavie, C. J., Carbone, S., Pandey, A., Ortega, F. B., & Milani, R. V. (2018). An overview and update on obesity and the obesity paradox in cardiovascular diseases. *Progress in Cardiovascular Diseases*, *61*(2), 142-150.

El-Soud, F. A. A., Alhoraim, S. A., Alammar, B. A., & Alotaibi, R. S. (2020). Quality of life, self-rated health and social support among older adult in the Saudi community. *The Malaysian Journal of Nursing*, *11*(03), 13–25. https://doi.org/10.31674/mjn.2020.v11i03.003

Etikan, I., & Bala, K. (2017). Sampling and sampling methods. *Biometrics & Biostatistics International Journal*, *5*(6), 00149.

Eunice O, O. (2017). Hypertension prevention and control: effects of a community health nurse-led intervention. *Journal of Health Education Research & Development*, *05*(01). https://doi.org/10.4172/2380-5439.1000210

Faulkner, S. S., & Faulkner, C. A. (2018). *Research methods for social workers: A practice-based approach*. Oxford University Press.

Ferrari, G., Giannichi, B., Resende, B., Paiva, L., Rocha, R., Falbel, F., ... & Rezende, L. F. M. (2022). The economic burden of overweight and obesity in Brazil: perspectives for the Brazilian Unified Health System. *Public Health*, *207*, 82-87.

Ford, C. D., Sims, M., Higginbotham, J. C., Crowther, M. R., Wyatt, S. B., Musani, S. K., ... & Parton, J. M. (2016). Psychosocial factors are associated with blood pressure progression among African Americans in the Jackson Heart study. *American Journal of Hypertension*, *29*(8), 913-924. https://doi.org/10.1093/ajh/hpw013

Fryar, C. D., Ostchega, Y., Hales, C. M., Zhang, G., & Kruszon-Moran, D. (2015). *Key findings data from the national health and nutrition examination survey*. *Hypertension prevalence and control among adults: United States*. Retrieved June 29, 2023 from: https://www.cdc.gov/nchs/data/databriefs/db289_table.pdf#2.

Fujikoshi, Y., Ulyanov, V. V., & Shimizu, R. (2011). *Multivariate statistics: High-dimensional and large-sample approximations*. John Wiley & Sons.

Galiè, N., Channick, R. N., Frantz, R. P., Grünig, E., Jing, Z. C., Moiseeva, O., ... & McLaughlin, V. V. (2019). Risk stratification and medical therapy of pulmonary arterial hypertension. *European Respiratory Journal*, *53*(1). 79-94.

Gallucci, G., Tartarone, A., Lerose, R., Lalinga, A. V., & Capobianco, A. M. (2020). Cardiovascular risk of smoking and benefits of smoking cessation. *Journal of Thoracic Disease*, *12*(7), 3866. https://doi.org/10.21037/JTD.2020.02.47

Gandham, A., Mesinovic, J., Cervo, M. M., Glavas, C., Jansons, P., Ng, C. A., ... & Scott, D. (2023). Associations of body mass index, body fat percentage and sarcopenia components with bone health estimated by second-generation high-resolution peripheral quantitative computed tomography in older adults with obesity. *Experimental Gerontology*, *179*, 112227.

Gao, J., Akbari, A., & Wang, T. (2022). Green tea could improve elderly hypertension by modulating arterial stiffness, the activity of the renin/angiotensin/aldosterone axis, and the sodium–potassium pumps in old male rats. *Journal of Food Biochemistry*, *46*(12), e14398. https://doi.org/10.1111/JFBC.14398

Garies, S., Hao, S., McBrien, K., Williamson, T., Peng, M., Khan, N. A., … Leung, A. A. (2019). Prevalence of hypertension, treatment, and blood pressure targets in Canada associated with the 2017 American College of Cardiology and American Heart Association Blood Pressure Guidelines. *JAMA Network Open*, *2*(3), 2–12. https://doi.org/10.1001/jamanetworkopen.2019.0406

Garies, S., Hao, S., McBrien, K., Williamson, T., Peng, M., Khan, N. A., ... & Leung, A. A. (2019). Prevalence of hypertension, treatment, and blood pressure targets in Canada associated with the 2017 American College of Cardiology and American Heart Association Blood Pressure Guidelines. *JAMA Network Open*, *2*(3), e190406-e190406.

GBD (2015). Health effects of overweight and obesity in 195 countries over 25 years. *New England Journal of Medicine*, *377*(1), 13-27.

Gebreyes, Y. F., Goshu, D. Y., Geletew, T. K., Argefa, T. G., Zemedu, T. G., Lemu, K. A., ... & Belayneh, A. B. (2018). Prevalence of high bloodpressure, hyperglycemia, dyslipidemia, metabolic syndrome and their determinants in Ethiopia: Evidences from the National NCDs STEPS survey, 2015. *PloS ONE*, *13*(5), e0194819.

Ghauri, P., Grønhaug, K., & Strange, R. (2020). *Research methods in business studies*. Cambridge University Press.

Golden, S. D., & Earp, J. A. L. (2012). Social ecological approaches to individuals and their contexts: twenty years of health education & behavior health promotion interventions. *Health Education and Behavior*, *39*(3), 364–372. https://doi.org/10.1177/1090198111418634.

Gorbani, F., Mahmoodi, H., Sarbakhsh, P., & Shaghaghi, A. (2020). Predictive performance of Pender's health promotion model for hypertension control in Iranian patients. *Vascular health and risk management*, 299-305.

Griendling, K. K., Camargo, L. L., Rios, F. J., Alves-Lopes, R., Montezano, A. C., & Touyz, R. M. (2021). Oxidative stress and hypertension. *Circulation Research*, *128*(7), 993–1020. https://doi.org/10.1161/CIRCRESAHA.121.318063.

Gupta, R., Gaur, K., & S. Ram, C. V. (2019). Emerging trends in hypertension epidemiology in India. *Journal of Human Hypertension*, *33*(8), 575-587.

Guwatudde, D., Nankya-Mutyoba, J., Kalyesubula, R., Laurence, C., Adebamowo, C., Ajayi, I. O., … Dalal, S. (2015). The burden of hypertension in sub-Saharan Africa: A four-country cross sectional study. *BMC Public Health*, *15*(1), 1–8. https://doi.org/10.1186/s12889-015-2546-z.

Guwatudde, D., Nankya-Mutyoba, J., Kalyesubula, R., Laurence, C., Adebamowo, C., Ajayi, I., ... & Dalal, S. (2015). The burden of hypertension in sub-Saharan Africa: a four-country cross sectional study. *BMC Public Health*, *15*, 1-8.

Halabi, A., Kenett, R. S., & Sacerdote, L. (2018). Modeling the relationship between reliability assessment and risk predictors using Bayesian networks and a multiple logistic regression model. *Quality Engineering*, *30*(4), 663-675.

Hall, M. E., Cohen, J. B., Ard, J. D., Egan, B. M., Hall, J. E., Lavie, C. J., ... & American Heart Association Council on Hypertension; Council on Arteriosclerosis, Thrombosis and Vascular Biology; Council on Lifestyle and Cardiometabolic Health; and Stroke Council. (2021). Weight-loss strategies for prevention and treatment of hypertension: a scientific statement from the American Heart Association. *Hypertension*, *78*(5), e38-e50.

