Understanding Multimorbidity of Older Adults in Niger State North Central Nigeria.

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UNIVERSITY OF WEST LONDON

Understanding Multimorbidity of Older Adults in Niger State North Central Nigeria

Ph.D. Thesis

Submitted in partial fulfilment of the requirements of the

University of West London for the Degree of Doctor of Philosophy in global health

Submitted by

Abdulsalam Ahmed
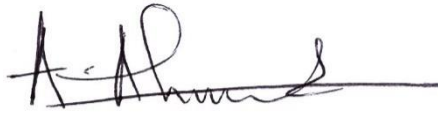
June 2023

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Signature:

Date: 19th June 2023

Dedication

This thesis is dedicated to my late grandmother Hajiya Asmau Gogo Kologbo and my late mother Hajiya Ramatu Ahmad, in recognition of their worth. Their actions and inactions are indisputable and treasured towards making sure I achieve my lifetime goals.

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List of abbreviations and their meaning

ACEs	Adverse Childhood Experiences
ACE-IQ	Adverse Childhood Experiences-International Questions
AJOL	African Journals Online
AOR	Adjusted Odd Ratio
CDC-BRFSS	Center For Disease Control-Behavioral Risk Factor Surveillance System
CINAHL	Cumulated Index to Nursing and Allied Health Literature
CLD	Chronic Liver Disease
CKD	Chronic Kidney Disease
COPD	Chronic Obstructive Pulmonary Diseases
CVD	Cardiovascular Diseases
DM	Diabetes Mellitus
HBP	High Blood Pressure
HTN	Hypertension
GH	General hospital
IBM	International Business Machine
IPA	Interpretative Phenomenological Analysis
JBI	Joanna Briggs Institute
JISC	Joint Information System Committees
LGA	Local Government Area
LMICs	Low- and Middle-Income Countries
NCDs	Non-Communicable Diseases
PCA	Principal Component Analysis
PubMED	Public/Publisher Medline
PPE	Personal Protective Equipment
PURE	Prospective Urban and Rural Epidemiology
PRISMA	Preferred Reporting Items for Systematic Review and Meta-Analysis
PSQ	Patient Satisfaction Questionnaires
REPC	Research, Ethics and Publication Committee
SARA	Service Availability and Readiness Assessment
SDH	Social Determinant of Health
SPSS	Statistical Package for Social Science
QI	Quality Improvement
Quan	Quantitative
Qual	Qualitative
WHO	World Health Organization

Abstract

Background: Multimorbidity is defined as the co-occurrence of at least two chronic diseases in the same person. With advancing epidemiological and demographic transitions, the burden of multi-morbidity is expected to increase globally, and Nigeria is not an exemption.

Overall objectives: The aim of the study was to develop a better understanding of multimorbidity among elderly Nigerians.

Methods: A multi-methods (systematic literature review, quantitative and qualitative) survey was conducted. The systematic review was preceded by a designed priori protocol following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist and the PRISMA Protocols statement. Data for the quantitative, and qualitative were administered on a cross-section of 734 and 12 multimorbid participants selected from 4 secondary hospitals and the communities respectively in Niger state over 5 months. SPSS and NVivo were used to analyze the quantitative and qualitative phases data respectively.

Results: The prevalence of multimorbidity in Niger state north central Nigeria was 51.9% with multimorbidity prevalence ranging from 27% to 74% across Nigeria. Chronic disease conditions like hypertension, diabetes, and acid peptic diseases were the commonly occurring clusters of multimorbidity. A positive association between adverse childhood experiences (AECs) and multimorbidity was observed. The study also observed an association between adverse childhood experiences (ACEs) and behavioral risk factors. A Positive moderate association was observed between age and multimorbidity and a negative association was found between multimorbidity and levels of education and income. Using Donabedian's model of healthcare quality revealed the process component of the model to be the primary component in determining the perceived quality of healthcare services among elderly multimorbid patients in Niger state north central Nigeria.

Conclusion: There is a need to recognize ACEs and their consequences as a public health problem in Nigeria and commence the practice of public health surveillance to reduce the occurrence of ACEs and their effects. The prevention of multimorbidity should begin from childhood by preventing ACEs through the creation of a positive setting for both children and families and a system that supports healthy families. Additionally, identifying the common pattern of multimorbidity will provide insight to develop more integrative multidisciplinary preventive and better management approach for multimorbidity. Finally, access to and quality of health care can be improved by improving patient-physician relationships, reducing waiting times for seeing physicians and reducing financial cost of medical treatment. improving   the These findings are important to better inform policymakers and related stakeholders, in order to ensure equitable access and improve the health outcomes of multimorbid patients and the overall population's health. Although the result of this study has the potential to illuminate some of the weaknesses of the current multimorbidity care among the elderly, the sample selection is limited to 4 hospitals and some communities in Niger state, thus the findings cannot be generalized for the country. Nevertheless, the study can be replicated elsewhere in the country to increase its impact.

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Chapter 1

Introduction

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This chapter introduces this research, it begins with an explanation of the effect of demographic transition in the relation to t Nigeria and the evolving demand in healthcare systems mainly in the provision of healthcare and long-term care for the growing number of older adults with multiple chronic diseases (multimorbidity). Other factors linked to multimorbidity like lifestyle and environmental factors were introduced. The rationale, aim, objectives, and research questions for the study are discussed. At the end of the chapter the structure of the thesis is outlined.

The coexistence of multiple chronic diseases in an individual at the same time a term known as multimorbidity is increasingly recognized as an imperative issue of public health and health care system in present-day societies (Marengoni *et al.,* 2011a). This is mainly because most healthcare systems are not wholly intended nor satisfactorily prepared to provide personalized care to patients with multimorbidity (Chiolero, Rodondi and Santschi, 2020). Studies have shown that multimorbid patients represent up to 78% of primary care consultations, high number of prescriptions, and hospital referrals (Quinaz Romana *et al.,* 2020). Studies also show that multimorbidity is linked to healthcare spending, increase healthcare utilization and reduce quality of life and in overall unmet healthcare needs (Sum *et al.,* 2019a).

The principal challenge facing the healthcare systems now and in the coming decades is handling multimorbidity, due to its adverse health and economic implications and for health workers whose decisions are principally supported by single disease-specific guidelines (Salisbury *et al.,* 2011a). Currently, no effective cure for multimorbidity, and

practice at disposal aims at secondary prevention of complications, quality of life upgrading, and functional capacity improvement (Löffler *et al.,* 2012). And as such multimorbid patients have unmet healthcare needs and typically do not receive appropriate care (Tinetti, Fried and Boyd, 2012). Also of importance is that research aimed at identifying risk factors, effective preventive measures, and management exclude multimorbid patients and mainly target patients with single diseases (Cicek *et al.,* 2021) thereby hindering the management of multimorbidity. Therefore, it is remarkable to include patients with multimorbidity especially older adults in research to uncover the connections at all stages of life course and their complex healthcare needs and this form the foundation for this study. It was anticipated that knowledge generated from this research would afford a new insight and inform the understanding of development and progression of multimorbidity and their complex healthcare needs in low resource setting care.

Globally, life expectancy is on the rise, and the incidence of multimorbidity is also on the surge. With approximately 1 in 4 adults being affected by multimorbidity globally, it is a growing concern worldwide (Khanam *et al.,* 2011). Although increasing life expectancy generally reflects positive human development, this demographic shift is not devoid of challenges. The earlier we regard this as a global trend for public health concern the better because research indicates that the current trend of the population aged 65 years and older will exceed the population of children globally for the first time in history (Zeeb, Rothgang and Darmann-Finck, 2018; Suzman *et al.,* 2015). Even if the proportion of the older population is higher in the developed countries, the most rapid increases in this population subset are occurring in the Low and Middle Income (LMICs)countries. Similarly, this

demographic change comes with the greatest challenges of the next decades not only because it contributes to the development of chronic conditions but also because of its evolving demand in healthcare systems mainly in the provision of healthcare and long-term care for the growing number of the elderlies (Zeeb, Rothgang and Darmann-Finck, 2018).

As the world's population is ageing the quality of these additional years remains unclear (Crimmins and Beltrán-Sánchez, 2011), nevertheless what was clear is the development of chronic illness which is an important part of this demographic shift. Between 2006 and 2030, the number of older people in less developed countries is projected to increase by 140 percent as compared to an increase of 51 percent in more developed countries (Dobriansky, Suzman and Hodes, 2007). In essence developing countries like Nigeria have bigger concerns because developed nations have decades to adjust to this change in the age structure. Ageing is regarded as a predisposing factor for the development of chronic diseases, therefore, represents the major risk factor for multimorbidity (Fabbri *et al.,* 2015a). Living with multimorbidity relates to increased or premature mortality, high healthcare utilization (including GP visits and unplanned admissions), reduced quality of life, and a high burden of illness and treatment, and a higher risk of disabilities (Boyd and Fortin, 2010a).

In addition to ageing, the population is experiencing a change in lifestyle like physical inactivity that contribute to non-communicable diseases (NCDs) (Autenrieth *et al.,* 2013). The accumulation of risk is likely to lead to an increased risk of NCDs which then is likely to lead to an increase NCDs factors amounts to an increase in the non-communicable diseases (NCDs) which is worrisome for the Low- and Middle-Income Countries (LMICs)

like Nigeria because the already fragile healthcare systems are further stretched by the dual burden of NCDs and infectious diseases. And management of multimorbidity is much more complicated and demanding for the health system, patients, and their families compared to those patients living with a single chronic condition (Abebe *et al.,* 2020a).

Overall, the rising ageing population is expected to lead to increases in the prevalence of chronic conditions, multimorbidity, and raised the demand for all care services. That said, we must also consider the fact that multimorbidity has become a growing health subject globally and it is expected to become challenging in developing countries like Nigeria as they experience economic, demographic, and epidemiologic transition. There has been a growing need for more applied health services research to understand better and manage multimorbidity in developed countries. However, what remains unclear is that researchers in Low- and Middle-Income Countries like Nigeria are not paying attention to this, and hence this research aimed to determine a better understanding of multimorbidity of older adults in Niger state north-central Nigeria.

1.1 The rationale of the research

The population incidence of multimorbidity is on the rise globally and developing countries are not an exception. It has been estimated that the number of people experiencing multimorbidity is projected to rise along with population ageing by >1% per annum until 2030 (Yoon et al., 2014). Multimorbidity raised the demand for all care services, thereby placing a substantial burden on patients and fragile healthcare systems in Nigeria which are already stretched. In Nigeria and indeed in most parts of the world, the single disease

paradigm is largely the basis for healthcare systems. The principal challenge facing the health care system now and in the coming decades is handling multimorbidity mainly because health care decisions are principally supported by single-disease specific guidelines. Similarly, most health-related research is currently focused on the prevention and management of disorders in isolation. And to enable healthcare systems to prepare and respond to multimorbidity and their complex healthcare needs we need to understand the problem better. Understanding multimorbidity, especially in an older adult will not only provide an opportunity to study its lifetime risk factors but will also provide a better grasp of the preventive measures and in overall reduce its impact on patients, caregivers, and healthcare professionals.

1.2 The conceptual framework linking the research objectives.

The concept of the study was to understand the multimorbidity among elderly Nigerians using a life course approach, bearing in mind that age has been recognized to be the greatest risk factor for multimorbidity. This approach is against the backdrop that non-communicable disease risk factors accumulate over the life course, and integrated prevention strategies can and should be used to intervene at all ages and stages of disease progression through both primary care and secondary care (Head *et al.,* 2021). Ageing brings with it the chronic dysregulation of multiple organ systems when a threshold of impairment is reached, such breakdown in regulation among several organs and tissues becomes evident to the clinician as morbidity (Fabbri *et al.,* 2015a). Furthermore,

prevention seems the single most important factor in the management of multimorbidity and from public health view, the identification of risk factors is an important aspect of the search for prevention and intervention (Fortin *et al.,* 2014a).

Firstly, to allow precise assessment of disease burden, resource allocation, and effective disease management at the national level this study was structured to uncover the prevalence of multimorbidity in Nigeria as the first research objective. That said, there is accumulating evidence of the potential risk factors and the gap in the existing knowledge regarding the impact of poor early-life conditions on older adult health (McEniry, 2013). And hence the study was structured to evaluate if childhood conditions are associated with trajectories of chronic conditions among older adults in Nigeria as the second research objective.

In early life, exposure to adverse childhood experiences (ACEs) is associated with increased risk for proximal harmful health behavior and distal negative health outcome in middle childhood and older adult respectively. While studies globally have been looking more into ACEs and how it contributes harmful adult health outcomes, less attention has been paid to the connection between ACEs and behavioral risk factors (Hunt, Slack and Berger, 2017). The current research gap in the LMIC entails that the connection between ACEs and behavioral risk factors and behavioral risk factors and multimorbidity have been understudied and hence this study explored these connections. The study was structured to determine the development and progression of multimorbidity among older adults in Niger state Nigeria as the third objective by testing two hypotheses (1) Does ACE increase the risk of developing health risk behavior among patients with multimorbidity in

Niger state, north-central Nigeria? (2) What are the relationships between multimorbidity and characteristics of older adults in Niger state Nigeria?

Just like the national level, the notion was to allow state-level specific assessment of disease burden, which will enhance resource allocation, and effective disease management hence the study determined the prevalence, pattern, and burden of chronic disease conditions among older people in Niger state Nigeria as the fourth objective. This is also in line that only a few studies have comprehensively evaluated the multimorbidity pattern, trends, and inequality among the elderly in the LMIC (Xu, Mishra and Jones, 2017).

As the population ages, more people are living longer with long-term conditions, it is a stint to focus on caring for people with multimorbidity, and hence this study examines the available health care for multimorbid patients in Niger state. Evidence has shown that integrating patients' voices in the form of patient-reported experiences and outcomes of care by articulating their preferences and values will be critical to the accomplishment of high-performing health systems that are mindful of the needs of people with multimorbidity (Valderas *et al.,* 2019). While significant work has been done to highlight the patient experiences of healthcare service in developed nations, this has not attracted adequate attention in developing country particularly in Nigeria. The elderly Nigerians living with multimorbidity may have healthcare experiences that may not be fully understood. Thus, the study will be exploring this both quantitatively and qualitatively to achieve the fifth research objectives.
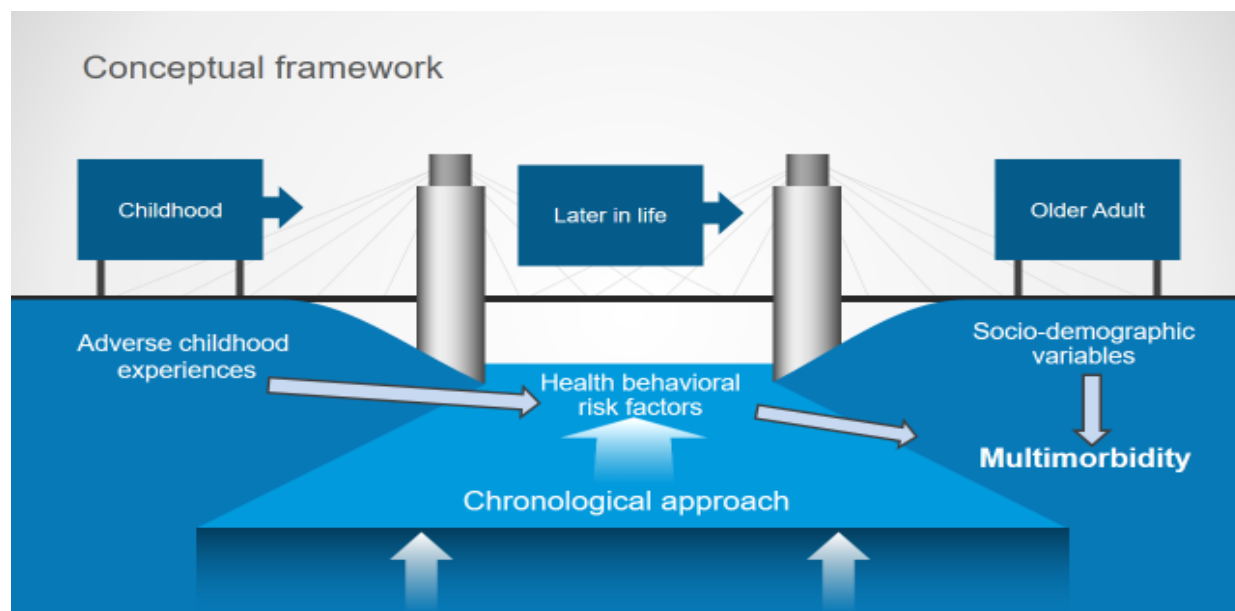
Figure 1.1 Conceptual framework showing the relationship of variables along a life course, from childhood, adult risk factors, (sociodemographic and behavioural) and multimorbidity.

1.3 Aim and research objectives

The overall aim of this study is to develop a better understanding of multimorbidity among the elderly in Niger state north central Nigeria.

Specific objectives are:

1. To systematically review studies of the prevalence, patterns, and determinants of multimorbidity among older adults in Nigeria.

2. To evaluate if childhood conditions are associated with trajectories of chronic conditions among older adults in Nigeria.

3. To understand the development and progression of multimorbidity among older adults in Nigeria.

4. To determine the prevalence, pattern, and burden of chronic disease conditions among older people in Niger state Nigeria.

5. To recommend an effective hospital care delivery model for older people in Nigeria with multimorbidity.

1.4 Research questions

1. *Are adverse childhood experiences (ACEs) associated with the multimorbidity among older adults in Niger state, north-central Nigeria?*

2. *Does ACE increase the risk of developing risky health behaviour among patients with multimorbidity in Niger state, north-central Nigeria?*

3. *What are the relationships between multimorbidity and adult (socio-demographic variables and behavioural risk) factors among older adults in Niger state Nigeria?*

4. *Which Multimorbidity cluster causes the greatest burden among the elderly in Niger state Nigeria?*

5. *How effective is the care pathway setting for multimorbid older people in Niger state Nigeria?*

1.5 The structure of this thesis

This is multi-methods research that has 3 phases: systematic literature review, quantitative, and qualitative phase. Chapter 1 is about the introduction, background,

rationale of the study, conceptual framework linking the research objectives, aim and research objectives, and research questions. Chapter 2 is a scoping literature review, mainly to identify the types of available evidence of multimorbidity, to clarify key concepts of multimorbidity in the literature, the identification of the research gaps and as a precursor for the systematic literature review discuss in the later chapter.

Chapter 3 introduces the overall research design and methodology used in this research study. This chapter discussed in detail the theoretical framework, research paradigm, research design, and setting. The chapter also discusses the inclusion and exclusion criteria as well as the safety measures that were set up for data collection during the pandemic. The chapter likewise discussed the methodological approach, sample size determination, data collection, analysis, and ethical approval for both quantitative and qualitative phases of the study. Additionally, this chapter represents the detailed methods for four research objectives (chapters 5-8) respectively as a series of 4 separate and distinct research.

Chapter 4 is a systematic literature review conducted to determine the prevalence, pattern, and determinants of multimorbidity in Nigeria. The chapter includes the study background, methods, inclusion and exclusion criteria, outcome variables, search strategy, study selection, data extraction, study quality and assessment, results, quality assessment, discussion, strength and limitation as well as the conclusion.

Chapters 5-8 discussed the research objectives and chapter 9 discussed the overall discussion, conclusion, implications of study and future research.

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                          Chapter 1

                          Introduction



                          Chapter 2

                          Scoping literature
                          review.



                          Chapter 3

                          Methodology
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Chapter 4	Chapter 5	Chapter 6	Chapter 7	Chapter 8
Systematic literature review	Quantitative study.	Quantitative study.	Quantitative study	Mixed study: quantitative + qualitative

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                          Chapter 9

                          Overall discussion

                          and Conclusion
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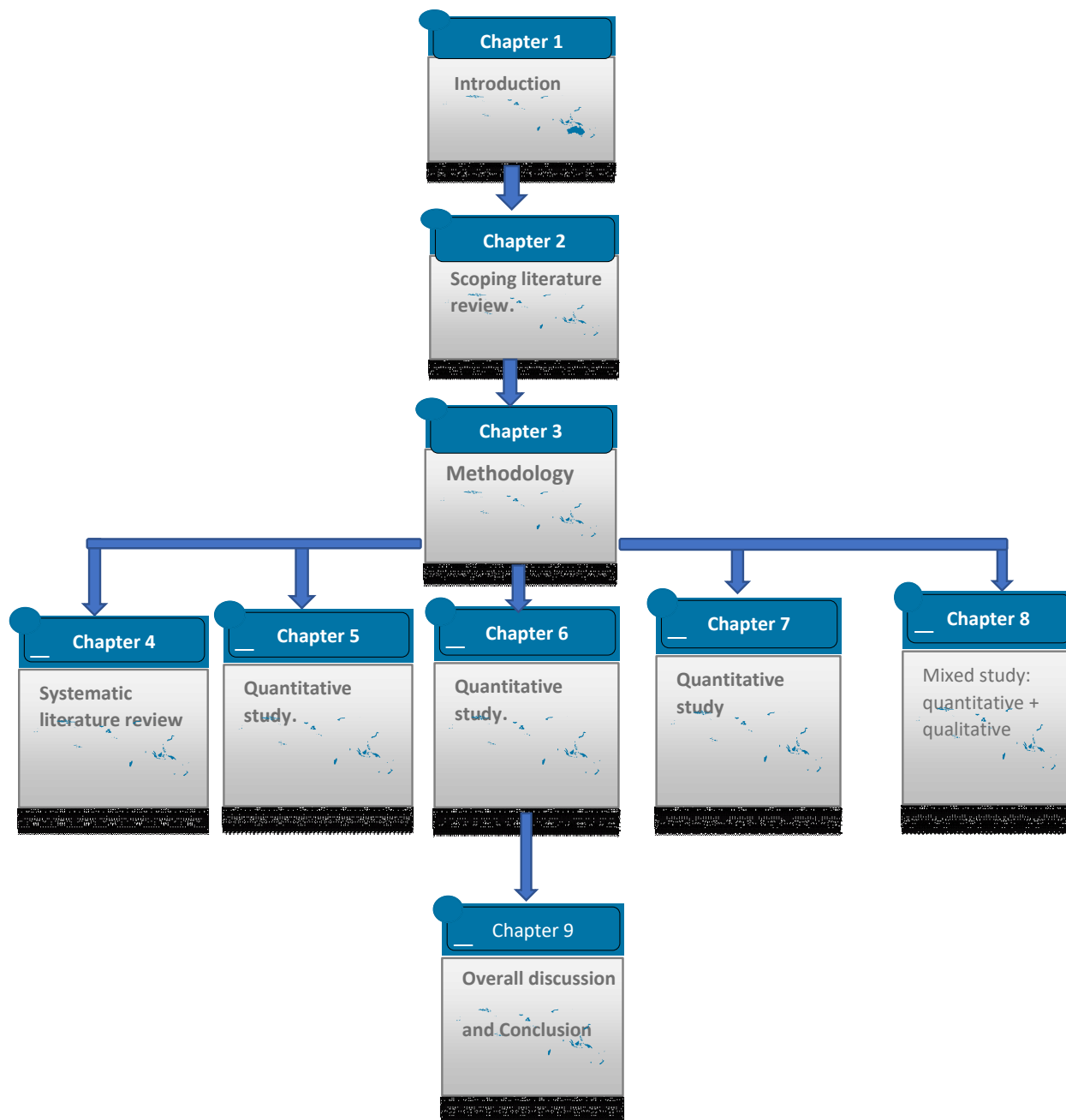
Figure1.2 thesis organogram

Chapter 2

Scoping literature review

There are 2 literature reviews undertaken for this research study (scoping literature review and systematic literature review). This chapter discussed the scoping literature review, to identify the types of available evidence of multimorbidity, to clarify key concepts of multimorbidity in the literature, for identification of the research gaps and as a precursor for the systematic literature review discussed in chapter 4. The scoping literature review was arranged in themes in line with the research objectives. (1) It begins with a review of the concept of multimorbidity and its operational definition. This goes along with how the review presents and discusses the fundamental issues of how multimorbidity is defined and measured. The lack of a universal approach to its measurement is demonstrated by the variety of prevalence estimates in the literature. (2) This chapter presents current evidence on the growing trends in the prevalence of multimorbidity in both clinical settings and the general population. The patterns and challenges of multimorbidity were reviewed and discussed. (3) The drivers of this trend are critically discussed and the main explanation – advanced age represents the greatest risk. The roles of societal factors such as health inequalities and social determinants of health are reviewed and placed in a historical context. (4) The review argues that understanding patient healthcare experience is a key step in moving toward patient-centred care and their assessment can provide a critical starting point to develop an effective action-based model of care for multimorbid patients in Nigeria. Few research gaps were discussed in the conceptual framework.

2.1 Multimorbidity

Mountford and Shojania, (2012) argued that an individual who does not die of acute illnesses, such as infections, and survives with chronic illnesses is more likely to develop additional chronic illnesses. In other words, it's more that organs are failing as we grow older as multimorbidity is inevitable (Navickas *et al.,* 2016a). This is to say that management of the rising prevalence of chronic illnesses is one of the biggest tasks facing many countries worldwide. And to achieve this task the concept of multimorbidity should be understood, ranging from the operational definition, measurability, prevalence, pattern, challenges, theories, available healthcare setting for multimorbid patients.

2.1.1 Operational definition of multimorbidity

Multimorbidity is frequently confused and often used interchangeably and /or in connection with comorbidity and frailty. One way of unpacking the concept of multimorbidity is to holistically understand terms that are commonly connected with it. This includes variation between studies on the number of chronic conditions collected, what makes up the long-term conditions or classification system for reporting, and the number of conditions for which the person is considered to have multimorbidity (Violan *et al.,* 2014a). The use of 3+ disease entities for multimorbidity depicts the thinking and recommendation around the number of conditions for which the person is considered to have multimorbidity (Harrison *et al.,* 2014; Fortin *et al.,* 2012). However, some researchers reasoned that using 3+ disease entities result in a lower prevalence estimate and is unlikely to identify patients with greater health needs, and is, therefore, less useful to the

clinician (Violan *et al.,* 2014b). As such the use of 2 or more disease conditions was use in this research.

To make it clear multimorbidity is commonly defined as the co-occurrence of at least two long-term conditions in the same individual (Nguyen *et al.,* 2019a). Whereas comorbidity has been defined as the occurrence or the existence of any distinct additional medical condition to an index condition, while frailty is a distinctive state of health, characterized by increasing vulnerability or decreasing resilience to seemingly minor health events, such as an infection or changes in medication (Turner and Clegg, 2014). This study recognized the use of multimorbidity as more accurate than comorbidity not only because it is more popularly used by the researchers but also because multimorbidity is a more patient-centered concept, and it better reflects disease burden (Catala-Lopez *et al.,* 2018).

There has been growing theoretical reasoning on the definition of multimorbidity during the past years, however, there is still no consensual definition (Willadsen *et al.,* 2016). while some studies use 2 or more, some used 3 or more, or even 4. These factors continued to fragment the existing literature and make comparisons between studies very difficult to interpret. Research has shown for instance that the higher the minimum number of different disease entities used to define multimorbidity, the lower the prevalence estimate. (Fortin *et al.,* 2012). Similarly, using 2+ disease entities identify such a large proportion of patients as having multimorbidity that it lacks the specificity to be useful, with a minimum of three disease entities arguably a better measure of multimorbidity (Harrison *et al.,* 2014; Fortin *et al.,* 2012).

Authors also believe that multimorbidity defined as three or more requires more measurement uniformity and inclusion of all chronic conditions but provides greater

specificity than the two definitions (Harrison *et al.,* 2014). The authors further developed the concept of complex multimorbidity as the co-occurrence of three or more chronic conditions affecting three or more body systems in an individual mainly to identify high-need individuals. This study observed the heterogeneous definition of multimorbidity to be implicated in the fragmented, difficult-to-interpret, and difficult-to-synthesize research. And to lessen some of these challenges, the index study will adopt the uniform definition and reporting system for multimorbidity, as recommended by (MacMahon *et al.,* 2018). They endorsed the co-existence of two or more chronic conditions, and that each one of which is either:

1. The co-existence of two or more chronic conditions, each one of which is either:
2. A mental health condition of long duration, such as a mood disorder or dementia.
3. An infectious disease of long duration, such as HIV or hepatitis

This is also adopted by WHO and has been used most often by researchers to date. The choice of the definition depends on the aim and objective of the research study. For this study, having two more disease was used to define multimorbidity. This will enable better reflection of the burden of multimorbidity in Nigeria. The aforementioned definition links to the next area of intense controversies of how many diseases are sufficient for valid measurement of multimorbidity.

2.1.2 Measurement of multimorbidity

Several ways of measuring multimorbidity has been found in works of literature. For example, simple disease count (Huntley *et al.,* 2012), the Charlson index of comorbidity (Charlson *et al.,* 1987), the cumulative illness rating scale (Miller *et al.,* 1992), John Hopkins adjusted clinical groups case-mix system (Salisbury *et al.,* 2011b). A systematic review of the literature examining the predictive validity of different measures found that simple counts of disease performed almost as well as complex measures in predicting important outcomes in patients (Huntley *et al.,* 2012). Although the choice of the measure of multimorbidity is based mainly on the suitability of the measure for data obtainable and the predilection of the researcher, the earlier cited systemic review shows that the most common approach to measuring multimorbidity is the use of simple disease counts (Huntley *et al.,* 2012). And they concluded that simple measures, such as counts of chronic diseases, are almost as effective at predicting healthcare utilization and quality of life as more sophisticated measurements. On account of these reasons, this study used a simple disease count.

2.2 Prevalence and pattern of multimorbidity

2.2.1 Prevalence of multimorbidity in the clinical setting

The multimorbidity global prevalence estimates ranged from 12.9% in the general population to 95.1% among people 65 years and older (Violan *et al.,* 2014b). Due to the high prevalence of multimorbidity among the older population across varying studies and because of the rising trend in the prevalence of multimorbidity in the low- and middle-income countries (LMICs), gives high relevance to this study. Multi-morbidity is becoming progressively common in both developed and developing countries (Khanam *et al.,* 2011).

The prevalence estimates of multimorbidity in older people have ranged from 3.5% in Netherland (Schellevis, 1993) to 98.5% in Canada, (Fortin *et al.,* 2005a). A systematic review of 41 published studies worldwide reported that multimorbidity varies between 55% and 98% among people aged 65 and over (Marengoni *et al.,* 2011a). The wide variance noticed at various times is thought to be not only due to the lack of standard definition and a unique measurement of multimorbidity but also because of reliable data sources, diagnosis, and study populations (Fortin *et al.,* 2010).

The rising burden of chronic diseases has attracted the attention of public health researchers and policymakers worldwide. Research has shown that evidence on the epidemiology of multimorbidity in Low- and Middle-Income Countries (LMICs) is limited even though the region bears 80% of the global burden of NCDs (Hunter and Reddy, 2013). Studies reported that only 5% of multimorbidity research studies originated in LMICs (Xu, Mishra and Jones, 2017). They further stated that most of the available studies in LMICs were confined to only six middle-income countries (Brazil, China, South Africa, India, Mexico, and Iran). This skewed distribution of multimorbidity studies demonstrates that there is a lack of attention on studying the phenomenon in other LMICs where it is likely to be more prevalent. In the same way, most of the recognized studies on multimorbidity extrapolated to the global population through the largest systematic review of the prevalence of multimorbidity conducted to date for over 25 years (1992-2017), by Nguyen et al. (2019) were largely skewed to the other region of the world excluding Africa. A breakdown of the study area shows only 3 in South Africa, 2 from Ghana, 2 from Burkina Faso, and one each from Egypt, Kenya, and Morocco (Afshar *et al.,* 2015a; Alaba and Chola, 2013; Garin *et al.,* 2016; Hien, Hervé *et al.,* 2014; Nguyen *et al.,* 2019a).

Even countries that prioritize multimorbidity could not develop sustainable models of care because of the dearth of knowledge in the aetiology, epidemiology, and risk factors of multimorbidity which have slowed down the development of efficient and cost-effective intervention for the prevention and management of multimorbidity (Navickas *et al.,* 2016). More data are needed to better understand the changing pattern and burden of multimorbidity, this is directly linked with one of the research objectives. Lessening multimorbidity will continue to be a big challenge not only because policy and research remain primarily focused on single diseases rather than multimorbidity, but also how to better prevent the accumulation of multiple diseases has received less attention (Head *et al.,* 2021).

2.2 Prevalence of multimorbidity in the community

Data from 15 European countries have shown that an increase in the prevalence of multimorbidity in both genders in 7 countries (Souza *et al.,* 2021). See figure 2.1. However, the increase in men only was observed in Netherlands and the prevalence was relatively stable in other countries in the period under review (Souza *et al.,* 2021). The increase or reduction in the prevalence of multimorbidity was explained by two factors: (1) changes in the prevalence of the main risk factors, such as tobacco and alcohol consumption, diet or practice of physical activity; or (2) changes in the classification system and/or improvement in diagnosis.
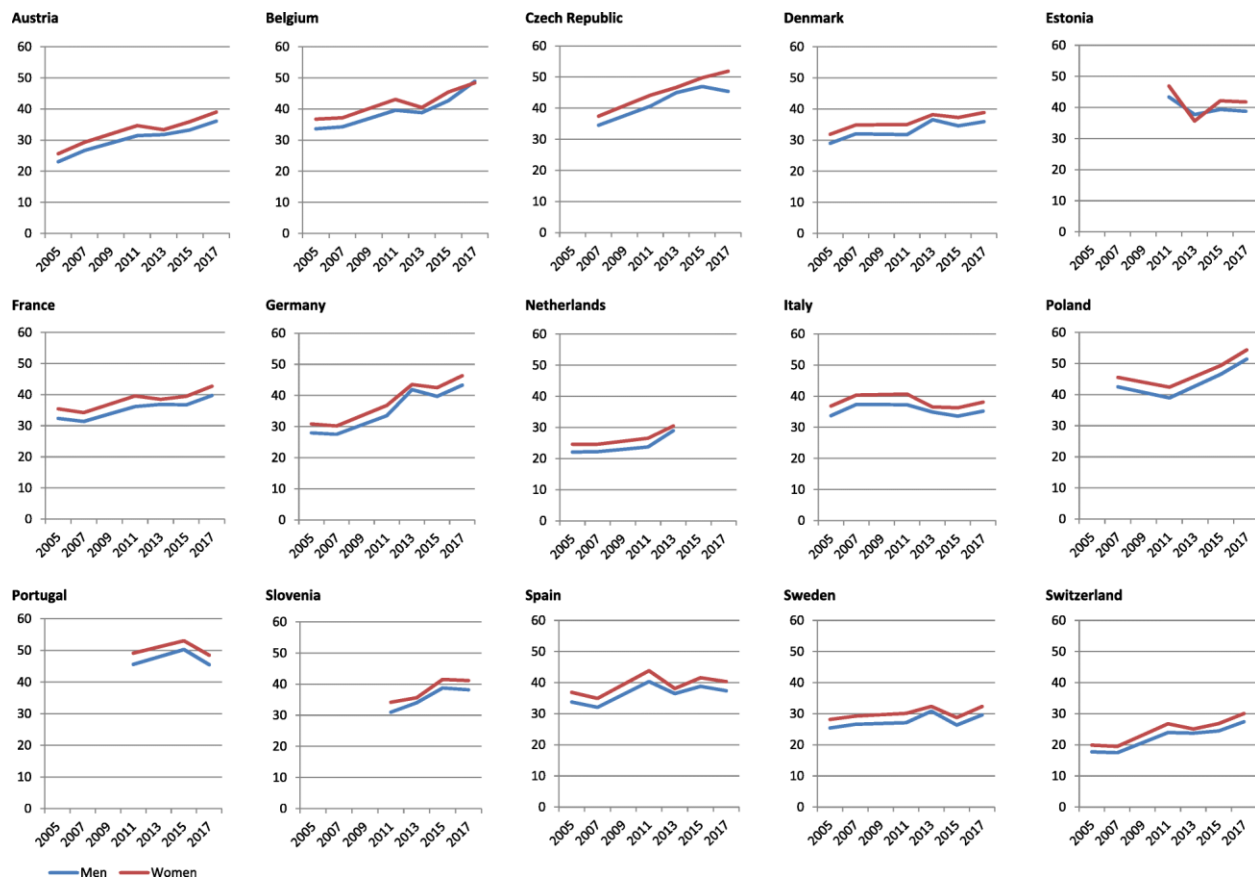
Figure 2.1 Prevalence trends of multimorbidity in 15 European countries in community-dwelling men and women aged 50 and over. Adopted from Souza et al. (2021, page 5) studies of Trends of multimorbidity in 15 European countries: a population-based study in a community.

A wide variation in the prevalence of multimorbidity was also observed in a systematic review conducted to examine previously published prevalence estimates of multimorbidity in both general populations and primary healthcare populations from more than ten countries including Australia, Canada, Netherlands, United States, and the United Kingdom (Boyd and Fortin, 2010b). This review found that the prevalence of multimorbidity, defined as at least two diseases, ranged from less than 10% to as high as 70% in the 50 years and older population. Other research also showed that the proportions of older adults with multimorbidity in high-income countries vary: 75% in Australia (Britt *et al.,* 2008), 21.7% in China (Zhou *et al.,* 2011) 83% in India (Joshi, Kumar and Avasthi, 2003) 95% in

Spain (Formiga *et al.,* 2013), and 55% in Sweden (Marengoni *et al.,* 2008a). Unfortunately, there are no comparative data from Africa. Prevalence data on multimorbidity in the in the older people elderly in low-income countries are also scared (Khanam *et al.,* 2011). Similarly, the findings from the systematic review on chronic diseases in sub-Saharan Africa revealed a neglect of research on chronic diseases (Dalal *et al.,* 2011).

Overall review of literature on the prevalence of multimorbidity indicates the research on this topic to be in its infancy to date in Nigeria to my knowledge. This is a critical knowledge gap not only because the available literature does not demonstrate the complex healthcare needs of patients with multimorbidity (Boyd *et al.,* 2007; Moffat and Mercer, 2015; Parekh and Barton, 2010) but also because it does not report the true regional burden of multimorbidity that policymakers need to reset their priority and cater for the older people that are most affected.