Han, J., Batterham, P. J., Calear, A. L., & Randall, R. (2018). Factors influencing professional help-seeking for suicidality: A systematic review. *Crisis*, *39*(3), 175–196. https://doi.org/10.1027/0227-5910/a000485

Hanna, D. R., Walker, R. J., Smalls, B. L., Campbell, J. A., Dawson, A. Z., & Egede, L. E. (2019). Prevalence and correlates of diagnosed and undiagnosed hypertension in the indigenous Kuna population of Panamá. *BMC Public Health*, *19*(1), 1–9. https://doi.org/10.1186/s12889-019-7211-5

Harrison, R. L., Reilly, T. M., & Creswell, J. W. (2020). Methodological rigor in mixed methods: An application in management studies. *Journal of Mixed Methods Research*, *14*(4), 473-495.

Hay, S., & Global Burden of Disease 2015 Obesity Collaborators. (2017). Health effects of overweight and obesity in 195 countries over 25 years. *New England Journal of Medicine*, *377*.

Haye, T. B., & Tolera-Agama, B. (2020). Prevalence of hypertension and associated factors among the outpatient department in Akaki Kality Subcity health centers, Addis Ababa, Ethiopia. *International journal of hypertension*, *2020*(1), 7960578.

He, Y., Chen, D., Xu, J. P., Jin, J., Wang, J., Geng, C., & He, Y. M. (2022). Association between serum uric acid and hypertension in a large cross-section study in a Chinese population. *Journal of Cardiovascular Development and Diseas,* *9*(10), 346. https://doi.org/10.3390/JCDD9100346.

Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-Based Nursing*, *18*(3), 66-67.

Helelo, T. P., Gelaw, Y. A., & Adane, A. A. (2014). Prevalence and associated factors of hypertension among adults in Durame town, Southern Ethiopia. *PLoS ONE*, *9*(11), 1–9. https://doi.org/10.1371/journal.pone.0112790

Hiremath, R. N., Kumar, M., Huchchannavar, R., & Ghodke, S. (2023). Obesity and visceral fat: Indicators for anemia among household women visiting a health camp on world obesity day. *Clinical Epidemiology and Global Health*, *20*, 101255.

Hisamatsu, T., Segawa, H., Kadota, A., Ohkubo, T., Arima, H., & Miura, K. (2020). Epidemiology of hypertension in Japan: beyond the new 2019 Japanese guidelines. *Hypertension Research,* *43*(12), 1344–1351. https://doi.org/10.1038/s41440-020-0508-z.

Hom, M. A., Stanley, I. H., & Joiner, T. E. (2015). Evaluating factors and interventions that influence help-seeking and mental health service utilization among suicidal individuals: A review of the literature. *Clinical Psychology Review*, *40*, 28–39. https://doi.org/10.1016/j.cpr.2015.05.006.

Hu, B., Liu, X., Yin, S., Fan, H., Feng, F., & Yuan, J. (2015). Effects of psychological stress on hypertension in middle-aged Chinese: A cross-sectional study. *PLoS ONE*, *10*(6), 1–13. https://doi.org/10.1371/journal.pone.0129163.

Jeemon, P., Séverin, T., Amodeo, C., Balabanova, D., Campbell, N. R. C., Gaita, D., … Prabhakaran, D. (2021). World heart federation roadmap for hypertension 2021 update. *Global Heart*, *16*(1). https://doi.org/10.5334/GH.1066.

Johnson, H. M. (2019). Anxiety and hypertension: is there a link? a literature review of the comorbidity relationship between anxiety and hypertension. *Current Hypertension Reports*, *21*(9), 1–7. https://doi.org/10.1007/S11906-019-0972-5/METRICS.

Jongen, V. W., Lalla-Edward, S. T., Vos, A. G., Godijk, N. G., Tempelman, H., Grobbee, D. E., … Klipstein-Grobusch, K. (2019). Hypertension in a rural community in South Africa: What they know, what they think they know and what they recommend. *BMC Public Health*, *19*(1), 1–10. https://doi.org/10.1186/s12889-019-6642-3.

Kalnins, A. (2018). Multicollinearity: How common factors cause Type 1 errors in multivariate regression. *Strategic Management Journal*, *39*(8), 2362–2385. https://doi.org/10.1002/SMJ.2783.

Kamran, A., Azadbakht, L., Sharifirad, G., Mahaki, B., & Sharghi, A. (2014). Sodium intake, dietary knowledge, and illness perceptions of controlled and uncontrolled rural hypertensive patients. *International journal of hypertension*, *2014*(1), 245480. https://doi.org/10.1155/2014/245480.

Kamran, A., Sharifirad, G., Heydari, H., & Sharifian, E. (2016). The effect of theory based nutritional education on fat intake, weight and blood lipids. *Electronic physician*, *8*(12), 3333.

Kazdin, A. E. (2021). Single-case experimental designs: Characteristics, changes, and challenges. *Journal of the Experimental Analysis of Behavior*, *115*(1), 56-85.

Khanam, M. A., Lindeboom, W., Razzaque, A., Niessen, L., & Milton, A. H. (2015). Prevalence and determinants of pre-hypertension and hypertension among the adults in rural Bangladesh: findings from a community-based study. *BMC Public Health*, 15(1), 1-9.

Kirunda, B. E., Fadnes, L. T., Wamani, H., Van den Broeck, J., & Tylleskär, T. (2015). A population-based survey of overweight and obesity and the associated factors in peri-urban and rural Eastern Uganda. *BMC Public Health*, *15*(1), 1-11.

Kishore, J., Gupta, N., Kohli, C., & Kumar, N. (2016). Prevalence of hypertension and determination of its risk factors in rural Delhi. *International Journal of Hypertension*, *2016,* 1-6. https://doi.org/10.1155/2016/7962595

Kitchlew, R., Chachar, A. Z. K., & Latif, S. (2017). Body mass index: Visceral fat and total body fat distribution and its relation to body mass index in clinical setting using bio-impedance body composition monitor. *The Professional Medical Journal*, *24*(02), 326-334.

Kjeldsen, S. E. (2018). Hypertension and cardiovascular risk: General aspects. *Pharmacological Research*, *129*, 95-99.

Knowles, S. R., Apputhurai, P., O'Brien, C. L., Ski, C. F., Thompson, D. R., & Castle, D. J. (2020). Exploring the relationships between illness perceptions, self-efficacy, coping strategies, psychological distress and quality of life in a cohort of adults with diabetes mellitus. *Psychology, Health & Medicine*, *25*(2), 214-228.

Kohler, I. V., Sudharsanan, N., Bandawe, C., & Kohler, H. P. (2022). Aging and hypertension among the global poor: Panel data evidence from Malawi. *PLoS Global Public Health*, *2*(6), e0000600.

Kohori, H., Id, S., Uematsu, H., Id, N. D., Wangdi, U., & Id, Y. I. (2021). Gender with marital status , cultural differences , and vulnerability to hypertension: Findings from the national survey for noncommunicable disease risk factors and mental health using WHO STEPS in Bhutan. *PLoS ONE,* 1–17. https://doi.org/10.1371/journal.pone.0256811.

Kondo, T., Nakano, Y., Adachi, S., & Murohara, T. (2019). Effects of tobacco smoking on cardiovascular disease. *Circulation Journal*, *83*(10), 1980-1985.

Kuiper, H., van Leeuwen, C. M., Stolwijk-Swüste, J. M., & Post, M. W. (2022). Reliability and validity of the brief illness perception questionnaire (B-IPQ) in individuals with a recently acquired spinal cord injury. *Clinical Rehabilitation*, *36*(4), 550-557.

Lamptey, P., Laar, A., Adler, A. J., Dirks, R., Caldwell, A., Prieto-Merino, D., ... & Perel, P. (2017). Evaluation of a community-based hypertension improvement program (ComHIP) in Ghana: data from a baseline survey. *BMC public health*, *17*, 1-16. https://doi.org/10.1186/s12889-017-4260-5

Landsbergis, P., García-Rivas, J., Juárez-García, A., Choi, B., Dobson Zimmerman, M., Gomez Ortiz, V., ... & Schnall, P. (2024). Occupational psychosocial factors and cardiovascular disease. In *Handbook of occupational health psychology, 3rd ed.* (pp. 309-339). American Psychological Association.