2.2.3 Pattern of multimorbidity

Multimorbidity has been defined as the simultaneous presence of more than one health condition in the same individual (Cucinotta and Vanelli, 2020; Javanmardi *et al.,* 2020; Sinclair and Abdelhafiz, 2020; Johnston *et al.,* 2019; van den Akker, Buntinx and Knottnerus, 1996) and multimorbidity patterns as the most frequent combination of specific disease pairs and the groups of health conditions with the highest degree of association found through using the cluster and factor analysis (Violan *et al.,* 2014b). Studies have shown that diseases that are common in older people may occur together by chance (Kirchberger *et al.,* 2012). They further state though that often "common pathways" may lead to clustering of major chronic

conditions. Thus, analysis and exploration of "common pathways" of these co-occurring conditions offer the potential for improved medical management and targeted interventions. Some studies have identified the most common disease pairs (Fried *et al.,* 1999; Marengoni *et al.,* 2009) and others analyzed triadic combination diseases (Van den Bussche *et al.,* 2011a). The commonest dyads (2 chronic diseases) combination of Multimorbidity among the respondents in the study is hypertension + diabetes mellitus which is consistent with a previous Nigeria study by Abdulraheem et al., (2017). However, this is inconsistent with findings that reported rheumatoid and digestive disease as the most frequent dyads (Barnett et al., 2012d; Zhang et al., 2019).

Only a few studies have explored the natural clustering of chronic conditions among the aged population in Nigeria. Thus, this research intends to achieve this. Although factor analysis was used as a method to explore multimorbidity patterns (Schäfer *et al.,* 2010), only a few studies have used cluster analysis to obtain a general picture of the broad pattern of how diseases are associated in a particular population (Cornell *et al.,* 2008; Marengoni *et al.,* 2009).

2.2.4 Adverse childhood experiences

ACEs refer to a wide range of circumstances or events that pose a serious threat to a child's physical or psychological well-being (Felitti, 2009). Adverse events in childhood are of great public health concern given the evidence of their long-term impact on health (Boullier and Blair, 2018). The ACEs are unexpectedly common in the earliest years, they are mostly anonymous and can be identified during childhood by history from children and caretakers (Flaherty *et al.,* 2009). ACEs include child maltreatment (e.g., physical, sexual, and verbal abuse) and broader experiences of household dysfunction, such as

witnessing violence in the home, parental separation, and growing up in a household affected by substance misuse, mental illness, or criminal behavior. ACEs have not only been associated with increased health risks later in life, but it can also start to manifest their damage as ill-health and somatization during childhood itself (Flaherty *et al.,* 2009).

Previous research has also documented the potential of early life conditions to affect the development of chronic conditions later in life, including hypertension, diabetes, and heart disease (Osmond and Barker, 2000; O'Rand and Hamil-Luker, 2005). Another key fact to remember is that individuals that reported an ACE are at increased odds of high-risk behavior such as alcohol consumption, tobacco smoking, risky sexual behavior, and subsequent adverse health outcome like diabetes, stroke, depression, premature death. compared to individuals who have never reported an ACE (Felitti *et al.,* 1998; Campbell, Walker and Egede, 2016a; Gilbert *et al.,* 2015). Moreover, exposure to one ACE can increase the odds of exposure to additional ACEs, indicating a relationship among other ACE exposures (Dong *et al.,* 2004).

Although the ACEs questionnaires has provided a mechanism for retrospectively measuring childhood adversities and identifying their impact on health in later life. The literature on the impact of ACEs on broader measures of mental health and well-being is less extensive. In other words, studies have not been focusing on modifiable risk factors that may have occurred earlier in the life course. Early life is arguably the most appropriate life phase for preventative efforts (Lehman, David and Gruber, 2017). Adverse childhood events (ACEs) have a profound impact on physical, emotional, and cognitive development in children and on physical and psychological health in adulthood (Golder, Loke and Bland, 2011). An equally significant aspect of the evidence from epidemiological

and neurobiological studies suggests adverse childhood experiences (ACE) such as sexual and physical abuse and related adverse experiences to be closely related to enduring brain dysfunctions that in turn, affect physical and mental health throughout the lifespan (Anda *et al.,* 2006; Felitti and Anda, 2010). In another proposed mechanism of effect, a history of ACEs may lead to disruptions in the neurobiological structure and functions that may persist into adulthood (Frodl *et al.,* 2017; Tomasdottir *et al.,* 2015).

The proportion of older adults and multimorbidity is on the rise in Nigeria and other parts of the world, it is also true that in most places, inadequate healthcare force does not receive adequate training or possess the necessary skills to deliver appropriate support and care to elderly people (Khan and Ahmed, 2017). Therefore, there is the need for the identification of early life modifiable risk factors like ACEs to help inform early prevention strategies during critical periods of lifespan. This may prevent, delay or compress the development and progression of multimorbidity. The compelling argument is that this study took a step further from the previous studies of predicting multimorbidity from ACEs by comparing linear relationships between ACEs and multimorbidity among older adults with a predetermined diagnosis of multimorbidity. And one good starting point is to establish the association of ACEs and multimorbidity. To this end, this study is aimed to evaluate if childhood conditions are associated with trajectories of chronic conditions among older adults. This study contributes to the existing literature on the health effects of ACEs by conducting research among multimorbid older adults in north-central Nigeria.

Studies have shown that the organizational growth of neural networks and the biochemistry of neuroendocrine systems can be transformed by ACEs and these changes can have enduring effects on the body, which include accelerating the processes of

diseases, immune system compromising, and ageing (Schury and Kolassa, 2012; Danese and McEwen, 2012). Moreover, there is growing evidence from physiological and biomolecular studies on how ACEs in the form of chronic stress have resulted in systematic development changes, especially in the nervous, endocrine, and immune systems leading to chronic physiological damages (Danese and McEwen, 2012b; Pechtel and Pizzagalli, 2011). A rising body of studies has uncovered the relationships between adverse childhood experiences and harmful health factors (Kessler *et al.,* 2010a; Greenfield, 2010) and associations between modifiable and non-modifiable risk factors and multimorbidity (Violan *et al.,* 2014c; Marengoni *et al.,* 2008b).

2.3 Risk factors and protective factors

2.3.1 Risk factors for multimorbidity

A review of studies has summarized the risk factors of multimorbidity into 2 broad categories (Violan *et al.,* 2014b; Marengoni *et al.,* 2011b; France *et al.,* 2012; Boutayeb, Boutayeb and Boutayeb, 2013; Pati *et al.,* 2015) namely: biomedical and individual factors, and socioeconomic factors.

2.3.2 Biomedical and individual factors:

The risk factors can also be grouped into modifiable and non-modifiable factors risk factors (Shakoori *et al.,* 2020). They cited examples of modifiable risk factors to include tobacco smoking, alcohol consumption, high level of physical inactivity, unhealthy eating

patterns, hypertension, and high body mass index. Whereas the non-modifiable risk factors included age, gender and genetics.

The factors in this group are age, women's sex, the high number of individual previous diseases, and mental disorders. Research has shown that divergence exists regarding the associations of multimorbidity in the older people. One factor that is well-known to be associated with both single chronic disease and multimorbidity is age and it plays a significant role in the outcome. In line with this, the discrepancy between multimorbidity studies concerning other variables was observed to be due to the different age groups of elderly persons analyzed (Melo *et al.,* 2019) While an association was observed between multimorbidity and female sex in some studies (Agborsangaya *et al.,* 2012; Marengoni *et al.,* 2008b; Cavalcanti *et al.,* 2017), some studies do not show similar findings (Ha *et al.,* 2015; Cavalcanti *et al.,* 2017). The association between the female sex and the prevalence of multimorbidity may be related to the fact that women have a longer life expectancy and worse health status than men (Ha *et al.,* 2015; Jerliu *et al.,* 2013).

2.3.3 Socioeconomic factors

An inverse association was observed between multimorbidity and richer older persons (Mini and Thankappan, 2017) some studies reveal an association between multimorbidity and self-reported poverty and financial dependence (Banjare and Pradhan, 2014). Concerning poorer individuals, economic difficulties continue to be a strong predictor of poor health, even in the in older people. Furthermore, poverty appears to be part of a vicious circle: a low-income during adulthood favors the persistence of poverty in the

ageing phase, which in turn contributes to poor health outcomes   (Jerliu *et al.,* 2013). Studies have revealed that people with greater education are less likely to suffer from multimorbidity (Ha *et al.,* 2015). People with less education are therefore likely to be more prone to multimorbidity because education often links to higher lifetime income and resources. Educated people may be able to access more information on health promotion and adopt healthy lifestyles, preventing the onset of certain chronic diseases (Ha *et al.,* 2015). In a certain study income and smoking show a higher association in multimorbidity than single chronic disease (Alaba and Chola, 2013). This signifies a strong connection between multimorbidity with income and smoking. Studies have also shown a strong association between living in rural areas and multimorbidity in the elderly. This may be due to the poor availability of health services and access to information in these places, which result in fewer opportunities for these older people to acquire the healthy habits to get early treatment that prevent the accumulation of chronic diseases (Kassouf, 2005). Prevalence of multimorbidity is affected by whether the elderly person lives with children or not suggests that living with other people, irrespective of whether it is a spouse, child, or grandchild, is extremely important for the health care of the elderly. The importance of family support through the management of chronic diseases may be an important component in reducing the likelihood of developing other chronic conditions (Agborsangaya *et al.,* 2012).

Overall, findings from studies reported an association between multimorbidity in the elderly and smoking, alcohol consumption, low schooling, living in rural areas, female gender, and being elderly. However, findings from Studies differed on the influence of

economic status on the prevalence of multimorbidity i.e., both high and low income were associated with multimorbidity.

2.3.4 Environmental factors

Environmental risks to health are defined as all the external physical, chemical, biological, and work-related factors that affect a person's health, excluding factors in natural environments that cannot reasonably be modified (Prüss-Ustün *et al.,* 2019). These environmental risks to health include pollution, radiation, noise, land use patterns, work environment, and climate change. The risks causing the most rapidly rising NCD deaths globally between 2010 and 2016 are ambient air pollution with a 9% increase and low physical activity with an 11% increase (Prüss-Ustün *et al.,* 2019). Combustion of fossil fuel can produce harmful air pollutants like ozone, sulfur dioxide, nitrogen dioxide, hydrocarbons, metals and particulate matter that are major contributors of disease burden (Dhimal, Neupane and Dhimal, 2021). With most of the countries been affected, ninety-one percent of people are exposed to ambient air pollution globally (World Health Organization, 2018). The situation is worse in LMICs because more than 40% of the people are cooking with inefficient technology and fuel combinations, generating harmful smoke in their homes and the health sector are not paying attention to the need to actively engage and participate in the development of plans in other areas where many environmental risks to health are shaped, such as energy or transport rules (Prüss-Ustün *et al.,* 2019).

2.3.5 Physiological factors

Physiological risk factors are factors that connected to an individual body which may be influenced by the combination of genetic, lifestyle and other broad factors like overweight or obesity, hypertension, hyperglycemia and high cholesterol. If these conditions are not control it can lead to single morbidity and then multimorbidity (Alloubani, Saleh and Abdelhafiz, 2018).

2.3.6 Mechanisms of action /pathophysiology

The heterogeneity of patients has made the studying of the mechanism and pathophysiology of multimorbidity to be difficult (Skou *et al.,* 2022). The concept of concordant where the morbidity shared common pathways and discordant whereby the medical conditions have unrelated pathophysiology does not help the matter (Piette and Kerr, 2006). Multifactorial pathways do exist evidenced by incipient literature on mechanism and pathophysiology (Sturmberg *et al.,* 2017). To this end, pathophysiology and mechanism leading to multimorbidity are broadly grouped into three, namely ageing and inflammation, activation of hypothalamic-pituitary-adrenal axis, pathology and medication pathology (Skou *et al.,* 2022)

2.3.6.1 Ageing and inflammation

The evidence linking ageing and development of multimorbidity is becoming robust (Barnes, 2015; Wetterling, 2021; Singer *et al.,* 2019). Ageing is almost always associated with complex changes at the molecular level (Skou *et al.,* 2022). The detailed of this mechanism are summarised in figure 2.2 Remarkably, these changes have now been regarded for

possible areas for drugs development to prevent or slow-down the development of multimorbidity (Ermogenous *et al.*, 2020).

Social: socioeconomic, psychosocial and behavioral determinants

• Socioeconomic factors (e.g., income, education level, housing and basic amenities)

• Behavioral factors (e.g., smoking, physical inactivity, diet and sleep)

• Psychosocial factors (e.g., loneliness and adverse childhood experiences)

Medication

Multimorbidity

Biological: ageing and inflammation

• Cellular senescence

• Stem cell exhaustion

• Epigenetics

• Loss of proteostasis

• Deregulated nutrient sensing

• Genomic instability

• Telomere attrition

• Altered intercellular communication

Figure 2.2 illustration of determinant of multimorbidity adapted from Skou et al., (2022, page 7)

2.3.6.2 Chronic activation of hypothalamic-pituitary-adrenal axis

The measurement of the income of the household, and total household health collectively tagged as socioeconomic deprivation (Ingram *et al.,* 2021), along with lower education are associated with both higher multimorbidity prevalence (Kivimäki *et al.,* 2020; Mounce *et al.,* 2018) and development of multimorbidity at a younger age (Barnett *et al.,* 2012a). However, the reverse has been observed in less affluence society (Pathirana and Jackson, 2018). Also, ACEs are associated with increase severity and complexity of multimorbidity (Abebe *et al.,* 2020a). There are range of hypothesis for potential mechanism including chronic activation of hypothalamic-pituitary adrenal axis. In the same way, unhealthy lifestyles combination increases the risk of multimorbidity (Fortin *et al.,* 2014b).

2.3.6.3 Medication-related mechanisms

Polypharmacy could be a cause of multimorbidity or a complication. While complications could arise as a result of taking multiple medications (Naples and Hajjar,2016), drugs like antipsychotics are connected to increase risk of dyslipidaemia and diabetes mellitus (Newcomer, 2007).

2.4 Theories of Multimorbidity

It is important to understand the dynamics of the paths that lead to the accumulation of diseases and multimorbidity in an individual implies more complexity and difficulties regarding their health care. According to Turabian, (2020) the accumulation of health problems that leads to multimorbidity is a complex process and can occur as a result of

an unclear genetic and environmental factors. This likely to be interplay between these. (Turabian, 2020)

Research has shown that Multimorbidity was hypothesized as a certain history of the pathways of accumulation of health problems. The stated hypotheses are as follows as presented in figure 2.3. However, those that seems connected to multimorbidity are common pathogenesis pathway, accumulation of risk factors, accumulation of genetic and epigenetic alteration of molecular and biological level sharing genes, and protein which are grouped as causality, association and links.

Other theories by researchers were not favored in this study this include (1) Coincidences, Series, Synchronicities, (2). Due to our other medical Interventions to solve other Previous health conditions (3). Multimorbidity (presence of multiple biological problems) gives rise to added psychological problems, (4). Two Diseases is better than one, and (5) multi-problem families (Wilkinson, 2000; Stanners *et al.,* 2014; Turabia, 2018; Turabian, 2017; Turabian, 2018).

casuality, association & links
- common pathway
- Accumulation of risk factor
- Accumulation of genetic and epigenetic alterations of molecular and biological level sharing genes, protein
- psychosocial links

Coincidental patway
- It is the simultaneous occurrence of two events that are not causally connected

Due to intervention
- Additional morbidity could be secondary to our intervention such as pharmacological iatrogenesis with adverse drug reactions and drug-drug-interactions or surgical sequelae

Two disease better one
- For example, patients with sickle cell disease, are more resistant to its effects if concomitantly have a second disease, glucose deficiency 6-phosphate dehydrogenase disease; cystic fibrosis protects against typhoid fever; Tay disease -Sachs may have evolved to fight tuberculosis

Presence of morbidity
- The presence of multiple biological problems gives rise to added psychosocial problems.

Multiple problem family
- Problems are often shared by more than one individual in the family, and can be seen more appropriately   as problems of the family system, and are frequently associated with critical periods of change, transitions, and turning points in families

Figure 2.3 Illustrates some theories of Multimorbidity (self-designed), literature from Turabian (2020,

page 10 & 11)

The vicious cycle of multimorbidity

According to Shakoori *et al.* (2020), increase in modifiable and non-modifiable risk factors

will lead to increase in multiple organ dysregulation and pathogenesis, this will in turn lead

to single morbidity and them multimorbidity and this can lead to mortality. In essence,

this can lead to one or more chronic diseases which eventually leads to increase morbidity

and economic burden that have an impact on socioeconomic, political, and cultural factors.
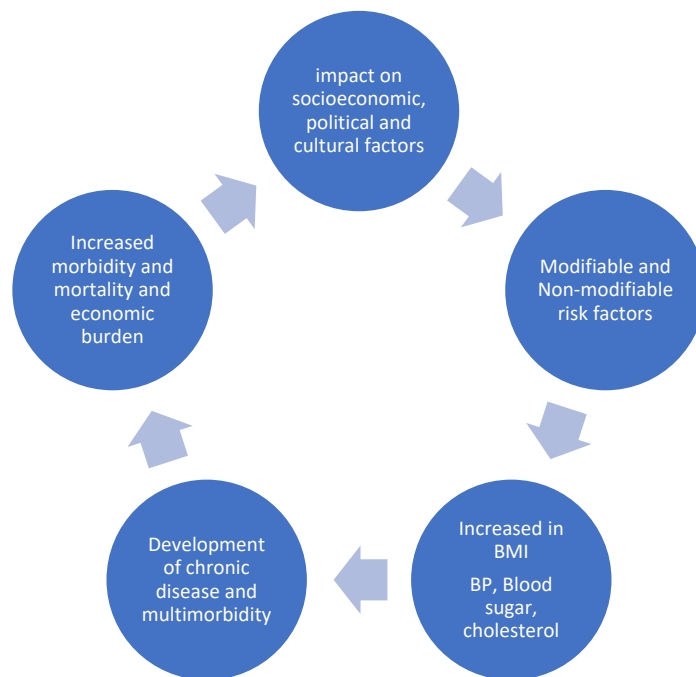
Figure 2.4 cycle of multimorbidity adopted from Shakoori et al. (2020, page 2) study of Understanding chronic disease risk factors and multimorbidity.

2.5 Healthcare setting in Nigeria

Health care pathways, also known as clinical pathways, integrated care pathways or care maps are used to systematically plan and follow up a focused patient or client care programme (Centre for Policy on Ageing, 2014). Care pathways are a way of setting out a process of best practice to be followed in the treatment of a patient or client with a particular condition or with needs. The health care pathway maps out the care journey an individual can expect, and should be multi-professional, crossing organizational

boundaries; and can act as a prompt for care (Allen, Gillen, and Rixson., 2009). The aim of a care pathway is to enhance the quality of care across the continuum by improving risk-adjusted patient outcomes, promoting patient safety, increasing patient satisfaction, and optimizing the use of resources (Schrijvers, van Hoorn, and Huiskes., 2012)

The health infrastructure of Nigeria is structured in 3 levels, tertiary, secondary, and primary health care. Tertiary health care comprises teaching hospitals and the federal medical center usually been coordinated by the federal government while the state government manages the various general hospitals (secondary healthcare) and local government focuses on dispensaries (primary healthcare), which are regulated by the federal government through the National Primary Health Care Development Agency. It is a norm in Nigeria for the patient to visit either primary or secondary healthcare settings first, which is usually been faced with an inadequate human resource for health and been structured to manage single morbidity or based on a single-disease paradigm irrespective of the complexity of their health problems. Furthermore, disease-specific models of care incorporate the threat of inadequate coordination of care, interference of medicines, and interference of advised self-care for multimorbidity (Greß et al., 2009, Van Weel and Schellevis, 2006). This current setting cannot comprehensively deal with the complex health issue of multimorbidity and there is a need for more research in this field.

5.1 Multimorbidity: a challenge to the healthcare system

Studies have shown that multimorbidity management requires a lot of resources that are hard work for both the patients and practitioners, especially when deepened with socioeconomic deprivation (O'Brien *et al.,* 2011). Additionally, multimorbid patients are

prone to frequent hospitalization, polypharmacy, treatment burden, and mortality (Duerden, Avery and Payne, 2013; Palmer *et al.,* 2018). People with multimorbidity are more likely to die prematurely, and they are frequently associated with an increase healthcare utilization (Vogeli *et al.,* 2007; Salisbury *et al.,* 2011a; Lehnert *et al.,* 2011). In high-income countries, individuals with multimorbidity make up 78% of all consultations in primary care (Salisbury *et al.,* 2011a). They have frequent hospital admission and stay longer on admission compared with people with single disease (Frølich *et al.,* 2019; Salisbury *et al.,* 2011a).

Comparing to the burden of NCDs in LMICs is not only increasing at an advanced rate but also occurring among younger age groups (Hajat and Stein, 2018). Similarly, as NCDs appear earlier, multimorbidity appears earlier leading to declining quality of life, life expectancy and productivity (Wade *et al.,* 2021).

2.5.2 Measurement of quality of care

Quality of care is defined as the degree to which health services for individuals and populations increase the likelihood of desired health outcomes (Lohr and Schroeder, 1990a). The most significant parameter for evaluating quality of care at patient's disposal is the satisfaction with the service and service providers (Abdulsalam and Khan, 2020; Gupta and Rokade, 2016). Therefore, a better understanding of quality of care is important for the process of selecting new interventions and building strategies for quality improvement. The healthcare quality enhancement faces considerable methodological, clinical, financial and political issues (Cooperberg, Birkmeyer and Litwin, 2009). Different frameworks

for measuring the quality of care have been developed. The commonest ones are the World Health Organization (WHO)- The recommended quality of care framework, Bamako initiative, and the Donabedian model.

2.5.2.1 Measuring quality of care for multimorbid patients

The WHO- recommended quality of care framework suggests that a health system should seek to make improvements in six areas or dimensions of quality of care, namely effectiveness, efficiency, accessibility, acceptability, equitable and safe. While Bamako Initiative (BI) brings about quality improvement of healthcare through self-sustain regular drugs supply to primary health care in sub-Saharan countries. BI is accompanied by several challenges such as the requirement of foreign currency to import drugs versus a local currency, and discernment against the poorest (Chetley, 1990). These two approaches are not flexible as Donabedian model of care.

One major advantage of the Donabedian model is that it is a quality-of-care framework model developed to be flexible enough for application in diverse healthcare settings and among various levels within a healthcare delivery system (Rubin, Pronovost and Diette, 2001). In addition to examining quality within a healthcare delivery unit, the Donabedian model can be applied to the structure and process for treating certain diseases and conditions to improve the quality of chronic disease management. At its most basic level, the framework can be used to modify structures and processes within a healthcare delivery unit, such as a small group practice or ambulatory care center, to improve patient flow, satisfaction and improved outcome (Rubin, Pronovost and Diette, 2001). Furthermore,

Donabedian's model can also be applied to a large health system to measure overall quality and align improvement work across a hospital, group practice, or the large integrated health system to improve quality and outcomes for a population. Using Donabedian model of care provide health care leaders with data to evaluate the organization's performance to design strategic quality improvement (QI) planning (Martin *et al.,* 2007). However, the Donabedian model is faulted because the sequential progression from structure to process to the outcome has been described by some as too linear of a framework (Mitchell *et al.,* 1998), and consequently has a limited utility for recognizing how the three domains influence and interact with each other (Flatley Brennan, 2006). The model has also been criticized for failing to incorporate antecedent characteristics (e.g., patient characteristics, environmental factors) which are important precursors to evaluating quality care.

There is increasing awareness of perception on quality of care as an important driver of care (Bhutta *et al.,* 2008; Heiby, 2014). According to Balabanova et al. (2009), easy-to-navigate care pathways and continuity are critical to how patients perceive the quality of care and choose whether to continue treatment or not. They further state that long-term compliance is only likely if the patients involved consider their care to be of good quality (Balabanova *et al.,* 2009). Overall, understanding the patient experience of those with multimorbidity is a key step in moving toward patient-centred care and their assessment can provide a critical starting point to develop an effective action-based model of care for multimorbid patients in Nigeria. This study assessed this as an objective by using the Donabedian model that appears to have fit well with the measurement of quality of care

for multimorbid patients in the outpatient department clinics in secondary hospitals that see all kinds of patients.


```
Quality of care          structure            process              outcome
measurement
domain

                    ┌──────────────┐   ┌──────────────────┐   ┌──────────────────┐
                    │ facility     │   │ 1. patient       │   │                  │
                    │ service      │   │    experience    │   │ client           │
                    │ readiness    │   │ 2. service       │   │ satisfaction     │
                    │              │   │    quality       │   │                  │
                    └──────────────┘   │    standard      │   └──────────────────┘
                                       └──────────────────┘

                    ┌──────────────┐   ┌──────────────────┐   ┌──────────────────┐
                    │ facility     │   │ 1. client exit   │   │                  │
                    │ readiness    │   │    interview     │   │ client exit      │
                    │ survey using │   │ 2. facility      │   │ interview        │
                    │ SARA tools   │   │    assessment    │   │                  │
                    │              │   │    with          │   └──────────────────┘
                    └──────────────┘   │    observation   │
                                       │    interview     │
                                       └──────────────────┘
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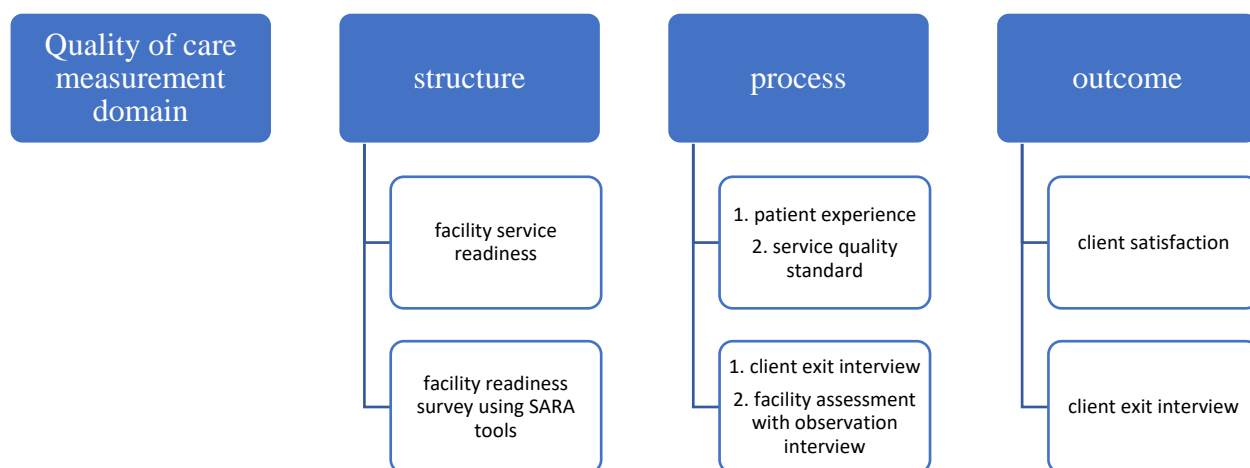
Figure 2.5 illustrating Donabedian model of care

2.5.3 Effect of COVID-19 pandemics on the management of multimorbidity

The emergence and spread of the COVID-19 have become a public health event of extensive concern across the globe in 2020, with the WHO declaring COVID-19 a pandemic in March 2020 (Du Toit, 2020). The preliminary epidemiological findings observed that adverse outcome is heightened in an individual with underlying diseases like the chronic kidney disease (CKD), cardiovascular disease (CVD), hypertension (HTN), diabetes, chronic obstructive pulmonary disease (COPD), and malignancy (Sinclair and Abdelhafiz, 2020). Of more concern to this study, and further supporting a better understanding of multimorbidity is the bidirectional relationship that multimorbidity has with Covid-19. The reports from recent data reveal that the presence of two or more

conditions accentuates the outcomes in covid- 19 with about 10- fold risk and on the other hand Covid-19 causes a notable disruption in the routine management for chronic diseases in the individual with multimorbidity than those with single disease (Cucinotta and Vanelli, 2020; Javanmardi *et al.,* 2020; Sinclair and Abdelhafiz, 2020). In line with the bidirectional relationships between covid-19 and multimorbidity, multimorbidity increases the risk of developing covid related complications and on the other hand, the epidemics itself has amplified the problems for preventing and management of multimorbidity (Monterrubio-Flores *et al.,* 2021; Reyes-Sánchez *et al.,* 2022).

Chapter 3

Methodology

This chapter outlines the two methodologies + range of methods used in the research study. It starts by setting out the theoretical framework, research paradigm and research design. The next part of the chapter discusses study setting, inclusion and exclusion criteria. Research data was collected during the Covid -19 pandemic, and the safety measures set up for data collection was discussed. The Quantitative methodology, Qualitative methodology, Sampling, Sampling Procedures and data collection, measurement of study variables and data analysis are set out. The Qualitative data analysis, Quality control and assurance, and Chapter summary.

3.0 Theoretical framework

This research has its theoretical bases on the concept of social determinants of health (SDH) and its application in selected studies demonstrating a causal link with chronic diseases. According to Marmot, (2015), social determinants of health are "the conditions in which people are born, grow, work, live, and age, and the set of forces and systems shaping the conditions of daily life. Biological, lifestyle, social, cultural, economic and economic environmental determinants of health lead to an accumulation of chronic stress leading to physiological changes (dysregulation + pathogenesis) across life course which lead to single and then multiple morbidities. And by intervening and influencing positively these determinants we can delay or reduce multimorbidity. This is also of importance considering the concept behind this study which is understanding multimorbidity following

a life course approach. Early childhood contributes to health inequalities in adult life because of the social gradient. Although this study is among older adults, looking into their respective early childhood experiences retrospectively is an investment for the future because adverse trends over the past decade do not describe the health trends of the past decade but might be an indication of things to come (Marmot, 2015).

Structural determinants include factors related to socioeconomic statuses, such as education, income, and occupation, and the broader social opportunity structures, such as social class and gender, which determine access to health care (Barnett, K. *et al.,* 2012). Generally, poor individuals are more likely to experience the worst health outcomes (Ataguba, Akazili and McIntyre, 2011). Social determinant of health has been analyzed by several researchers yielding robust findings on how factors such as education, marital status, socioeconomic status, and smoking influence chronic diseases (BeLue *et al.,* 2009).

SDH is followed in this study, not only because the SDH model reported that besides inherent genetic factors, other factors including the living and working environment, life events, behavioral risk factors, and socioeconomic status may affect the occurrence and intensity of the disease, but also because the model uses structural and intermediary determinants to explain factors influencing health and wellbeing (Cockerham, Hamby and Oates, 2017). An empirical study showed that socioeconomic deprivation is associated with an increased likelihood of multimorbidity (Barnett, Karen, Mercer, Norbury, Watt, Wyke and Guthrie, 2012a). Addressing the structural determinants of health is therefore important to create an enabling environment for equitable delivery of healthcare. Social capital serves as an important asset that helps to strengthen health information dissemination and improves access to healthcare (Vogel *et al.,* 2012).

Moreover, social factors such as tobacco smoking, alcohol consumption, and lack of physical inactivity can initiate the onset of pathology and may serve as having a direct link with several chronic health conditions. For instance, smoking has been found to be related to more than 21 chronic diseases (Carter *et al.,* 2015; Cockerham, 2021). In summary, SDH formed the bases of this study mainly because it has a causal role in fostering illness and disability and equally can promote prospects for delaying or preventing disease and maintaining health.

3.1 Research paradigm

Studies that are products of the pragmatist paradigm and combine the quantitative and qualitative approaches at different phases of the research process are referred to as mixed methods research design (Tashakkori and Teddlie, 2008). Quantitative research (i.e., a positivist paradigm) has historically been the basis of social science research. Quantitative researchers aim to eliminate their biases, stand emotionally detached and uninvolved with the objects of study, and test or empirically justify their stated hypotheses (Johnson and Onwuegbuzie, 2004). Whereas, the qualitative researchers support a constructivist and interpretivist paradigm and contend that multiple-constructed realities abound, that time- and context-free generalizations are neither desirable nor possible, that research is value bound, that it is impossible to differentiate fully causes and effects, that logic flows from specific to general and that knower and known cannot be separated because the subjective knower is the only source of reality (Johnson and Onwuegbuzie, 2004). The research philosophy and paradigm used in this research is summarized in the Table 3.1. Overall, a pragmatic paradigm has been used in this research.

Table 3.1 showing Research Philosophy and Paradigm

Research paradigm	Ontology	Objective	Subjective
	Epistemology	Positivist	constructivist
Data gathering	Methodology	Quantitative	Qualitative
	Data collection technique	Survey	In-depth interviews
	Data analysis approach	Deductive – Descriptive and inferential analysis	Inductive-Thematic analysis

3.2 Research design

The study used multi-method research design which is different from mixed methods. While mixed methods is defined as "a term used to combine qualitative and quantitative research methods in the same research project"(Johnson, Onwuegbuzie and Turner, 2007). Multimethod research may be broadly defined as the practice of employing two or more different methods or styles of research within the same study or research program rather than confining the research to the use of a single method (Salmons, 2015). In otherwords, researchers reported that it carries all types of research methods and agree that they can all be used in one research study to come up with the different results or the same results (Johnson, Onwuegbuzie and Turner, 2007; Salmons, 2015; Kasirye, 2021). For this study it includes systematic literature review, quantitative and qualitative studies. Therefore in addition to mixed method (quantitative and qualitative), a systematic literature review was conducted to answer specific research objectives.

This project started with systematic literature review (detailed methodology documented in chapter 4). This was followed by a mixed method with each aspect of the study having

unequal status, represented thus: QUAN > QUAL. The essence, is to explain quantitative results by exploring certain results in more detail or helping explain unexpected results qualitatively. In overall, for this research the multiple sources of data are looking at different things and answering different research question to provide a better insight and enhance the validity and relevance of the project. A quantitative study in 4 general hospitals, an in-depth interview was conducted in the community. See figure 3.1.

Multi-method research design

Phase 1   **Phase 2**   **Phase 3**

Phases of research

Systematic literature review.

Quantitative study .

Qualitative study

2   To evaluate if childhood conditions are associated with trajectories of chronic conditions among older adults in Nigeria.

1   To systematically review studies of the prevalence, patterns, and determinants of multimorbidity among older adults in Nigeria

Research objectives

3   To understand the development and progression of multimorbidity among elderly people in Nigeria

4   To determine the prevalence, pattern, and burden of chronic disease conditions among older people in Niger state Nigeria.

5   To recommend an effective hospital care delivery model for older people in Nigeria with multimorbidity

Figure 3.1 the diagram of the Research design linking with the research objectives.

3.3 The Study setting

Niger is a state in North central Nigeria, and it covers one-tenth of the landmass of the country. The state's capital is Minna and has a total of 25 LGA areas with an approximate population of 6,522,777 in 2021 from the 2006 census projection. Although other ethnic groups are present especially in the state capital, the predominant ethnic groups are Nupe, Gwarri, and Hausa mostly in the 3 distinct senatorial zones of A, B and C respectively see figure 4. It has 1123 functional primary health care centers, 22 secondary health facilities, and 2 tertiary health facilities.

The participants for the quantitative phase were recruited from the outpatient department of 4 secondary hospitals: general hospital Minna, general hospital Bida, general hospital Suleja and general hospital Kontagora. The general hospital Minna is in the state capital and is the largest state-owned health facility in Niger state with 250 beds capacity and 22 functioning departments. The general hospitals in Bida, Suleja, and Kontagora are the largest hospital in the senatorial zone A, B, and C, respectively. The study is limited to 4 secondary hospitals in the state that served as a referral center for the primary health institutions, private facilities, and other secondary hospitals of their respective zones across the 25 LGAs in the state. These 4 hospitals combine sees about 85 to 90% of patients in the state. These high patient volume hospitals guaranteed a satisfactory sample size and an adequate representation of all the zones of the state. Although the finding cannot be generalized to Nigeria, the study can be replicated elsewhere in the country to increase its impact.
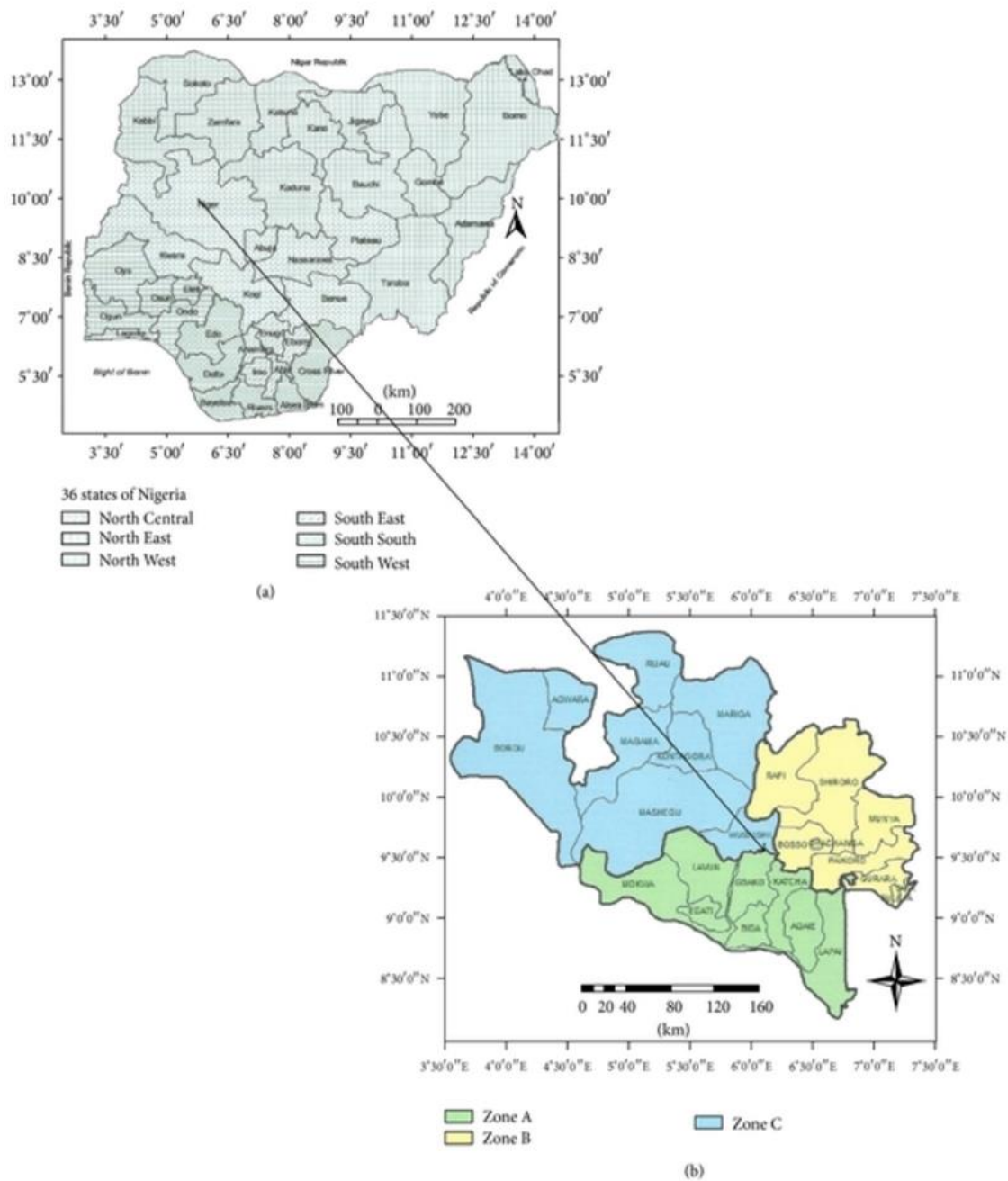
Figure 3.2 Map of Nigeria showing the location of Niger state and the 3 senatorial zones in the state.

3.4 Inclusion and exclusion criteria of the study

Inclusion criteria

(1) Participants were patients 60 years and above with 2 or more chronic diseases (multimorbidity) (2) who present for routine ambulatory outpatient and/ or from the community and (3) And were able to give consent.

Exclusion criteria

The study excluded patients having (1) communication problems, acutely and severely sick that will need admission and/or a specialized line of management. (3) patients with any form of cognitive impairment were also excluded.

3.5 Safety measures that was set up for data collection amid the pandemic

Although the incidence and prevalence of Covid-19 was low in Niger state, the participants were at greater risk of complications or death if they were diagnosed with covid-19. Therefore, the researcher ensured their protection through the following measures during the field work.

The selected hospitals are public health facilities that were upgraded to identify, refer, and respond to Covid-19 patients in separate designated areas, and they routinely did staff testing. As a rule, hospital rules and guidelines of adherence to Covid protocol were in place and seen to be strictly observed. Patients that enter the facility were checked for sign and symptoms of COVID-19 (e.g., temperature checks, questions about and observations of signs or symptoms), and denial of entry for those with signs or symptoms or who have had close contact with someone with COVID-19 infection in the prior 14 days (regardless of the visitor's vaccination status).

Furthermore, the researcher requested from the hospital, the need to use instructional signage throughout the facility and proper visitor education on COVID19 signs and symptoms, infection control precautions, other applicable facility practices (e.g., use of face mask, hand hygiene, specified entries, exits, and routes to designated areas)

In addition to all the above, all research participants were provided with an alcohol-based hand rub and face mask for hand hygiene and covering of the mouth and nose respectively. The social distancing of at least six feet between persons was maintained. The researcher also ensured cleaning and disinfection of high-frequency touch surfaces in the hospital. In addition to hospital rules and guidelines of using appropriate personal protective equipment (PPE) by the staff, PPE were provided and used by the research team.

3.6 Sample size, Sampling, Sampling Procedures

With the utilization of statistical literature, a total sample size (N) of 800 was determined by using the formula for sample size determination when the target population is more than 10,000.

The total average number of patients seen in 2020 at general hospital Minna was 336,000 total patients and about 105,000 patients 60 years and above (sample frame) are seen at the outpatient department of the 4 sampled hospitals. Substituting the values in the formula

$n = N/1+N (e)2$

Where n = sample size,

N is the population size (sample frame),

and e is the level of precision.

105,000/1+105,000 (0.05) * (0.05)

= 396.

e was defined from power calculations used in other calculation in other similar studies. To reduce the margin error and allow for drop out of the participants the sample size was increased to about double the calculated value to 800. A purposive sampling method was used to select 4 high-volume general hospitals, one each in the 3 senatorial districts and one in the state capital, all having a good representative of multimorbid patients. A systematic random number of 5 was used to select every 5th patient, after identifying the first patient randomly daily. Although the systematic sampling can include over- or under-

representation of patterns and cause a greater risk of data manipulation, the researcher used it because of its simplicity, and popular with researchers. It also eliminating the phenomenon of clustered selection and a low probability of contaminating data. Of the 800 participants contacted for the studies, 734 consented and answered the questionnaire (response rate 91.8%).

3.7 Quantitative methodological approach, and data collection

This phase of the study was hospital-based and carried out at the outpatient department of 4 general hospitals in Niger state north-central Nigeria. On the scheduled clinic days (Monday to Friday), the research team which comprises the principal researcher, 10 research assistants as well as 2 medical record officers from the outpatient departments of the 4 general hospitals meets every morning to outline plans for the day. The records of all the patients were checked collectively to confirm the diagnosis and all the medical conditions the patient had. After separating the records of patients with multimorbidity, the patients are then approached for identification as they await consultation.

Patients' consent was sought, and the participants were given the opportunity to consider participating with at least a 24-hour gap between being provided with information about the study and being involved in interviews. Participants freely sign an informed consent to participate in the study, and the individual's right to withdraw partially or completely was reiterated during data collection, and participants were assured of the confidentiality of the information they provided. A simple count of individual chronic conditions was the

approach to measure multimorbidity, which is also the most common across the literature (Huntley *et al.,* 2012). After obtaining informed consent, participants were interviewed face-to-face by the researcher and trained research assistant using a pre-validated structured electronic questionnaire. The survey interview was conducted in English or Hausa language, the most popular language in Niger state, Nigeria (whichever the respondent felt comfortable with). The questions on socio-demographic characteristics of participants were collected, including age, sex, ethnicity, marital status, types of family or composition of the family, level of education, types of occupation, and monthly family income. Other aspects of the questions are described in the measurement section. The physical presence of the researchers does not only help the participants to understand the questionnaires it provides the researcher to go through the patient's folder and be sure of the diagnosis and fit into the inclusion criteria after getting the permission for this from the hospital and the patients.

An in-depth interview was conducted with some participants from the community to explore in detail the respondent's perception of their experience with the multimorbidity and access to healthcare notably the healthcare pathway setting and quality of care. This provides opportunity to give sense of belonging, give purpose and sense of distribution This phase of the research provided an opportunity to explore in detail finding in the quantitative study that needs understanding.

3.8 Measurements of variables

Predictors of adverse childhood experiences (ACEs) exposure was assessed using the Adverse Childhood Experiences International Questionnaire (ACE-IQ). The ACE questionnaire is a reliable and valid measure of childhood adversity that has been used extensively in large-scale ACE studies. Questions about ACEs of the respondents' first 18 years of life were in binary form (yes vs no). The questions addressed 10 individual ACEs: (1) Physical abuse, (2) Emotional abuse, (3) Contact sexual abuse, (4) Alcohol or drug abuse, (5) incarcerated household abuse, (6) Someone chronically depresses, (7) Household members were treated violently, (8) One or no parent/ parental separation or divorce, (9) Emotional neglect, and (10). Physical neglect.

Information on the existence and intensity of lifestyle factors were collected by extracting from Behavioral Risk Factor Surveillance (CDC-BRFSS-2019) questionnaires (Core section 8, 9,10,11 for socio-demographic, smoking, alcohol, and exercise respectively).

To provide comprehensive information on the quality of care that the multimorbid patient receive in the hospitals, the Donabedian model of care was used to assess the quality of care. For the structural- quality measures, a facility survey with standard Service Availability and Readiness Assessment (SARA) tools was studied. Process-quality measures were investigated using on exit interviews with the participants on their perception of provider adherence to quality standards and procedure as well as an in-depth interview of participants from the community. The outcome quality measures were based on the participants satisfaction as they exited the health facility.

Facility survey-structural quality was assessed in the 4 health facilities using a standard facility assessment tool focused on an inventory of availability and readiness of basic

health facility structures: basic amenities (6 tracer items), diagnostic capacity (7 tracer items), essential items (20 tracer items), and standard precaution for infection prevention (9 tracer items). For the process and outcome quality measurement, the patient satisfaction questionnaire (PSQ)-18 was adopted (Marshall and Hays, 1994). It is the revised short-form version of PSQ-III and PSQ that retains many characteristics of its full-length counterpart. This includes general satisfaction, Technical Quality, Interpersonal Communication, Financial Aspects, Time spent with Doctor, Accessibility, and Convenience.

Morbidity was assessed by adopting the list of chronic diseases used in prospective urban and rural epidemiology (PURE) studies because the disease on the list fulfills WHO criteria for chronic diseases (Teo et al., 2009). Variables were measured consistently in line with the existing good practice literature. The reliability and validity of data were checked before finalizing the data for analysis.

3.9 Quantitative Data Analysis

The data was collected through the use of the JISC online data collection tool and exported to the Statistical Package for Social Science (SPSS) version 27 for analysis. Descriptive analysis and inferential analysis were undertaken to determine the association between the covariate and dependent variables. See Table 3.2

Table 3.2 showing research objectives, variables and statistical analysis

Research objectives	Data/ Variables used	Statistical analysis
▪ To systematically review studies of the prevalence, patterns, and determinants of multimorbidity in Nigeria.	Secondary data	Systematic review of literature
▪ Are childhood conditions associated with trajectories of chronic conditions among older adults in Nigeria?	Adverse Childhood Experiences (ACE) Multimorbidity	Descriptive analysis Pearson correlation
▪ What are the relationships between the multimorbidity and adult (sociodemographic variables and behavioral risk) factors in an older adult in Niger state Nigeria?	Adverse childhood experiences Lifestyle factors Multimorbidity	Descriptive analysis Binary logistic regression Chi-square test Pearson's correlation
▪ Which multimorbidity cluster causes the greatest burden among the elderly in Nigeria?	List of chronic diseases used in prospective Urban and Rural Epidemiology (PURE)	Descriptive Relational association rules
▪ How effective is care pathway setting for multimorbid patients in Niger state Nigeria?	General service readiness Patient experience with the quality of care	Descriptive analysis Spearman's correlation Principal component analysis IPA

3.10 Qualitative Methodological Approach

In-depth interview was conducted in the study community to explore in detail the respondent's perception of their experience of the burden of multimorbidity and access to healthcare notably the healthcare pathway setting and quality of care. This part of the study used interpretative phenomenological analysis (IPA). IPA is a qualitative approach that aims to provide detailed examinations of personal lived experiences (Smith and Shinebourne, 2012). Phenomenology is a philosophical approach, which aims to produce an account of lived experience on its terms rather than one prescribed by pre-existing theoretical preconceptions. The researcher explained to the participant why they were invited and the significance of the study and what the data will be used for. The researcher also made it apparent that every person's input is important, and the main aim is not to reach a consensus.

3.10.1 Qualitative participant recruitment

Although there are no specific regulations to determine the sample size for a qualitative study, the sample size can be decided by the resources available, the time assigned, and the research objectives (Shetty, 2020). If possible, phenomenology studies should aim for sample sizes of between 5-25 (Creswell and Poth, 2016), at least 6 (Morse, 1994). Whereas grounded theory methodology sample size should be between 20-30 (Creswell and Poth, 2016), or between 30-50 interviews (Morse, 1994). Overall, 12-15 seems to be the smallest acceptable sample for qualitative samples (Bertaux, 1981). The purposive sampling

method was used to select 12 participants who met the inclusion criteria and were willing to participate in the study.

Participants were patients 60 years and above with 2 or more chronic diseases (multimorbidity) who consented to participate in the study. All necessary steps were taken to make the sample as representative as possible for the study area. A mixture of factors was used to guide the recruitment of participants in terms of socioeconomic background, level of education, ethnoreligious affiliation, and the rest. Data collection was preceded by a pilot interview; the process and resulting data were reflected on by the author and the project supervisors to ensure quality before carrying out other interviews. Furthermore, to create an enabling environment, the interviews were carried out at the participant's preference in terms of location and at a time suitable. After the informed consent, the interviews were carried out and audio recorded on devices were in place to minimize the loss of data through technical error. All potential participants were provided with the information sheet (Appendix 1) and the opportunity to contact the University or the researcher for additional information before participation.

3.10.2 Qualitative data collection

This qualitative data was collected by an open-ended structured interview guide to assess the (1) personal experiences of patients on multimorbidity and (2) access to healthcare, (3) the healthcare pathway setting and (4) quality of care. (Suhonen *et al.,* 2012). The in-depth interviews were carried out at a location of the participants' choosing and at a time suitable for them. Once consent had been gained, the interviews was carried out and audio recorded on two devices to minimize the loss of data through technical error. A pilot

interview was completed; the process and resulting data was reflected on by the researcher to improve the validity/ reliability interview guide before carrying out other interviews.

3.10.3 Qualitative data analysis

The audio data was transcribed by the author; although time-consuming this brings the researcher close to the data and increases familiarity with the data. The qualitative interview data was analyzed using interpretative phenomenological analysis with the help of NVivo software. This software is considered the most powerful software for gaining richer insights from qualitative and mixed-methods data (Castleberry., 2014). For this study, participants were asked the same set of questions and the questions were grouped under a few heading styles. Notes were taken during the interview to documents impressions, changes in behaviors, or attitudes that were not audible. Transcript (or verbatim) the exact reproduction of the interview, with every word and sound and silence was produced. Keywords and sayings were recorded as preliminary coding.

3.11 Ethical Approval

Ethical approval was obtained from the College of Nursing, Midwifery, and Healthcare, Research Ethics Panel, University of West London and Authorization to collect data was gotten from the Research, Ethics, and publication committee (REPC) of Hospitals Management Board, Minna, Niger state of Nigeria. (See appendix 6 and 7).

3.12 Quality control and assurance

3.12.1 Quantitative phase

The scales used in this study have been used in other studies and pre-tests of the contextually adopted tools were carried out before the actual data collection. Multiple items were used to establish appropriate measurement properties of the selected constructs. At the end of each day, the supervisors of data collection checked for the right recording of all entries by the data collectors by randomly checking completed questionnaires. As explained earlier, the researcher took several steps and actions to certify that he gathers accurate data and makes the right interpretation despite his personal belief and values. The quantitative phase the quality principles were measured by internal validity, external validity, reliability and objectivity. See Table 3.3.

3.12.2 Qualitative phase

Trustworthiness is the term used to establish the confidence in the truth and accuracy of findings and it is also analogues to validity and reliability as used in quantitative research, (Lincoln and Guba, 1986). Trustworthiness of a research is significant in evaluating its worth, and keyways of determining it include credibility, transferability, confirmability and dependability (consistency). Detailed discussed on Table 3.3.

Table 3.3 showing Quality control and assurance for quantitative and qualitative

Quality principles	Quantitative phase	Technique used	Qualitative phase	Technique used
True value of evidence	Internal validity	The calculated sample size by the researcher has sufficient statistical power. 396 was calculated and to reduce the margin error and allow for fall out the sample size was increased to about double the calculated value to 800. Only few participants refused to participate for personal reasons. The response rate was 91.9%	Credibility	The participants were old, and some were vulnerable, and as such prolonged engagement was allowed during data collection. To achieve credibility, respondent validation (member check) was employed in this study. The data were returned to the study participant, and they were asked to validate the analyses
Application of evidence	External validity	Population generalization was allowed because a random sampling technique was used. A purposive sampling method was used to select 4 high-volume general hospitals, one each in the 3 senatorial districts and one in the state capital, all having a good representative of multimorbid patients. A systematic random number of 5 was used to select every 5th patient, after identifying the first patient randomly daily. Clear steps followed and described in detailed to ensure the study can be replicated. Predicted relationships between dependent and independent variable were verified.	Transferability	The researcher described the finding in detail thereby making the finding more explicit to the readers. The purposeful sampling method was used to select 12 participants who meet up the inclusion criteria and are willing to participate in the study. A mixture of factors was used to guide the recruitment of participants in terms of socioeconomic background, level of education, ethnoreligious affiliation, and the rest. All interviews verbatim were transcribed and used of quotation of the participants to support and clarify the result section.
Consistency of evidence	Reliability	The internal consistency was tested with Cronbach's Alpha Adverse Childhood Experiences International Questionnaire (ACE-IQ) and the patient satisfaction questionnaire (PSQ)-18. It was tested with 40 adults 60 years and above for comprehensibility. ACE displayed moderate but acceptable internal consistency (Cronbach's alpha: 0.6) while PSQ-18 displayed a strong Cronbach's alpha of 0.7.	Dependability	The researcher was flexible and open-minded towards the topic and process
Neutrality of evidence	Objectivity	The researcher identified anonymous participants/ patients that meet up the inclusion and exclusion criteria. The researcher maintained and safeguarded the original data for accountability	Confirmability	The researcher discussed the process of the research with peers in the same research team

Chapter 4

Systematic literature review of the prevalence, pattern, and determinant of multimorbidity in Nigeria

This chapter discussed the systematic literature review that is linked to one of the research objectives. The systematic review was preceded by a designed priori protocol following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist and the PRISMA Protocols statement.

4.0 Introduction

The increase in average life span and transformation in global age structure towards a rapidly ageing society is a major success for medical and public health systems. Though the increase lifespan is a global trend, the impact is not spread equally across the world (Khan, 2019). This success epitomizes new challenges for public health policy to ensure that healthy life expectancy is increased rather than just life expectancy (Brayne, 2007). This is because an ageing population presents many challenges and ignoring them could undermine the potential benefits and opportunities that living for longer can bring (Khan, 2019).

Ageing represents the greatest risk factor for disease and brings with it the chronic dysregulation of multiple organ systems (Fabbri *et al.,* 2015b). Diseases rarely occur in isolation, and as life expectancy increases, people acquire a growing number of disease+ physiological/ organ dysfunction (Barnett, Karen, Mercer, Norbury, Watt, Wyke and Guthrie,

2012b). The number of people affected by multiple chronic diseases, a condition termed multimorbidity, is increasing dramatically around the world and caring for them has placed substantial stress on many health systems (Navickas *et al.,* 2016). Although this rising burden of chronic diseases has attracted the attention of public health researchers and policymakers worldwide, studies have shown that evidence on the epidemiology of multimorbidity in Low- and Middle-Income Countries (LMICs) is limited even though the region bears 80% of the global burden of non-communicable diseases (NCDs) (Hunter and Reddy, 2013). Healthcare utilization and cost have surged in LMICs as a result of the prevalence of multimorbidity which places strain on the health system (Frølich *et al.,* 2019; Sum *et al.,* 2019b). Multimorbidity management requires a lot of resources and are hard work for both the patients and practitioners, especially when deepened with socioeconomic deprivation (O'Brien *et al.,* 2011). Likewise, multimorbid patients are prone to frequent hospitalization, polypharmacy, treatment burden, and mortality (Duerden, Avery and Payne, 2013; Palmer *et al.,* 2018).

Recent studies reported that only 5% of multimorbidity research studies originated in LMICs, out of which were confined to only six middle-income countries (Brazil, China, South Africa, India, Mexico, and Iran) (Xu, Mishra and Jones, 2017). Similarly, most of the recognized studies on multimorbidity extrapolated from the global population through the largest systematic review of the prevalence of multimorbidity conducted to date for over 25 years (1992-2017), by Nguyen et al. (2019) were largely skewed to the other region of the world excluding Africa. This skewed distribution of multimorbidity studies demonstrates that there is a lack of attention on studying the phenomenon in other LMICs where it is likely to be more prevalent.

It has been estimated that the number of people experiencing multimorbidity is projected to rise along with population ageing by >1% per annum until 2030 (Yoon *et al.,* 2014). Therefore, there is a need for greater insight and an up-to-date understanding of the prevalence and patterns of multimorbidity, especially among the older population to inform preventive strategies in LMICs like Nigeria. To our knowledge, no study has been done to assess the prevalence and pattern of multimorbidity in Nigeria. This systematic review was conducted to synthesize existing literature on the prevalence of multimorbidity in Nigeria and identify common disease clusters in the country. The objectives were to determine (I) the prevalence of multimorbidity in older adults aged 60 years and above in Nigeria. (II) The prevalence of multimorbidity in adult males and females stratified by age group in Nigeria. (III) The common multimorbidity disease clusters in Nigeria and (IV) the determinant of multimorbidity disease in Nigeria.

4.1 Methods

We conducted a systematic review that was preceded by a designed priori protocol (S1 File), following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist (see S2 File in appendix 8) (Moher, 2009) and the PRISMA Protocols statement (see S3 File in appendix 9) (Shamseer *et al.,* 2015) respectively. The Protocol was registered on PROSPERO Ref no. CRD42021273222 and available at https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=273222.

4.2 Inclusion and exclusion criteria

Eligible studies were original, peer-reviewed articles (published either online or as hard copy, with available abstracts in English). Opinion pieces, conference presentations, books, letters, editorials, dissertations/theses, or abstracts were not included. The articles are observational cross-sectional articles on multimorbidity with a well-defined population 60years and above conducted in Nigeria. The setting of the study was either community-based or health facility-based involving either or both inpatient and outpatient. Any other studies besides cross-sectional studies like cohort studies, experimental studies were excluded. In addition, papers without a clear description of the population were also excluded. Articles about the prevalence, pattern, and determinants of multimorbidity in Nigeria were included. For articles where multimorbidity has not been clearly defined, this (SR) adopted an operational definition of multimorbidity to include the article with operational definition studies documenting two or more chronic conditions", even though not mentioning the term multimorbidity. Papers with single condition morbidity and studies with weak methodology were excluded. No limitations were placed on the years of publication.

Recent studies defined multimorbidity as the simultaneous presence of more than one health condition in the same individual (Cucinotta and Vanelli, 2020; Javanmardi *et al.,* 2020; Sinclair and Abdelhafiz, 2020; Johnston *et al.,* 2019; van den Akker, Buntinx and Knottnerus, 1996) and multimorbidity patterns as the most frequent combination of specific disease pairs and the groups of health conditions with the highest degree of association using the corresponding statistical analyses of either cluster or factor analysis (Violan *et al.,* 2014b).

4.3 Search strategy and study selection

We conducted an online literature search on PubMed, Web of Science, CINAHL, PsycINFO, Africa Index Medicus/Global Index Medicus electronic databases, from inception up to 16 of August 2021. Additionally, a corresponding internet search was done in Google Scholar, Google, and an online search from Africa Journal Online (AJOL) applying the same algorithm used in the bibliographic database search. However, the search strategy was modified, where necessary, according to the database or search engine used. Reference lists of included articles was also screened for relevant articles. The search terms included 'multimorbidity' and linguistic variations such as 'multi-morbidity', 'multimorbidities', 'multi-morbidities', 'multi morbidity', 'multi morbidities', multiple morbidities', 'multiple-morbidities'. Also included in the list are terms such as 'multiple conditions', 'multiple diseases', 'multiple chronic diseases', 'multiple chronic conditions', 'multiple illnesses', 'multiple diagnoses', 'multipathology', 'chronic condition', 'chronic diseases. We were interested in how multimorbidity was defined so deliberately we excluded 'comorbidity' and other synonyms in our search strategy. And prevalence or epidemiology AND (pattern) AND determinants were used. This was done by using the 'AND' and 'OR' Boolean operators where appropriate (online supplement). These terms were further restricted by location 'Nigeria (Abia OR Adamawa OR Akwa Ibom OR Anambra or Bauchi or Bayelsa OR Benue OR Borno OR Cross River OR Delta OR Ebonyi OR Edo State OR Ekiti OR Enugu OR Gombe OR Imo OR Jigawa OR Kaduna OR Kano OR Katsina OR Kebbi OR Kogi OR Kwara OR Lagos OR Nasarawa OR Niger OR Ogun OR Ondo OR Osun OR Oyo OR Plateau OR Rivers OR Sokoto OR Taraba OR Yobe OR

Zamfara OR ABUJA OR FCT). The details of the search in specific databases are given in the study protocol (S1 File).

We downloaded and exported all identified citations to Mendeley referencing software manager. Duplicates were excluded using the Mendeley reference manager deduplication function. Afterward, the citations were exported from the reference manager into Rayyan systematic review software (Ouzzani *et al.,* 2016) for the screening process. Title/abstract and full-text screening were carried out on the Rayyan software. The titles and abstracts of all hits returned by the search were screened initially by the first reviewer (AA). The second reviewer (ML) tested a 10% random sample of all references to ensure that eligible studies were not missed out. Studies that satisfied all the eligibility criteria specified above were kept for full-text screening. The full-text screening was done independently by two reviewers (AA and ML). Where there were disagreements, AA and ML discussed resolving them. HK was consulted when an agreement could not be reached. Disagreements were finally resolved by consensus. For multiple studies from the same dataset, the most appropriate data was included. A PRISMA flow diagram is attached to show the detail of the study selection decisions made.