Latunji, O. O., & Akinyemi, O. O. (2018). Factors influencing health-seeking behaviour among civil servants in Ibadan, Nigeria. *Annals of Ibadan Postgraduate Medicine*, *16*(1), 52–60.

Laurent, S., & Boutouyrie, P. (2020). Arterial stiffness and hypertension in the elderly. *Frontiers in Cardiovascular Medicine*, *7*, 544302.

Laver-Fawcett, A., Brain, L., Brodie, C., Cardy, L., & Manaton, L. (2016). The face validity and clinical utility of the activity card sort–United Kingdom. *British Journal of Occupational Therapy*, *79*(8), 492-504.

Lemogoum, D., Van de Borne, P., Lele, C. E. B., Damasceno, A., Ngatchou, W., Amta, P., ... & Bovet, P. (2018). Prevalence, awareness, treatment, and control of hypertension among rural and urban dwellers of the Far North Region of Cameroon. *Journal of Hypertension*, *36*(1), 159-168.

Leng, B., Jin, Y., Li, G., Chen, L., & Jin, N. (2015). Socioeconomic status and hypertension: a meta-analysis. *Journal of Hypertension*, *33*(2), 221-229.

Lili, Y. (2016). *Factors influencing blood pressure among rural adults with hypertension in China* (Master's thesis). Loma Linda University. Retrieved January 13, 2023, from https://scholarsrepository.llu.edu/etd/381/

Little, M., Humphries, S., Dodd, W., Patel, K., & Dewey, C. (2020). Socio-demographic patterning of the individual-level double burden of malnutrition in a rural population in South India: a cross-sectional study. *BMC Public Health*, *20*, 1-14.

Little, M., Humphries, S., Patel, K., & Dewey, C. (2016). Factors associated with BMI, underweight, overweight, and obesity among adults in a population of rural south India: a cross-sectional study. *BMC Obesity*, *3*, 1-13.

Ma, J., & Li, H. (2018). The role of gut microbiota in atherosclerosis and hypertension. *Frontiers in Pharmacology*, *9*, 393604.

Machado, V., Botelho, J., Ramos, C., Proença, L., Alves, R., Cavacas, M. A., & Mendes, J. J. (2019). Psychometric properties of the brief illness perception questionnaire (Brief-IPQ) in periodontal diseases. *Journal of Clinical Periodontology*, *46*(12), 1183-1191.

Maharjan, S., Chinnawong, T., & Kritpracha, C. (2017). Illness perception among patients with hypertension in Nepal. *Journal of Nursing and Health Care (JNHC)*, *4*(2).

Matheson, F. I., Smith, K. L. W., Fazli, G. S., Moineddin, R., Dunn, J. R., & Glazier, R. H. (2014, June 25). Physical health and gender as risk factors for usage of services for mental illness. *Journal of Epidemiology and Community Health*, *68*(10), 971–978. https://doi.org/10.1136/jech-2014-203844.

Mills, K. T., Bundy, J. D., Kelly, T. N., Reed, J. E., Kearney, P. M., Reynolds, K., ... & He, J. (2016). Global disparities of hypertension prevalence and control: a systematic analysis of population-based studies from 90 countries. *Circulation*, *134*(6), 441-450.

Mills, K. T., Stefanescu, A., & He, J. (2016). The global epidemiology of hypertension Katherine. *Physiology & Behavior*, *176*(1), 139–148. https://doi.org/10.1038/s41581-019-0244-2.

Mills, K. T., Stefanescu, A., & He, J. (2020). The global epidemiology of hypertension. *Nature Reviews Nephrology*, *16*(4), 223-237.

Ministry of Health. (2020). *National Health Policy: Ensuring healthy lives for all* (Revised Edition, January 2020). Retrieved August 23, 2023 from https://www.medbox.org/document/national-health-policy-health-lives-for-all-revised-edition-january-2020

Mohajan, D., & Mohajan, H. K. (2023). Obesity and its related diseases: A New escalating alarming in global health. *Journal of Innovations in Medical Research*, *2*(3), 12-23.

Mohammed N.Nawi, A., Mohammad, Z., Jetly, K., Abd Razak, M. A., Ramli, N. S., Wan Ibadullah, W. A. H., & Ahmad, N. (2021). The prevalence and risk factors of hypertension among the urban population in Southeast Asian countries: A systematic review and meta-analysis. *International Journal of Hypertension*, *2021*. https://doi.org/10.1155/2021/6657003

Moschonis, G., & Karatzi, K. (2020). Novel dietary approaches for controlling high blood pressure. *Nutrients*, *12*(12), 3902.

Mucci, N., Giorgi, G., Ceratti, S. D. P., Fiz-pérez, J., Mucci, F., & Arcangeli, G. (2016). *Anxiety, stress-related factors, and blood pressure in young adults*. *7*, 1–10. https://doi.org/10.3389/fpsyg.2016.01682

Muhihi, A. J., Anaeli, A., Mpembeni, R. N. M., Sunguya, B. F., Leyna, G., Kakoko, D., … Urassa, D. P. (2020). Prevalence, awareness, treatment, and control of hypertension among young and middle-aged adults: Results from a community-based survey in rural Tanzania. *International Journal of Hypertension*, *2020* (1)*,* 9032476. https://doi.org/10.1155/2020/9032476

Musinguzi, G., Anthierens, S., Nuwaha, F., Van Geertruyden, J. P., Wanyenze, R. K., & Bastiaens, H. (2018). Factors influencing compliance and health seeking behaviour for hypertension in Mukono and Buikwe in Uganda: a qualitative study. *International Journal of Hypertension*, *2018*(1), 8307591. https://doi.org/10.1155/2018/8307591.

Myers, M. G., & Valdivieso, M. (2012). Evaluation of an automated sphygmomanometer for use in the office setting. *Blood Pressure Monitoring*, *17*(3), 116-119.

Nagarkar, A., Gadhave, S., Gund, P., Sharma, I., & Choure, A. (2013). Comparative study of illness perception among hypertensive patients in India. *Int J Psychol Behav Sci*, *3*, 151-6.

Nan, X., Lu, H., Wu, J., Xue, M., Qian, Y., Wang, W., & Wang, X. (2021). The interactive association between sodium intake, alcohol consumption and hypertension among elderly in northern China: a cross-sectional study. *BMC Geriatrics*, *21*, 1-10.

Ndejjo, R., Masengere, P., Nuwaha, F., Ddumba, I., Bastiaens, H., Wanyenze, R. K., & Musinguzi, G. (2021). Hypertension and diabetes patients' perspective of challenges and their coping mechanisms in Mukono and Buikwe districts in Uganda: A qualitative study. *Open Research Europe*, *1*, 30. https://doi.org/10.12688/openreseurope.13286.1.

Nomah, D. K. (2019). Prevalence of hypertension, obesity, and diabetes in rural Ghana: a cross-sectional study in the Birim central district of Ghana. *MD Thesis. Universitat de Barcelona*.

Noor, N., Hassan, D., Khalid, S., & Kashif, M. (2024). Perceptions about hypertension in an urban population in Pakistan. *Eastern Mediterranean Health Journal, 30*(10), 682-688.

Norfazilah, A., Samuel, A., Law, P. T., Khusairi, A. A. A., Nurul, A. Z., Syahnaz, M. H., & Azmawati, M. N. (2013). Illness perception among hypertensive patients in primary care centre UKMMC. *Malaysian Family Physician*, *8*(3), 19–25.