4.4 Data extraction

Extraction of data was conducted simultaneously with full-text searching. The relevant information was extracted from each article included and recorded immediately in the data extraction file (MS Excel). This was carried out by two independent reviewers and one other checked the information. The following data were extracted: Citation details:

authors, title, journal, and year, details of the study: study setting (community or health facility) study design, period of data collection, location of the study, sample size, case definition: how multimorbidity was defined and how disease conditions were measured, characteristics of the participants: age, sex, urban/rural, socioeconomic characteristics, description of main results: percentage prevalence of multimorbidity (n/N) and 95% CIs. Prevalence of conditions stratified by age and sex. Information on the most common disease clusters in the study sample. In addition to the aims of the study, the method of data analysis used, and any points of difference that may affect the interpretation of findings were noted.

4.5 Study quality assessment

Assessing the study characteristics and the risk of bias was done by two reviewers. The Joanna Briggs Institute (JBI) critical appraisal tool for prevalence studies was used (Joanna Briggs Institute, 2017). The JBI uses 9 items. (1) Was the sample frame appropriate to address the target population? (2) Were study participants sampled in an appropriate way? (3) Was the sample size adequate? (4) Were the study subjects and the setting described in detail? (5) Was the data analysis conducted with sufficient coverage of the identified sample? (6) Were valid methods used for the identification of the condition? (7) Was the condition measured in a standard, reliable way for all participants? (8) Was there appropriate statistical analysis? (9). Was the response rate adequate, and if not, was the low response rate managed appropriately? There are four possible answers to the nine items (yes, no, not clear, and not applicable). The threshold for the conversion of the JBI is as follows. Any item with a yes gets a score of 1, for no and unclear the score is zero,

and for not applicable items are not included in the % calculation. A score of 60% and above was regarded as good quality. Based on the JBI data quality assessment system, all 6 studies were rated good quality. 4 studies had a score of 100%, one study have 88% and one study had 62.5%. The results from the two researchers were compared and differences were discussed between them.

4.6 Ethics and dissemination

Only published journal articles were included in the systematic review (This review received ethics approval as part of a larger project by the University of the West London ethical committee). This research provided information on the prevalence of multimorbidity and other studied outcomes in Nigeria. Thus, contributing to the design of future research projects in this area. The findings of this SR will be disseminated in a peer-reviewed journal article.

4.7 Results

4.7.1 Study overview

In total, 738 titles were retrieved from the initial search and removing duplicates and records that are not original articles, there were 581 that were eligible for the title and abstract screening. 567 were further excluded after title/abstract screening leaving 14 articles for full-text assessment for eligibility of which 6 were included in the narrative synthesis (see S1 Table in appendix 10). The PRISMA flow diagram in figure 4.1 shows the exact process of studies selection.
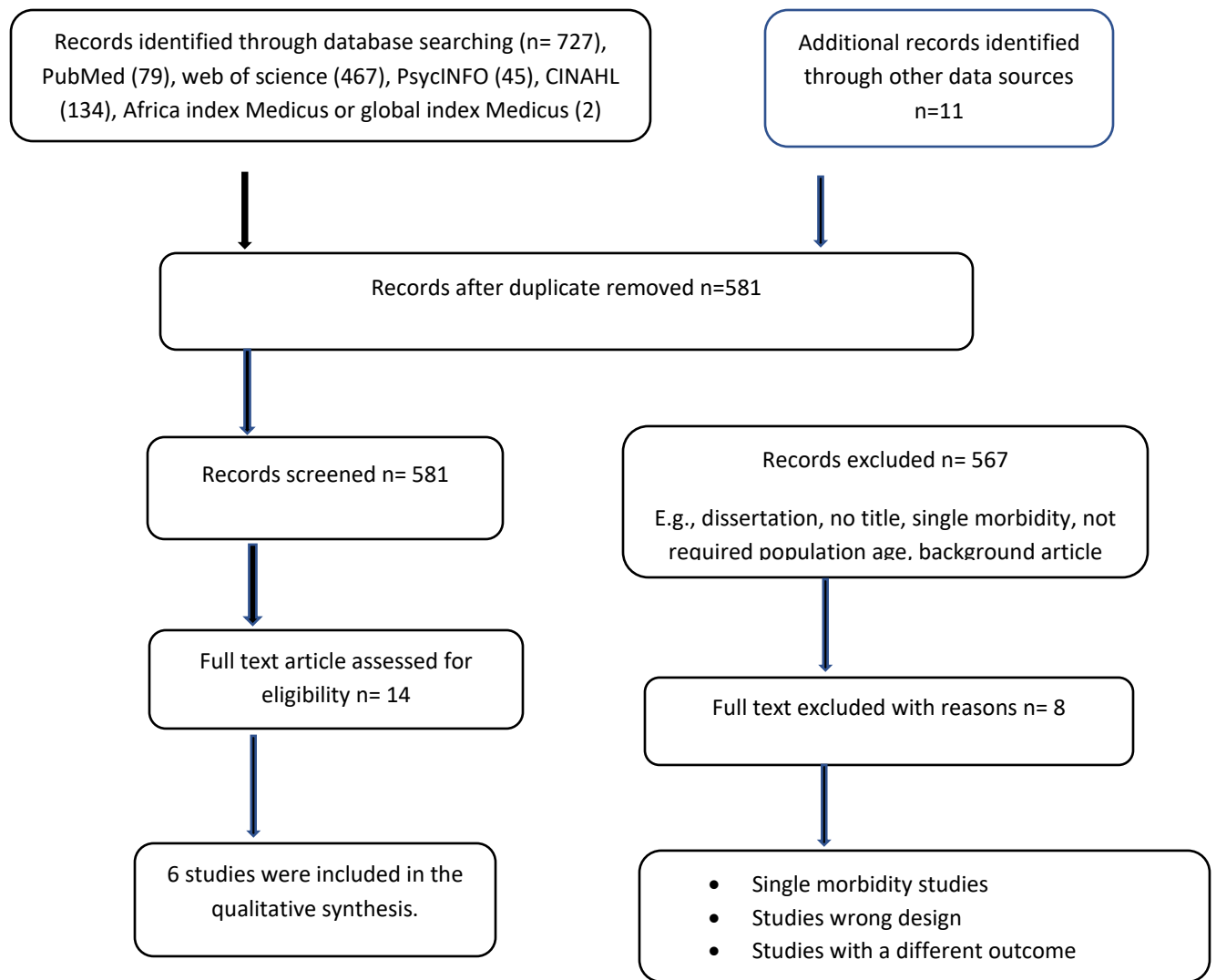
Figure 4.1 showing the PRISMA flow chart.

4.7.2 Study characteristics

Although the studies are relatively few, there is a fair representation of Nigeria as a country. Two studies each were conducted in the north-central of Nigeria (Abdulraheem *et al.,* 2017; Adams and Abubakar, 2019). Two studies were also conducted in Kano state northwestern Nigeria (Olawumi *et al.,* 2021; Abdulazeez *et al.,* 2021). One study each was conducted in the western and eastern parts of Nigeria respectively (Faronbi, Ajadi and

Gobbens, 2020a; Nwani and Isah, 2016a). The total number of participants across the six studies was 3332 (men: 47.5%, women: 52.5%) (Abdulraheem *et al.,* 2017; Adams and Abubakar, 2019; Faronbi, Ajadi and Gobbens, 2020a; Nwani and Isah, 2016a; Abdulazeez *et al.,* 2021; Olawumi *et al.,* 2021). The sample sizes of the included studies range from 333 to 1650 participants see Table 4.1. All included studies were published after 2013 and the majority in the last 6 years. Four studies conducted primary cross-sectional descriptive using either or combination of clinical evaluation and administration of a questionnaire, interviews, and review of medical records (Abdulraheem *et al.,* 2017; Faronbi, Ajadi and Gobbens, 2020a; Abdulazeez *et al.,* 2021; Olawumi *et al.,* 2021). One study conducted a cross-sectional retrospective study over 12 months from January to December 2018 (Adams and Abubakar, 2019) and the other study a longitudinal prospective study both using medical health records (Nwani and Isah, 2016b). Two studies were carried out at the family medicine/ outpatient department of Aminu Kano teaching hospital Kano, Nigeria respectively (Abdulazeez *et al.,* 2021; Olawumi *et al.,* 2021). One study each was conducted at Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi Anambra state Nigeria (Nwani and Isah, 2016a), and General Out-Patient Clinic of the UATH Gwagwalada, Abuja, Nigeria (Adams and Abubakar, 2019), Osogbo, and Osun State, Nigeria respectively (Faronbi, Ajadi and Gobbens, 2020a). Four studies were hospital-based (Abdulazeez *et al.,* 2021; Olawumi *et al.,* 2021; Adams and Abubakar, 2019; Nwani and Isah, 2016b) while two were conducted in the community (Abdulraheem *et al.,* 2017; Faronbi, Ajadi and Gobbens, 2020a).

Table 4.1 showing study characteristics

Study (state of study)	Study setting	Study design	Data collection period	Data source	Sample size	Age of participants
Nwani and Isah, 2016 (Anambra state)	Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi Anambra State Nigeria	prospective study	January 1, 2009, to December 31, 2009	Not reported	345 patients	patients aged 65 years
Adams and Abubakar, 2018 (Abuja)	General Out-Patient Clinic of the UATH Gwagwalada, Abuja.	Cross-sectional retrospective study	12 months, January 2018-December 2018	Medical health record	333 patients	60 and above years
Olawumi et al., 2021 (Kano)	conducted in the family medicine clinic (FMC) of Aminu kano teaching hospital kano	descriptive cross-sectional study	5th October 2020 to 28th December 2020.	Clinical evaluation and administration of a questionnaire	348 patients	60 and above years
Abdulraheem et al., 2017 (Niger)	The study was carried out in Niger State, Nigeria	A descriptive cross-sectional study	August 2014 to February 2015	Data were collected by questionnaire, interviews, review of medical records and clinical examination	conducted among 1650 rural elderly populations attending primary healthcare centers	age 60 years and above
Faronbi, Ajadi and Gobbens, 2020 (Osun state)	Osogbo, Osun State, Nigeria.	A cross-sectional study	Data collection took six weeks (between October and November 2015)	Data were collected by questionnaire	400	60 years of age and above
Abdulazeez et al., 2021 (Kano)	General Outpatient Clinic of Aminu Kano Teaching Hospital (AKTH) Kano	A descriptive cross-sectional study	May to June 2018.	interviewer-administered questionnaire	384	60 years and above

4.8 Analysis of selected studies

The definition of multimorbidity used, the number of disease conditions included in the study, and how the disease conditions were measured are all known facts that influence the prevalence of multimorbidity. However, all included studies used a 'count' of the number of diseases to define multimorbidity, and multimorbidity was defined by having two or more diseases in an individual (Adams and Abubakar, 2019; Abdulraheem *et al.,* 2017; Abdulazeez *et al.,* 2021; Faronbi, Ajadi and Gobbens, 2020a; Olawumi *et al.,* 2021; Nwani and Isah, 2016a). All the included studies specified they were only focused on chronic conditions. One study qualified chronic diseases as compiled and counted by the World Health Organization (WHO) (Nwani and Isah, 2016b). They stated that WHO defines chronic diseases as health problems that require ongoing management over a period of years or decades. Four studies draw and classify the chronic health problems of interest from the 147 International Classification of Primary Care, second edition (ICPC-2) rubrics list gathered by the Family Medicine Research Centre, University of Sydney (Abdulraheem *et al.,* 2017; Abdulazeez *et al.,* 2021; Olawumi *et al.,* 2021; Nwani and Isah, 2016a). (Adams and Abubakar, 2019; Faronbi, Ajadi and Gobbens, 2020a).

4.9 Prevalence of multimorbidity

All the included studies measured the prevalence of multimorbidity out of which 5 was among 60 years and above (Adams and Abubakar, 2019; Abdulraheem *et al.,* 2017; Abdulazeez *et al.,* 2021; Faronbi, Ajadi and Gobbens, 2020a; Olawumi *et al.,* 2021) and one study uses 65 years and above (Nwani and Isah, 2016a). One study conducted in Oshogbo in Osun state reported the lowest prevalence of 27% (Faronbi, Ajadi and Gobbens, 2020a)

while another conducted in Kano, Kano state-reported prevalence of 74% (Olawumi *et al.,* 2021). The overall prevalence estimates range from 27% to 74.4% among elderly Nigerians. The most common study design observed is cross-sectional (Adams and Abubakar, 2019; Faronbi, Ajadi and Gobbens, 2020a; Abdulraheem *et al.,* 2017; Abdulazeez *et al.,* 2021; Olawumi *et al.,* 2021). In addition to the common cut-off point of 2 chronic diseases used in 5 studies, one study also investigated the prevalence estimate when multimorbidity was defined as 'the co-occurrence of three or more chronic diseases' (Abdulazeez *et al.,* 2021). And as the number of diseases included in the definition increased, the prevalence decreased. See Table 4.2

Table 4.2 shows prevalence and pattern of multimorbidity among elderly Nigerians

Study (state of study)	Prevalence (%)	Patterns of multimorbidity
Nwani and Isah, 2016 (Anambra state)	The overall prevalence of multimorbidity among the elderly population studied was 49%. The two chronic diseases were present in 39.4% (n ¼ 136), whereas three or more chronic diseases were present in 9.6%.	No pattern was reported. However, percentage of single morbidity was reported
Adams and Abubakar, 2018 (Abuja)	The majority 236 (71%) of the study participants had multiple morbidities.	No morbidity pattern was reported. The cardiovascular system was the most affected system with 227 of the study population followed by the musculoskeletal system 90 and 84 had metabolic derangement. The least affected system was the Ears Nose and Throat with 13 persons.
Olawumi et al., 2021 (Kano)	The prevalence of multimorbidity in this study is 74.4%.	No multimorbidity pattern was reported. CV diseases were the most prevalent morbidity (88.5%) among the respondents, followed by the diseases of the musculoskeletal system (42%). Hypertension was the most prevalent (50%) among all the CV diseases.
Abdulraheem et al., 2017 (Niger)	The percentage of participants with multimorbidity was 68.4% for 2 or more and 57.3 for 3 or more morbidities.	The most prevalent dyads of morbidities were hypertension and diabetes (31.4%), and hypertension and heart disease (25.6%). For triads of morbidities, the highest prevalence was found in HBP, diabetes and heart problem (10.3), and HBP, heart problem and Osteoarthritis (9.8%).

Faronbi, Ajadi and Gobbens, 2020 (Osun state)	This study also showed that multimorbidity is prevalent (27.0%) among the older adults in Nigeria.	No pattern was reported. However, percentage of single morbidity was reported
Abdulazeez et al., 2021 (Kano)	More than half 190 (68.2%) of the participants had a 201(72.0%) had two or more chronic diseases (multimorbidity).	The commonest multimorbidity pattern based on system cluster were cardio-metabolic-mechanical conditions 42(15.1%). The top three frequent patterns of multimorbidity involving two clusters (dyad) of chronic diseases were hypertension-diabetes 7(17%), followed by hypertension overweight 5(12.1%) and hypertension osteoarthritis 4(9.7%). The commonest triads of chronic diseases were hypertension-diabetes-osteoarthritis 15(22.1%). The commonest quartet of chronic disease was hypertension diabetes-osteoarthritis-depression 3(5.9%). The commonest quintet of chronic diseases was hypertension diabetes-osteoarthritis-visual impairment-obesity/overweight 3(7.3%).

4.10 Pattern of multimorbidity

The results of the studies were difficult to compare due to how data were reported. Only two studies reported the most frequent common pairs (Abdulraheem *et al.,* 2017; Abdulazeez *et al.,* 2021). See table 4. 2. The study by Abdulraheem et al., (2018) reported the most prevalent dyads of morbidities were hypertension and diabetes (31.4%), and hypertension and heart disease (25.6%). For triads of morbidities, the highest prevalence was found in HBP, diabetes and heart problem (10.3), and HBP, heart problem, and Osteoarthritis (9.8%) (Abdulraheem *et al.,* 2017). While Abdulazeez et al., (2021) reported the commonest multimorbidity pattern based on system clusters were cardio-metabolic-mechanical conditions 15.1% (Abdulazeez *et al.,* 2021). The top three frequent patterns of multimorbidity involving two clusters (dyad) of chronic disease were hypertension-diabetes (17%) followed by hypertension-overweight (12.1%) and hypertension-

osteoarthritis (9.7). the commonest triad of chronic disease was hypertension-diabetes-osteoarthritis (22.1%). The commonest quartet of chronic diseases was hypertension-diabetes-osteoarthritis- depression (5.9%) (Abdulazeez *et al.,* 2021). The commonest quintet of chronic disease was hypertension-diabetes-osteoarthritis-visual impairment/overweight (7.3%). The remaining four studies were not structured to display the pairs, but the pattern reported that hypertension was the commonest in all the studies (Abdulazeez *et al.,* 2021).

4.11 Factors associated with multimorbidity

Age was the frequent studied determinant of multimorbidity (Barnett, Karen, Mercer, Norbury, Watt, Wyke and Guthrie, 2012c; Minas *et al.,* 2010; Prados-Torres *et al.,* 2012; Van den Akker *et al.,* 1998; Marengoni *et al.,* 2008b). Although determinant of multimorbidity was not assessed in all the included studies, 3 studies reported the determinants of multimorbidity (Adams and Abubakar, 2019; Abdulraheem *et al.,* 2017; Abdulazeez *et al.,* 2021). One study reported that multi-morbidity occurred more in males (73.4% of males; OR = 1.062; CI = 0.926-1.219), age 70 – 79 years (72.2%), unskilled workers (73.8%), and urban dwellers (73% of patients living in urban areas) (Adams and Abubakar, 2019). A larger study by Abdulraheem *et al.,* (2017) showed that age and sex are independent risks factors for multi-morbidity (Abdulraheem *et al.,* 2017). They further stated that apart from age, factors most strongly and independently associated with multi-morbidity were female sex, low education status, poor monthly income/ unemployment, hospitalization, medical visits, and emergency services. One study reported that apart from age, factors most strongly and independently associated with multi-morbidity were female sex, low education status, poor monthly income/ unemployment, (Abdulraheem *et al.,* 2017).

Another study reported that Participants with formal education were more than 30% less likely to have multimorbidity than those without formal education (Abdulazeez *et al.,* 2021). Similarly, participants that were employed were almost 40% less likely to have multimorbidity than those that were unemployed (Abdulazeez *et al.,* 2021). The same study reported that participants that were overweight/obese had higher chances of developing multimorbidity when compared with individuals with normal BMI. And participants that were functionally dependent were 20 times more likely to have multimorbidity than functionally independent elderly participants (Abdulazeez *et al.,* 2021).

4.12 Discussion

This systematic review provides an up-to-date and comprehensive analysis of multimorbidity prevalence, pattern, and determinants in Nigeria. We identified 6 articles across 5 states in Nigeria. Earlier authors of systematic literature reviews of multimorbidity also noted the limited representation of developing countries in multimorbidity research reference. However, the scarcity of publications in our review demonstrates an obvious mismatch between the need for work versus work accomplished in this area. Multimorbidity is not a priority area of research in Nigeria, and this will continue to hinder policy development in this area.

Our review shows that prevalence estimates varied markedly according to age, sex, marital status, marital setting, tribe, educational levels, adequate income, living condition, family support, and operational definitions of multimorbidity (Nwani and Isah, 2016b; Adams and Abubakar, 2019; Abdulraheem *et al.,* 2017; Abdulazeez *et al.,* 2021). This was due to wide variations in sample size, characteristics, and how prevalence was reported across

studies. However, findings from our studies were consistent with other previous studies and systematic reviews (Violan *et al.,* 2014b; Marengoni *et al.,* 2011a; Nguyen *et al.,* 2019b). While the prevalence estimates varied between and within age groups, most studies in our review indicated multimorbidity as a common phenomenon in individuals 60 years and above. Where prevalence estimates by sex were reported, it showed variation, two studies reported higher prevalence among men (Adams and Abubakar, 2019; Nwani and Isah, 2016a). However, in one study females appeared to have higher multimorbidity prevalence than males in studies (Abdulraheem *et al.,* 2017). This is suggestive of an association between sex and multimorbidity, evidence of which is provided in multiple studies (Alimohammadian *et al.,* 2017; Munn *et al.,* 2014; Nguyen *et al.,* 2019b).

Although there was no consistency in disease combinations and cut-off points for multimorbidity, it followed that the higher the cut-off point, the lower the prevalence. This was observed in our review, the percentage of participants with multimorbidity was 68.4% for 2 or more and 57.3% for 3 or more morbidities (Abdulraheem *et al.,* 2017). This finding supported an observation where it was found that prevalence went from 44% when multimorbidity was defined as 2 diseases, the prevalence reduced to 27% for 3 diseases, 15% for 4 diseases, 7% for 5 diseases, and only 3% for 6 diseases (Harrison *et al.,* 2014). The highest prevalence estimates in our sample were reported in studies that used 2 diseases to define multimorbidity 71% (Adams and Abubakar, 2019) and 74% (Olawumi *et al.,* 2021). The combination of diseases may make multimorbidity prevalence differ significantly (Harrison *et al.,* 2014; Fortin *et al.,* 2012). In the existing literature, a range of different combinations have been proposed from a list of 16 chronic diseases (Ferrer *et al.,* 2017) to a list of 291 diseases (Quiñones, Markwardt and Botoseneanu, 2016) and

anything in between (Van den Bussche *et al.,* 2011b). (Ferrer *et al.,* 2017) argued that an open list of diagnoses should be used since it gave the highest prevalence estimate. For our studies most of the chronic health problems of interest were drawn from the 147 International Classification of Primary Care, second edition (ICPC-2) rubrics list gathered by the Family Medicine Research Centre, the University of Sydney (WHO, 2022). There were no specific criteria for disease inclusion in these studies because of the lack of a standardized list and they were often determined by the author's expertise and experience. However, the most common conditions included were those that have the highest prevalence of clinical relevance.

4.13 Strengths and limitations

This review has several strengths compared to previous reviews that provide data on the prevalence, pattern, and determinants of multimorbidity. While our study selection and screening processes, search strategy and inclusion criteria systematic and comprehensive. Our review included studies in both the hospital and communities and was the first of its kind to conduct Systematic Literature Review of prevalence, pattern, and determinant of multimorbidity in Nigeria. Our data extraction and quality assessment were also cross-checked and very few disagreements arose. This review, however, was not without limitations. Evaluations of prevalence, determinants, and patterns in our study are limited by the methods used in the primary studies. Most studies in this review were cross-sectional, which only allowed estimation of multimorbidity at a certain point in time. Similarly, all the measures of multimorbidity used in these studies were mostly disease count. And disease count is only one of the near 20 measures to date. Fortin et al. reported a much higher prevalence of multimorbidity when using the Cumulative Illness

Rating Scale, compared with the prevalence measured by disease count in other studies (Fortin *et al.,* 2005b). However as discussed earlier disease count is the most robust measures and easy to use.

The included studies lack consistency in measuring and reporting the prevalence of multimorbidity, this is a factor that needs to be considered when interpreting findings from our analysis. However, as discussed above, given that there is no consensus about multimorbidity, heterogeneity across studies is inevitable.

Chapter 5

Effect of childhood conditions on trajectories of chronic conditions among older adults in Nigeria

More attention and close analysis of factors responsible for multimorbidity beyond the etiology of a single disease entity. One good starting point is to establish the association of ACEs and multimorbidity. the objective of this chapter was to evaluate if childhood conditions are associated with trajectories of chronic conditions among older adults in Niger state north-central Nigeria.

5.1 Introduction

One way to shift the paradigm from the focus on a single disease to multimorbidity is to understand the dynamics of the causal pathways that lead to the accumulation of diseases and multimorbidity in an individual. Turabian (2020) found that the accumulation of health problems that leads to multimorbidity is a complex and multifactorial and can occur as a result of a genetic and environmental factors. That said, from public health view, the identification of risk factors is an important aspect of the search for prevention and intervention (Fortin *et al.,* 2014a).

5.2 Measurement of variables

The questions on socio-demographic characteristics of participants were collected, which included age, sex, ethnicity, marital status, types of family or composition of the family, level of education, types of occupation, and monthly family income.

Adverse childhood experiences (ACEs) exposure was assessed using the Adverse Childhood Experiences International Questionnaire (ACE-IQ). The ACE questionnaire is a reliable and valid measure of childhood adversity that has been used extensively in large-scale ACE studies. Questions about ACEs of the respondents' first 18 years of life.

As discussed, earlier multimorbidity was operationalized according to the definition recommended by the National Institute for Health and Care Excellence (NICE): the presence of "two or more long-term health conditions. The morbidity was assessed by adopting the list of chronic diseases used in prospective urban and rural epidemiology (PURE) studies because the disease on the list fulfills WHO criteria for chronic diseases. A simple count of individual chronic conditions was used as the approach to measuring multimorbidity, which is also the most common across the literature (Huntley et al., 2012). Multimorbidity comprised self-reported conditions diagnosed and confirmation of diagnoses through the use of the patient's record.

5.2.1 Independent variable

Adverse childhood experiences were used as the predictor variable in this study. 13 ACEs (1. Physical abuse, 2. Emotional, abuse, 3. Contact sexual abuse, 4. Alcohol and/or drug abuser in the household, 5. Incarcerated houses hold members, 6. Living with someone chronically depressed, mentally ill, institutionalized, or suicidal, 7. Household members were treated violently, 8. One or no parent separation or divorce, 9. Emotional neglect, 10. Physical neglect, 11. Bullying, 12. Community violence, and 13. Collective violence) in the respondents' first 18 years of life were assessed in the study. Responses to each

item on the 13 Adverse Childhood Experiences (ACE) were dichotomized yes =1 or no =0 for having the ACE or not respectively.

5.2.2 Outcome variable

Multiple chronic disease condition (multimorbidity) was assessed in the study by assessing 24 chronic conditions, including hypertension, diabetes, peptic ulcer, arthritis, heart failure, stroke, other heart disease, angina, COPD, CLD, obesity, depression, asthma, cataract, chronic renal failure, osteoporosis, glaucoma, tuberculosis, emotional& mental illness, cancer, Alzheimer's disease, and dementia. Participants were asked, "Have you ever had the disease?". If they answered "No" or "I don't know", they were classified as a disease-free group. To be double sure of the diagnosis the respondent's treatment case note was crosschecked.

5.2.3 Confounding factors

The following variables were recorded and analyzed: age, marital status, educational level, and occupation. Age was entered as a continuous variable but was then grouped into an interval of 10years. Participants responded to marital status as either never married, currently married, divorced, separated, or widow/er.

Education level was evaluated for individuals and was categorized as one of the following: Illiterate, can read and write, primary school level, secondary school, Tertiary school, and post-graduate. The occupation was evaluated as to whether the participants are a

government staff, own a business, were involved in a family business, are dependent, or retired.

5.3 Statistical analysis

Reported data were collated, checked, coded, and entered into JISC online survey software and were exported to IBM SPSS version 27. The data were then cleaned and analyzed using descriptive and inferential statistics. A descriptive and comparative statistical data analysis was processed to answer the research questions. Descriptive statistics were used to summarize the overall characteristics of the participants including gender, age, marital status, family structure, educational level, ethnicity, occupation, and level of income. Variables were measured consistently in line with the existing literature for data analysis. The reliability or internal consistency of data was checked with Cronbach alpha before finalizing the data for analysis.

Responses to each item on the 13 Adverse Childhood Experiences (ACE) were dichotomized (yes =1 or no =0) this was then summed to generate a cumulative ACE score for each participant, ranging from 0 to 13. The summed participant's ACE score was further categorized into 5 groups based on the cumulative ACE scores: 0, 1, 2, 3, and 4 or higher. Multimorbidity was also transformed into categories based on the number of chronic diseases (2, 3, 4, and 5).

5.3.1 Test of assumptions

A Chi-Square test of independence was used to determine a statistically significant difference association between the two categorical variables ACE and Multimorbidity.

The assumption required for Chi-square was met because both variables were categorical and every observation in the dataset was independent i.e., the value of one observation in the dataset does not affect the value of any other observation. Similarly, individuals only belong to one cell in the contingency table. That is, cells in the table were mutually exclusive and finally, the expected value of cells in the contingency table was 5 or greater in at least 80% of cells and no cell had an expected value less than 1.

Pearson correlation was used to test the linear relationship between adverse childhood experiences and multimorbidity because both variables can also be classified as an interval or ratio level of measurement and both variables followed normal distributions and represent data from a random sample. There appeared to be a relationship between the two variables. This was checked by creating a scatter plot of the two variables and the plot appears to fall roughly along a straight line, suggesting a linear relationship. The two variables are roughly normally distributed, with no evidence of outliers and each observation in the dataset has one measurement.

5.4 Results

5.4.1 Basic information of the participants

The sociodemographic features of the participants are presented in Table 5.1. Of the 800 participants contacted for the studies, 734 consented and answered the questionnaire (response rate 91.8%). Of the participants, more than half (About 60%) of the respondents were female and the mean age of the sample was 67.3 years. 65.8% were currently married, 62.9% did not have any form of education, 38.1% had their own

business, and earning less than fifteen thousand naira (less than 36 dollars at the official

rate of 414. 52 as at 27/06/2022) were reported in nearly 66% of the cases (27/06/2022).

Table 5.1 Socio-demographic characteristics of the respondent (n= 734)

Variables	n	%
Gender		
Male	300	40.9
Female	434	59.1
Age * 67.37 (66.37 for male and 68.06 for female)		
60-64	262	35.7
65-69	267	36.4
70-74	123	16.8
75-79	29	4.0
80 and greater	53	7.2
Marital status		
Never married	11	1.5
Currently married	483	65.8
Divorced	21	2.9
Separated	19	2.6
Widow/er	200	27.2
Family structure		
Nuclear Family	140	19.1
Three Generation Family	150	20.5
Extended Family	442	60.4
Education level		
Illiterate	462	62.9
Can read and write	35	4.8
Primary school level	74	10.1
secondary school	64	8.7
Tertiary school	83	11.3
Post-graduate	16	2.2
Occupation		
Government staff	36	4.9
Own business	280	38.1
Involve in the family business	36	4.9
Company staff/ worker	30	4.1
Dependent	214	29.2
Retired	128	17.4
Others (specify)	10	1.4
Ethnicity		
Gwarri	193	26.3
Hausa	174	23.7
Nupe	204	27.8
Others	163	22.2

Level of income (Naira)		
0-15k	477	65.0
16k-30k	124	16.9
31k-45k	30	4.1
46k-60k	27	3.7
greater than 60	76	10.4

Table 5.2 shows the prevalence of ACE and their percentage contributions. The commonest ACE in this study is emotional neglect 74.8%, closely followed by community violence 71.8%, and Household members are treated violently 65.5% each contributing 15.6%, 15%, and 13.6% of the total ACEs respectively. About 55.4% (407 out of 734) experience parental physical abuse before the age of 18 years, contributing to 11.5% of the total ACEs in the study. The least ACE is contact sexual abuse, contributing 2.3%.

Table 5.2 Prevalence of ACE and percentage contributions

Category of ACE	Yes	No	ACE prevalence	Total	% Of the ACE contribution
Physical abuse	407	327	55.4	734	11.5
Emotional abuse	459	275	62.5	734	13.0
Contact sexual abuse	82	652	11.2	734	2.3
Alcohol and/or drug abusers in the household	155	597	21.1	734	4.4
Incarcerated household member	83	651	11.3	734	2.4
Someone chronically depressed, mentally ill, institutionalized or suicidal	170	564	23.2	734	4.8
Household members are treated violently	481	253	65.5	734	13.6
One or no parents, parental separation, or divorce	132	602	18.0	734	3.7
Emotional neglect	549	185	74.8	734	15.6
Physical neglect	206	528	28.1	734	5.8
Bullying	147	587	20.0	734	4.2
Community violence	527	207	71.8	734	15.0
Collective violence	127	607	17.3	734	3.6
Total					100

Table 5.3 shows the frequency distribution of ACEs scores among multimorbid patients in the study. While about 66% of the respondents reported 4 or more ACEs, about 16%, 9%, 6%, and less than 1% reported 3, 2, 1, and 0 ACEs respectively. Although all the ACEs contributed to each category of multimorbidity, only 2 ACEs are statistically significant emotional neglect ($\chi2$ = 8.360; p-value = 0.039) and community violence ($\chi2$ = 20.980; p-value 0.001), see table 5.4. In general, compared with participants without emotional neglect and community violence before the age of 18 years, it was observed that multimorbidity (number of chronic diseases) was higher among those that reported a history of emotional neglect and community violence.

Table 5.3 adverse childhood experience score among multimorbid patients

Adverse childhood experience score	Frequency	Percent
0	6	0.82
1	44	5.99
2	65	8.86
3	117	15.94
4 and greater	502	68.39
Total	734	100.0

Table 5.4 Distribution of multimorbidity by individual ACEs

Adverse childhood experience	Number of chronic diseases				
	2	3	4	5	Total
Physical abuse	195	174	29	9	407
Emotional abuse	228	187	32	12	459

Contact sexual abuse	35	33	9	5	82
Alcohol and/or drug abuser in the household	80	55	15	5	155
Incarcerated household member	42	28	8	5	83
Someone chronically depressed, mentally ill, institutionalized or suicidal	89	55	19	7	170
Household members treated violently	261	174	33	13	481
One or no parents, parental separation, or divorce	70	37	19	6	132
Emotional neglect	331	181	28	9	549
Physical neglect	130	62	11	3	206
Bullying	64	60	14	9	147
Community violence	307	176	33	11	527
Collective violence	50	53	16	8	127

Table 5.5 shows the results of the Pearson correlation that tested the association between ACEs (ACEs score) and Multimorbidity. A statistically significant positive moderate correlation was observed between them. Increases in cumulative ACE scores were associated with increased prevalence of multimorbidity in the overall sample. In essence, the higher the number of individual adverse experiences, the higher the number of multimorbidity see Table 5.5. Adjusting for age, marital status, educational level, and occupation factors only marginally declined this association see Table 5.5.

Table 5.5 Multiple regressions between sociodemographic factors (age, marital status, educational level, and occupation) and multimorbidity

	Multimorbidity			
	Unadjusted coefficient (b)	P-value	Adjusted coefficient (b)	P-value
Adverse Childhood Experiences	0.21**	<0.01	0.17**	<0.01
Age	0.32**	<0.01	0.21**	<0.01
level of income	-0.13**	<0.01	0.03	0.49
Gender	0.07*	0.045	-0.01	0.72
Marital status	0.23**	<0.01	0.09*	0.02
Occupation	0.14**	<0.01	0.12*	0.02
Educational level	-0.21**	<0.01	-0.14*	0.02
Family structure	0.04	0.24	0.01	0.59
The ethnicity of the respondent	-0.01	0.78	-0.02	0.66

Note. *Significant at $p < .05$, **Significant at $p < .01$

5.5 Discussion

To our knowledge, this is the first study that analyses the impact of ACEs on the health of older adults in Niger state north-central Nigeria. And it showed that the prevalence of ACEs is common in this part of the world. This is like findings from Bethell et al., (2017), that ACEs are common across all race/ethnicity groups, though are somewhat disproportionately lower for White, Non-Hispanic and lowest for Asian children. They further stated that black children are disproportionately represented among children with ACEs with over 6 in 10 having ACEs, representing 17.4% of all children in the US with ACEs. Studies have shown that children identify with one ACE, have higher chances of additional ACEs (Bethell et al., 2017).

The commonest domains of ACE in this study are emotional neglect and community violence. That is, compared with participants without emotional neglect and community violence before the age of 18 years, it was observed that multimorbidity (number of chronic diseases) was higher among those that reported a history of emotional neglect and community violence. The finding in this study is consistent with findings from Vásquez *et al.,* (2019), conversely, the finding in our study are partially congruent with another study in Nigeria by Salawu and Owoaje, (2020). While it was similarly stated that most respondents reported they had experienced ACEs, differences were observed in the most prevalent ACEs with psychological neglect, physical neglect psychological abuse, and household substance abuse being the most prevalent in their study.

The prevalence of ACEs reported in this study was high, several factors could interplay between increasing and reducing it. Firstly, the participants were given enough time to recall their experiences before the age of 18 years, this goes a long way to reduce recall bias because the questions are retrospective life experiences, and this bias might have been pronounced among the oldest participants. Secondly, previous studies have shown that ACEs were strongly related to multimorbidity and premature mortality and the high ACEs in these studies are not coincident because this study comprises only participants with multimorbidity. Interpreting the prevalence of multimorbidity must be done with caution because this might be an overrepresentation of multimorbidity in the general population. However, the reported prevalence of ACEs might also be affected by the literacy level of the participants because there may be differences between age cohorts in their understanding of what qualifies as a difficult childhood and their expectations of how childhood should be.

Although the predictors of experiencing ACEs were not one of the research objectives Salawu and Owoaje, (2020) in their study in Nigeria reported that the predictors of experiencing ACEs were having a mother with primary education or lower education and being in the lowest wealth quintile. This is of important because most participants in this study do not have any form of education and were in the lowest wealth quintile and this is a potentially vicious circle of low education and low wealth quintile leading to ACEs and ACEs leading to multimorbidity.

The main objective of this analysis was to evaluate if childhood conditions are associated with trajectories of chronic conditions among older adults in Nigeria. It found out that there is a statistically significant positive moderate correlation between ACEs (ACEs score) and Multimorbidity (individual number of chronic diseases) ($r = 0.362$, $p = 0.01$). Increases in cumulative ACE scores were associated with increased prevalence of multimorbidity in the overall sample. The higher the number of individual adverse experiences, the higher the number of multimorbidity. Adjusting for age, marital status, educational level, and occupation factors only marginally declined this association. This is similar to several studies that reported the dose-response relationship between the number of ACEs reported and the increase in the prevalence of multimorbidity in adulthood (Gruenewald *et al.,* 2012; Vannorsdall and Munro, 2017). The dose-dependent relationship that was observed in our study also corresponds with previous literature that found an association between the amount of exposure to adverse experiences and risky behaviors and increased likelihood of disease conditions (Campbell, Walker and Egede, 2016a; Felitti *et al.,* 1998).

5.6 Limitation

The cross-sectional design nature of the study cannot establish causation between the predictor variable and the outcome variable. However, since ACEs are childhood occurrence it indicates a temporal relationship between ACE exposure and health outcomes measured as of the survey date. Secondly, responding to questions on ACE might introduce recall bias, i.e., younger respondents may have an easier time recalling events that occurred in childhood than an elderly respondent. Although the ACE measure used in our study is all-inclusive and consists of 13 different survey items, it does not capture other circumstances such as malnutrition during childhood and the variables making up the ACE measure are equally weighted. Finally, a factor-based ACE index that differentially weights various ACE components might be a better methodological approach, which should be explored in future research. Differences in understanding of what ACE is by the participants may be a limitation.

Chapter 6

Understanding the pathway of the development and progression of multimorbidity among elderly people in Nigeria

Adverse childhood experiences (ACEs) have been associated with increased risky health behaviour and poor health outcomes like multimorbidity later in life. And little is known about this connection in high-violence, low-resource settings like Nigeria where exposure to ACEs is common throughout the life course. The objective of this chapter was to understand the pathway of the development and progression of multimorbidity among elderly people in Nigeria. By testing 2 research hypotheses 1. Does ACE increase the risk of developing health risk behavior among patients with multimorbidity in Niger state, north-central Nigeria? And 2. what are the relationships between multimorbidity and adult (socio-demographic variables and behavioral risk) factors among older adults in Niger state Nigeria?

6.1 Introduction

Adverse childhood experiences (ACEs) are defined as the harms that affect children either directly such as child abuse, and child neglect, or indirectly in the form of their living conditions (Felitti, 2009). ACEs affect the take up of opportunities like education, employment, and income (Metzler *et al.,* 2017). Studies have reported that individuals with accumulated adverse childhood experiences are at an increased risk of developing more physical and mental health medical conditions and untimely death compared to those without ACEs exposure (Bellis *et al.,* 2015). In the same way, the more ACEs reported in

an individual, the higher their risky health behavior like smoking and alcohol consumption (Hughes et al., 2017). The study of multiple ACEs is usually better than the examination of a single ACE not only because it allows an improved evaluation of the scope of childhood adversity but also because it allows a better understanding of its relationships with adult health (Hughes et al., 2017). Also, of importance is the impact of ACEs on health outcomes in adulthood has congregated attention as a public health concern evidenced by the recent inclusion of the ACE scale in large population surveys such as the Behavioral Risk Factor Surveillance System (BRFSS) (Kessler *et al.,* 2010b; Bellis *et al.,* 2014a; Mersky, Topitzes and Reynolds, 2013b).

The adult factors in this study refer to socio-demographic factors and behavioral risk factors (Shakoori *et al.,* 2020). Modifiable risk factors include tobacco smoking, alcohol consumption, high level of physical inactivity, unhealthy eating patterns, hypertension, and high body mass index whereas the non-modifiable risk factors included age, gender, and genetics (Kessler *et al.,* 2010a; Greenfield, 2010). (Fabbri *et al.,* 2015b).