Norling, A. M., Gerstenecker, A. T., Buford, T. W., Khan, B., Oparil, S., & Lazar, R. M. (2020). The role of exercise in the reversal of IGF-1 deficiencies in microvascular rarefaction and hypertension. *Geroscience*, *42*(1), 141-158.

Norman, V. E. (2014). *The Sociocultural Basis of Epidemiology of Hypertension Among Residents of Ogun State* (Doctoral dissertation, Walden University).

Nyaaba, G. N., Masana, L., Aikins, A. D. G., Stronks, K., & Agyemang, C. (2018). Lay community perceptions and treatment options for hypertension in rural northern Ghana: a qualitative analysis. *BMJ Open*, *8*(11), e023451.

Obirikorang, Y., Obirikorang, C., Acheampong, E., Odame Anto, E., Gyamfi, D., Philip Segbefia, S., ... & Amoah, B. (2018). Predictors of noncompliance to antihypertensive therapy among hypertensive patients Ghana: application of health belief model. *International Journal of Hypertension*, *2018*(1), 4701097. https://doi.org/10.1155/2018/4701097

OfilI, M. I., Nwogueze, B. C., & Endurance, A. G. O. H. (2024). Knowledge and awareness of lifestyle modifications as a measure influencing the management of hypertension among hypertensive patients at the Delta State University Teaching Hospital, Oghara. *Journal of Biomedical Investigation*, *12*(1), 55-66.

Okello, S., Muhihi, A., Mohamed, S. F., Ameh, S., Ochimana, C., Oluwasanu, A. O., ... & Danaei, G. (2020). Hypertension prevalence, awareness, treatment, and control and predicted 10-year CVD risk: a cross-sectional study of seven communities in East and West Africa (SevenCEWA). *BMC Public Health*, *20*, 1-13. https://doi.org/10.21203/rs.3.rs-25100/v1.

Okojie, O. M., Javed, F., Chiwome, L., & Hamid, P. (2020). Hypertension and alcohol: a mechanistic approach. *Cureus*, *12*(8), e10086. https://doi.org/10.7759/cureus.10086.

Olawade, D., Afolalu, T., Wada, O., & Barka, I. (2020). Evaluations of hypertension among adult residents of tinda rural community, Nigeria. *Int J Pub Health Epidemiol Res*, *6*(2), 157-62.

Omar, S. M., Musa, I. R., Osman, O. E., & Adam, I. (2020). Prevalence and associated factors of hypertension among adults in Gadarif in eastern Sudan: a community-based study. *BMC Public Health*, *20*, 1-6.

Oparil, S., Acelajado, M. C., Bakris, G. L., Berlowitz, D. R., Cífková, R., Dominiczak, A. F., Grassi, G., Jordan, J., Poulter, N. R., Rodgers, A., & Whelton, P. K. (2019). Hypertension. *Nature Reviews Disease Primers*, *22*(4), 1–48. https://doi.org/10.1038/nrdp.2018.14.Hypertension

Opreh, O. P., Olajubu, T. O., Akarakiri, K. J., Ligenza, V., Amos, J. T., Adeyeye, A. V., Oyewole, F. C. (2021). Prevalence and factors associated with hypertension among rural community dwellers in a local government area, South West Nigeria. *African Health Sciences*, *21*(1), 75–81. https://doi.org/10.4314/ahs.v21i1.12.

Ostchega, Y., Fryar, C. D., Nwankwo, T., & Nguyen, D. T. (2020). Hypertension prevalence among adults aged 18 and over: United States, 2017-2018. *NCHS Data Brief*, *364*, 1–8.

Osuala, E. O., Oluwatosin, A. O., Osuala, F. N., & Ibe, S. N. O. (2016). Perceptions and thirst for knowledge regarding hypertension among rural dwellers in isunjaba, imo state, nigeria: a qualitative study. *Health*, *8*(14), 1603-1615.

Osunkwo, D., Mohammed, A., Kamateeka, M., Nguku, P., Umeokonkwo, C. D., Abolade, O. S., ... & Zoakah, A. I. (2020). Population-based prevalence and associated risk factors of hypertension among adults in Benue State, Nigeria. *Nigerian Journal of Clinical Practice*, *23*(7), 944-949.

Ozoemena, E. L., Iweama, C. N., Agbaje, O. S., Umoke, P. C. I., Ene, O. C., Ofili, P. C., … Anthony, E. (2019). Effects of a health education intervention on hypertension-related knowledge, prevention and self-care practices in Nigerian retirees: A quasi-experimental study. *Archives of Public Health*, *77*(1), 1–16. https://doi.org/10.1186/s13690-019-0349-x

Peltzer, K., & Pengpid, S. (2018). The prevalence and social determinants of hypertension among adults in Indonesia: A cross-sectional population-based national survey. *International journal of hypertension*, *2018*(1), 5610725. https://doi.org/10.1155/2018/5610725

Pérez, A. (2015). Acculturation, health literacy, and illness perceptions of hypertension among Hispanic adults. *Journal of Transcultural Nursing*, *26*(4), 386-394.

Petrie, J. R., Guzik, T. J., & Touyz, R. M. (2018). Diabetes, hypertension, and cardiovascular disease: clinical insights and vascular mechanisms. *Canadian Journal of Cardiology*, *34*(5), 575-584.

Phoswa, W. N., & Khaliq, O. P. (2021). The role of oxidative stress in hypertensive disorders of pregnancy (preeclampsia, gestational hypertension) and metabolic disorder of pregnancy (gestational diabetes mellitus). *Oxidative medicine and cellular longevity*, *2021*(1), 5581570. https://doi.org/10.1155/2021/5581570

Pickett, S., Allen, W., Franklin, M., & Peters, R. M. (2014). Illness beliefs in African Americans with hypertension. *Western Journal of Nursing Research*, *36*(2), 152-170.

Pirkle, C. M. (2018). *Social and community factors associated with hypertension awareness and control among older adults in Tirana , Albania*. *28*(6), 1163–1168. https://doi.org/10.1093/eurpub/cky036

Pirkle, C., Guo, M., Guerra, R., Gomes, F., Belanger, E., & Sentell, T. (2020). Socioecological factors associated with hypertension awareness and control among older adults in Brazil and Colombia: Correlational analysis from the international mobility in aging study. *Global Heart, 18(1).* https://doi.org/10.21203/rs.3.rs-37151/v1

Pitzer, C. R., Aboaziza, E. A., O'Reilly, J. M., Mandler, W. K., & Olfert, I. M. (2023). Nicotine and microvascular responses in skeletal muscle from acute exposure to cigarettes and vaping. *International Journal of Molecular Sciences, 24*(12), 10208. https://doi.org/10.3390/IJMS241210208.

Princewel, F., Cumber, S. N., Kimbi, J. A., Nkfusai, C. N., Keka, E. I., Viyoff, V. Z., … Akum, E. A. (2019). Prevalence and risk factors associated with hypertension among adults in a rural setting: The case of Ombe, Cameroon. *Pan African Medical Journal*, *34*(1), 1–9. https://doi.org/10.11604/pamj.2019.34.147.17518.

Qin, N., Yao, Z., Shi, S., Duan, Y., Li, X., Liu, H., ... & Zhong, Z. (2024). Association between medication literacy and blood pressure control among hypertensive patients. *International Journal of Nursing Practice*, *30*(2), e13153.

Quainoo, A. (2021). *Factors affecting rural women's involvement in physical activity in Ghana* (Doctoral dissertation, Memorial University of Newfoundland).

Quainoo, A., & Loeffler, T. A. (2023). Factors affecting rural women's involvement in physical activity in Ghana. *International Journal of Physical Activity and Health*, *2*(3), 6.

Rahman, M., Williams, G., & Al Mamun, A. (2017). Gender differences in hypertension awareness, antihypertensive use and blood pressure control in Bangladeshi adults: findings from a national cross-sectional survey. *Journal of Health, Population, and Nutrition*, *36*(1), 23. https://doi.org/10.1186/s41043-017-0101-5

Rahman, N., Alam, S. S., Nisha, S., Mohsin, F. M., Mannan, M., Hasan, M., ... & Islam, K. (2021). Prevalence of hypertension and its associated factors among adults in selected areas of Bangladesh: a community based cross-sectional study. *Journal of Food Research*, *10* (6), 56-64. https://doi.org/10.5539/jfr.v10n6p56.

Rajpura, J., & Nayak, R. (2014). Medication adherence in a sample of elderly suffering from hypertension: Evaluating the influence of illness perceptions, treatment beliefs, and illness burden. *Journal of Managed Care Pharmacy*, *20*(1), 58–65. https://doi.org/10.18553/jmcp.2014.20.1.58

Rozjabek, H., Fastenau, J., LaPrade, A., & Sternbach, N. (2020). Adult obesity and health-related quality of life, patient activation, work productivity, and weight loss behaviors in the United States. *Diabetes, Metabolic Syndrome and Obesity*, 2049-2055.

Rupakheti, B., Kc, B., Bista, D., Kc, S., & Pandey, K. R. (2024). Treatment adherence and health-related quality of life among patients with hypertension at tertiary healthcare facility in Lalitpur, Nepal: A cross-sectional study. *Patient Preference and Adherence*, 2077-2090.

Saade, I. (2020). The impact of the Syrian refugee crisis on the Lebanese NGOs and civil society sector. *Syrian Crisis, Syrian Refugees: Voices from Jordan and Lebanon*, 139-156.

Saarti, S., Hajj, A., Karam, L., Jabbour, H., Sarkis, A., El Osta, N., & Rabbaa Khabbaz, L. (2016). Association between adherence, treatment satisfaction and illness perception in hypertensive patients. *Journal of Human Hypertension*, *30*(5), 341-345.

Sackou, J. K., Tiadé, M. L., Hounsa, A. A., Malik, S. K., Coulibaly, M., Desquith, A. A., … Kouadio, L. K. (2019). Prevalence and factors associated with hypertension in Anonkoi 3, a peri-urban area in Abidjan (Côte d'ivoire). *Journal of Public Health in Africa*, *10*(2). https://doi.org/10.4081/jphia.2019.1106

Otenyo, S. O., & Kereri, D. K. (2021). Illness perceptions and adherence to medication regimen among hypertensive patients attending a county referral hospital in Kenya. *J Hypertens Manag*, *7*, 059. https://doi.org/10.23937/2474-3690/1510059

Samal, J. (2016). Health seeking behaviour among tuberculosis patients in India: A systematic review. *Journal of Clinical and Diagnostic Research*, *10*(10), 1–6. https://doi.org/10.7860/JCDR/2016/19678.8598

Selya, A. S., Rose, J. S., Dierker, L. C., Hedeker, D., & Mermelstein, R. J. (2012). A practical guide to calculating Cohen's $f^2$, a measure of local effect size, from PROC MIXED. *Quantitative Psychology and Measurement, 3*(111), 1-6.

Shafiee, N. H., Razalli, N. H., Muhammad-Nawawi, K. N., Mohd-Mokhtar, N., & Raja Ali, R. A. (2022). Implication of food insecurity on the gut microbiota and its potential relevance to a multi-ethnic population in Malaysia. *JGH Open*, *6*(2), 112-119. https://doi.org/10.1002/JGH3.12709

Shah, N., Shah, Q., & Shah, A. J. (2018). The burden and high prevalence of hypertension in Pakistani adolescents: a meta-analysis of the published studies. *Archives of Public Health*, *76*, 1-10.

Shakoor, H., Platat, C., Ali, H. I., Ismail, L. C., Al Dhaheri, A. S., Bosevski, M., ... & Stojanovska, L. (2023). The benefits of physical activity in middle-aged individuals for cardiovascular disease outcomes. *Maturitas*, *168*, 49-52.

Shakya, R., Shrestha, S., Gautam, R., Rai, L., Maharjan, S., Satyal, G. K., … Rai, M. K. (2020). Perceived illness and treatment adherence to hypertension among patients attending a tertiary hospital in Kathmandu, Nepal. *Patient Preference and Adherence*, *14*, 2287–2300. https://doi.org/10.2147/PPA.S270786

Sharifirad, G., Kamran, A., Azadbakht, L., Mahaki, B., & Mohebi, S. (2015). The relationship between blood pressure and the structures of Pender′s health promotion model in rural hypertensive patients. *Journal of Education and Health Promotion*, *4*(1), 29. https://doi.org/10.4103/2277-9531.154124

Sharma, J. R., Mabhida, S. E., Myers, B., Apalata, T., Nicol, E., Benjeddou, M., … Johnson, R. (2021). Prevalence of hypertension and its associated risk factors in a rural black population of mthatha town, south africa. *International Journal of Environmental Research and Public Health*, *18*(3), 1–17. https://doi.org/10.3390/ijerph18031215

Siddiqui, F., Salam, R. A., Lassi, Z. S., & Das, J. K. (2020). The intertwined relationship between malnutrition and poverty. *Frontiers in Public Health*, *8*, 453.

Simo, L. P., Agbor, V. N., Noubiap, J. J. N., Nana, O. P., Nkosu, P. S. M., Anouboweh, A. F. A., … Mbanya, D. (2020). Hypertension prevalence, associated factors, treatment and control in rural Cameroon: a cross-sectional study. *BMJ Open*, *10*(9), e040981. https://doi.org/10.1136/bmjopen-2020-040981

Smith, J. R., Koepp, K. E., Berg, J. D., Akinsanya, J. G., & Olson, T. P. (2019). Influence of sex, menstrual cycle, and menopause status on the exercise pressor reflex. *Medicine and Science in Sports and Exercise*, *51*(5), 874. https://doi.org/10.1249/MSS.0000000000001877

Solomon, I., Adjuik, M., Takramah, W., Axame, W. K., Owusu, R., AttaParbey, P., ... & Kweku, M. (2017). Prevalence and awareness of hypertension among urban and rural adults in Hohoe Municipality, Ghana. *Journal of Marketing Research*, *3*(3), 136-145.

Stojcic, I., Dong, X., & Ren, X. (2020). Body image and sociocultural predictors of body image dissatisfaction in Croatian and Chinese women. *Frontiers in Psychology*, *11*, 731.

Subu, M. A., Wati, D. F., Netrida, N., Priscilla, V., Dias, J. M., Abraham, M. S., ... & Al-Yateem, N. (2021). Types of stigma experienced by patients with mental illness and mental health nurses in Indonesia: a qualitative content analysis. *International Journal of Mental Health Systems*, *15*, 1-12.

Sun, M., Zhang, S., Chen, L., Li, Y., Diao, J., Li, J., ... & Qin, J. (2022). Association between paternal pre-pregnancy body mass index with preterm birth and low birth weight. *Frontiers in Pediatrics*, *10*, 955544.