To end, understanding multimorbidity, especially in an older adult will not only provide an opportunity to study its lifetime correlates but will also provide a better grasp of the distal preventive measures like exposure to adverse childhood experiences and proximal factors adult factors (sociodemographic factors and health behavioral risk factors) and in overall reduce its impact on patients, caregivers, and healthcare professionals.
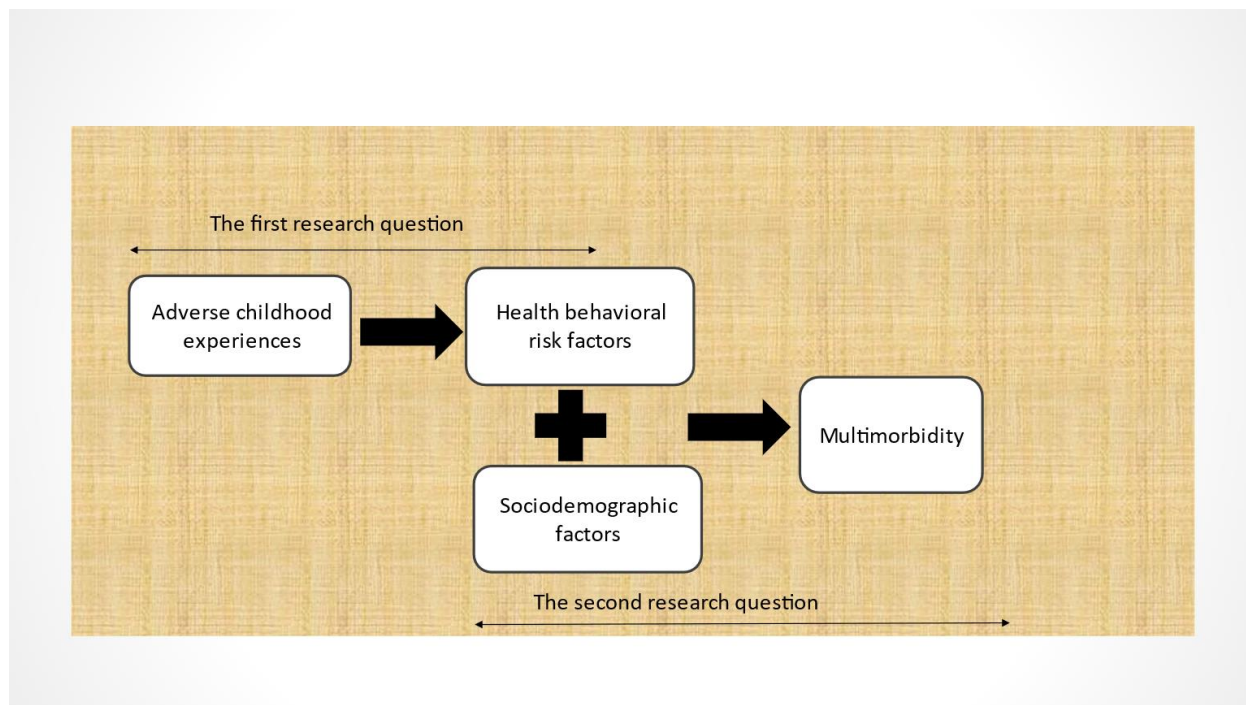
Figure 6.1 Conceptual framework showing the relationship of variables along a life course, from childhood,

adult risk factors, (sociodemographic and behavioural), and multimorbidity.

6.2 Measurements of variables

For the first research question, adverse childhood experiences were used as the predictor variable. Health behavior factors were used as the outcome variables.

And for the second research question, the predictor variables were divided into two categories: sociodemographic variables and behavioral risk factors.

Table 6.1 shows the interaction of the study variables

	Predictor variables	Outcome variables
First research question	adverse childhood experiences	Health behavior risk factors
Second research question	Adult factors which is health behavioral factors and sociodemographic factors	Multimorbidity

6.2.1 Adverse Childhood Experiences

ACEs exposure was assessed using the Adverse Childhood Experiences International Questionnaire (ACE-IQ). The data on ACEs was collected retrospectively. Questions about ACEs of the respondents' first 18 years of life are 13 ACEs (1. Physical abuse, 2. Emotional, abuse, 3. Contact sexual abuse, 4. Alcohol and/or drug abuser in the household, 5. Incarcerated houses hold members, 6. Living with someone chronically depressed, mentally ill, institutionalized, or suicidal, 7. Household members were treated violently, 8. One or no parent separation or divorce, 9. Emotional neglect, 10. Physical neglect, 11. Bullying, 12. Community violence, and 13. Collective violence). The ACEs questionnaire is a reliable and valid measure of childhood adversity that has been used extensively in large-scale ACE studies.

6.2.2 Behavioral risk factors

Information on the existence and intensity of lifestyle factors was collected by extracting from Behavioral Risk Factor Surveillance (CDC-BRFSS-2019) questionnaires (Core sections 8, 9,10,11 for socio-demographic, smoking, alcohol, and exercise respectively).

The behavioral risk factors selected were tobacco smoking, alcohol consumption, eating habits and level of physical activity. Smoking was dichotomous as either smoking (yes) or not smoking (no), this was further grouped into heavy smokers and light smokers. A heavy smoker was defined as someone who smoked at least 20 cigarettes a day, while a light smoker was defined as someone smoked less than 20 cigarettes a day. Present and past smokers was also used as dichotomous variable that represented the number of cigarettes smoked in the past.

Alcohol consumption was classified into frequent excessive drinker (daily or 2-3 times a week), occasional excessive drinker (once a week), moderate drinker (once a month), and abstainer (never drink alcohol at all). The level of physical activity was dichotomous only to either engage in physical activities or not. Four foods were assessed which include (1) fresh fruits, (2) green leaf and lettuce, (3) fried potatoes, and (4) other vegetables. And each food response was grouped as consume very much, consume considerably, consume fairly, and consume infrequently.

6.2.3 Multimorbidity

Multimorbidity was operationalized according to the definition recommended by the National Institute for Health and Care Excellence (NICE): the presence of "two or more long-term health conditions. A simple count of individual chronic conditions was used as the approach to measuring multimorbidity, which is also the most common across the literature (Huntley et al., 2012). For this study, multimorbidity comprised self-reported conditions (patient's diagnosis) and confirmation of diagnoses through the use of the patient case note (folder). A total of 21 noncommunicable chronic diseases were included

in the study. The morbidity was assessed by adopting the list of chronic diseases used in prospective urban and rural epidemiology (PURE) studies because the disease on the list fulfills WHO criteria for chronic diseases. This includes hypertension, diabetes, peptic ulcer, arthritis, heart failure, stroke, other heart diseases, angina, COPD, CLD, obesity, depression, asthma, cataract, chronic renal failure, osteoporosis, glaucoma, tuberculosis, emotional & mental illness, cancer, Alzheimer's disease, and dementia.

6.2.4 Sociodemographic characteristics

The sociodemographic variables considered included age, gender (male and female), ethnicity (Gwarri, Hausa, Nupe and others), marital status (single, married, separated and divorced) types of family or composition of the family Nuclear Family (Father, mother, and children), three generation Family (Grandparents, Father, mother, and children), extended Family (Grandparents, parents, children, and other relatives (nuclear family, extended family and three generation family), level of education (no formal education, primary, secondary, tertiary and post-graduate) types of occupation (Government staff, Own business, involved in the family business, Company staff/ worker, Dependent, Retired, and Others) and level of monthly income (0-15k, 16k-30k, 31k-45k, 46k-60k and greater than 60)

6.3 Statistical analysis

Data were entered into JISC online software and analyzed using the Statistical Package for the Social Sciences (SPSS), version 27 (IBM, sourced from the University of West

London, United Kingdom). All variables were coded before entry and checked before analysis using descriptive and inferential statistics. Descriptive statistics were used to summarize the overall characteristics of the participants including gender, age, marital status, family structure, educational level, ethnicity, occupation, and level of income.

For the first research question, Responses to each item on the 13 Adverse Childhood Experiences (ACE) were dichotomized (yes =1 or no =0) this was then summed to generate a cumulative ACE score for each participant, ranging from 0 to 13. The summed participant's ACE score was further categorized into 5 groups based on the cumulative ACE scores: 0, 1, 2, 3, and 4 or higher. Then separate linear logistic regression was performed. The dependent variable (smoking and drinking of alcohol) was regressed on predicting variable ACEs to test the hypothesis. Finally, the gender-adjusted association was performed to see the effect of gender on risk health behavior.

For the second research question, an independent chi-square was used to test the association of gender and family structure with multimorbidity, and the Pearson correlations test was used to test the association of age group, levels of education, and income with multimorbidity.

The association between behavioral risk factors and multimorbidity. The chi-square test was used to test the association between behavioral risk factors and multimorbidity. The reliability or internal consistency of data was checked with Cronbach alpha see Table 3.1.

6.3.1 Assumptions testing

To determine the predictive effect (odds ratio) of adverse childhood experiences on behavioral risk factors, binary logistic regression was performed because the dependent

variable (tobacco smoking had a binary dichotomous output and alcohol consumption was also recoded into a binary fashion). The outcome was discrete, either presence or. absent). No outliers in the data, and there were no high intercorrelations among the predictors.

The assumption required for chi-square was met because both variables were categorical and the observation in the dataset is independent i.e., the value of one observation in the dataset does not affect the value of any other observation.

Pearson correlation was used because both variables were classified as an interval or ratio level of measurement and both variables followed normal distributions and represent data from a random sample. And they appeared to have a relationship between the two variables.

6.4 Results

6.4.1 Characteristics of the participants

Of the 800 patients aged 60 years and above approached for inclusion in the study, only 734 agreed to participate in the study. A total of 66 patients refused to participate for personal reasons. About 60% of the respondents are female and the age range was 60 to 95 years, the mean age of the sample is 67.3 years (male 66.3 years and female 68.1 years) see table 6.2. The most frequent marital status is married in 65.8% of the sample. The major family structure is extended family in 60% of respondents. A considerable pro-portion of the respondents do not have any form of education (62.9%) and own a business as their occupation (38.1%). Many of the respondents were from the major ethnic groups of the state (Nupe 27.8%, Gwarri 26.3%, and Hausa 23.7%). Less than fifteen thou-sand

naira was reported in nearly two-thirds of the cases which is less than 36 dollars at the official rate of 1 dollar to 414. 52 naira (27/06/2022). There is a statistically significant difference between gender and multimorbidity. Males were more like to consume alcohol and smoke than females. See table 6.3.

Table 6.2 shows cross-tabulation of socio-demographic features and multimorbidity (n=734)

Socio-demographic variables	Multimorbidity Number of Chronic diseases				Total	%
	2	3	4	5		
Age group						
60-64	184	70	7	1	262	35.7
65-69	178	82	5	2	267	36.4
70-74	62	42	16	3	123	16.8
75-79	14	13	2	0	29	4.0
80 and greater	14	23	8	8	53	7.2
Gender						
Male	198	84	14	4	300	40.9
Female	254	146	24	10	434	59.1
Marital status						
Never married	5	4	2	0	11	1.5
Currently married	330	139	11	3	483	65.8
Divorced	13	6	1	1	21	2.9
Separated	11	5	2	1	19	2.6
Widow/er	93	76	22	9	200	27.2
The education level of the respondent						
Illiterate	248	172	29	13	462	62.9
Can read and write	25	8	2	0	35	4.8
Primary school level	54	17	3	0	74	10.1
secondary school	45	15	4	0	64	8.7
Tertiary school	65	17	0	1	83	11.3
Post-graduate	15	1	0	0	16	2.2
Family structure						
Nuclear Family	108	31	2	0	141	19.1
Three Generation Family	65	62	16	8	151	20.5
Extended Family	279	137	20	6	442	60.4
Occupation of the respondent						
Government staff	30	5	0	1	36	4.9
Own business	191	81	8	1	281	38.1
Involve in the family business	24	12	0	0	36	4.9
Company staff/ worker	26	4	0	0	30	4.1

Dependent	81	95	26	12	214	29.2
Retired	92	32	4	0	128	17.4
Others (specify)	8	1	0	0	9	1.4
level of income						
0-15k	269	167	29	12	477	65.0
16k-30k	86	30	6	2	124	16.9
31k-45k	18	9	3	0	30	4.1
46k-60k	22	5	0	0	27	3.7
greater than 60	57	19	0	0	76	10.4
The ethnicity of the respondent						
Gwarri	115	65	8	5	193	26.3
Hausa	103	58	9	4	174	23.7
Nupe	137	57	9	1	204	27.8
Others	97	50	12	4	163	22.2

Table 6.3 Association between behavioral risk factors and gender

		Gender	
Behavioral risk factors		Male (%)	Female (%)
Smoking	Yes	57.14	42.86
	No	36.99	63.01
Alcohol consumption	Yes	66.67	33.33
	No	37.23	62.77

6.4.2 Cumulative Relationships of ACEs and Health-Risk behaviors among older adults with multimorbidity.

This relationship was used to answer the first research question: do ACEs increase the risk of developing health risk behavior among patients with multimorbidity in Niger state, north-central Nigeria? Table 6.4 shows the frequency distribution of ACEs scores among multimorbid patients in the study. While about two-thirds of the respondents reported 4 or more ACEs, about 16%, 9%, 6%, and less than 1% reported 3, 2, 1, and 0 ACEs

respectively. ACE scores were predictive of risk behaviors and the dosing relationship of ACEs for harmful health risk behaviors was significant. Individuals having 4 or more ACEs are more likely to engage in smoking (AOR = 1.592, 95% CI: 0.427, 5.927) and alcohol consumption (AOR= 1.078, 95% CI: 0.430, 2.701) than individuals with less than 4 ACEs, or non-ACEs at all. See table 6.5.

Table 6.4 shows adverse childhood experience score among multimorbid patients

Adverse childhood experience score	Frequency	Percent
0	6	0.82
1	44	5.99
2	65	8.86
3	117	15.94
4 and greater	502	68.39
Total	734	100.0

Table 6.5 multivariate binary logistic regression between ACEs and Health risk behaviors

	Behavioral risk factor Harmful					
	Smoking			**Alcohol consumption**		
ACEs exposure		95% CI			95% CI	
	AOR	Lower	Upper	AOR	Lower	Upper
No ACEs	Reference			Reference		
One to three ACEs	0.85	0.28	2.51	0.59	0.20	1.76
four or more ACEs	1.59	0.42	5.92	1.07	0.43	2.70

6.4.3 To identify the key factors of multimorbidity in old age in Nigeria.

What are the relationships between multimorbidity and adult (socio-demographic variables and behavioural risk variables) factors among older adults in Niger state Nigeria?

6.4.3a Sociodemographic characteristics and multimorbidity

No statistically significant difference were observed between both gender 4.542 (p-value 0.209) and ethnicity 7.908 (p-value 0.543) with multimorbidity. However, there were statistically significant differences between multimorbidity and family structure 47.530, (p-value 0.001), occupation status 105.129 (p-value 0.001), marital status 54.654 (p-value 0.001), see table 6.2, and about 31% of the multimorbidity contribution was from those who own a business as an occupation. The majority of multimorbidity cases were among respondents that are currently married making up nearly two-thirds of cases.

Furthermore, multimorbidity was statistically significantly associated with age, education, and income. A positive moderate correlation exists between age and number of multimorbidity $r = 0.317^{**}$ $(P < 0.001)$ see table 6.6. The number of chronic diseases increased with ageing. A negative moderate correlation and a negative weak correlation were found between education -0.206^{**} $(P < 0.001)$ and income -0.155^{**} $(P < 0.001)$ and multimorbidity respectively. In essence, lower levels of education and income are associated with an increased number of chronic diseases.

Table 6.6 Socio-demographic variables and multimorbidity

Socio-demographic variables	Multimorbidity	
Pearson's correlation	r-value	p-value
Age group in years	0.32**	0.001
Education level	-0.21**	0.001
Level of income	-0.13**	0.001
Chi-square test of independent	χ2	p-value
Gender	4.54	0.21
Family structure	47.53	0.001
Occupation	105.13	0.001
Marital status	54.65	0.001
Ethnicity	7.91	0.54

**. Correlation is significant at the 0.01 level (2-tailed).

6.4.3b Behavioral risk factors and multimorbidity

For behavioral risk factors and multimorbidity refer to table 6.7. A statistically significant difference was observed between those who smoke and those who don't smoke with multimorbidity. However, there is no significant statistical difference between heavy and light smokers (those who smoke at least 100 cigarettes or less and multimorbidity). And no significant statistical difference was observed between present and past smokers with multimorbidity. No significant statistical difference between those that are engaged with physical exercise and those that don't with multimorbidity.

For alcohol consumption, multimorbidity was also found higher among frequent excessive drinkers. No statistically significant difference was observed between multimorbidity and the consumption style of specific vegetables like (1) fresh fruit, (2) green leafy or lettuce salad, (3) French fries, home fries, or hash browns, and (4) other vegetables. For this study the eating habit does not have any statistical significance with multimorbidity.

Table 6.7 Association between behavior risk factors and multimorbidity

Behavioral risk factors	n	%	Chi-square value	P-value
Smoking status				
Yes	140	19.1		
No	594	80.9	32.053**	< 0.001
Total	734	100		
Quantity of smoking				
Heavy smokers	129	92.1		
Light smokers	11	7.9	2.630	0.816
Total	140	100		
Smoking status				
Past smokers	90	64.3		
Current smokers	50	35.7	5.475	0.405
Total	140	100		
Exercise status				
Engaged in Physical Exercise	117	15.9		
Do not engage in physical exercise	617	84.1	27.253	0.220
Total	734	100		
Alcohol consumption status				
Frequent excessive drinker	55	7.5		
Occasional excessive drinker	29	4.0	59.026*	0.031
Moderate drinker	6	0.8		
Abstainer	644	87.7		
Total	734	100		
Fruit consumption				
More than once a day	29	4.0		
At least once daily	93	12.7	11.737	0.218
Once on a weekly	263	35.8		
Once a month	349	47.5		
Total	734	100		
Green leafy or lettuce salad, with or without other vegetables	15 85			
More than once a day	275	2.0		

At least once daily	359	11.6	16.653	0.059
Once on a weekly	734	37.5		
Once a month		48.9		
Total		100		
Fried potatoes, including French fries, home fries, or hash browns				
More than once a day	19	2.6		
At least once daily	62	8.4	8.130	0.492
Once on a weekly	231	31.5		
Once a month	422	57.5		
Total	734	100		
Other vegetables				
More than once a day	26	3.5		
At least once daily	56	7.6		
Once on a weekly	218	29.8	12.453	0.176
Once in a month	434	59.1		
Total	734	100		

6.5 Discussion

The study evaluates the association of ACEs and behavioral risk factors and the relationships between adult (socio-demographic variables and behavioural risk) factors and multimorbidity. To our knowledge, this is the first study to explore the understanding of the development and progression of multimorbidity in Niger state north central Nigeria. Previous studies reported efforts to prevent non-communicable diseases to focus mainly on tackling proximal causes like behavioral modifications (World Health Organization, 2014) but to sustain robust prevention gain there should be a shift in focus to include the early precursor of poor health (Hughes *et al.,* 2017).

6.5.1 ACEs and behavioural risk factors

While other studies reported how high ACEs are widespread globally, this study reported the high prevalence and supports the earlier researcher's hypothesis that a marked

increase in ACEs could lead to an increase in health-harming behaviors (Stoltenborgh *et al.,* 2015). This study supports the hypothesis that exposure to ACEs increases, the odds of behavioral risk factors, see for example (Mersky, Topitzes and Reynolds, 2013a; Bellis *et al.,* 2014b; Campbell, Walker and Egede, 2016b; Vander Weg, 2011; Downey *et al.,* 2017; Windle *et al.,* 2018; Zhang, J. *et al.,* 2020). Also, of importance and comparable to this study is the report from South-west Nigeria that compared the association of ACEs and health behavioral risk factors, which states that as compared with respondents reporting no ACEs, those reporting 4 or more categories of ACEs had a substantially higher risk of engaging in smoking behaviors (Salawu and Owoaje, 2020). This is not surprising because studies have reported that the developing child attempt to cope by adopting health-risk behaviors such as smoking which has been associated with adverse health outcomes which may not be apparent until many years after exposure (Anda *et al.,* 2010; Ramiro, Madrid and Brown, 2010). Also consistent with previous studies of adverse childhood experiences males were more likely than females to have engaged in risky behavior (Moffitt and Caspi, 2001; Garrido, Weiler and Taussig, 2018).

6.5.2a Sociodemographic characteristics and multimorbidity

The finding from this study revealed no statistically significant difference between sex with multimorbidity. This is contrary to many studies which found that multimorbidity may be more common in females than in males and that the female sex seems to be associated with a higher number of chronic conditions (Van den Akker *et al.,* 1998; Salisbury *et al.,* 2011a). However, there were statistically significant differences between multimorbidity and family structure, occupation status, and marital status. This is contrary to another

study that found no effect of marital status on the health status of the multimorbid cohort (Schäfer *et al.,* 2012a). But was like many other studies which showed that married adults may have lower morbidity and better physical health than their unmarried counterparts (Waldron, Hughes and Brooks, 1996). A positive moderate correlation exists between age and the number of multimorbidity. In essence, we found a higher number of chronic conditions with increasing age. This is in line with other studies, which found a higher number of chronic conditions in the most advanced ages (Van den Akker *et al.,* 1998; Glynn *et al.,* 2011). Income and education influenced the number of chronic conditions in our study participants. Education also significantly influenced occurrence and extent of multimorbidity in several other studies (Marengoni *et al.,* 2008b; Nagel *et al.,* 2008).

6.5.2b Lifestyle factors and multimorbidity

Several studies in the past have shown that common lifestyle factors such as smoking, alchohol consumption either individually or combined, are associated with individual chronic conditions (Fortin *et al.,* 2014c; Reis *et al.,* 2011; Forman, Stampfer and Curhan, 2009; Odegaard *et al.,* 2011; Sasazuki *et al.,* 2012; Åkesson *et al.,* 2007; Cuenca-García *et al.,* 2014; Garrido, Weiler and Taussig, 2018). This study reported that some individual lifestyle factors as well as the combined effect of lifestyle factors are associated with the likelihood of the simultaneous presence of two or more chronic conditions. In essence, multimorbidity was found to be higher among those that consume alcohol and smoke than those who don't consume alcohol or smoke tobacco. Physical activity (PA) has been shown to improve the general health of patients with chronic diseases and prevent the onset of such conditions (Woodcock *et al.,* 2011). While this coincides with the finding by Millar *et al.,*

(2013) and Cimarras-Otal *et al.,* (2014) that demonstrated an inverse association between physical activities and multimorbidity in older males, no significant differences were observed between those who exercise or not and multimorbidity in this study. Our results coincide with those published by (Hudon, Soubhi and Fortin, 2008), who concluded that multimorbidity was not associated with PA levels in Canadian adults. According to some researchers, greater consumption of fruits and vegetables and whole-grain products appear to lower the risk of multimorbidity (Ruel *et al.,* 2014), this differs from our study because no statistically significant difference was observed between Multimorbidity and the consumption of (1) fresh fruit, (2) green leafy or lettuce salad, and (3) French fries, home fries, or hash browns. However, the findings in this study are in line with a study by Nagel *et al.,* (2008) in which adjustment for fruit and vegetable intake, physical activity, and alcohol consumption did not substantially influence the associations between multimorbidity and education in both sexes (Nagel *et al.,* 2008).

6.6 Limitation

The present study is a cross-sectional design, which does not permit causal extrapolation between ACEs and health behavior risk factors and health behavior risk factors and multimorbidity. However, since ACEs are childhood occurrences it indicates a temporal relationship between ACE exposure and health outcomes measured as of the survey date. To confirm hypotheses in the present study, longitudinal analyses are therefore required to gain further knowledge. Longitudinal research can help to understand the interacting complexities of risk factors and multimorbidity.

Chapter 7

The prevalence and pattern of multimorbidity and its burden among older people in Nigeria

The healthcare systems in Nigeria are developed to be accustomed to managing a single disease entity on a regular basis. While public health planners and practitioners are increasingly aware of the role of inequity in health, the prevalence, pattern burdens of chronic disease have not kept pace with this knowledge in northern part of Nigeria. The objective of this chapter was to determine the prevalence and pattern of multimorbidity and its burden among older people in Niger state north central Nigeria.

7.1 Measurement of variables

The variables used in this chapter were sociodemographic factors and multimorbidity. the detailed description can be found in the variable section in chapter 3.

7.2 Statistical analysis

For this study, all participants have 2 or more chronic diseases. And the highest number of chronic diseases in an individual in this study was 5. The prevalence of multimorbidity was calculated from the total number of patients that presented to outpatients of the 4 hospitals during the lifespan of data collection. For clustering or pattern of multimorbidity, relational association rules were used. Relational association rules are an extension of ordinal association rules, which are a particular type of association rules that describe

numerical orderings between attributes that commonly occur over a dataset (Czibula, Marian and Czibula, 2014). This rule was also adopted in newer studies (Zheng *et al.,* 2022). Firstly, cross-tabulation of all chronic diseases in the study was done to find the dyad pattern of multimorbidity. The result was presented in a correlation matrix table. For the triad, tetra, and Penta of morbidities combination, the individual's morbidities were summed up and categorized into 4 groups based on the number of chronic diseases (2, 3, 4, and 5). An independent chi-square was performed against each category of multimorbidity. The percentage of the dyads, triad, tetra, and Penta morbidities were determined by the frequency of the chronic disease in the category divided by the total of the category and then multiple by 100. The chronic diseases were presented in frequency and percentage and were disaggregated by gender. Chronic disease was also grouped based on systems and system contributions were calculated and highlighted accordingly.

7.3 Results

The sociodemographic characteristics of this study are the same as documented in the preceding chapters.

7.3.1 Prevalence of multimorbidity and burden of chronic diseases

The main objective of this phase of the study is to determine the prevalence and pattern of chronic disease conditions and their burden among older people in Nigeria.

Figure 7.1 shows the prevalence of chronic health conditions in the sample. The 3 leading chronic diseases in both sexes were hypertension 68.4% (37.45% males and 62.55

males), diabetes 55.30% (40.15 males, and 59.85% females), and peptic ulcer 22.60% (33.73% males and 66.27%).   Arthritis was the fourth most common chronic health disease among males and post-CVD (stroke) among females. In both sexes, heart failure came in fifth place. The least common chronic health disease among males is Alzheimer's disease & dementia, and epilepsy in females. Cardiovascular system disease was the most affected system, contributing about 46% (339) of the multimorbidities, followed by the endocrine system at 20.6% (151) and gastroenterology at 10.6% (78). The least affected system was the oncology system with 5 persons see table 7.1. The overall prevalence of multimorbidity for this study was estimated to be 51.9%. see table 7.2.

Hypertension, diabetes, and peptic ulcer account for the first, second, and third medical conditions responsible for the most hospital visit, contributing 29.8%, 19.6%, and 8.6% respectively of all the visits by the multimorbid patients in Niger state, Nigeria, see figure 7.2. Heart failure (8.3%) and stroke (post cerebrovascular accident disease) (7.2%) make up the top five and together they represent the leading cause of disease burden in this study. Similarly, findings from 7.3 shows the association of multimorbidity with disease cluster of multimorbidities. In all categories of multimorbidities, i.e., either in 2,3,4 or 5 chronic diseases hypertension and diabetes are the most implicated chronic medical conditions.
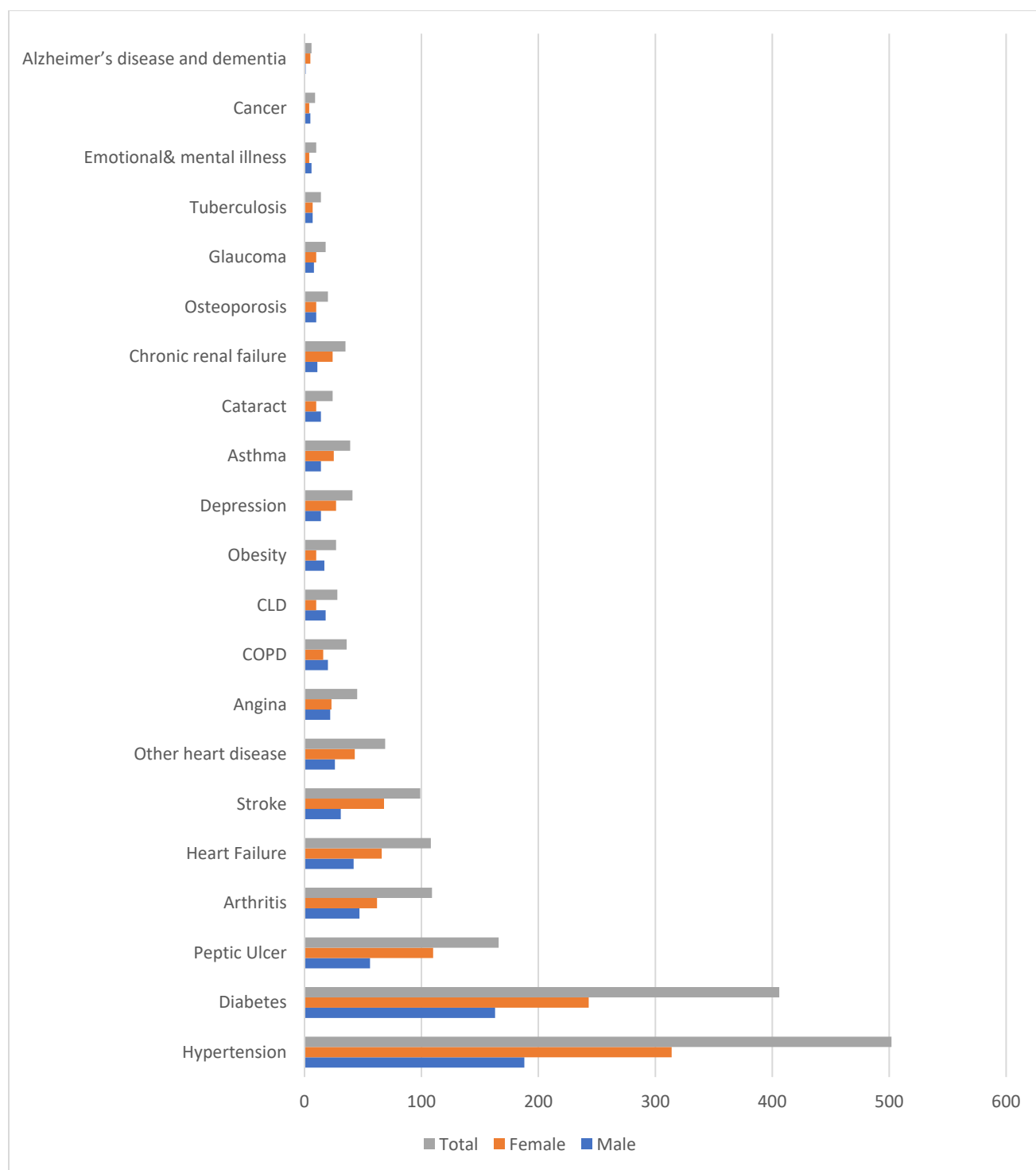
Figure 7.1 Distribution of chronic disease by gender

Table 7.1 system presentation of multimorbidity

System	n	%	% System contribution to MM
Cardiovascular system diseases			
Hypertension	219	29.8	
Heart failure	61	8.3	46.1
Other heart diseases	33	4.5	
Angina/heart attack	26	3.5	
Total	339	46.1	
Endocrinology system			
Diabetes mellitus	144	19.6	20.6
Obesity	7	1.0	
Total	151	20.6	
Gastroenterology			
Peptic ulcer	63	8.6	10.6
Chronic liver disease	15	2.0	
Total	78	10.6	
Respiratory system			
Asthma	7	1.0	4.6
Chronic obstructive pulmonary disease	16	2.2	
Tuberculosis	10	1.4	
Total	33	4.6	
Musculoskeletal system			
Arthritis	14	1.9	2.4
Osteoporosis	4	0.5	
Total	18	2.4	
Central nervous system			
Cerebrovascular disease (stroke)	53	7.2	
Depression	11	1.5	9.9
Emotional and mental illness	10	1.3	
Total	73	9.9	
Renal system			
Chronic renal disease	16	2.2	2.2
Total	16	2.2	
Ophthalmology			
Cataract	9	1.2	2.3
Glaucoma	8	1.1	
Total	17	2.3	
Oncology			
Cancer	5	0.7	0.7
Total	5	0.7	
Others	4	0.6	0.6
Total	734	100	100

Table 7. 2 shows the prevalence of multimorbidity

Months	Males	Females	Total	Patients with multimorbidity	
Oct 2021	264	657	921	468	
Nov 2021	287	581	868	462	
Dec 2021	290	564	854	403	Prevalence of multimorbidity 51.9 %
Jan 2022	302	662	964	470	
Feb 2022	137	560	697	432	
Total	1280	3024	4304	2235	
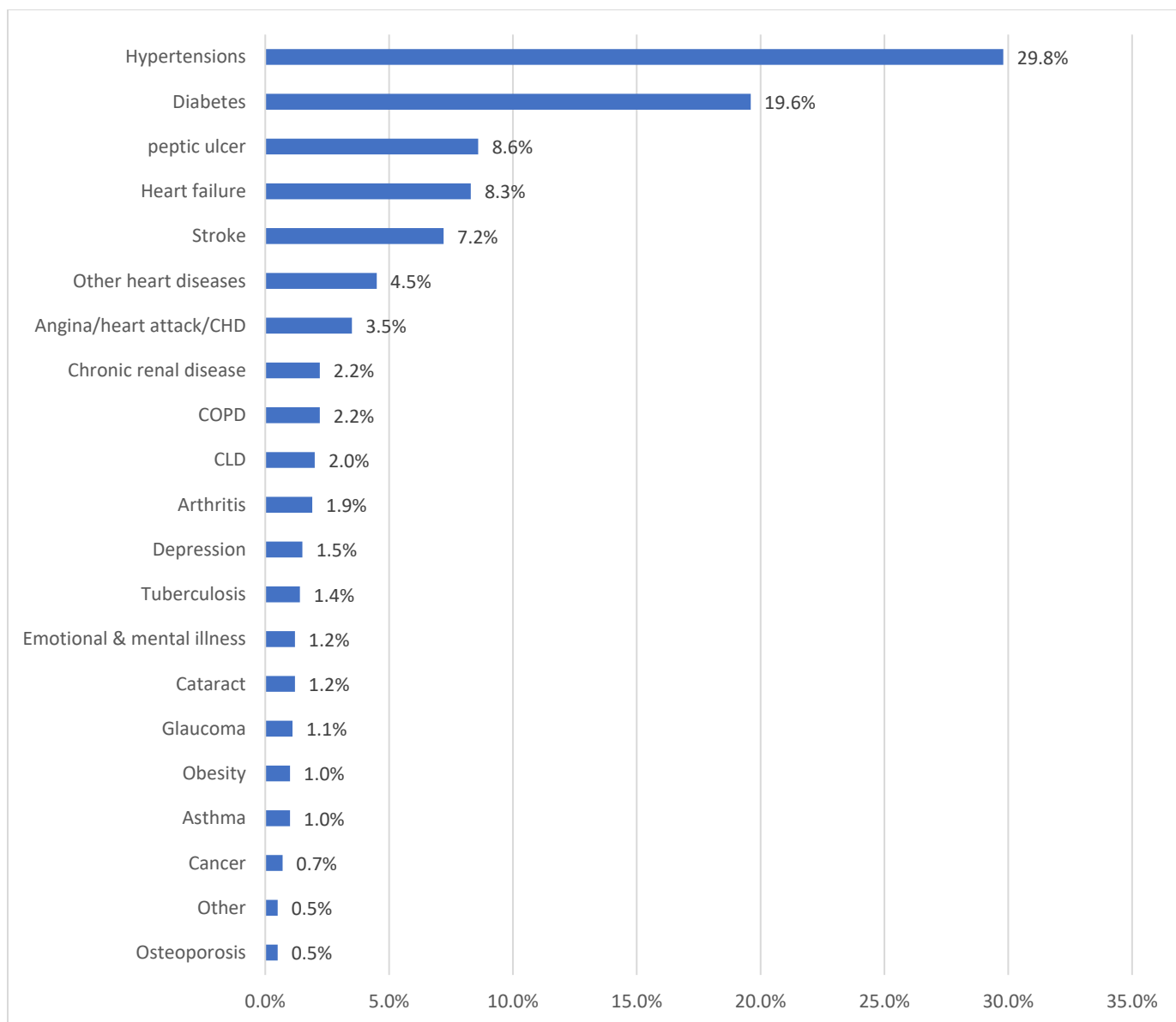
Figure 7.2 showing burden of chronic health problem.

Table 7.3 Association of morbidity with patterns of multimorbidity

Type of disease	Multimorbidity (Number of chronic diseases)				
	Two	Three	Four	Five	Total
Diabetes	197	167	30	12	406
Hypertension	272	179	37	14	502
Stroke	15	58	17	9	99
Angina	27	45	1	2	45
Heart failure	35	45	21	7	108
Other heart diseases	38	24	5	2	69
Cancer	6	3	0	0	9
COPD	21	15	0	0	36
Asthma	33	6	0	0	39
Tuberculosis	13	1	0	0	14
Osteoarthritis	40	48	12	9	109
Osteoporosis	15	4	1	0	20
Cataract	14	6	2	2	24
Glaucoma	12	3	2	1	18
Depression	9	22	5	5	41
Emotional mental illness	6	3	0	0	9
Acid peptic disease	108	46	9	2	165
Chronic liver disease	17	9	3	0	28
Obesity	6	17	3	1	27
Alzheimer's disease and dementia	1	3	1	1	6
Chronic renal failure	15	16	4	1	36

7.3.2 Patterns of Multimorbidity

The commonest dyads (2 chronic diseases) combination of Multimorbidity among the respondents in the study is hypertension + diabetes mellitus contributing to about 19% of all the possible combinations of multimorbidity when considering 2 chronic disease conditions. See the cross-tabulation in table 7.4. Hypertension + heart failure, hypertension + stroke, and hypertension + acid peptic diseases. Diabetes + heart failure completes the top ten of the dyads of multimorbidity.

Table 7.5 shows the top triad of multimorbidity i.e., the commonest combination of 3 disease conditions is first (hypertension + diabetes + stroke), second (hypertension +diabetes + osteoarthritis), and third (hypertension + diabetes + acid peptic diseases. The commonest combination of 4 chronic disease conditions is (hypertension + diabetes + heart failure + stroke) followed by (hypertension + diabetes + heart failure + osteoarthritis). Hypertension + diabetes + heart failure + acid peptic disease or angina. Two patterns of Multimorbidity of 5 chronic diseases were observed in the study predominantly. The first is the combination of (hypertension + diabetes + stroke + osteoarthritis + heart failure) and the second is (hypertension + diabetes + stroke + osteoarthritis + acid peptic). Figure 3 shows that for all classes of multimorbidity, it is higher in females than male.

Table 7. 4 showing dyads combination of multimorbidity

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Hypertension	1	1	306	70	64	89	85	50	22	10	9	14	21	6	5	19	4	15	0	0	0	5
Diabetes Mellitus	2	306	1	58	49	47	63	18	11	7	5	16	26	6	20	22	4	4	0	3	1	2
Acid peptic disease	3	70	58	1	22	10	5	10	7	7	6	1	2	28	2	3	2	0	1	1	2	0
Arthritis	4	64	49	22	1	15	11	10	7	4	1	5	5	2	4	3	1	2	0	3	0	0
Heart failure	5	89	47	10	15	1	21	5	8	4	2	3	3	1	0	4	0	2	0	0	1	0
Stroke	6	85	63	5	11	21	1	5	2	0	0	0	14	0	0	4	1	1	0	0	1	3
Other heart diseases	7	50	18	10	10	5	5	1	0	2	0	3	1	0		1	2			1		1
Angina	8	22	11	7	7	8	2	0	1	3	0	4	2	0	0	0	1	0	0	0	0	1
Chronic Obstructive Pulmonary Diseases	9	10	7	7	4	4	0	2	3	1	7	3	0	0	0	0	3	0	0	0	1	0
Chronic liver disease	10	9	5	6	1	2	0	0	0	7	1	1	2	0	1	1	1	0	4	0	0	0
Obesity	11	14	16	1	5	3	0	3	4	3	1	1	0	1	0	2	0	0	0	0	0	0
Depression	12	21	26	2	5	3	14	1	2	0	2	0	1	0	4	0	0	2	2	1	2	1
Asthma	13	6	6	28	2	1	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0
Cataract	14	5	20	2	4	0	0	0	0	0	1	0	4	0	1	0	2	0	0	0	2	0

Chronic renal failure	15	19	22	3	0	4	4	1	0	0	1	2	0	0	0	1	1	0	1	0	0	0
Osteoporosis	16	4	4	2	1	0	1	2	1	3	1	0	0	0	2	1	1	1	4	0	0	0
Glaucoma	17	15	4	0	2	2	1	0	0	0	0	0	2	0	0	0	1	1	1	0	0	0
Tuberculosis	18	0	0	1	0	0	0	0	0	0	4	0	2	1	0	1	4	1	1	0	0	0
Emotional mental illness	19	0	3	1	3	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Cancer	20	0	1	2	0	1	1	0	0	1	0	0	2	0	2	0	0	0	0	0	1	0
Alzheimer's disease and dementia	21	5	2	0	0	0	3	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1

Table 7.5 shows patterns for 2,3,4 and 5 multimorbidities

	Clusters of Multimorbidities		
The top ten dyads	The top triad	The top tetra	The top Penta
Hypertension + Diabetes Hypertension + heart failure Hypertension + stroke Hypertension + acid peptic diseases Hypertension + osteoarthritis Diabetes + stroke Diabetes + Acid Peptic Diseases Hypertension + other heart diseases Diabetes + osteoarthritis Diabetes + heart failure	Hypertension + diabetes + stroke Hypertension + diabetes + osteoarthritis Hypertension + diabetes + acid peptic disease Hypertension + diabetes + angina (heart failure)	Hypertension + diabetes + heart failure + stroke Hypertension + diabetes + heart failure +osteoarthritis Hypertension + diabetes + heart failure + acid peptic disease	Hypertension + diabetes + stroke + osteoarthritis + heart failure Hypertension + diabetes + stroke + osteoarthritis + acid peptic diseases
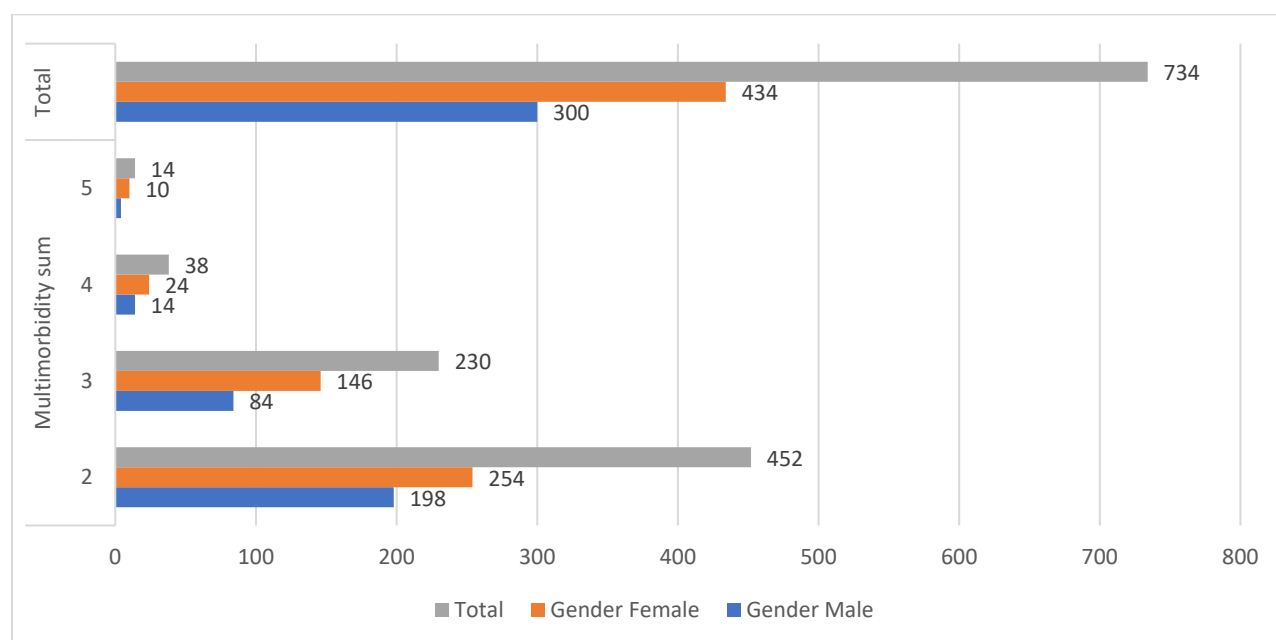
Figure 7.3 number of chronic diseases by gender

7.4 Discussion

In this cross-sectional study among multimorbid older adult patients receiving care at 4 high-volume general Hospitals, the total number of diseases in an individual range from 2 to 5 chronic diseases. The total number of health conditions in individuals increases with advancing age, this is consistent with findings in the earlier studies. See for example (Steinman *et al.,* 2012; Nützel *et al.,* 2014; Barnett, Karen, Mercer, Norbury, Watt, Wyke and Guthrie, 2012d; Li *et al.,* 2016). This steady finding is important because Starfield, (2007) reported that if we are to deal with an increasing prevalence of multimorbidity in an ageing population, we need to know about disease combinations so we can design best practice guidelines for clinicians. To our knowledge, this is the first study to determine the pattern of multimorbidity only among multimorbid patients in north-central Nigeria. this was consistent with findings in other studies from Canada 49.4% (Sakib *et al.,* 2019), Ireland 53.7% (Ryan *et al.,* 2018), but was less than the value in Burkina Faso 65% (Hien, Herve *et al.,* 2014) and higher than the value in Nigeria 27% (Faronbi, Ajadi and Gobbens, 2020b). This is however, lower than finding from other parts of the world. For example, a study in Belgium showed that the multimorbidity rate was as high as 82.6%. (Afshar *et al.,* 2015b) and another study in Australia showed that 83.2% of the respondents suffered from multimorbidity (Boeckxstaens *et al.,* 2014). Although prevalence estimation of multimorbidity is usually reported to be difficult to compare among studies due to differences in the selected definitions, demographic features of the sample, and different study methodologies (Fortin *et al.,* 2012). This could be the explanation for the contrasting differences studies in Belgium showed that the multimorbidity rate was as high as 82.6%

(Boeckxstaens *et al.,* 2014) and another study in Australia showed that 83.2% of the respondents suffered from multimorbidity (Zhang, R., Lu, Shi, Zhang and Chang, 2019).

So many dyads' combinations of morbidities have been reported in previous studies. The commonest dyads pair in this study are hypertension and diabetes which is consistent with a previous Nigeria study by Abdulraheem *et al.,* (2017). However, this is inconsistent with findings that reported rheumatoid and digestive disease as the most frequent dyads in Scotland and China respectively (Barnett, Karen, Mercer, Norbury, Watt, Wyke and Guthrie, 2012d; Zhang, R., Lu, Shi, Zhang and Chang, 2019). For triads of morbidities, hypertension, diabetes, and post-cerebrovascular disease were the commonest in this study. This partially coincides with findings by Abdulraheem *et al.,* (2017 who reported the highest prevalence was in HBP, diabetes, and heart problem (10.3), and HBP, heart problems, and Osteoarthritis (9.8%) in a study in Nigeria. However, the result partially disagreed with findings from other studies where arthritis or rheumatism, stomach or other digestive diseases, and hypertension were the commonest triads (Afshar *et al.,* 2015b; Zhang, R., Lu, Shi, Zhang and Chang, 2019). While it was evident that arthritis can easily coexist in these studies, the medical condition that easily co-exists in our study is hypertension mainly because the prevalence of hypertension in this study is high (28.9%), substantiating existing studies in Nigeria, the study by Okubadejo *et al.,* (2019) and Adeloye *et al.,* (2015) reported 27.5% of hypertension in urban Nigeria and approximately 1/3rd of urban-dwelling adults in Nigeria and West Africa have hypertension respectively.

Figure 7. 1 ranked health conditions according to the reason for hospital visits. Hypertension and diabetes represent the greatest burden, this was buttressed by a high relative risk for hypertension and diabetes (27.72, and 22.42 respectively) (see Table 7.1).

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Hypertension and diabetes are also among the leading component of all the leading morbidity in the dyads and triads, tetra and Penta commonly occurring diseases in multimorbidity in this study. Though the frequent occurrence of hypertension or diabetes in multimorbidity in this study might be simply due to the high prevalence of these diseases, this is vital when designing and implementing management guidelines for multimorbid patients in this part of the world. This is consistent with findings from other studies, see for example (Schäfer *et al.,* 2012b; Roman Lay *et al.,* 2020; Sharma and Maurya, 2021). In all the studies the prevalence of multimorbidity was found to be higher in women than men.

7.5 Strength and Limitation

Although the result of this study revealed the burden of multimorbidity and the existence of associations beyond chance among the different diseases, which has the potential to address this emerging health priority holistically, by adopting a more integrated and sustainable model of care, the sample selection is limited to 4 hospitals in Niger state, thus the findings cannot be generalized to Nigeria. However, the study can be replicated elsewhere in the country to increase its impact. Similarly, 21 predefined chronic diseases were included in the study, and these may not be comprehensive of the conditions of the population. However, including this number provide a fair representation of chronic disease conditions. Although it is limited by the cross-sectional design. It is worthy of note that the data obtained from the survey was not only based on self-reporting but was also grounded on doctors' confirmation evidence in the patient's case note report.

Chapter 8

An effective hospital care delivery model for older people in Nigeria with multimorbidity

Developing an effective action-based model of care for multimorbid patients has become common knowledge, it remains unknown why researchers in Nigeria have not been paying attention to this. Hence, the objective of this chapter was to access the quality of health services through the Donabedian model, which posits that the presence of structural quality facilitates process quality, which leads to outcome quality based on client experience and satisfaction.

8.0 Introduction

The quality of care has been defined as the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge (Lohr and Schroeder, 1990b). What remains of concern is how to successfully measure the quality of care in the general health care setting let alone care for patients with 2 or more chronic diseases who usually have complex health care needs.

Even though, Hurst *et al.,* (2018) reported that multimorbidity should drive a shift in the way health policies are developed and guide the health care system in tackling this challenge, one big issue that is persistent is the care for multimorbidity because of their complex healthcare need. Similarly, Prathapan and colleagues, (2020) argued that limited research on multimorbidity especially in developing countries like Nigeria curtails the

development and implementation of sustainable healthcare models. Therefore, a better understanding of the quality of care available for multimorbidity patients is imperative for the process of selecting new interventions and building strategies for quality improvement for them.

Though some researcher critique Donabedian model to be too linear framework (Mitchell *et al.,* 1998), Donabedian model of health care was used for this study mainly because the model gathered information in 3 distinct phases (structure, process and outcome) which can be modify within healthcare delivery unit. While understanding patient experience is a key step in moving toward patient-centered care and their assessment can provide a critical starting point to developing an effective action-based model of care for multimorbid patients has become common knowledge, it remains a mystery why researchers in Nigeria have not been paying attention to this. This chapter presents the quality of health services through the Donabedian model, which posits that the presence of structural quality facilitates process quality, which leads to outcome quality based on client experience and satisfaction.
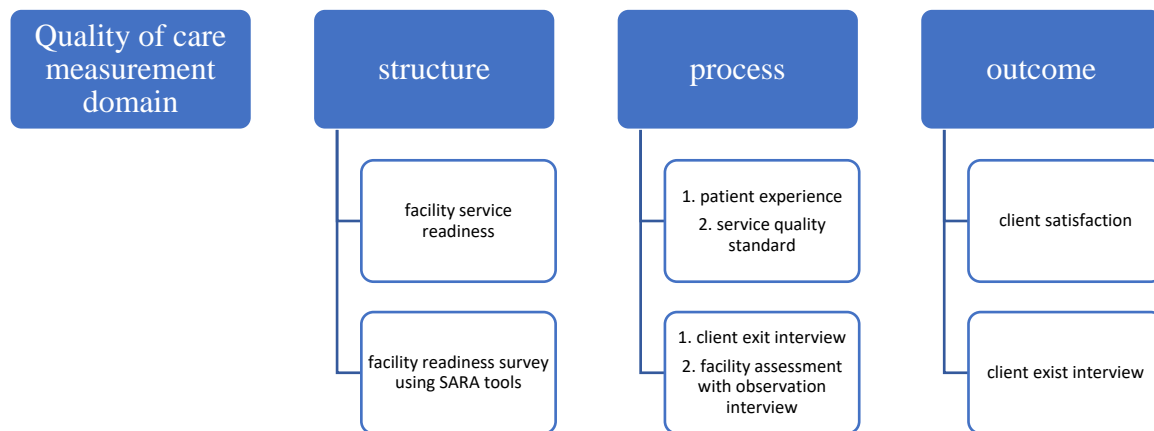
Figure 8.1 illustrating Donabedian model of care

8.1 Quantitative phase- Study design, setting, and participants

Study design, setting and participants and data collection are the same as the previous chapters and the detail are discussed in chapter 3.

8.1.1 Measurement of variables

To provide comprehensive information on the quality of care the multimorbid patient receive in the hospitals, the Donabedian model of care was used to assess the quality of care. This model was a good fit and was adopted for this research because it explored all the three elements of quality of care (structure, process, and outcome). For the structural-quality measures, facility survey with standard tools was studied. Process-quality measures were investigated based on exit interviews with the participants on their perception of provider adherence to quality standards. Whereas the outcome quality measures were explored based on the client satisfaction as they exited the health facility.