Taheri-Kharameh, Z., Hazavehei, S. M. M., Ramezani, T., Vahedi, A., Khoshro, M., & Sharififard, F. (2017). The assessment of illness perception and adherence to therapeutic regimens among patients with hypertension. *Journal of Education and Community Health*, *3*(2), 9–15. https://doi.org/10.21859/jech-03022

Tan, S. T., Quek, R. Y. C., Haldane, V., Koh, J. J. K., Han, E. K. L., Ong, S. E., ... & Legido-Quigley, H. (2019). The social determinants of chronic disease management: perspectives of elderly patients with hypertension from low socio-economic background in Singapore. *International Journal for Equity in Health*, *18*(1), 1-14.

Tandstad, B. J. (2017). Hypertension and its association with socioeconomic factors in rural Nepal. *American Journal of Hypertension*, *26*(1), 83–89.

Tao, K. M., Sokha, S., & Yuan, H. B. (2019). Sphygmomanometer for invasive blood pressure monitoring in a medical mission. *Anesthesiology*, *130*(2), 312-312.

Tawfik, H. M. (2018). Waist height ratio and waist circumference in relation to hypertension, Framingham risk score in hospitalized elderly Egyptians. *The Egyptian Heart Journal*, *70*(3), 213-216.

Teshome, D. F., Balcha, S. A., Ayele, T. A., Atnafu, A., Sisay, M., Asfaw, M. G., ... & Gelaye, K. A. (2022). High burden of hypertension amongst adult population in rural districts of Northwest Ethiopia: A call for community based intervention. *PLoS ONE*, *17*(10), e0275830.

Thompson, A. E., Anisimowicz, Y., Miedema, B., Hogg, W., Wodchis, W. P., & Aubrey-Bassler, K. (2016). The influence of gender and other patient characteristics on health care-seeking behaviour: A QUALICOPC study. *BMC Family Practice*, *17*(1), 1–7. https://doi.org/10.1186/s12875-016-0440-0

Tripathy, J. P., Thakur, J. S., Jeet, G., Chawla, S., & Jain, S. (2017). Alarmingly high prevalence of hypertension and pre-hypertension in North India-results from a large cross-sectional STEPS survey. *PloS ONE*, *12*(12), e0188619.

Trivedi, T., Liu, J., Probst, J., Merchant, A., Jones, S., & Martin, A. B. (2015). Obesity and obesity-related behaviors among rural and urban adults in the USA. *Rural and Remote Health*, *15*(4), 217-227.

Uchmanowicz, B., Jankowska, E. A., Uchmanowicz, I., & Morisky, D. E. (2019). Self-reported medication adherence measured with morisky medication adherence scales and its determinants in hypertensive patients aged≥ 60 years: a systematic review and meta-analysis. *Frontiers in Pharmacology*, *10*, 423226.

Umuerri, E. M., Ayandele, C. O., & Eze, G. U. (2017). Prevalence and sociodemographic correlates of obesity and overweight in a rural and urban community of Delta State, Nigeria. *Sahel Medical Journal*, *20*(4), 173-178.

Unger, T., Borghi, C., Charchar, F., Khan, N. A., Poulter, N. R., Prabhakaran, D., … Schutte, A. E. (2020). International Society of Hypertension global hypertension practice guidelines. *Hypertension*, *75*(6), 1334–1357. https://doi.org/10.1161/HYPERTENSIONAHA.120.15026

United Nations (2023). *Sustainable Development Goals: Goal 1: End poverty in all its forms everywhere*. Retrieved October 19, 2023: https://www.un.org/sustainable development/poverty/

Utami, N. P., Ayuningtyas, C. E., & Hariyono, W. (2020). Association of body composition and anthropometric measurement with hypertension among workers in Universitas Ahmad Dahlan. *Electronic Journal of General Medicine*, *17*(5).

Vasquez, F., Correa-Burrows, P., Blanco, E., Gahagan, S., & Burrows, R. (2019). A waist-to-height ratio of 0.54 is a good predictor of metabolic syndrome in 16-year-old male and female adolescents. *Pediatric Research*, *85*(3), 269-274.

Wachamo, D., Geleta, D., & Woldesemayat, E. M. (2020). Undiagnosed hypertension and associated factors among adults in Hawela Tula sub-city, Hawassa, Southern Ethiopia: a community-based cross-sectional study. *Risk Management and Healthcare Policy*, 2169-2177.

Wada, O., Olawade, D., Afolalu, T., Oluwatofarati, A., & Akinwalere, I. (2020). Prevalence of hypertension among rural adults and availability of management services in Abimbola Com-munity, Ayedaade Local Government Area, Osun State, Nigeria. *Hypertension Management*, *6*, 046.

Wang, C., Yuan, Y., Zheng, M., Pan, A., Wang, M., Zhao, M., Li, Y., Yao, S., Chen, S., Wu, S., & Xue, H. (2020). Association of age of onset of hypertension with cardiovascular diseases and mortality. *Journal of the American College of Cardiology*, *75*(23), 2921–2930. https://doi.org/10.1016/J.JACC.2020.04.038.

Wang, Q., Song, X., Du, S., Du, W., Su, C., Zhang, J., ... & Wang, H. (2022). Waist circumference trajectories in relation to blood pressure and the risk of hypertension in Chinese Adults. *Nutrients*, *14*(24), 5260.

Whitehead, A. K., Erwin, A. P., & Yue, X. (2021). Nicotine and vascular dysfunction. *Acta Physiological*, *231*(4), e13631. https://doi.org/10.1111/APHA.13631.

WHO. (2015). World health Statistics. Retrieved January 21, 2023 from: https://www.who.int/docs/default-source/gho-documents/world-health-statistic-reports/world-health-statistics-2015.pdf.

WHO. (2019). Hypertension. Retrieved February 18, 2024 from: https://www.paho.org/en/enlace/hypertension.

WHO. (2021). Hypertension. Retrieved August 18, 2023 from https://www.who.int/news-room/fact-sheets/detail/hypertension.

WHO. (20223). Hypertension. Retrieved December 23, 2024 from https://www.who.int/news-room/fact-sheets/detail/hypertension.

Williams, E. A., Keenan, K. E., Ansong, D., Simpson, L. M., Boakye, I., Boaheng, J. M., ... & Dickerson, T. T. (2013). The burden and correlates of hypertension in rural Ghana: a cross-sectional study. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *7*(3), 123-128.

Wölkart, G., Kollau, A., Stessel, H., Russwurm, M., Koesling, D., Schrammel, A., Schmidt, K., & Mayer, B. (2019). Effects of flavoring compounds used in electronic cigarette refill liquids on endothelial and vascular function. *PLoS ONE*, *14*(9), e0222152. https://doi.org/10.1371/JOURNAL.PONE.0222152

World Health Organisation (2023). *SDG Target 3.4 Non-communicable diseases and mental health*: *SDG Target 3.4 Reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.* Retrieved December 21, 2023 from: https://www.who.int/data/gho/data/themes/topics/sdg-target-3_4-noncommunicable-diseases-and-mental-health

Wu, C., & Thompson, M. E. (2020). *Sampling theory and practice*. Cham: Springer International Publishing.

Wu, X., & Wang, Z. (2019). Role of socioeconomic status in hypertension among Chinese middle-aged and elderly individuals. *International Journal of Hypertension*, *2019*. https://doi.org/10.1155/2019/6956023

Yang, L., Winslow, B., Huang, J., & Zhou, N. (2021). Study on illness perceptions of Chinese rural-dwelling adults with hypertension: A descriptive study. *Public Health Nursing*, *38*(1), 22-31.

Yang, Y. C., Boen, C., & Mullan Harris, K. (2015). Social relationships and hypertension in late life: Evidence from a nationally representative longitudinal study of older adults. *Journal of Aging and Health*, *27*(3), 403–431. https://doi.org/10.1177/0898264314551172

Yazdanpanah, Y., Saleh Moghadam, A. R., Mazlom, S. R., Haji Ali Beigloo, R., & Mohajer, S. (2019). Effect of an educational program based on health belief model on medication adherence in elderly patients with hypertension. *Evidence Based Care*, *9*(1), 52-62.

Yousaf, O., Grunfeld, E. A., & Hunter, M. S. (2015). A systematic review of the factors associated with delays in medical and psychological help-seeking among men. *Health Psychology Review*, *9*(2), 264-276.

Zahirian Moghadam, T., Raeissi, P., & Jafari-Sirizi, M. (2019). Analysis of the health sector evolution plan from the perspective of equity in healthcare financing: a multiple streams model. *International Journal of Human Rights in Healthcare*, *12*(2), 124-137.

Zangirolami-Raimundo, J., de Oliveira Echeimberg, J., & Leone, C. (2018). Research methodology topics: Cross-sectional studies. *Journal of Human Growth and Development*, *28*(3), 356-360.

Zechariah, O, W., David B, O., Temitope D, A., Awe O, O., & Iyanuoluwa G, A. (2020). Prevalence of hypertension among rural adults and availability of management services in Abimbola community, Ayedaade local government area, Osun State, Nigeria. *Journal of Hypertension and Management*, *6*(1). https://doi.org/10.23937/2474-3690/1510046

Zekewos, A., Egeno, T., & Loha, E. (2019). The magnitude of hypertension and its risk factors in southern Ethiopia: A community-based study. *PLoS ONE*, *14*(8), e0221726.

Zhou, B., Carrillo-Larco, R. M., Danaei, G., Riley, L. M., Paciorek, C. J., Stevens, G. A., … Ezzati, M. (2021). Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *The Lancet*, *398*(10304), 957–980. https://doi.org/10.1016/S0140-6736(21)01330-1

Zhou, B., Perel, P., Mensah, G. A., & Ezzati, M. (2021). Global epidemiology, health burden and effective interventions for elevated blood pressure and hypertension. *Nature Reviews Cardiology*, *18*(11), 785-802.

# APPENDICES

## Appendix A: Data Collection Instruments

Thank you for considering participation in this study on hypertension prevalence and risk factors among rural dwellers in the Eastern Region of Ghana. This study aims to assess hypertension prevalence and identify associated risk factors in selected districts. You will answer questions about your health, lifestyle, and demographics, and the questionnaire will take about 30 minutes. Physical measurements like blood pressure, height, and weight may be taken. Participation is entirely voluntary, and you can withdraw at any time without penalty. All information will be kept confidential and anonymised, with data reported in aggregate form only. There are no known risks associated with participation, and while there are no direct benefits to you, your participation will help improve understanding of hypertension in rural communities and inform public health initiatives.

For any questions, please contact the principal investigator, Jones Abekah Baah at +233244572319 or nhyiraabekah2009@gmail.com

**Section A: Background Information**

| | | |
|---|---|---|
| 1 | Gender | Male [ ]<br>Female [ ] |
| 2 | Educational status | No formal education [ ] Basic education [ ] Secondary [ ] Tertiary [ ] |
| 3 | Marital status | Single [ ]<br>Married [ ]<br>Separated [ ]<br>Divorced [ ]<br>Widowed [ ]<br>Cohabiting [ ] |
| 4 | Main work status over the past 12 month | Government employee [ ]<br>NGO employee [ ]<br>Self-employed [ ]<br>Student [ ]<br>Homemaker [ ]<br>Retired [ ]<br>Unemployed [ ] |
| 5 | Number of people in household (including yourself) | …….. |
| 6 | Estimated monthly household income in Ghana Cedis | …….. |

**Section B: Hypertension Risk Factors**

(Behavioural Measurements)

| | | |
|---|---|---|
| | ***Tobacco use*** | |
| 7 | Do you currently smoke any tobacco products, such as cigarettes, cigars or pipes? | Yes [ ] No [ ] |
| 8 | Do you currently smoke tobacco products daily? | Yes [ ] No [ ] *(If no skip to question 14)* |
| 9 | How old were you when you first started smoking? | ……..years (kindly specify) |
| 10 | During the past 12 months, have you tried to stop smoking? | Yes [ ] No [ ] |
| 11 | During any visit to a doctor or other health worker in the past 12 months, were you advised to quit smoking tobacco? | Yes [ ] No [ ] |
| 12 | In the past, did you ever smoke daily? | Yes [ ] No [ ] |
| 13 | Do you currently use any smokeless tobacco products such as [snuff, chewing tobacco, betel]? | Yes [ ] No [ ] |
| 14 | During the past 30 days, did someone smoke in your home? | Yes [ ] No [ ] |
| | ***Alcohol use*** | |
| 15 | Have you ever consumed any alcohol such as beer, wine, spirits | Yes [ ] No [ ] |
| 16 | Have you consumed any alcohol within the past 12 months? | Yes [ ] No [ ] |
| 17 | Have you stopped drinking due to health reasons, such as a negative impact on | Yes [ ] No [ ] |

| | | |
|---|---|---|
| | your health or on the advice of your doctor or other health worker? | |
| 18 | During the past 12 months, how frequently have you had at least one standard alcoholic drink (''tort'') | Daily [ ]<br>5-6 days per week [ ]<br>3-4 days per week [ ]<br>1-2 days per week [ ]<br>1-3 days per month [ ]<br>Less than once a month [ ]<br>Never [ ] |
| 19 | During the past 12 months, have you had family problems or problems with your partner due to drinking? | Yes, more than monthly [ ]<br>Yes, monthly [ ]<br>Yes, several times but less than<br>Monthly [ ]<br>Yes, once or twice [ ]<br>No [ ] |
| | ***Diet*** | |
| 20 | In a typical week, how many days do you eat fruit? | .....(specify) |
| 21 | How many servings of fruit do you eat on one of those days? | 1 serving [ ]<br>2 servings [ ]<br>3 servings [ ]<br>4 servings [ ] |
| 22 | In a typical week, on how many days do you eat vegetables? | .....specify |
| 23 | How often do you add salt or a salty sauce such as soy sauce to your food right before you eat it or as you are eating it? | Always [ ]<br>Often [ ]<br>Sometimes [ ]<br>Rarely [ ] |

| | | |
|---|---|---|
| | | Never [ ]<br>Don't know [ ] |
| 24 | How often is salt, salty seasoning or a salty sauce added in cooking or preparing foods in your household? | Always [ ]<br>Often [ ]<br>Sometimes [ ]<br>Rarely [ ]<br>Never [ ]<br>Don't know[ ] |
| 25 | How often do you eat processed food high in salt? (salty snacks, canned salty food including pickles and preserves etc) | Always [ ]<br>Often [ ]<br>Sometimes [ ]<br>Rarely [ ]<br>Never [ ]<br>Don't know [ ] |
| | ***Physical Activity*** | |
| 26 | Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like (carrying or lifting heavy loads, digging or construction work] for at least 10 minutes continuously?) | Yes [ ] No [ ] |
| 27 | If item 21 was yes, how many days do you do vigorous-intensity activities as part of your work in a week? | ……(specify) |
| 28 | Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking [or carrying light loads] for at least 10 minutes continuously? | Yes [ ] No [ ] |

| | | |
|---|---|---|
| 29 | Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places? | Yes [ ] No [ ] |
| 30 | Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, [cycling, swimming, and volleyball] for at least 10 minutes continuously? | Yes [ ] No [ ] |
| 31 | How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day? | 5- 10 minutes [ ]<br>10-20 minutes [ ]<br>20-30 minutes [ ]<br>30- 60 minutes [ ] |
| | ***History of Raised Blood Pressure*** | |
| 32 | Have you ever had your blood pressure measured by a doctor or other health worker? | Yes [ ] No [ ] |
| 33 | Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension? | Yes [ ] No [ ] |
| 34 | In the past two weeks, have you taken any drugs (medication) for raised blood pressure prescribed by a doctor or other health worker? | Yes [ ] No [ ] |
| 35 | Are you currently taking any herbal or traditional remedy for your raised blood pressure? | Yes [ ] No [ ] |