Facility survey-structural quality was assessed in 4 health facilities using a standard facility assessment tool focused on an inventory of availability and readiness of basic health facility structures: basic amenities (6 tracer items), diagnostic capacity (7 tracer items), essential items (25 tracer items), and standard precaution for infection prevention (9 tracer items). In addition to the facility survey, an interview was conducted with the heads of the facility supplemented by observation of facility adherence to serve quality standards. The observation of service standards included 18 tracer indicators on the facility quality. For the process and outcome quality measurement, the patient satisfaction questionnaire (PSQ)-18 was adopted (Marshall and Hays, 1994). It is the revised short-form version of PSQ-III and PSQ that retains many characteristics of its full-length counterpart. This includes general satisfaction, Technical Quality, Interpersonal Communication, Financial Aspects, Time spent with Doctor, Accessibility, and Convenience.

8.1.2 Statistical analysis

The general service readiness was assessed by using the five domains of tracer indicators (1) basic amenities (2) basic equipment (3) standard precaution for infection prevention (4) diagnostic capacity and (5) essential drugs. The average readiness score for each domain tracer was calculated by the ratio of the available tracer item over the total required items. The average service readiness index for each health facility was determined by adding the mean score of the five domains and dividing by 5 (total number of the domains). To assess general service readiness, we first calculated scores for each of five domains (amenities, basic equipment, infection prevention, diagnostic capacity, and essential medicines) based on the mean availability of tracer items as a percentage within the domain. Then mean of all five domains was calculated and expressed as a

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general service readiness index. The average general service readiness score represents the overall readiness status of PHCCs and hospitals to provide services. The average general readiness score is a composite indicator calculated from the range of indicators from five domains of WHO Service Availability and Readiness Assessment (SARA) indicators. Each domain carries equal weights.

The Donabedian process care was assessed by patient experience with the quality of care. To begin, a descriptive analysis of the satisfaction level of patient experiences was presented in frequency and percentages. A Chi-square test of association was carried out to test the association of Multimorbidity and level of satisfaction level of patient experience and a Spearman's analysis was performed to test the linear relationships among these variables. A further analysis was carried out to test the association between satisfaction level with the medical care received and the five domain of health facility readiness (Total score Basic Amenities, Total score Basic Equipment, Total score infection control, Total score diagnostic capacity, Total score essential drugs), and the General facility readiness, using Spearman's correlation. Spearman correlation is that data must be at least ordinal and the scores on one variable must be monotonically related to the other variable.

The overall, satisfaction level with medical care was predicted using linear regression (patience experience as an independent variable).

Linear regression was used because the relationship between the independent and dependent variables appeared to be linear, this was confirmed by plotting a scatter plot which showed evidence of a linear relationship. Similarly, the linear regression analysis requires all variables to be multivariate normal. This assumption can best be checked

with a histogram that showed a normal distribution curve devoid of outliers. And normality was checked with a goodness of fit test, e.g., the Kolmogorov-Smirnov test. Multicollinearity was tested with Correlation matrix – when computing the matrix of Pearson's Bivariate Correlation among all independent variables the correlation coefficients need to be smaller than 1.

Principal component analysis was used to reduce the dimensions of the multimorbid patient experience into smaller measurements present in multiple variables that are organized on a Likert scale. And most of the variables appeared to have a linear relationship this was tested by random selection of a few possible relationships between variables. The 5-point ordinal scale was used to rate the degree to which they agree or disagree with the statement. The correlation analysis indicates that the relationships of the Likert items range from moderate to very weak positive and negative relationships. A sample size of 734 appears adequate for PCA to produce reliable results. Regarding the assumption of the adequacy of sample size, KMO statistic (0.87) indicates that the sample size is adequate for principal component analysis table 8.4. Since the KMO statistic is considerably greater than the threshold of 0.5, Field (2013) describes the adequacy of sample size as remarkable. The data was suitable for reduction as illustrated in Table 8.4, Bartlett's test of sphericity is statistically significant (p<0.001), and thus, it rejects the null hypothesis.

8.2 Results- Characteristics of the participants

The socio-demographic characteristics of the respondents for the quantitative phase of study in this chapter is the same as the previous chapters.

Table 8.1 Socio-demographic characteristics of the respondent (n= 734)

Variables	n	%
Gender		
Male	300	40.9
Female	434	59.1
Age * 67.37 (66.37 for male and 68.06 for female)		
60-64	262	35.7
65-69	267	36.4
70-74	123	16.8
75-79	29	4.0
80 and greater	53	7.2
Marital status		
Never married	11	1.5
Currently married	483	65.8
Divorced	21	2.9
Separated	19	2.6
Widow/er	200	27.2
Family structure		
Nuclear Family	140	19.1
Three Generation Family	150	20.5
Extended Family	442	60.4
Education level		
Illiterate	462	62.9
Can read and write	35	4.8
Primary school level	74	10.1
secondary school	64	8.7
Tertiary school	83	11.3
Post-graduate	16	2.2
Occupation		
Government staff	36	4.9
Own business	280	38.1
Involve in the family business	36	4.9
Company staff/ worker	30	4.1
Dependent	214	29.2
Retired	128	17.4
Others (specify)	10	1.4
Ethnicity		
Gwari	193	26.3
Hausa	174	23.7

Nupe	204	27.8
Others	163	22.2
Level of income		
0-15k	477	65.0
16k-30k	124	16.9
31k-45k	30	4.1
46k-60k	27	3.7
greater than 60	76	10.4
Total	734	100

8.2.1 Readiness status in five domains

This study presents the quality of health services through the Donabedian model, which posits that the presence of structural quality facilitates process quality, which leads to outcome quality based on client experience and satisfaction. General Service readiness is described by the following five domains of tracer indicators: (1) Basic amenities, (2) Basic equipment, (3) Standard precautions for infection prevention, (4) Diagnostic capacity, and (5) Essential medicines. The average readiness score for basic amenities was the same for General hospitals in Kontagora, Minna, and Suleja with 85.7% score and the lowest in general hospital Bida with 28.6% score. See table 8.2. The average basic amenities readiness score was 100% across all the hospitals. The average score for standard precautions for infection prevention readiness measures in the sample facilities was 83.3%. Two hospitals recorded a score of 100% and the other recorded a score of 67.7%. The average diagnostic capacity readiness score of the general hospital in the study sample was 96.9%. The average score for essential medicine readiness is 90%. The average general service readiness score of study facilities in the study was 88%. General hospital Bida 72%, general hospital Kontagora 97%, Minna 97% and Suleja 87%.

Spearman's correlation was performed between satisfaction level with the medical care received and the five domain of health facility readiness (Total score Basic Amenities, Total score Basic Equipment, Total score infection control, Total score diagnostic capacity, Total score essential drugs), and the General facility readiness. See table 8.2. No statistically significant association was observed between them. In other words, the level of preparation in any of the domains as well as the general facility readiness does not have any relationship with how the patients are satisfied with their medical care experiences.

Table 8.2 Mean availability of items by Domain score in the 4 general hospitals (GH) Satisfaction level with the medical care received and facility readiness

Facility readiness	Number of available items (Mean score) in the secondary hospitals					The Satisfaction level with the medical care received	
	GH Bida	GH Kontagora	GH Minna	GH Suleja	Total	rho	p-value
Basic amenities	2 (28.6%)	6 (85.7%)	6 (85.7%)	6 (85.7%)	71.4%	0.272	0.728
Basic equipment	6 (100%)	6 (100%)	6 (100%)	6 (100%)	100%	0.123	0.635
Standard precautions for infection prevention	6 (66.7%)	9 (100%)	9 (100%)	6 (66.7%)	83.3%	-0.236	0.764
Diagnostic capacity	8 (100%)	8 (100%)	8 (100%)	7 (87.5%)	96.9%	-0.544	0.456
Essential medicines	13 (65%)	20 (100%)	20 (100%)	19 (95%)	90%	0.500	0.789
General service readiness index = (Mean score of the five domains) (a + b + c + d + e) / 5	72%	97%	97%	87%	88.3%		

8.2.2 The concept of the healthcare process with patient satisfaction

There is no consensus in the literatures on how to define the concept of patient satisfaction in healthcare. In the Donabedian quality measurement model, patient satisfaction is defined as a patient-reported outcome measure while the structures and processes of care can be measured by patient-reported experiences. For satisfaction, more than half of the respondents (disagree 30%, strongly disagree 25.3%) disagree that doctors are good at explaining the reason for medical tests. See figure 8.2, 543/734 (74 %) of the respondents disagree that the doctor's office has everything needed to provide complete medical care. About 38% and 42% of the participants agree that their medical bills are often beyond my reach is strongly agree and agree respectively. An overwhelming 639 (87%) of the respondents either strongly agree or agree that when they need emergency care, the waiting times are usually too long. For satisfaction with the time the multimorbid patients spent with the doctor, less than half of respondents 298 (40.6%) were satisfied with the time the doctor usually spends with them. While the remaining more than half were not satisfied with the doctor-patient time, 9 (1.2%) of the respondents were not certain or remained indifferent with the doctor-patient time, see figure 8.2.
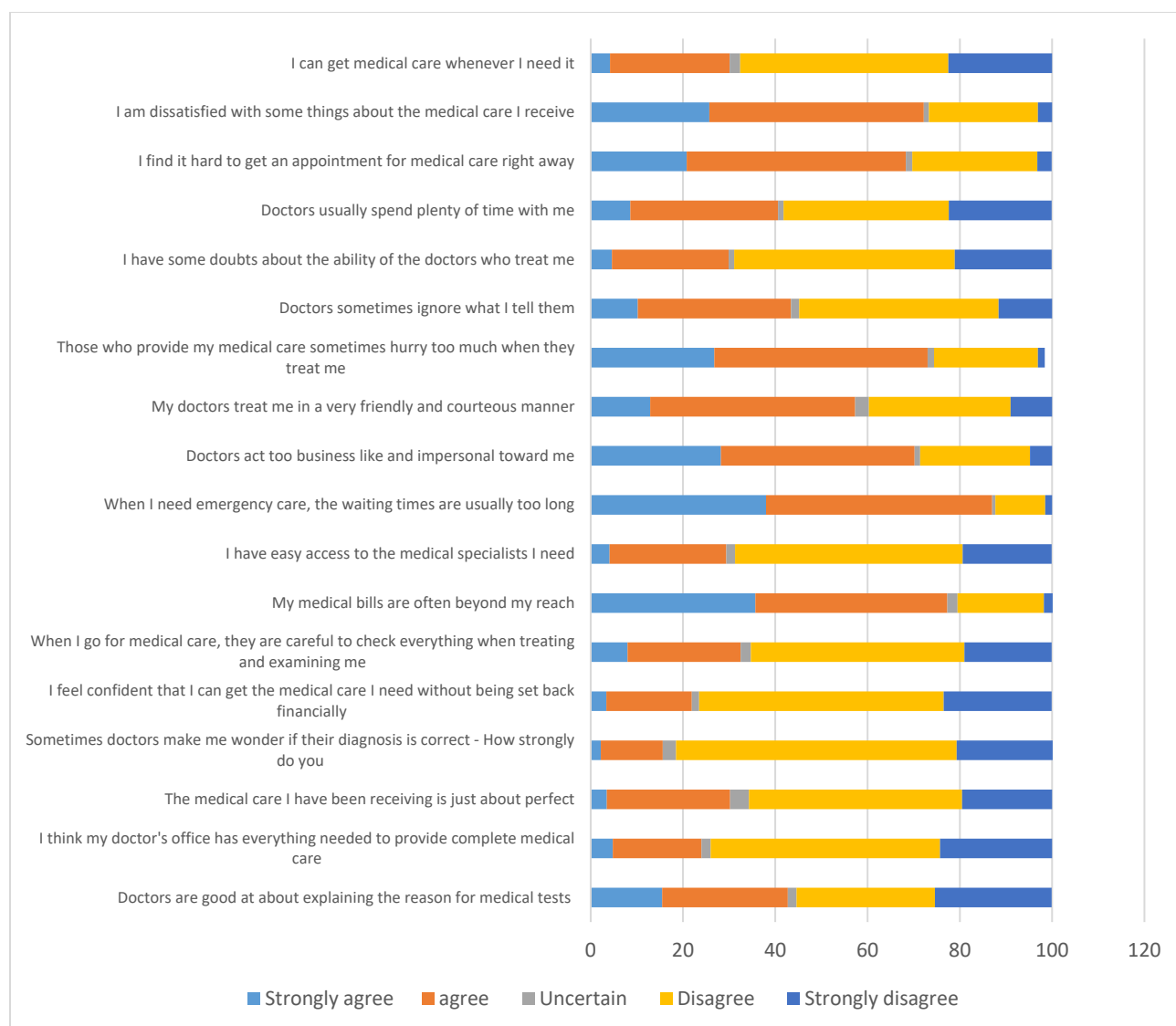
Figure 8.2 shows Patient satisfaction will quality of services among older people in Nigeria with multimorbidities

The findings from Table 8.3 shows that in the unadjusted multiple regression model for the overall satisfaction with the healthcare care that is received, and the patient health experiences variables, all the variables of patient's healthcare experiences are predictors of overall patient satisfaction, except the variable that said sometimes doctors make the patients wonder if their diagnosis is correct (see Table 8.3). In the adjusted model, eight of the variables remain significant. The strength of the remaining predictor variables is reduced to varying degrees. Overall, in the unadjusted model, the coefficient is higher in

the variable that those who provide patients' medical care sometimes hurry too much when they treat them, but in the adjusted model, it is higher in the variable that patients can receive medical care whenever they need it. These variables reflect the patients' quality of care and access to medical care.

Table 8.3 Multiple regression model for overall satisfaction level with the medical care received and patient's health care experiences

Variables	Overall patients' satisfaction			
	Unadjusted coefficient (b)	p-value	Adjusted coefficient (b)	p-value
Doctors are good at about explaining the reason for medical tests	-0.407**	0.001	-0.026	0.524
I think my doctor's office has everything needed to provide complete medical care	-0.322**	0.001	-0.075*	0.027
The medical care I have been receiving is just about perfect	-0.328**	0.001	0.040	0.275
Sometimes doctors make me wonder if their diagnosis is correct	-0.060	0.102		
I feel confident that I can get the medical care I need without being set back financially	-0.210**	0.001	0.027	0.421
When I go for medical care, they are careful to check everything when treating and examining me	-0.452**	0.001	-0.240*	0.002
My medical bills are often beyond my reach	0.135**	0.001	0.002	0.949
I have easy access to the medical specialists I need	-0.255**	0.001	0.038	0.232
When I need emergency care, the waiting times are usually too long	0.324**	0.001	-0.024	0.455
Doctors act too business-like and impersonal toward me	0.502**	0.001	0.252**	0.001
My doctors treat me in a very friendly and courteous manner	-0.322**	0.001	-0.057	0.080
Those who provide my medical care sometimes hurry too much when they treat me	0.519**	0.001	0.142**	0.001
Doctors sometimes ignore what I tell them	0.274**	0.001	0.089*	0.004
I have some doubts about the ability of the doctors who treat	0.133**	0.001	0.090*	0.002
Doctors usually spend plenty of time with me	-0.350**	0.001	-0.036	0.279
I find it hard to get an appointment for medical care right away	0.381**	0.001	0.062*	0.050
I can get medical care whenever I need it	-0.482**	0.001	-0.240**	0.001

Correlation is significant at 0.05 *. Correlation is significant at the 0.01 level (2-tailed).**

Principal Components Analysis (PCA) was performed to reduce the dimension or group of the principal factors of the process indicator (patient experience) dataset among multimorbid patients together. The analysis showed the data met the assumptions of sample adequacy (KMO = 0.87), the absence of multicollinearity (r < 0.6), and the significance of Bartlett's test of sphericity see table 8.4. Factor extraction established four components with eigenvalues greater than one. Moreover, the four eigenvalues collectively accounted for 53.450% of the variation in patients' experience satisfaction see table 8.4. The scree plot confirms the extraction of the four components because the major inflection point occurred at the fourth factor see figure 8.3. The analysis of how each question loaded onto different components revealed varied themes in the questions see table 8.4. Seven questions that loaded onto the first component relate to the accessing quality of care, six questions that loaded onto the second component relate to patient-physician relationship and timing. Whereas two questions that loaded onto the third component relate to the financial burden of medical care, the remaining three questions that loaded onto the fourth component relate to the confidence and trust in medical care. Thus, in brief, PCA shows that (1) accessing the quality of care, (2) patient-physician relationship and timing, (3) financial burden of medical care, and (4) confidence and trust in medical care are the principal factors in the study that influence multimorbid patient experience satisfaction.

Table 8.4 Principal component analysis (PCA)- 18 items summarizing patient experiences

Kaiser-Meyer-Olkin Measure of Sampling Adequacy 0.872
Bartlett's Test of Sphericity 3873.187
p-value 0.000

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Factor loading and commonalities for independent variables			
	Total	% Of Variance	Cumulativ e %	Total	% of Variance	Cumulativ e %	1	2	3	4
I think my doctor's office has everything needed to provide complete medical care	5.361	29.786	29.786	5.361	29.786	29.786	.757	.019	-.043	.017
Doctors are good at explaining the reason for medical tests -	1.633	9.074	38.860	1.633	9.074	38.860	.753	-.263	.010	-.098
The medical care I have been receiving is just about perfect	1.505	8.361	47.221	1.505	8.361	47.221	.730	-.130	.200	.033
When I go for medical care, they are careful to check everything when treating and examining me	1.121	6.229	53.450	1.121	6.229	53.450	.633	-.414	.142	-.031
My doctors treat me in a very friendly and courteous manner	.971	5.395	58.845				.578	-.209	.071	-.168
I have easy access to the medical specialists I need -	.909	5.052	63.897				.447	-.101	.380	.005
I can get medical care whenever I need it	.842	4.677	68.574				.435	-.373	.280	.045
Doctors act too businesslike and impersonal toward me	.729	4.051	72.625				-.185	.797	-.092	.046
Those who provide my medical care sometimes hurry too much when they treat me	.681	3.784	76.409				-.226	.764	-.124	.204
When I need emergency care, the waiting times are usually too long	.669	3.718	80.127				.085	.647	-.194	-.045
I am dissatisfied with some things about the medical care I receive	.587	3.263	83.390				-.353	.610	-.039	.243
Doctors usually spend plenty of time with me -	.571	3.173	86.563				.325	-.550	-.052	.230
I find it hard to get an appointment for medical care right away	.515	2.860	89.423				-.147	.526	-.139	.078
My medical bills are often beyond my reach	.451	2.506	91.928				.082	.174	-.825	.062
I feel confident that I can get the medical care I need without being set back financially	.408	2.267	94.196				.282	-.172	.683	.028
I have some doubts about the ability of the doctors who treat me -	.393	2.184	96.379				-.141	-.053	-.012	.796
Doctors sometimes ignore what I tell them	.346	1.920	98.299				-.095	.274	-.125	.595
Sometimes doctors make me wonder if their diagnosis is correct	.306	1.701	100.000				.234	-.018	.372	.508

Extraction Method: Principal Component Analysis.
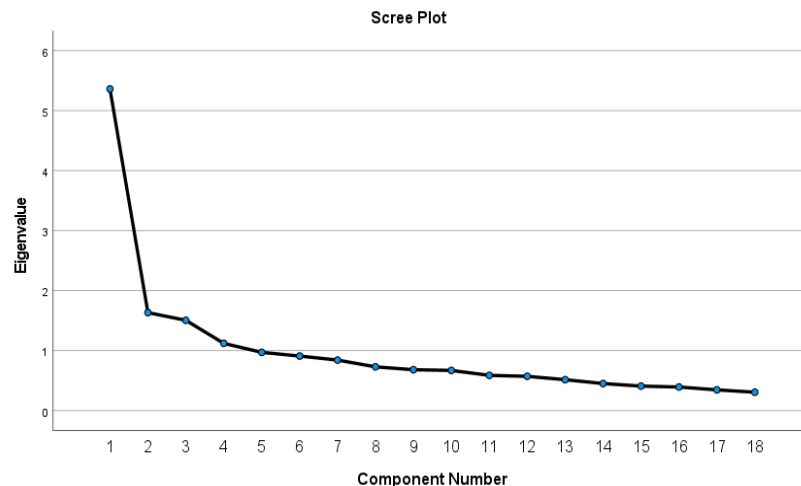
Figure 8.3 shows scree plot

8.3 Introduction: Qualitative Methodological Approach

To answer the fifth research objective, an in-depth interview was conducted in the community in addition to the quantitative survey to determine patients' perceptions of their experiences as they access and navigate the healthcare pathway. Just like the quantitative phase, the qualitative phase also follows the Donabedian model of care, which includes evaluation of the quality of care in 3 areas namely structure, processes, and outcome as illustrated in figure 8.4. Although the interview was guided by a set of questions, the data was analyzed by interpretative phenomenological analysis (IPA) because the analysis in IPA was said to be a bottom-up approach and not to be seen as a means of testing the hypothesis. IPA is a qualitative approach that aims to provide detailed examinations of personal lived experiences (Smith and Shinebourne, 2012). Phenomenology is a philosophical approach, which aims to produce an account of lived experience in its terms rather than one prescribed by pre-existing theoretical preconceptions (Smith and Fieldsend, 2021). In essence, it aims to offer understandings into how a given person, in a given setting, makes sense of a given circumstances.

The researcher explained to the participant why they were invited and on the significance of the result and what it will be used for. The researcher also made it apparent that every person's input is important, and the main aim is not to reach an accord understanding. The researcher then re-arranged and structure the responses according to the Donabedian model of care to answer the research objective.

structure	processes	outcome
• Facilities • Equipments • Technology	• Healthcare experiences	• participants care expectation
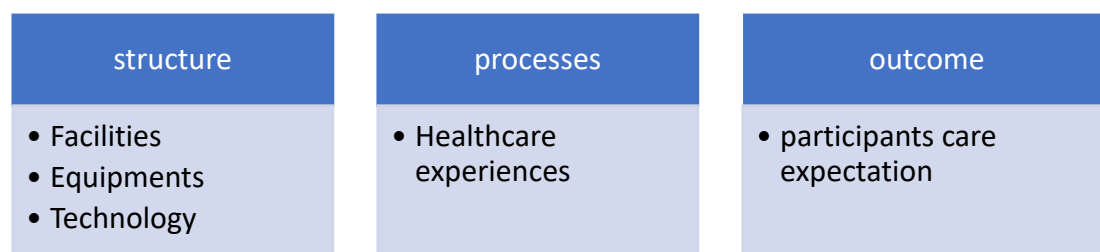
Figure 8.4 illustrating the Donabedian model of care for the qualitative phase

8.3.1 Qualitative participant recruitment

The participants were recruited from the communities in the study setting. This was preceded by linking up with the community leaders, to provide them with the explanation of the study, seeking permission to work in their locations, and subsequently leading the research team to the local health staff and then members of the communities. Although there are no specific regulations to determine the sample size for a qualitative study, the sample size can be decided by the resources available, the time assigned, and the research objectives (Shetty, 2020). If possible, phenomenology studies should aim for sample sizes between 5-25 (Creswell and Poth, 2016), at least 6 (Morse, 1994). Whereas grounded theory methodology sample size should be between 20-30 (Creswell and Poth,

2016), or between 30-50 interviews (Morse, 1994). Overall, 15 is consider the smallest

acceptable sample for all qualitative samples (Bertaux, 1981).

Participants were selected purposefully after meeting the inclusion criteria (Participants

were patients 60 years and above with 2 or more chronic diseases from the community

and consented to participate in the study). However, the study excluded patients having

communication problems and patients with any form of cognitive impairment.

It is important to ensure that participants in any one group have something in common

with each other. All necessary steps were taken to make the sample as representative as

possible for the study area. As such a mixture of factors was observed in recruiting a

heterogeneous range of participants in terms of clinical diagnosis, the number of disease

conditions, socioeconomic backgrounds like level of education, ethnoreligious affiliation,

age,. All participants were provided with the information sheet (Appendix 1) and the

opportunity to contact the University or the researcher for additional information before

participation. Informed verbal consent was obtained before commencement of data

collection. And participants were given at least 24 hours to respond.

. The purposive sampling method was used to select 12 participants who met the inclusion

criteria and were willing to participate in the study.

8.3.2 Qualitative data collection

This qualitative data was collected by an open-ended interview guide to assess the

personal experiences of patients, access to healthcare, and quality of care. Patient

experiences have been identified as an indicator for evaluating and improving the quality

of care (Suhonen *et al.,* 2012). This phase of data collection was preceded by a pilot

interview; the process and resulting data were reflected on by the author and the project supervisors to ensure quality before carrying out other interviews.

Furthermore, to create an enabling environment, the interviews were carried out at the participant's preference in terms of location and at a suitable time. After the informed consent, the interviews were carried out and audio recorded on devices were in place to minimize the loss of data through technical error.

8.3.3 Qualitative data analysis

The qualitative interview data were analyzed using interpretative phenomenological analysis (IPA) with the help of NVivo software. This software is considered the most powerful software for gaining richer insights from qualitative and mixed-methods data (QSR International). The interview was conducted in the language the participants felt more comfortable with and were asked the same set of questions and the questions were grouped under a few topics heading. The audio data was transcribed by the author; although time-consuming this brings the data close to the researcher and increases familiarity with the data. Observation notes were also taken during the interview to document impressions, changes in behaviors, or attitudes that. The exact words were complete with every word and sound and silence. Keywords and sayings were recorded as part of preliminary coding.

Using IPA was time consuming, the researcher still perceived it as an exciting exercise, because it provided the researcher the opportunity to get close to the data. IPA provides the opportunity to document participants' sense of

phenomena and at the same time document, the sense researchers made from

it and in general provide researchers with adaptable flexible guidelines according

to the research objectives (Pietkiewicz and Smith, 2014). IPA should not be used

as a recipe and the researcher should feel free to create their own template. This

study was analyzed following 5 stages: namely

1. Initial analysis,

2. Transforming nodes into emerging themes,

3. The grouping of generated themes into categories, and

4. The final template and writing of the IPA study.

5. Synthesis and restructuring of the response to answer the research
    objective.

8.3.4 Stage 1 Initial stages of the analysis

The principal researcher translated the transcript of the interview responses from the local

language to English. As much as possible verbatim transcription was used though some

degree of free translation was employed, which required some word changes and minor

modifications to improve grammar and enhance the readability and understanding of the

meaning in English. Therefore, important to point out that the extract from participants

narratives presented in the results are not a verbatim translation. The transcript was read

while listening to the conversation in order to verify the accuracy of the transcription. The

transcript was categorized into individual participant files as word Microsoft documents

and exported into QSR NVivo 12 Pro software. It is a widely used and validated electronic

package for qualitative research. Although, NVivo software is not in itself an interpretive device (Cassell and Symon, 2004). In the software, the transcript was reviewed several times, and codes, categories, and themes were identified from each respondent. At this stage, the researcher, closely read the data multiple times which provided some new insight. The word cloud is a supplemental numerical tool to deepen qualitative analysis with a lot of cons in qualitative analysis like its lack of weight or significance, a lot of use of word does not necessarily mean a mean a trend. (DePaolo and Wilkinson, 2014), the researcher included a frequency word cloud see figure 8.5, to enable a quick idea of what key words are emerging from the research in the early stage. This acted as a starting point to triggering questions and potential insights (DePaolo and Wilkinson, 2014).

Figure 8.5 showing the word cloud frequency

The word frequency search was used to build a series of nodes based on individual words, this was spread to the surrounding paragraph to involve 3 words on either side of the word and a matrix was run to see where these nodes intersected. The data was initially coded into 3 nodes. That is either a (1) good experience or a (2) bad experience or (3) meet expectation. The interpretation of whether the healthcare experience was positive or negative or met expectation was plotted against participants with a concept map. See figure 8.6.
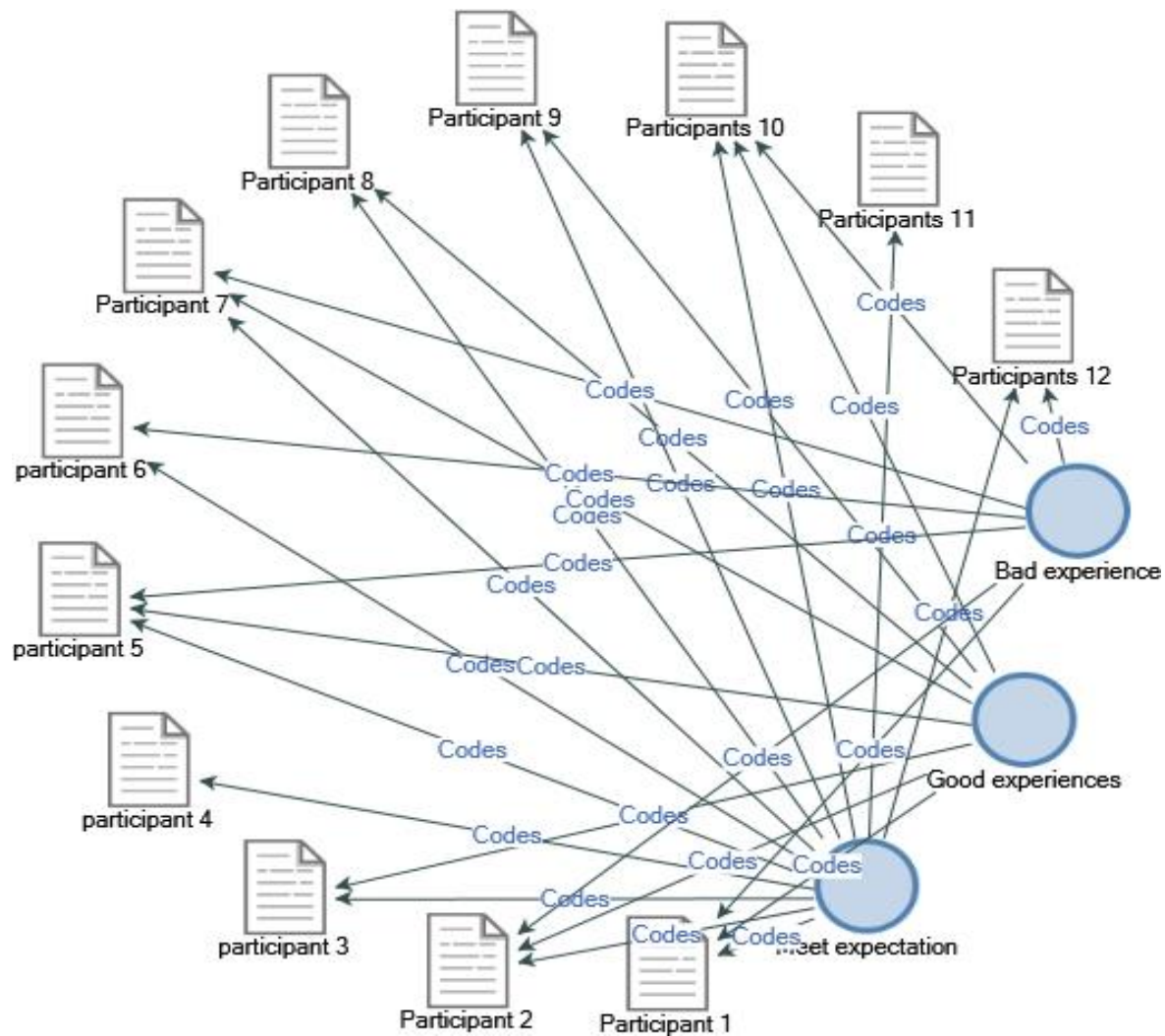
Figure 8.6 showing of health experience on a concept map

With further analysis, it was broken down into more word-specific nodes of about

31 nodes and then recognized 23 nodes namely: Communication, Diagnosis,

Difficult follow-up, Disease arrangement, Easy drugs dosage, Family burden,

financial burden, Follow-yes, Health workers' quality, High-cost medication,

Hurry consultation, Linked to a specialist, Linked to God, Living with condition,

Meet expectation, Other health workers, Personal opinion, Roles of health

workers, Structure and technology, Teamwork, Traditional medicine, Unfamiliar

with a health workers, Waiting time and consultation time. and examples of how some of these node's intercept with the participants are shown in figure 8.7.
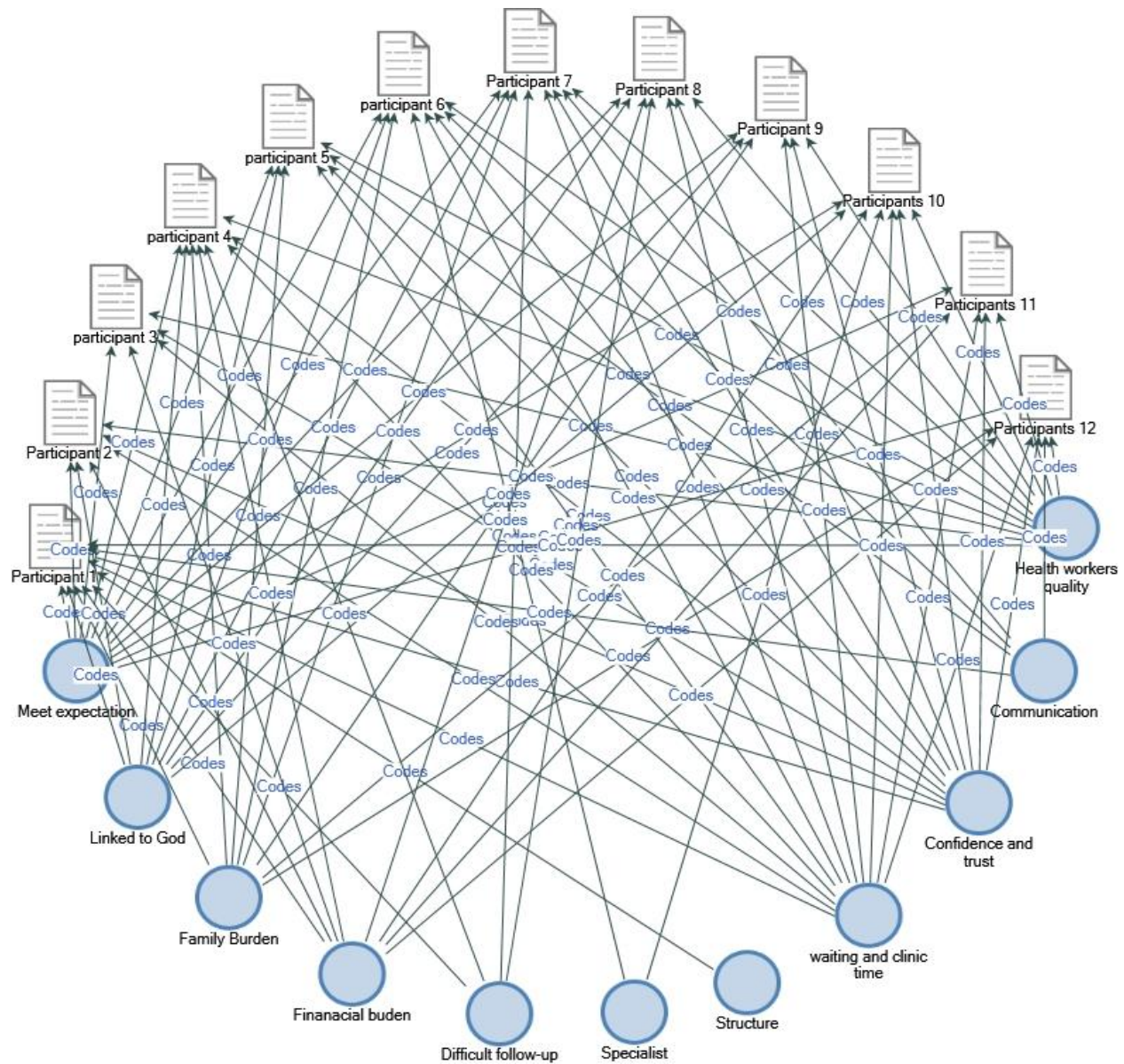
Figure 8.7 shows further analysis of health experiences on concept map

8.3.5 Stage 2 grouping nodes together and transforming nodes into patterns

Ask a guide to identify possible themes, particularly in the early stages of a project, in the NVivo software, the transcripts were reviewed several times, the initially formed nodes were grouped together and the closely related nodes were grouped together into patterns. This was according to the insight into the participant's experience and perspective on their words. After grouping close nodes together, nine patterns were identified as follows and their interaction is depicted on a conceptual framework, see figure 8.8.

1. The nodes on communication with health workers, consultation time, and education on medication prescribed were grouped together.

2. The nodes on teamwork, Health workers' quality, and Personal opinions on healthcare were grouped together.

3. The nodes on the link to specialists, unfamiliar with health workers, roles of health workers were grouped together.

4. The nodes on diagnosis, follow-up, living with the chronic condition, and medical history were grouped together.

5. The nodes on the family burden, financial burden, and high-cost medication were grouped together.

6. The nodes on equipment, structures, and technology were grouped together.

7. The node on patient waiting time was coded alone.

8. The nodes on Faith and belief, traditional medicine, and confidence and trust in healthcare were grouped together.

9. The node on meet expectation was coded alone.
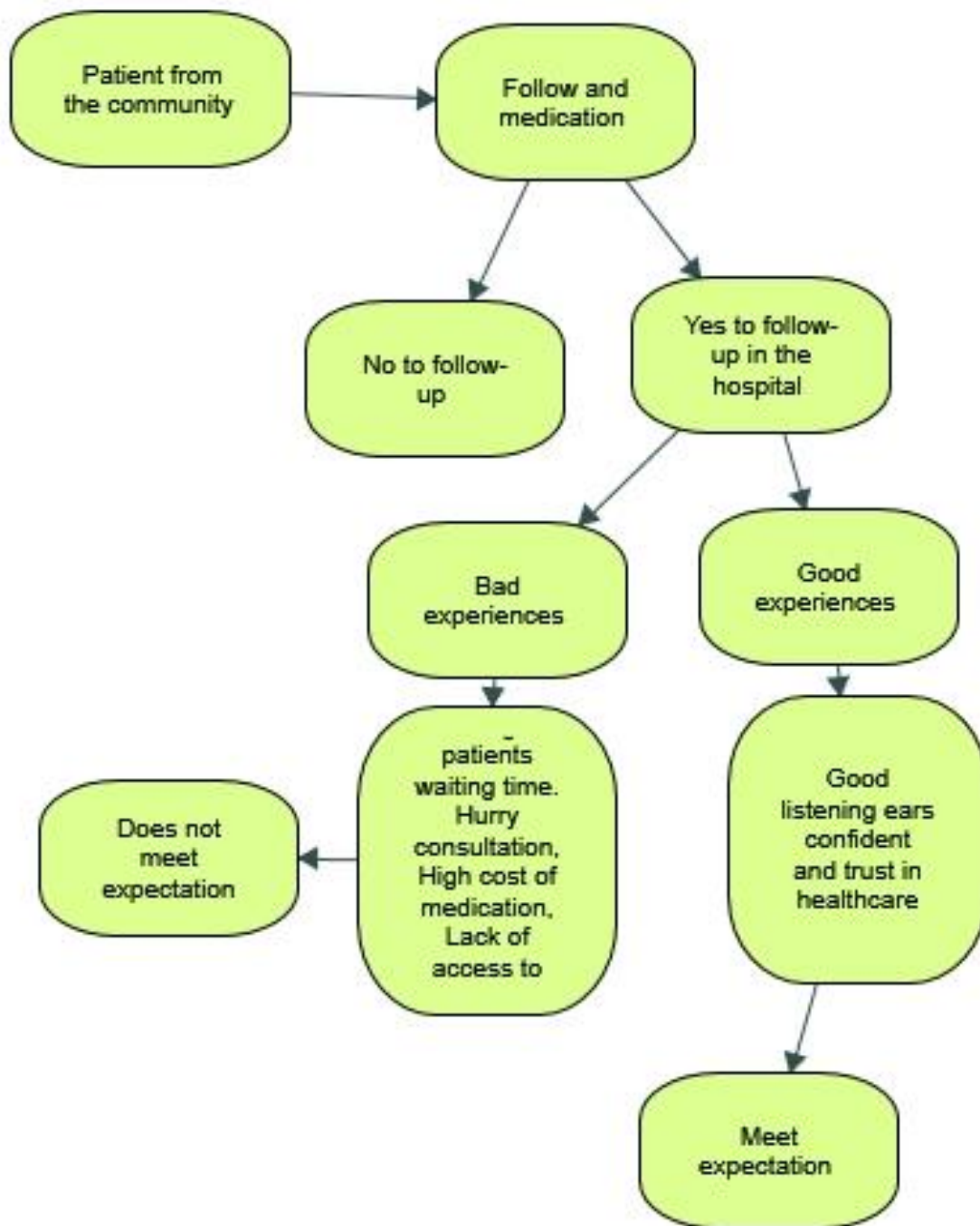
Figure 8.8 conceptual framework of the qualitative analysis

8.3.6 Stage 3 Re-grouping and renaming of nodes (initial themes)

As the analysis developed, the emerging patterns were catalogued, observed, re-evaluated regrouped, and rearranged into themes. Themes are recurrent ideas, thoughts, and feeling throughout the text and parent nodes provides a general overview of the discussion while child nodes or detailed lower order codes enable the distinction to be made both within and between cases (McDonald, S., Daniels and Harris, 2004). For example, see table 8.5. Some themes were further grouped together into broader themes. Each broad theme was then analyzed manually, and some child nodes were identified. The final themes were summarized and renamed to cover the daughter nodes which were named from the quota of the text. See table 8.5.

8.3.7 Stage 4 The final template and writing of the IPA study

The final report is derived from the final template. This stage includes writing out the notes identified in the final template and documenting them one after the other. Each theme was described and supported by comments by the participants and analytic comments from the author.

The final themes were (1) **Patients-health workers interaction, (2) Access to healthcare and knowledge of healthcare professionals, (3) Follow-up and medical history, (4) Healthcare burden, (5) Hospital facility, manpower and equipment, (6) Patient waiting time, (7) Perception of trust and confidence in orthodox medication, and (8) patient satisfaction**. These themes intersected to some degree but taken together provide a comprehensive

overview of the interpretation of the perception of patients' experience with healthcare from the communities in Niger state north central Nigeria. However, the themes were reorganized in line with the research objectives. Any quotes are *"written in italics surrounded by double quotation marks" which* signifies that the wordings are from the participants.

Table 8.5 the initial, grouping, regrouping of nodes and final themes

Initial coding	Grouping of nodes together	Re-grouping and renaming of nodes (initial themes)	Final themes generated
Communication	Communication with health workers	Patient-health workers communication	**Patients-health professional interaction**
Diagnosis	Consultation time	Consultation time	
Difficult follow-up	Education on drugs		
Disease arrangement	Teamwork	Quality of care	**Quality of healthcare**
Easy drugs dosage	Health workers quality		
Family burden	Personal opinions on care		
Financial burden	link to specialist	Access to healthcare professional	**Access to healthcare and knowledge of healthcare professionals**
Follow-yes	Unfamiliar with health workers	Roles and Knowledge of healthcare professionals	
Health workers quality	Roles of health workers		
High-cost medication	Diagnosis	Medical history	**Follow-up and medical history**
Hurry consultation	Follow-up	Follow-up	
Linked to specialist	Living with the chronic condition		
Linked to God	Medical history		

Living with condition	Family burden	Family burden	**Healthcare burden**
Meet expectation	Financial burden	Financial burden	
Other health workers	High-cost medication		
Personal opinion	Equipment	Manpower	**Health facility.**
Roles of health workers	Structures	Equipment and technology	**Manpower and equipment**
Structure and technology	Technology		
Teamwork	Patient waiting time	Patient waiting time	**Patients waiting time**
Traditional medicine	Faith and believe	Confidence and trust in healthcare	**Perception of trust and confidence in orthodox medication**
Unfamiliar with health workers	Traditional medicine	Perception of faith and believe	
	Confidence and trust in healthcare		
Waiting time and consultation time	Meet expectation	Meeting healthcare expectation	**Patients' satisfaction**

8.3.8 Results of qualitative interviews

Sociodemographic characteristics of the participants

Participants were 60 years and above with two or more chronic diseases recruited from the communities in Niger state north central Nigeria. A total of 15 participants were contacted but only 12 consented to participate. Findings from Table 8.6 show that the lowest age of the participants was 60 years, and the highest is 80 years. Most of the participants were between 60 – 70 years and the mean age of the participants is 67.4 years. About 66.3% of the participants have an income of fifteen thousand naira or less. The remaining 25% and 8.3% of the participants have an income level of between 16 to 20,000 and greater than 50,000 naira respectively. More than half of the participants (58.3%) were females and the majority (58.3%) of the participants do not have any form of education. And about two-thirds of the participants were married and own their own businesses (self-employed). 4 participants were selected from each of the geographical zones of the state: Niger south, Niger east, and Niger north respectively. The diagnoses of the participants are reported in table 8.6.

Table 8.6 Sociodemographic characteristics of the participants in qualitative study

Participants	Local (geographical location)	Diagnosis	Age	Gender	Occupational	Educational	Income	Ethnicity	Marital status
1	Minna (Niger east)	Hypertension, diabetes, and Peptic ulcer	80	Male	Retired civil servant	Tertiary	45 k	Gwarri	Married
2	Suleja (Niger east)	Diabetes, Hypertension, and osteoarthritis	60	Female	Own business	No education	<10k	Kanuri	Married
3	Minna (Niger east)	Stroke, diabetes, and hypertension	62	Male	Own business	Tertiary	200k	Eshan	Married
4	Lapai (Niger south)	Stroke and diabetes	68	Male	Own business	Primary	25k	Nupe	Divorced
5	Kontagora (Niger north)	Hypertension and diabetes	71	Female	Own business	No Education	12k	Igbira	Separated
6	Mokwa (Niger south)	Hypertension, diabetes	70	Female	Dependent	Primary	0k	Yoruba	widow
7	Bida (Niger south)	Hypertension and osteoarthritis	65	Female	Dependent	No Education	0k	Nupe	Married
8	Katcha (Niger south)	Hypertension, diabetes, and peptic ulcer	65	Male	Own business	No Education	50k	Nupe	Married
9	Borgu (Niger north)	Diabetes and hypertension	64	Female	Own business	No Education	15k	Fulani	Married
10	Rijau (Niger north)	Peptic ulcer, diabetes, and hypertension	62	Female	Own business	No Education	3k 500H	Hausa	
11	Munya (Niger east)	Hypertension, heart disease, and peptic ulcer	63	Female	Own business	Secondary	10k	Gwarri	Married
12	Wushishi (Niger north)	Diabetes and peptic ulcer	79	Male	Retired messenger	No Education	10 k	Hausa	Married

8.3.8a Perception of patients waiting time

This theme deals with participants' perceptions of patients' waiting time. A lot of references were coded into this node that eventually became a stand-alone broader theme. Most of the participants were dissatisfied with the patient waiting time. A few accepted it as part of the normal process in the healthcare system, the majority saw it as a setback that prevents them from using the healthcare facilities regularly. For example, comments of some participants on waiting time.

... "Regarding patient waiting time, you know because of the population sometimes we used to take longer time waiting before we could see the doctor. Whereas sometimes people are not much and in a very short time you will be called to meet with the doctor"
…

... "Again, on the patient's waiting time sometimes we used to stay longer waiting to meet with the doctor but in some cases, we stay a little to meet him. In my own case even if they're many people in the queue I used to wait patiently to meet with the doctor" …

… "My relationship with my doctor is a good one, the doctor gives me enough time, and listens to me very well in a private manner. Patients sometimes used to wait longer before seeing the doctor in the hospital due to maybe population at that time and sometimes patients don't stay a long time waiting for doctors to start meeting them. In my own experience, I don't wait much, I think the waiting time is okay" …

... "Besides the money issue, each time I go to the hospital myself and other People are suffering in the hospital they don't use to attend to me on time and they also waste time so I will use that opportunity for my exercise" …

… "I am happy each time I go to the hospital, my only problem is that they waste a lot of my time" …

… "When I go to the hospital am expecting the doctors to give me good treatment so that I will be free and enjoy my health. But each time I think of the time that I will wait before seeing a doctor it makes me weak and does not encourage me to go back" …

... "Just like I said before. I used to wait a long time before they see me and sitting without doing anything is not too good" …

... "And the patient waiting time should not be too long like what we are experiencing now" …

... "And we should not be waiting for so long. If we go to the hospital, we are just sitting doing nothing" …

… "Some days we have to wait for the doctor to come from the wards and they wait is not easy because it uses to take time, almost all doctors have to go into the wards before they can attend to them" …

… "Some days we used to stay up to 11 am without the doctors, whenever that happens it means they're having a meeting or seeing another patient been hospitalized" ….

… "I think there is a serious problem in this area, and the hospital leadership can do something about it. The last time I went to the hospital I have to wait about 4hrs before it gets to my turn. I could hear a lot of patients grumbling and we were told that the

doctors have to see the hospitalized patient first before they start with us. Though I feel bad I think it is okay like that because I believe their condition is more serious than mine" …

... "Health care workers should be patient with us and talk to us in a friendly manner, giving us enough time to express ourselves. And they should start the clinic on time so that they will not waste our time" …

... "We wait a long time before we can see the doctor. this sometimes discourages me from going to the hospital" …

... "I understood that Outpatients will wait for doctors on duty to attend to the admitted patients in the wards before attending to them. This is not good, and the government should try and do something about it" …

A lot of references were coded for patient waiting time when the direct question on patient waiting time was asked and for every opportunity, the participants have during the interview they referred to the negative perception of patient waiting time. Participants perceived prolonged waiting time to be caused by long queues as a result of increased patient workload, late commencement of clinics, and in some cases, the same set of doctors who must attend to inpatients before the outpatients. The participant's reactions to prolonged waiting time include using the waiting time to do other things in the hospital like going for physiotherapy and laboratory tests. Others react to prolonged waiting time positively by staying patiently, reasoning with the situation, and waiting for their turn, while others negatively perceived it as idleness

and a waste of wait of their time and a strong reason discouraging them from using the health facilities.

8.3.8b Participants' perception of health worker's interaction

This theme deals with the participant's perception of the interaction with health workers. As it was coded, it gives the participant freedom to narrate their experience when accessing health care in the hospital. From the in-depth interview analysis, the nodes that made up these themes were communication with health workers, health education, and consultation time. This was further categorized into 2 subthemes: (1) patient-health professionals' communication and health education, and (2) perceptions of consultation time.

8.3.8b1 Perception of participants on content of patients-health professional communication

The responses that are connected to these themes generated mixed feelings. While some participants are happy with their communication with the health workers, simply because they were engaged in listening to their complaints or symptoms. For an example a comment made by of the one the participants … "*The doctors usually ask questions about how I am feeling each time I visit the hospital and then he will prescribe certain drugs for me to go and buy. Even the other doctors too that used to meet on different occasions that are the kind of role they usually play regarding my condition*" …

Many of the participants are not satisfied with health education during the consultation, and communication on decision-making link to care which has ultimately affected the

perception of patients-health workers interaction negatively. For example, some comments by participants ... *"But they did not tell me why they change my follow-up pattern" ……* and another … *"They do not explain the drugs to me"* …

... *"By highlighting more about my diabetes diet and the regular taking of prescribed drugs via regular check-ups. I need more education about diabetes and ulcer"* …

Another factor that might negatively hamper communication and general interaction might be language barriers. See comment from one participant.

… *"I don't know their names, because I don't ask their names and even if I want to ask most of them, I don't speak their language. I believe any doctor in the hospital can treat somebody"* …

8.3.8b2 Perception of consultation time

This subtheme discussed the perception of participants on consultation time. The time the multimorbid patient spent with the healthcare professional. A participant showed negative experience indirectly in the form of advice see an example of the comment

… *"A good doctor will stay and ask you questions, and we the patient should control ourselves. A good doctor will examine us thoroughly"* …

However, the perception of consultation was discussed in more detail in the quality of healthcare broad theme.

8.3.8b3 Perception of access to healthcare and knowledge of health workers

This theme has 3 subthemes (1) perception of access to health workers, (2) perception of knowledge of health workers, and (3) perception of roles of health workers. The theme reveals the participant's perception of access to medical doctors and other health workers as well as provides some context to the general research area, this theme casts some light on how familiar the participants with their health care providers are. And what they think the health workers normally do when they went visiting the hospital.

8.3.8c1 perception of knowledge of healthcare worker

This is the subtheme that discussed the perception of participants of the healthcare worker. Surprisingly interesting is that most of the participants are not familiar with the health care personnel that attend to them even among those with regular follow-ups. This was reported when participants were asked who the doctors are involved in treating their medical conditions. Examples of some of the comments made by the participants

... *"There are many doctors that treat me, but I think there are about five of them. I can only recognize them by their faces"* …

…*" I have seen several doctors over the years involved in treating my condition, but I actually don't know them by their names. There are both female and male doctors. Usually not the same doctor. They listened to my complaints"* …

…" Some of the doctors don't like telling us their names. But there is a particular place I sit each time I go to the hospital. I use to stay there and wait for the doctors" …

… "Some doctors come and go, well some have become known faces because of regular appointments. Since some of us are on weekly or monthly appointments to see the doctor. Only that I don't know their name. doctors are doctors any doctor that attends to us" …

... "I don't know. Since no one knows the set of doctors they may bring next. They keep changing my doctors. But I am quite familiar with some of them" …

... "No, I don't know their names. But there are both males and females" …

… "The doctors involved in treating my condition are of different doctors because whenever I come for my check-up, not the doctor I saw on the last check-up appointment I will them see in the next check-up appointment" ……….

……. "They are different doctors that are involved in treating me, of which I do not know their names" …

… "I don't really know them by name, but we play a lot whenever we see them, there is one particular consulting room where they always play with me and they have taken me to be their grandmother. No doctor has ever looked down on me and I am grateful for that" …

From their responses, knowing the health care workers by name is likely to adherence to medication. Another factor that was reported and is linked to lack of participant familiarization with the health workers is language barriers, this might also play a role

in negative experiences associated with patient-health workers interaction. See for example comment from … *"I don't know their names, because I don't ask their names and even if I want to ask most of them, I don't speak their language. I believe any doctor in the hospital can treat somebody"* …

8.3.8c2 Perception of access to specialist care

This subtheme described participants' perceptions of access to specialist care. Some participants perceived that their conditions are special and required the services of a specialist. For example, comments from some participants … *"We need doctors that know more about this diabetes and hypertension as well"* …... and another participant … *"The doctors in the hospital because not all doctors can treat this kind of disease. The physicians are the ones that treat me. And the doctors that assist me in exercise"* … Furthermore, it is implicit that the participant is not satisfied with the experience of the health professional that usually attends to him/her and hence the request for doctors that know more about diabetes and hypertension (specialist).

8.3.8c3 Perception of roles of health workers

This theme, although intertwined with other themes reported the idea roles of healthcare workers. See for example

… *"The doctors should be good listeners; they should not be in a hurry like some do. They should not ignore what we tell them. And we need doctors that Know more about this diabetes and hypertension well"* …

... *"They should have patient and listen to the senior ones and should also listen to us the patients calmly"* …

8.3.8d Perception of quality of healthcare

This theme is a broad theme that reported participants' perceptions of the quality of healthcare available to them. It encompasses participants' understanding of the quality of care, how an ideal health professional should be, personal opinions on healthcare, and perception of teamwork. Many participants perceived quality of care to include healthcare that is been provided by healthcare professionals that show some attributes like good listening character, compassion, patience, tolerance, sympathy, and considerable. Some participants felt relaxed and carried along when you ask them to express themselves without undue interference and sign of hurriedness. Examples of some of the comments made by the participants

… *"The doctor should have good listening, patience, and consideration to patients. These are the good qualities that I will like to see in doctors or other healthcare workers. And they should also have the spirit of teamwork in them"* …

… *"Quality of care as I understand is attending to patients with seriousness and good listening to their complaints. Just as they're doing to me in this hospital is also a quality of care. They often ask me if any problem is there. If there is I tell them and then they prescribe appropriate drugs for me to buy"* …

… *"The quality I rate so high and I think all healthcare professionals should have, is they should have human sympathy and good listening to patients. These are the type of things that doctors or healthcare professionals should be exhibiting in their job"* …

… *"The qualities I want most about healthcare workers are that I want them to listen to our problems and should be patient with us. They should not be in a rush when they are treating us"* …

… "The doctors should be good listeners; they should not be in a hurry like some do. They should not ignore what we tell them. And we need doctors that Know more about this diabetes and hypertension well" …

… "They should have patient and listen to the senior ones and should also listen to us the patients calmly" …

… "My expectation in the hospital is for the doctors and nurses to listen to me and hear my problem" …

… "They should be patient and listen to our problems, they should put in their best, be focused and determined, and be patient with us" …

… "Doctors should give care by paying more attention, time, and hospitality to their patients, good health is good and it will help us in our everyday life" …

… "Every doctor I had come in contact with in the hospital listen to my complaints and they are good too. And I think that quality is ok" …

… "They should be calm and patient and use the knowledge acquired to better people's life. But this generation of doctors and some nurses are not the same as those before them like 30 years ago. Some doctors are friendly while others look irritated when with some patients" …

… *"I don't know what to say again besides what I said earlier on. By being calm with patients, listening to them, laughing with us, and interacting with us, they should not be in a hurry. These are the things I mean earlier"* …

… *"They do listen even if their friends or colleagues came around, they use to stop their conversation and listen to me. After which sometimes they do continue with their discussion"* …

… *"I can say the kind of services I am getting now is qualitative. Because the doctors listen to me and show empathy"* …

… *"The qualities I like with health care professionals which I have seen with the ones that attend to me are good listeners, and friendly"* …

… *"I understand the quality of care by giving the client the best treatment in all means to give a sound health condition, being passionate to the client and be friendly"* …

… *"Human sympathy is the number one quality I think is important in treating my health conditions. Also, good speaking words and tolerance are also important just as I'm seeing now with Doctor Ayu (a Chinese national)"* …

In addition to the conventional perception of individual attributes or character associated with the quality of healthcare expressed by the participants, some participants also perceived quality of healthcare as when a healthcare professional makes an accurate diagnosis, prescribed good drugs, and should always be available at all costs for the patients. Another participant also included in the perception of quality-of-care provision of adequate equipment, money to buy drugs, and adequate patient-health profession interaction time. Examples of some comments from the

participants.

… "Quality of care to me could mean accurate diagnosis and prescription, good listening, and showing sympathy towards patients" …

... "Quality of care in my understanding is diagnosing a patient properly and prescribing accurate drugs and medicines. Also, assisting patients wherever and whenever they're in need of assistance" …

… "They should prescribe the right medication, provide adequate equipment, and a reasonable amount of time, and money to buy drugs" …

… "The doctor should be calm with good listening; he should not be in a hurry like some do. Then there should be someone that will be interpreting our language for the doctors. The doctor should give us go time" …

A few participants perceived quality of care to also include health education such as dietary advice and availability of equipment and drugs in the hospital. Others further perceived the quality of healthcare to include cleanliness of the hospital environment, recommendation of necessary laboratory investigation, and communication of the finding. This was derived out of the fact that occasionally patients are been referred outside the hospital especially private hospitals to do some laboratory investigation and return the result to the hospital which served as a potential source of the additional cost. Examples of some comments made by the participants.

… "The government should provide drugs, machinery, and good hospitals to enable the doctors to treat patients well, the country is very bad and there is no money I want

the government to help us with hospital equipment like beds, machines, drugs, wheelchairs, etc.

The doctors and health care professionals should focus on what they are doing and they should listen to the patient" ….

… "I want the doctors to give us quality care. In terms of quality, I mean the doctor to do the necessary test and explain the result to us. The hospital environment should be clean and the government should buy quality equipment. Because sometimes patients use to go to private hospitals to do the test and bring the result back. The transportation to and from is something" …

… "In my view, quality of care should be when a doctor gives advice like food advice. For example, we should eat healthy food like the garden egg I can eat more than 10 and drink water. We should stop eating red meat and I can cook Eweado soup (local soup) and eat it to stay healthy" …

… "They are trying their possible best since the drugs work and they give advice when necessary" …

Similarly, others perceived the quality of healthcare as dependent on the doctor's ability to carry-out out their role and can only be noteworthy with God's guidance. Others believe for healthcare to be of quality, healthcare professionals must be updated with continuing medical education to update their knowledge in diagnosis and appropriate medication. See the example of some comments.

… "I want the doctors to give us good care. Because the quality of care depends on the doctor. So, God will guide them to deliver good quality service" …

… "They should be updated with diagnoses and drugs in treating my condition, more friendly, human tolerant, and good listeners" …

8.3.8e Perception of medical history and follow-up

This theme comprises 3 subthemes namely the participant's diagnosis, how they are living with the medical condition, follow-up, and medication history.

8.3.8e1 Perception of participant's diagnosis

All the participants have 2 or more chronic diseases and almost all the participants were able to mention their diagnoses. See comments of the participants

… "I am having pains in my leg that made me not to be walking some time ago and I have Diabetes, peptic ulcer, and hypertension. Again, something appeared in my neck which used to cause me pain" …

… "Diabetes, hypertension, as well as having leg pain (osteoarthritis)" …

… "I have stroke, diabetes, and hypertension" …

… "I have Diabetic and Stroke" …

… "I am a Diabetic and hypertensive patient" …

… "Hypertension + Diabetic" …

… "Hypertension and osteoarthritis" …

… "Hypertension, Peptic ulcer, Diabetes" …

… "Diabetes, peptic ulcers, and hypertension" …

… "Diabetics and hypertension" …

……….. "Hypertension, heart problem, and peptic ulcer" ……………

... "Diabetes and peptic ulcer" …

8.3.8e2 Perception of follow-up

The participant's perception of follow-up generated mixed feelings of positive and negative experiences. Some participants acknowledged difficult regular check-ups, and some admitted irregular check-ups. Some of the reasons given by the participants responsible for the difficult follow-up were financial constraints and the long distance of the hospital from their homes. however, some were able to maintain follow through the availability of a family member that could assist them to the hospital, and. Example of comments made by the participants.

…. "For my health conditions, I do go to the hospital for check-ups before. However, things are not easy now" …

… "My treatment and follow-up are not easy" ….

… "I don't go to the hospital continuously as required. I only make it to the hospital if my children have the chance and money at that time to take me to the hospital" …

… "To be honest, I don't want to lie, I don't use to go to the hospital the way it should be, because I don't have money and the hospital is too far from me. I am not strong as before and it is my children that are helping me because I depend on them. If I have money from them, I go" …

… "I go for a follow-up at the hospital where they give me some drugs that got finished, I don't know their names but I enjoy the drugs very well, and coupled with my age things are very hard to remember. I don't have money to buy drugs" …

Of those that admit a regular follow-up, some reported money and distance to be a constraint but they have to put extra effort to make it to the follow-up. Some attached importance to the follow-up and maintained that and could only miss follow-up because of the perception of getting to the hospital after the consultation period. Some perceived that follow-up can give them the opportunity to interact with the healthcare professional, and show them self-done and self-recorded laboratory test results. See some comments by some participants.

… *"Hmm, I used to go to the hospital frequently for a very long time now. Even if I didn't have money with me at certain times I would go to the hospital for check-ups and possibly get a new prescription. The hospital is a bit far from me but even if it involves borrowing money to go. I don't joke with my follow-up. I am not a doctor so I must try and see one time to time"* …

… *"To be honest I was regular on follow-up like I am doing now. At the moment I take follow-up very seriously. Since the beginning of this year, the only time I have missed my follow-up was in February. The reason for missing the follow-up was that I was very late, so I have to wait for another date to go. I can only see the doctor between 9 am and 11.30 am on the days he comes"* …

… *"That is why I tell you I normally go for follow-ups to take my treatments. I have my own machine for testing myself and I will record it and bring it to the hospital for them to check the record will be the same and they will be happy with me, and I also follow their instruction"* …

… *"I use to buy drugs for my treatment as recommended by the doctor and I buy the drugs every month. I used to go to the hospital for my follow. Just like I said earlier, initially after 4 weeks but now after 8 weeks that is after 2 months"* …

… *"Sometimes my doctor appointment uses to be in two (2) months while sometimes just a month, but my last one has been one month and a week. I have not taken local herbs since my condition started, and my children frown at it. They prefer hospital better than local herbs"* …

… *"I have always kept to my appointment and am very happy that both the doctors and the nurses are working really hard"* …

Furthermore, some participants also reported that follow-up provides them the opportunity of getting a medical prescription, updating prescription, avoidance of self-medication, and an opportunity for health education like diabetes diet. Examples of some comments by participants

… *"Since after I was admitted and discharged from the hospital. I have been going to the hospital regularly for check-ups and taking the prescribed medication. And I noticed good changes"* …

… *"I use to go to the hospital for my appointment regularly"* …

… *"I was placed on prescribed hypertensive drugs, of which I am getting better but just like I said some drugs make me dizzy, and I stop using them. Sometimes they will change my drugs"* …

… *"I experienced that I could not take drugs anyhow without a doctor's prescription and even though you followed the prescription of the doctor, you have to go to the hospital for check-ups so that you will be updated with the drugs that improve and better your health condition"* …

… *"I was placed on a diabetes diet and prescribed drugs. Also went to the hospital on the due date of the next appointment"* …

8.3.8e3 Perception of medical history

One of the subthemes in this broad theme is the participant's medical history. As earlier reported, all the participants know and mentioned their diagnoses but this was revealed in this subtheme that the details around the diagnosis were missing. For example, while others were up to date with their medical history, some participants did not know which disease condition was the first to start nor the duration of diagnosis of their medical conditions, or even the preceding factors before diagnosis. See comments by some participants

… *"The diabetes is more than ten years, the ulcer I can't remember the exact duration but the hypertension was diagnosed 2 years ago"* …

… *"So, since the two medical conditions came to my notice almost the same time, I don't know which one started before which. However, about 6 years ago I was told of having osteoarthritis"* …

… *"I have been having this medical condition for more than 2 years. I don't know when they start but all I know is that it is more than 2 years. I first know about diabetes before the B.P"* …

… *"I don't know which one started before which one, all I can remember is I have had this medical condition for like 26 years, even before I retired"* …

… *"I have been living with the two medical conditions for the last 26 years. I don't know which one started before which one, all I can remember is I have had this medical condition for like 26 years, even before I retired"* …

… "Actually, my long-term health conditions began more than ten (10 years ago when there was a time, I was feeling sick in my body and I visited the hospital for consultation where they reveal to me that I have diabetes. Subsequently, I was told that I have peptic ulcers and hypertension. So, in north-shell diabetes is first, followed by peptic ulcer and hypertension. The diabetes is more than ten years, the ulcer I can't remember the exact duration but the hypertension was diagnosed 2 years ago" …

… "Thirteen years ago, I was feeling a severe headache and my chest was also paining me. My leg was also paining me to the extent that I cannot even put my leg on the ground. I was later taken to the hospital and told that I have diabetes and hypertension. So, since the two medical conditions came to my notice almost the same time, I don't know which one started before which. However, about 6 years ago I was told of having osteoarthritis. I can't really remember but all I can say is that it is up to 7 years. It was diabetes that I was first told then later stoke set in"...

Also in this subtheme, the participant's perception of living with this medical condition. Most participants perceived that living with multiple health conditions is not easy for them. And their health and well-being as not been the same following the diagnosis of the conditions. However, they have been improving mainly by adhering to prescribed medications. Others also reported deterioration in general health conditions with the increasing number of the chronic medical condition and coping with the conditions will not have been possible without the assistance of a family member, especially in the area of their day-to-day activities. See some comments by participants

… "You know because of old age; it has been so challenging but we have been improving at some point in time through the intake of medication. And I thank my

children that are living with me, they help me with my daily activities like walking, using the toilet, and other errands. But generally, it is not easy but thank God" …

Another participant … *"Hmm, ever since I was diagnosed with these chronic medical conditions, I have not been myself. I have to live with this new reality. I am looking so dry and suffering. And cannot go about my business as usual. Before this sickness, I used to do business of buying and selling. The little profit I make was enough for me to take care of my family and my day-to-day needs. However, as the disease becomes chronic everything becomes so hard for me"* …

… *"Over the years, I have been taking drugs and managing my health condition of diabetes and hypertension. But when the stroke came it was very challenging for me and it is the most disturbing one of my chronic health conditions. With stroke, I could not do some of my daily activities without help. And it is very challenging because I have to depend on others that have their own schedule"* …

… *"My condition is making me not to have strength, I use to go to the hospital every month, but now my hands and leg are not working fine and I don't have strength am just sitting in one place, my children are the ones taking me out to urinate and to do other activities"* ...

Additionally, other participants believed one way to overcome the struggles of living with multiple disease conditions is to calm down and turn their attention to God. See example of some comments by participants …" *When something happens to you If you take it seriously it will be serious but if you don't take it seriously that is God doing you will live happily as a human being there are times you will think over it. In the situation am in now I thank God and am living happily with my family. I don't allow it*

to disturb me" … and another participant state that … *"It has not been easy but I thank God because my condition is getting better and my children are trying. My children will always remind me to go for follow-up. But sometimes I don't go if my BP is 140 and below, I believe it is normal. I just thank God"* …

Some participants perceived that living with the multiple medical conditions is associated with recurrent symptoms, that make their life difficult. Example of comments made by some participants

… *"Very difficult. To stand after waking up sometimes is very difficult to even sleep and sometimes they have to tie my leg before I can walk. I used to have constant headaches and occasional dizziness. In short since then my life has not been the same"* …

… *"Some days it's difficult to sleep at night with all these conditions just like yesterday ulcer did not allow me to sleep till this morning. Sometimes I can't sit only to lie down"* …

… *"Since it started it has only been chronic like three (3) times now comparing myself to others I'm grateful. Although I have been hospitalized for diabetes three times. By chronic I mean it became serious like an attack"* ...

However, some participants reported that following diagnosis of their medical conditions they have been living with the medical conditions by regular medical check-ups, following health professional recommendations, adherence to prescribed medications, although some participants could no longer sustain the purchase of medication. A few admit to self-adjustment in medication in response to the symptoms. See example of comments made by participants

… *"Ever since I was diagnosed with the health conditions, I follow their rules and regulations, for example, avoiding excess salt in meals, and regularly on prescribed medications"* …

… *"I normally take the drug as prescribed I felt better by taking my drugs but when I noticed dizziness, I reduced the dose of the drugs and I felt much better"* …

… *"By going to the hospital to see a doctor via regular check-ups"* …

… *"I always try to buy the prescribed drugs but with the current high cost of drugs am no longer regular with medication and I cannot be disturbing my people always. I believe they also have their own problems. And because am retired it is not easy again"* ...

Furthermore, a particular participant perceived that his medical conditions got worse following industrial actions (strike) by the healthcare professionals. In his own words he said

… *"About 10 years ago I was feeling unwell and went to a private hospital called Savannah Hospital to check what was wrong with me. Dr. Fidelis at Savannah hospital here in Minna got me tested and confirmed that I have diabetes. The same day he told me that I have hypertension. In my opinion, I think the stroke started after when I had a change of drugs because sometimes, I have been managing my medical condition with certain drugs. Like, when I first got to IBB hospital they changed the whole of the drugs that I was using before. After that change I was not feeling fine in my body then*

I went back to IBB hospital where they gave me another set of new drugs. They now removed two drugs from the new drugs for me to continue using the remaining ones and I was admitted. There comes strike action by the health workers and they said we should all go home and no treatment again because of the industrial action. A day later I got stroke" …

Still part of this subtheme of medical history is the perception of the duration of their medical condition, preceding factors, and when first diagnosed. Some participants could recall their medical history while some could partly remember. Example of participants' response.

… "This year will make it 16 years since I was first diagnosed" …

… "My health condition has been for over 20 years and since then, I have been on medication and I always go for my check-up every 1 month as of then. But now they have increased it to 2 months. I also try to go for my check-up when due" …

… "My medical condition started about 20 years ago when I came to the hospital to greet a relative and suddenly collapse after which I was informed to have hypertension" …

… "I became aware of my medical conditions about 5 months ago when I was not feeling fine, I went to the hospital and they told me that my B.P is high and that I also have peptic ulcer" …

… "I can't really recall how it started; all I do remember is more than 18 years since it started" …

…….. "It has been 10 years and above, it just started, I don't know how it started" …….

8.3.8f Perception of the burden of care

This broad theme is made up of two subthemes namely burden on a family member and financial burden. The two subthemes were generated following continued referencing of the burden of health in the two themes by the participants.

8.3.8f1 Burden on the family member

This theme discussed the burden the participants experience regarding their medical care. Nearly all the participants reported that their hospital bills are been financed by their children, and some reported that their children are also responsible for providing the recommended meals, monitoring their medications, and transporting them to the hospital despite their own challenges. Example of comments from the participants.

… "Whenever my drugs got finished, my son would take the prescription and purchase new ones for me. This my son also used to make sure he buys the type of food that the doctor advised me to be eating and avoids buying the ones prohibited for me to eat. But I must be honest with you it is usually not easy for everybody but I appreciate all that he is doing" …

… *"My treatment and follow-up are not easy. My children are the ones taking me to the hospital for my treatment and I use to do my exercise there"* …

… *"It is God that is providing and my children are also helping me in terms of medication"* …

… *"My children have been the ones taking care of my hospital bills financially. I really thank them"* …

… *"I am not strong as before and it is my children that are helping me because I depend on them. If I have money from them, I go"* …

… *"Though my children have observed that some drugs are not good for me, so when a doctor prescribes it they don't use to buy it"* …

… *"My children buy all the drugs that the doctors ask me to buy, for over 15-20 years now that my health condition started my children have been there for me buying drugs and making sure. But it has not been easy on them"* …

… *"I have not taken local herbs since my condition started, and my children frown at it. They prefer hospital better than local herbs"* …

… *"After each hospital visit, all I need to do is to show the prescription to my children and they will also buy it for me. Not that their rich but they always buy the drugs for me. They contribute money to pay for my drugs without complaint. I really thank them"* …

… "My children are always angry with me if I take local herbs" …

…" As a retired staff, my pension salary is not enough for my medical care, so get financial assistance from my children" …

8.3.8f2 Perception of the financial burden of care

This is the final subtheme in the broad theme of the burden of healthcare. Most participants admit that they try to purchase the prescribed medication after each follow-up. While few participants maintained regular follow-up medication with relative ease. See comments,

… "It has never been a problem since I have means of income, some drugs are cheaper at the hospital than outside. I always buy my drugs within the hospital that way I am sure the drugs are not fake" …

… "Well, financing my medical care has been consistent without any problem and I take care of the bills myself because I am a successful businessman. Like in the primary health care hospital where Dr. Ayu (a Chinese national) used to treat me, I used to pay one thousand naira (N1000) only each time I visit the hospital. I spent N300,000 on two native doctors that I once visited and I used to spend N4000 to N5000 each time I visit the other third native doctor" …

However, this was not always possible for others mainly because of the high cost of medication. And as such, they are not regular on medication or can only maintain that with difficulty or by assistance from a family member. Example of comments from the participants.

… *"I always try to buy the prescribed drugs but with the current high cost of drugs am no longer regular with medication "*…

… *"Each time I go for a check-up, they normally check my B.P and sugar. They use to give me two weeks or sometimes one month or more. Sometimes they give me advice on what to eat and what not to eat and drugs, but just like the way I said earlier, the drugs are expensive and not easy to buy. And to be honest I am not currently regular with medication"* …

… *"Like a day before yesterday, my drugs have all finished and I was not feeling good in my body to the extent that yesterday night I could not sleep well. I have to struggle to get some money to renew my medication"* …

… *"Now that you have asked me directly, let me tell you in detail. Actually, earlier I used to finance my medical care through my pension money. But now, my first son in particular is the one taking care of all finances for the drugs am taking, and thank God he has been consistent in paying the bills"* …

… *"Financing my medical care is a challenging one because in many instances about five drugs in number are prescribed for me but I could not afford to buy them all at the same time. I would buy like three and leave the purchase of the remaining two to a later time"* …

… *"Hmm, there was a time that they prescribe some drugs for me to buy, and the money was not that much. It's about N4000 and up till now, I could not buy those drugs to make use of it"* …

… *"It has not been easy taking care of my medication, No money for drugs and check-up hospital bills. I only buy the ones I can buy and leave the rest"* …

Furthermore, to maintain regular medication, some participants relied on their own small businesses, borrowing from neighbours and their pension earnings. See the example of some comments.

… *"I sell sobo (local drinks) to finance myself or even borrow money from my neighbours before going to the hospital, this will enable my transport and the cost of medication. I will try to pay them back so that I can borrow from them again"* …

… *"The finance of my medical care is poor because I am not a retired government staff collecting pension, and it is not easy to earn money from my own business due to my age and health condition. Please I need financial assistance either from the government or any other individual"* …

… *"As a retired staff, my pension salary is not enough for my medical care, so get financial assistance from my children"* …

8.3.8g Perception of confidence and trust in healthcare

This theme discussed the participant's perception of the confidence and trust they have in health care. Besides the confidence and trust that is the hallmark of this theme, another theme was also generated as a subtheme name perception of belief and faith.

8.3.8g1 Perception of trust and confidence in medical care

All the participants said they had confidence and trust in the healthcare service they received. Some of the reasons given for this by participants were perception of the improvement in their medical condition, getting better with the prescribed medication, and family influence factor, especially by the children on the trust in healthcare. Some participants also demonstrate their confidence and trust in the healthcare service available to them by maintaining regular follow-ups in their hospitals. Others demonstrated their confidence and trust in healthcare by not patronizing traditional medicine although occasionally uses self-prescribed medications from the chemist in-between follow-ups. See some comments by participants

… *"Yes, I have confidence and trust in the medical care I am receiving right from my heart. This is because whenever I take the drugs prescribed to me, I used to see improvements in my health condition. Although doctors are humans and cannot be perfect, I do have confidence in what they're doing to me"* …

… *"Yes, I have confidence and trust in the medical services I received and am grateful to God"* …

… *"Truthfully, I have confidence and trust in the treatment am receiving because am seeing the impact of managing my condition"* …

… *"Yes, I have because ever since I started coming here ending of February 2022 for treatment, I have been seeing significant improvements"* …

… *"Yes, and I thank God for helping me in my treatment at the hospital. I believe in what they are doing and I also have trust in the services but my problem is the expenses"* …

… *"Yes, the doctors are trying their best. And trust them and I have confidence in them"* …

… *"Yes, since I don't know how it works all I can do is pray for them, if I don't have confidence in them what about my children who are educated and are supporting me? But normally I go to traditional if I don't have money to go to the hospital but if my children find out they will be a"* …

… *"Yes. That is why since all these problems started general hospital has been the only place, I go for my treatment"* …

… *"Yes, because everything they have given has been good. And my children also don't want me to miss any appointments and I don't miss them"* …

… *"Yes, I noticed good health conditions. And because of that, I have confidence and trust in the medical care I get from the hospital. And that is why I don't use traditional medicine but chemist only sometimes"* …

… *"Yes, I do because I am feeling much far better and more improvement in my health condition"* …

… *"Yes, I do because if I do not have confidence and trust in the medical care with my long-term health condition, I could have discontinued my check-up at the hospital"* …

8.3.8g2 Perception of faith and belief

This subtheme emerged as a result of participants linking their predicaments to God. Some perceived God to be responsible for their medical condition and recovery. Others believed their recovery depends on God guiding the health care professional. Example of comments made by participants.

… *"Before I usually go to the hospital, my expectations before going to the hospital were good and I believe that it is God that brings ill health and determines recovery"* …

… *"I only buy the ones I can buy and leave the rest. God will look after me"* …

… *"It has not been easy but I thank God because my condition is getting better and my children are trying"* …

… *"Whatever they want to do without God's guidance it will not be possible"* …

… "And I also believe in what God can do" …

… "In the situation am in now I thank God and am living happily with my family. I don't allow it to disturb me" …

… "I thank God and His messenger for everything. After each hospital visit" …

… "And God will continue to guide them" …

… "They should be assisting people when needed and I pray that God will guide and helps them to be successful in their endeavours" …

… "There are trying but they should try more and I pray for God to help them" …

… "What did I know to be able to give advice? I only pray God will help and increase their knowledge" …

… "I seek Allah's intervention for their guidance and support and also seek government intervention in the area of giving us drugs that are free or at a subsidized rate" …

… "I want the doctors to give us good care. Because the quality of care depends on the doctor. So, God will guide them to deliver good quality service" …

… "Normally I don't believe in other things other than going to the general hospital which is better. Going onwards that will be if there is life then. There is no life after death, so I take my health seriously and I thank God everything is fine" …

8.3.8h Participant's perception of meeting healthcare expectations

This is the theme that is directly linked with patient satisfaction. Participants' perception of meeting their healthcare expectations for the time they visit the hospital was asked directly. The perception of meeting participants' expectations with the healthcare they received generated diverse responses. While some reported that their expectation was met, a few expressed neutrality and/ or unmet expectation. The reported reason for meeting the expectations of the participants are perceived good medical care, cross-checking of medication and renewal of prescription, and giving of medical advice continuously. Others perceived they are rightly diagnosed and on the correct medication for their chronic medical conditions and others' healthcare expectations are met by getting routine checks like blood pressure measurement, sugar level tests, and renewal of medications. And others linked their expectation to access to healthcare professionals and post-consultation occurrence to measure expectations. Example of response by participants.

… "Well, I don't have any expectations, my own is just to come to the hospital and get treated. It is the doctors that know their work" …

… "Since is a follow-up. I expect them to check my drugs and give us the right medication and the right advice. They normally do" …

… *"It has always met my expectations in the real sense and am glad for that"* …

… *"Yes, it's meeting my expectations because I used to have good medical care quite above average. And I normally go back home as a happy man"* …

… *"In my belief, I don't have a choice but to go to the hospital, I believed that they'll have to diagnose a person before they prescribe drugs for you and they'll prescribe the one that is meant for your condition. And so far, I have been getting that from the hospital each time I visit"* …

… *"Yes, every drug given to me has helped with my condition and I'm very happy"* …

… *"Yes. Since my condition started, I have taken a lot of drugs and now the doctors are reducing it for me. Before now I use to take (2) two pills/drugs in the morning and evening now I only take one in the morning and evening"* …

… *"My expectation each time I go to the hospital I believe depends on my medical condition. I will usually expect them to check my blood pressure and sugar level and the doctor will now write drugs for me"* …

… *"Yes, very much what I expected and they don't waste much time attending to patients"* …

… *"Nothing as far as I'm concerned. Everything I needed from the doctor I have; be it drugs and advice and they are good"* …

… "Yes, the treatment has met my expectation because you will always see doctors and nurses that will attend to you to treat my health condition. And I feed better after their advice and after taking the prescribed drugs" …

… "Yes. Sometimes if I forget to take my drugs it uses to tell me about my condition. And it used to show immediately that I did not take the pills" …

However, some participants' healthcare expectation was met with a clause like they need to do more, and not happy with the patient's waiting time. See an example of comments made by participants

… "I want them to do more for me because am happy with the treatment and they are trying a lot if I say they are not trying then am not saying the truth" …

… "Yes, my expectation is being met. But am not happy about the way I normally waste time" …

8.3.8i Perception of health facilities, manpower, equipment, and technology

This theme comprises 2 subthemes, (1) the participant's perception of the availability of healthcare professionals, (2) participants' perception of available equipment and technology at their disposal. Participants perceived a shortage of health care professionals, rising chronic medical conditions, inadequate laboratory tests in some health facilities, suboptimal conducive working areas, and long-distance travel to