| | | |
|---|---|---|
| | ***History of Diabetes*** | |
| 36 | Have you ever had your blood sugar measured by a doctor or other health worker? | Yes [ ] No [ ] |
| 37 | Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes | Yes [ ] No [ ] |
| 38 | In the past two weeks, have you taken any drugs (medication) for diabetes prescribed by a doctor or other health worker? | Yes [ ] No [ ] |
| 39 | Are you currently taking insulin for diabetes prescribed by a doctor or other health worker? | Yes [ ] No [ ] |
| 40 | Are you currently taking any herbal or traditional remedy for your diabetes? | Yes [ ] No [ ] |
| | | |
| | **(Physical Measurements)** | |
| | Blood pressure | |
| 41 | Blood pressure reading 1 | mmHg |
| 42 | Blood pressure reading 2 | mmHg |
| 43 | Blood pressure reading 3 | mmHg |
| | ***Height, weight*** | |
| 44 | For women: Are you pregnant? | Yes [ ] No [ ] |
| 45 | Height | ..... |
| 46 | Weight | |

**Section C: Illness Perception**

For the following questions, please circle the number that best corresponds to your views:

47. How much does your illness affect your life?

| 0 no affect at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 severely affects my life |
|---|---|---|---|---|---|---|---|---|---|---|

48How long do you think your illness will continue?

| 0 a very short time | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 forever |
|---|---|---|---|---|---|---|---|---|---|---|

49. How much control do you feel you have over your illness?

| 0 absolutely no control | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 extreme amount of control |
|---|---|---|---|---|---|---|---|---|---|---|

50. How much do you think your treatment can help your illness?

| 0 not at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 extremely helpful |
|---|---|---|---|---|---|---|---|---|---|---|

51. How much do you experience symptoms from your illness?

| 0 no symptoms at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 many severe symptoms |
|---|---|---|---|---|---|---|---|---|---|---|

52. How well do you feel you understand your illness?

| 0 don't understand at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 understand very clearly |
|---|---|---|---|---|---|---|---|---|---|---|

53. How much does your illness affect you emotionally? (e.g. does it make you angry, scared, upset or depressed?)

| 0 not at all affected emotionally | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 extremely affected emotionally |
|---|---|---|---|---|---|---|---|---|---|---|

**Thank You**

**Appendix B: Ethical Clearance**

# UNIVERSITY OF CAPE COAST

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OMB NO: 0990-0279
IORG #: IORG0011497

5TH MAY 2023

Mr Jones Abekah Baah
Department of Health, Physical Education and Recreation (HPER)
University of Cape Coast

Dear Mr Baah,

**ETHICAL CLEARANCE – ID (UCCIRB/CES/2023/03)**

The University of Cape Coast Institutional Review Board (UCCIRB) has granted Provisional Approval for the implementation of your research on **Prevalence and Risk Factors of Hypertension among Rural Dwellers in Selected Districts of the Eastern Region, Ghana**. This approval is valid from **5th May 2023** to **4th May 2024**. You may apply for a renewal subject to the submission of all the required documents that will be prescribed by the UCCIRB.

Please note that any modification to the project must be submitted to the UCCIRB for review and approval before its implementation. You are required to submit a periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

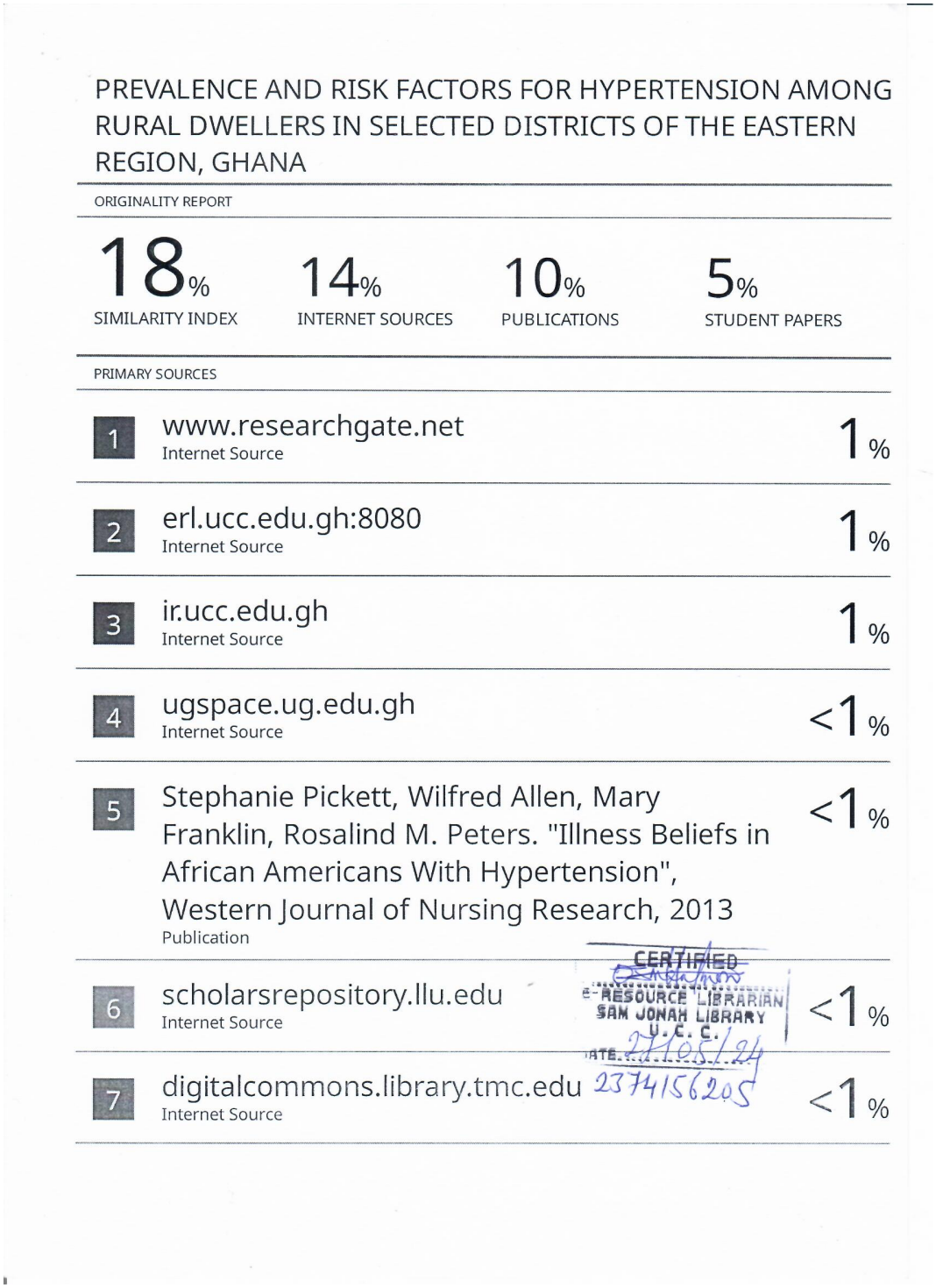
Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

Kofi F. Amuquandoh
**Ag. Administrator**

ADMINISTRATOR
INSTITUTIONAL REVIEW BOARD
UNIVERSITY OF CAPE COAST

## Appendix C: Similarity Index



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