hospitals. Participants further recommended employment of health workers, improvement in health worker's environments like the consultation offices, buying of equipment that aid some laboratory investigation, and building of more health facilities by the government. See comments by the participants … *"I will like to discuss on availability of doctors, nurses, and other healthcare staff. Due to the population of recent clients with different health problem conditions, the government is supposed to employ more staff in the hospital for better and improve the standard health care condition of the clients. Also, will make all the staff more effective and updated in their various roles in the hospital by giving the best of their ability because they are overloaded with work"* …

… *"And equipment should be readily available for use in any hospital one is going to without having to refer to a bigger hospital at an affordable rate"* …

… *"The doctor's office I think it used to be okay but I don't know how it is now"* …

… *"All I want is if the government can build more hospitals closer to people"* …

… *"I have seen some changes within the hospital like the new structure that this government has built. May God continue to bless them and everyone involved in improving the working conditions"* …

8.4 Synthesis and restructuring of the response to answer the research objective

This phase of the study just like the quantitative phase evaluates the existing healthcare pathway through the Donabedian model, which suggests that the presence of structural quality facilitates process quality, which leads to outcome quality based on client experience and satisfaction. The structural component was assessed by the theme of Perception of Health facilities. Manpower, Equipment, and Technology, the process was assessed by healthcare experiences and this study generated 7 themes; (1) Patients-health workers interaction, (2) Access to healthcare and knowledge of healthcare professionals, (3) Follow-up and medical history, (4) Healthcare burden, (5) Patient waiting time, (6) Perception of trust and (7) confidence in orthodox medication, and the outcome was assessed by patient satisfaction (meet expectation). See figure 8.9.

structure	processes	outcome
•Perception of Health facilities Manpower, Equipment, and Technology	•perception on healthcare experiences as follows • 1 Patients-health workers interaction, •2 Access to healthcare and knowledge of healthcare professionals, • 3 Follow-up and medical history • 4 Healthcare burden • 5 Patient waiting time • 6 Perception of trust and confidence in orthodox Medicine •7 perception of quality of healthcare	•perception of participants meeting care expectation

Figure 8.9 illustrates restructuring of the responses into Donabedian model of care

8.4.1 Structural assessment: Perception of Health facilities Manpower, Equipment, and Technology

From the participant's perception, shortage of health care professionals, rising chronic medical conditions, leading to increase workload, inadequate laboratory tests in some health facilities, and sub-optimal working environment are responsible poor for healthcare. Moreover, few participants reported long-distance travel to hospitals affects them from keeping regular follow-ups. Participants further recommended the recruitment of more health workers, improvement in health professionals' working environments like the consultation offices, buying of equipment that aid some laboratory investigation, and building of more health facilities by the government.

8.4.2a Processes assessment 1: Patients-health workers interaction

This theme is connected to process assessment. The majority of the participants reported dissatisfaction with health education during the consultation, and communication on decision-making link to care which has ultimately affected the perception of patients-health workers interaction negatively. Although they have multiple medical conditions and are on numerous drugs but could not differentiate specific drugs for the particular ailment because the health workers do not convey that message. Another source of dissatisfaction among the participants is the consultation time, the majority of the participants perceived the time between them and the health professionals to be too small. The alternative factor that might also negatively hamper communication and general interaction reported was language barriers.

8.4.2b Processes assessment 2: Access to healthcare and knowledge of healthcare professionals

This theme is linked to the process assessment by reporting the participant's perception of access to medical doctors and other health workers, and how familiar are the participants with their health care providers and their roles. Surprisingly, even the participants that are regular on follow-up are not familiar with the health care personnel that attend to them. And from their responses, knowledge of health care workers will improve interaction and adherence to medication. Another factor that was reported and is linked to lack of participant familiarization with the health workers is language barriers, this might also play a role in negative experiences associated with patient-health workers interaction.

Although many of the participants reported good access to general practitioners, some participants are not satisfied with the experience of health professional that usually attends to them and perceived that their conditions are special and required the services of a specialist. And hence requested the government to employ more specialists.

8.4.2c Processes assessment 3: Follow-up and medical history

The participants are multimorbid and all were able to mention their diagnosis. However, their reaction to medical follow-ups has reported a combination of encouraging and negative reactions. While some participants reported regular but difficult medical follow-ups, others admitted to irregular follow-ups. Some of the reasons given by the participants responsible for the difficult follow-up were financial constraints and the long distance of the hospital from their homes. However, some were able to maintain follow through with the availability of a family member that will

assist and take them to the hospital.

Although money and long distance were identified as constraints to regular follow-up by some participants, they still maintained regular follow-up except for other reasons beyond their control. They perceived that regular medical follow-up would give them the opportunity to maintain steady interaction with the health professional and review their personal records like personal sugar checks. Furthermore,   some participants also reported that follow-up provides them the chance of getting a health education, medical prescriptions, and update prescriptions, thereby avoiding self-medication.

As earlier reported, all the participants know and mentioned their diagnoses but the details around the diagnosis were missing. For example, while others were up to date with their medical history, some participants do not know which disease condition was the first to start nor the duration of diagnosis of their medical conditions, or even the preceding factors before diagnosis.

Most participants perceived that living with multiple health conditions has been difficult for their health and well-being following the diagnosis of the conditions. However, they have been sustained mainly by adhering to prescribed medications. Others also reported deterioration in general health conditions with the increasing number of chronic medical conditions and coping with the conditions will not have been possible without the assistance of a family member, especially in the area of their day-to-day activities.

Participants reported different coping mechanisms to overcome living with multiple disease conditions. Some participants perceived that living with multiple medical conditions is associated with recurrent symptoms, that make their life difficult. While

others reported that following the diagnosis of their medical conditions they have been living with the medical conditions through regular medical check-ups, following health professional recommendations, and adhering to prescribed medications. Although some participants could no longer sustain the purchase of medication, few admit to self-adjustment in medication in response to the symptoms in between follow-ups. Some participants believed one way to overcome the struggles of living with multiple disease conditions is to calm down and turn their attention to spirituality. Furthermore, a particular participant perceived that his medical conditions got worse following industrial actions by the healthcare professionals. In general, only a few participants could recall their medical histories like as disease condition precedent, duration of diagnosis, and the rest.

8.4.2d Processes assessment 4: Healthcare burden

This theme discussed the burden the participants experience regarding their medical care. Nearly all the participants reported that living with multiple medical conditions is a burden either in the form of financially or on family members. Participants reported that their hospital bills are often beyond their reach and have depended on their children to finance them. Similarly, some reported that their children are not only responsible for providing the recommended meals, monitoring their medications, and transporting them to and from the hospital despite their own challenges but also assist them with activities of daily living like bathing, walking, and rest. Although nearly all participants reported that they try to purchase the prescribed medication after each follow-up, only a few participants maintained regular follow-up medication with relative ease. However, this was not always possible for many participants mainly because of the high cost of medication. And as such, they are not regular on medication or can

only maintain that with difficulty mainly by relying on their own not-so-good small business, borrowing from neighbours, pension earnings, or assistance from a family member.

8.4.2e Processes assessment 5: Patients waiting

This discussed the time patients waited before being consulted by health professionals. This is one area of process assessment that generated a lot of references from the participants. Virtually all the participants were dissatisfied with the patient waiting time. While few accepted it as part of the normal process in the healthcare system, the majority see it as a setback that prevents them from using the healthcare facilities regularly. Participants perceived prolonged waiting time to be caused by long queues as a result of increased patient workload, late commencement of clinics, and in some cases, the same set of doctors who have to attend to inpatients before the outpatients. The participant's reactions to prolonged waiting time include using the waiting time to do other things in the hospital like going for physiotherapy and going laboratory tests. Others react to prolonged waiting time positively by staying patiently, reasoning with the situation, and waiting for their turn, while others negatively perceived it as idleness and a waste of wait of time and a strong reason discouraging them from using the health facilities.

8.4.2f Processes assessment 6: Perception of trust and confidence in orthodox Medicine

All the participants said they had confidence and trust in the healthcare service they received. Some of the reasons given for this by participants were perceived

improvement in their medical conditions, especially following prescribed medication. Some participants reported that the confidence and trust they had for the available healthcare were influenced by their family, especially by their children. Some participants also demonstrate their confidence and trust in the healthcare service available to them by maintaining regular follow-ups in their hospitals. Others demonstrated their confidence and trust in healthcare by not patronizing traditional medicine although occasionally uses self-prescribed medications from the chemist in-between follow-ups. The majority had confidence and trust in the available healthcare, however, some perceived God to be responsible for their medical condition and recovery. Others believed their recovery depends on God guiding the health care professional.

8.4.2g Processes assessment 7: Perception of quality of healthcare

This theme is classified as part of the process assessment of the Donabedian model of care. It reported participants' perceptions of the quality of healthcare available to them. It encompasses participants' understanding of the quality of care, how an ideal health professional should be, personal opinions on healthcare, and perception of teamwork.

Many participants perceived quality of care to include healthcare that is been provided by healthcare professionals that show some attributes like good listening, compassion, patience, tolerance, sympathy, and consideration Some participants felt relaxed and carried along when you ask them to express themselves without undue interference and sign of hurriedness. In addition to the conventional perception of individual attributes or character associated with the quality of healthcare expressed by the participants, some participants also perceived quality of healthcare as when a

healthcare professional makes an accurate diagnosis, prescribed good drugs, and makes themselves accessible at all times. However, some participants perceived quality-of-care to the availability of equipment, and monetary government support to purchase medications money.

A few participants perceived quality of care to also include health education such as dietary advice and availability of equipment and drugs in the hospital. Others further perceived the quality of healthcare to include cleanliness of the hospital environment, recommendation of necessary laboratory investigation, and communication of the lab test findings. This was derived out of the fact that occasionally patients are been referred outside the hospital especially private hospitals to do some laboratory investigation and return the result to the hospital which served as a potential source of the additional cost. Similarly, others perceived the quality of healthcare as dependent on the doctor's ability to carry-out out their role and can only be noteworthy with God's guidance. Others believe for healthcare to be of quality, healthcare professionals must be updated with continuing medical education to update their knowledge in diagnosis and appropriate medication.

8.4.3 Participant's perception of meeting healthcare expectations

This is the theme that is directly linked to patient satisfaction and represents the outcome process of the Donabedian model of care in this study. Participants' perception of meeting their healthcare expectations for the time they visit the hospital was asked directly. The perception of meeting participants' expectations with the healthcare they received generated diverse responses. While most reported that their

expectation was met, few expressed neutrality and unmet expectation. The participants' expectations were mainly assessed by their regular follow-up experiences. Those that were satisfied reported the reasons for meeting their expectations as perceived good medical care provided with full attention, cross-checking of medications and renewal of prescription, and giving of medical advice continuously by the health professionals. Similarly, others perceived they are rightly diagnosed and on the correct medication for their chronic medical conditions, and others' healthcare expectations are met by getting routine checks like blood pressure measurement, sugar level tests, and renewal of medications. And others linked their source of satisfaction to be able to get access to healthcare professionals and good patient- health worker interaction time. However, some participants' healthcare expectation was met with a clause like they need to do more, and not happy with the patient's waiting time.

8.5 Triangulation of the quantitative and qualitative findings

The integration of the qualitative data into the quantitative data has contributed to the amplification and illumination of the findings of this research to answer the fifth research objective. The fifth research objective was to recommend an effective hospital care delivery model for older people in Nigeria with multimorbidity. The research question was to investigate how effective is the healthcare pathway setting for multimorbid patients in Niger state Nigeria quantitatively. And qualitatively to explore in detailed the care pathway setting available for multimorbid patients in Niger state Nigeria? Additionally, the advantage of the in-depth interview uncovered some areas of the quantitative data. In this phase of study, key findings of participants'

perceptions and expectations of their healthcare were disclosed qualitatively using participants from the communities of the study area.

The inclusion criteria for both phases were participants aged 60 years and above with 2 or more chronic diseases and consented to take part in the studies, while participants with cognitive disorder or difficulty in communication were excluded from the studies. In the quantitative phase, hypertension and diabetes were the most prevalent medical condition among the participants, this is similar to the findings in the qualitative phase where hypertension and diabetes are very common among the participants. Although the sampling methods differ for the two phases, the mean ages of the sampled participants were similar, 67.3 years and 67.4 years for the quantitative and qualitative phases correspondingly.

The Donabedian model of care was used to structure and reorganized the quantitative data and qualitative responses respectively. See figure 8.10.

The phase of
the research:
Design

Phase - 1:
Quantitative

Phase - 2 :
Qualitative

Data collection
:
Study setting

Survey:
hospitals

In-depth
interview:
Communities

Illustration of stages of Donabedian model of care

Stage – 1
Structure

- Basic amenities,
- Basic equipment,
- Standard precautions
  for infection prevention,
- Diagnostic capacity,
  and
- Essential medicines

Perception of Health
facilities Manpower,
Equipment, and
Technology

Stage – 2
Process

.18-item PSQ
Patient's
satisfaction with
healthcare
pathway.

Emerging themes :
- Patient-health workers'
  interaction,
- Access to healthcare and
  knowledge of healthcare
  professionals,
- Follow-up and medical
  history
- Healthcare burden
- Patient waiting time
- Perception of trust and
  confidence in orthodox
  Medicine
- perception of quality of
  healthcare

Phase – 3
Outcome

The overall
patients
satisfaction
variable

Perceptions of
participants'
Meeting healthcare
expectations

Figure 8.10 illustration of triangulation of quantitative and qualitative phase using Donabedian model of

care

8.5.1 Stage 1: The structure

Emerging findings from the communities were compared and discussed side by side

with findings from the hospitals. Stage one of the Donabedian model of care of the

quantitative phase and qualitative were assessed facility readiness (basic amenities,

basic equipment, standard precaution for infection control, diagnostic capacity, and

essential medicines) and emerging perception of health facilities, manpower,

equipment, and technology respectively. See figure 8.9. For the quantitative phase, no statistically significant association was observed between the total score of basic Equipment, total score of infection control, total score of diagnostic capacity, total score of essential drugs), and general facility readiness. Whereas in the qualitative phase, the participants were broadly discussed on only one theme.

The findings from the qualitative phase explains some of the structure-related factors of the source of dissatisfaction by participants and also showed that these findings are partly similar in the two phases. In the quantitative phase, the level of preparation in any of the domains as well as the general facility readiness does not have any relationship with how the patients are satisfied with their medical care experiences. This is similar to the qualitative phase where only one broad theme emerges from the in-depth interview as opposed to the process stage which had 7 broad themes. This lack of correlation in the quantitative phase and the generation of only one theme linked to the structure stage is connected to the fact that most the participants and understanding of issues related to the structural component of healthcare might be limited and their current healthcare received experience maybe beyond their current expectations.

The quantitative phase reported a shortage of diagnostic capacity which partially coincides with participants' perception of lack of adequate laboratory investigations in some facilities. And the scarcity of diagnostic tests limits the ability of healthcare providers to provide quality care. Furthermore, manpower was not assessed in the quantitative phase but in the qualitative phase participants perceived and showed their dissatisfaction with the shortage of manpower, long-distance travel, and lack of basic equipment in some facilities, but they were somehow impressed with the cleanliness of some health facilities.

8.5.2 Stage 2: the processes

The process stage as emerge as the most important stage in both phases of the study. Using the principal component analysis in the quantitative phase, the process assessment of the healthcare pathway using 18- PSQ was reduced to 4 dimensions namely, (1) accessing the quality of care, (2) patient-physician relationship and timing, (3) financial burden of medical care, and (4) confidence and trust in medical care are the principal factors in the study that influence multimorbid patient experience satisfaction.

The 7 factors that loaded for access to quality healthcare are:

- I think my doctor's office has everything needed to provide complete medical care

- Doctors are good at explaining the reason for medical tests

- The medical care I have been receiving is just about perfect

- When I go for medical care, they are careful to check everything when treating and examining me

- My doctors treat me in a very friendly and courteous manner

- I have easy access to the medical specialists I need

- I can get medical care whenever I need it.

(2) for patient-physician relationship and timing, 6 factors:

- Doctors act too business-like and impersonal toward me

- Those who provide my medical care sometimes hurry too much when they treat me

- When I need emergency care, the waiting times are usually too long

- I am dissatisfied with some things about the medical care I receive

- Doctors usually spend plenty of time with me

- I find it hard to get an appointment for medical care right away.

(3) For the financial burden of medical care 2 factors:

- My medical bills are often beyond my reach and

- I feel confident that I can get the medical care I need without being set back financially

(4) confidence and trust in medical care are 3 factors

- I have some doubts about the ability of the doctors who treat me

- Doctors sometimes ignore what I tell them

- Sometimes doctors make me wonder if their diagnosis is correct

These variables were somewhat similar to the emerging 7 themes in the qualitative phase that fit and have been classified into the process stage; (1) Patients-health workers interaction, (2) Access to healthcare and knowledge of healthcare professionals, (3) Follow-up and medical history, (4) Healthcare burden, (5) Patient waiting time, (6) Perception of trust and confidence in orthodox Medicine and (7) perception of quality of healthcare.

8.5.2a Stage 2a: For patient-physician relationship and timing

In the quantitative phase, 87% agreed that patient waiting times are usually too long, this is also the observed perception in the qualitative phase where almost all the

participants were dissatisfied with the patient's waiting time. A few participants stated that they now see it as a norm in the healthcare process whereas the majority saw it as a setback that prevents them from maintaining regular follow-ups. In the qualitative phase, the participants perceived prolonged waiting time to be caused by long queues, increase patient workload, late commencement of clinics, and seeing the inpatients before the outpatients. While some participants negatively perceived patient waiting time as idleness and a waste of time and a strong reason discouraging them from using the health facilities, others see it as an opportunity to complete other tasks like physiotherapy, laboratory test, and the rest.

Regarding patient-health professionals' interactions, in the quantitative phase, 70.2% agreed that Doctors act too business-like and impersonal toward me, and 73% of participants agreed that those who provide their medical care sometimes hurry too much when they treat me. In the qualitative phase, some reported hurry consultations, little patient-health professional interaction time, and the majority of the participants perceived quality of care to include healthcare that is been provided by healthcare professionals that show key attributes like good listening, compassion, patience, tolerance, sympathy, and considerable and acknowledged were missing in some healthcare available to them. Overall, the quantitative phase reported that 40.6% of the 73 participants agreed Doctors usually spend plenty of time with me.

8.5.2b Stage 2b: The financial burden of medical care

In the quantitative phase, 77.3% agreed that their medical bills are beyond their reach and only 21.9% of the participants felt confident that they can get the medical care they need without being set back financially. Similarly, in the qualitative phase, nearly

all the participants reported that living with multiple medical conditions is a burden either in the form of financially and on family members. Although nearly all participants reported that they try to purchase the prescribed medication after each follow-up, only a few participants maintained regular follow-up medication with relative ease. For many participants this was not possible mainly because of the high cost of medication. And as such, they are not regular on medication or can only maintain that with difficulty mainly by relying on their own not-so-good small business, borrowing from neighbours, pension earnings, or assistance from a family member. Participants reported that their hospital bills are often beyond their means and reported that they depended on their children to finance them. Participants reported that their children are also accountable for the suggested meals, purchasing their medications, transportation to hospitals and above all helping with activities of daily living despite their own challenges.

8.5.2c Stage 2c: Access to quality healthcare

In the quantitative phase, only 29.4% agreed they have easy access to a specialist at needed and only 30.1% agreed that they get medical care whenever they need it. This was not the case in the qualitative phase where the majority of the participants reported good access to general practitioners, however, some participants perceived limited access to specialists as a result of that argued that the government should employ more. Although the wider research has shown that knowledge of healthcare workers improves interaction and adherence to medication, participants were unfamiliar with their healthcare personnel even among those that are regular on medications.

In the quantitative phase, more than half of the participants disagree that doctors are good at explaining the results of medical tests, another 30.2% of the participants

reported that the medical care they received was perfect and only 32.5% reported that doctors are careful to check everything when they go for medical check-ups.

These findings are similar to qualitative findings where most participants repeatedly referred to inadequate patient-health profession interaction time.

8.5.2d Stage 2d: Confidence and trust in medical care

In the quantitative phase, 29.9% reported that they have some doubts about the ability of the doctors who treat them and 15.6% reported that sometimes doctors make them wonder if their diagnosis was correct. This is similar to findings from the qualitative phase, where most of the participants said they had confidence and trust in the healthcare service they received. Participants gain confidence and trust in the available healthcare because of the perceived improvement in their medical conditions, especially after taking prescribed medications. Some participants reported that the confidence and trust they had for the available healthcare were influenced by their family, especially by their children. Some participants also linked their confidence and trust in the healthcare service available to them by maintaining regular follow-ups in their hospitals. Others demonstrated their confidence and trust in healthcare by reporting not patronizing traditional medicine although occasionally using self-prescribed medications from the chemist in-between follow-ups. However, some perceived God to be responsible for their medical condition and recovery and others believed their recovery depends on God guiding the health care professional. Hence, this might explain the 29.9% and 15.6% of participants in the quantitative study that lack confidence in healthcare by having some doubts about the ability of the doctors who treat them and sometimes feeling that doctors make them wonder if their diagnosis was correct respectively. Furthermore, 43.4% of the participants reported

that Doctors sometimes ignore what I tell them this could be another reason for lack of confidence and trust in the healthcare system.

8.5.3 Stage 3: The outcome

In the quantitative phase, 72.2% agreed that they are dissatisfied with some things about the medical care they received. It was reported that participants with a higher number of morbidities strongly disagree with the medical bills, access to medical specialists, and doctor-patient time. Participants with a higher number of morbidities also strongly agreed that those that provide their medical care sometime hurry too much when they treat them. These hypotheses were not tested in the qualitative, but the healthcare expectation was used to measure overall patient satisfaction. In contrast to the findings in the quantitative phase, qualitative study reported patient satisfaction in majority of the participants and the source of satisfactions were perceived good medical care provided with full attention, regular cross-checking of medications and renewal of prescription, and giving of medical advice continuously by the health professionals. Other reported that their satisfaction was linked to be able to get access to healthcare professionals and good patient- health worker interaction time, perceived they are rightly diagnosed and on the correct medication for their chronic medical conditions, and others' healthcare expectations are met by getting routine checks like blood pressure measurement, sugar level tests, and renewal of medications. However, some participants' healthcare expectation was met with a clause like they need to do more, and not happy with the patient's waiting time, medical bills are too much, doctors are not patients.

8.6 Discussion

The study reported patient experiences as they navigate the healthcare pathway using the Donabedian model of healthcare. The model is flexible and can be used in diverse health care setting to modify structures, processes, and outcomes within a healthcare delivery unit as postulated by Donabedian (Donabedian, 2002; Donabedian, 1992; Donabedian, 1980). Even though the model has been developed a long time ago and been used in a diverse clinical setting, it still remains unclear why its application in multimorbidity healthcare is scarce. This study is the first of its kind to evaluate the quality of healthcare for multimorbid patients received in Nigeria using the Donabedian model of care. While the general service readiness index for this study was 83.3%, it was not uniform across the board, with health facilities having moderate to high scores (GH in Bida 72%, GH kontagora 97%, GH Minna 97%, and GH suleja has 87%). It's only the domain of basic equipment that all the tracer items are complete 100% in the four Health facilities. This study found a shortage of diagnostic capacity which partially coincides with findings from studies by Shawon *et al.,* (2018). Such scarcity of diagnostic tests limits the ability of healthcare providers to provide quality healthcare. he facility readiness domains as well as the general service readiness index have no statistically significant association between them. The level of preparation in any of the domains as well as the general facility readiness does not have any relationship with how the patients are satisfied with their medical care experiences. Only one theme emerges in the qualitative phase that is related to structure and as such the structure appears not to play a significant role in the determinant of overall patient satisfaction or meeting of patient's expectation. This is not unconnected to the fact that most of the participants don't have any form of education and comprehension of structurally related source satisfaction might be beyond their expectation. Another line of thought

on this is despite the low literacy level among participants, the study clearly demonstrated poor accommodation of patient's needs, evidenced by the level of dissatisfaction reported with variables of patient's experience.

Qualitatively, shortage of manpower, long distance to travel, lack of basic equipment and cleanliness of facilities are identified structurally related challenges to healthcare delivery. This is consistent with finding from another study (Oleribe *et al.,* 2019). Furthermore, this is happening at the time the health system in Nigeria is suffering from not only limited institutional capacity but also undergoing the worse brain drain in the history of the country. This is also trendy in the face of daily societal vices like insecurity, banditry, kidnapping, political instability, corruption, an unstable economy, and worsen health indexes.

The process evaluation was by patient experience with healthcare services. Using a principal component analysis, the process items were reduced into 4 main components (1) accessing quality of care (2) patients physician relationship and timing (3) financial care of the medical care (4) confidence and trust in the medical care. Easy-to-navigate pathways to care and continuity are critical to how patients perceive the quality of care and choose whether to continue treatment or not, they further stated that long-term compliance is only likely if the patients involved consider their care to be of good quality (Balabanova *et al.,* 2009). Collectively with the qualitative phase patient waiting time which normally occurs because of long patients' queue, late commencement of clinics, seeing of inpatients before the outpatients. Similar reasons were also observed to be the cause of prolonged waiting from other studies (Thacher, 2005; Abdulsalam and Khan, 2020). Also, of important process evaluation is the poor patient-doctor interaction, also found to be consistent with (Abdulsalam and Khan, 2020). The greatest factor that influences the overall satisfaction with the quality of services was the variable those who provide my medical care sometimes are in a hurry

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(quality issues) in the unadjusted model, but I can get medical care whenever I need it (access issue) in the adjusted model. However, they are reflections of the quality of care and access to medical care and complementary they represent access to quality care. Moreover, paying attention to these main factors will be very essential in designing effective quality health care for multimorbid patients. Lastly, what patients think of their experience with the healthcare system must matter to the healthcare planners, managers, and policymakers because this experience, as much as the technical quality of care, will determine how people use the system and how they benefit from it (Lateef, 2011).

8.7 Strength and Limitation

The strength of this study is grounded in the context that it used Donabedian model, which has been tested in many studies on patient satisfaction revealing significant results. The model is a direct target for quality improvement. However, only selected tracer items were used, and it only focused on the patient's perception of their satisfaction with their experiences as they navigate the healthcare facility.

Chapter 9

9.1 Overall discussion and Conclusion

The overall aim of this study was to understand the multimorbidity of Older Adults in Niger State North Central Nigeria. By answering 5 research objectives. The research is best comprehended as 5 independents but linked studies.

Multimorbidity is an important issue of public health and the healthcare system in present day society. Without a paradigm shift, this problem will likely persist because the scarcity of studies in our review demonstrates an obvious mismatch between the need for work versus work accomplished in this area in Nigeria and this will continue to hinder policy development in that area.

The prevalence of multimorbidity in this study was found to be 51.9%, this value is within prevalence values reported across studies in Nigeria which is 27% to 74%. These values are more likely to get worse because the number of older people in less developed countries is projected to increase by 140 percent as compared to an increase of 51 percent in more developed countries. With the increase in older people population, the prevalence of multimorbidity is likely to be on the rise. The high prevalence is a major concern for LMICs like Nigeria mainly because HICs have had decades to adjust to this change in the age structure. The prevalence is in congruent with other studies that reported 55% to 98% globally. Hypertension and diabetes are the most frequent cluster in this study, this is consistent with findings in other part of Nigeria but was not the case in other part of the globe where arthritis and or digestive systems were more common. Multimorbidity estimates and patterns are heavily dependent on the measurement methods, however, there is evidence that a substantial proportion of the older adults population are affected globally.

Adverse childhood experiences were found to be associated with multimorbidity which was marginally attenuated by the age, marital status, income and occupation. Individuals having 4 or more ACEs were more likely to engage in smoking and alcohol consumption than individuals with less than 4 ACEs, or non-non-ACEs at all. A positive moderate association was found between age and multimorbidity and a negative association between education and income with multimorbidity. A statistically significant difference was observed between those who smoke and those who don't smoke with multimorbidity. And multimorbidity was also found higher among frequent excessive drinkers. No association was observed between physical exercise, eating habits, and multimorbidity. This in tandem with the global findings, that reported ACE to have increased odds of high-risk behaviour such as alcohol consumption, tobacco smoking, risky sexual behaviour, and subsequent adverse health outcome like diabetes, stroke, depression, premature death, compared to individuals who have never reported any ACE.

Biological, lifestyle, social, cultural, economic and environmental determinant of health leads to an accumulation of chronic stress, leading to physiological changes (ageing and compromised immune system) across life course which led to single and then multimorbidity. And by intervening and influencing positively these determinants we can delay or reduce multimorbidity. The compelling argument is that this study took a step further from the previous studies of predicting multimorbidity from ACEs by comparing the relationship between ACEs and multimorbidity among older adults in Niger state Nigeria.

The integration of the qualitative data with the quantitative data has contributed to the amplification and illumination of the findings of this research. Key factor determining the quality of healthcare accessed multimorbid patients in Niger state. The process

component of the Donabedian model of care was found to dominant determinant of the quality of healthcare among multimorbid patients in Niger state. The factors that this study found are strongly liked to improving access to quality of care, improving patient-physician relationships and timing, reducing the financial burden of medical care. These link to a need to build confidence and trust in medical care. Therefore, they should be incorporated into designing the healthcare model for multimorbid patients in Nigeria.

9.2 General Research limitation

The result of this study has the potential to illuminate some of the weaknesses of the current multimorbidity care among the elderly, however the sample selection is limited to 4 hospitals and some communities in Niger state, thus the findings cannot be generalized to the country. Nevertheless, the study can be replicated elsewhere in the country to increase its impact.

9.3 Research implications

- This is first study to systematically review the literature on prevalence, patterns, and determinants of multimorbidity in Nigeria. The scarcity of studies in the review demonstrates an obvious mismatch between the need for work versus work accomplished in this area in Nigeria and this will continue to hinder policy development in multimorbidity.

- The two commonest ACEs found in this study to be linked to multimorbidity are emotional neglect and community violence. While community' violence is a well-recognized public health issue, researchers in Nigeria are not paying

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attention to emotional neglect. Emotional neglect is the parent's failure to meet their child's emotional needs during the early years, which is not always obvious as the majority don't even know the sign to look for. In essence, the children's emotional needs for affection, support, attention, or competence are ignored.

- The key pathway for how ACEs can lead multimorbidity is through people with ACEs engaging in risky behavior. The two key one identified in this study were smoking and drinking of alcohol.

- Having 4 or more adverse childhood experiences are noticeably high in the study area and the high ACEs prevalence found in the study does not conform with the low prevalence of health behavioral risk factor in the study.

- The chronic disease dyads pattern identified in this study is similar to many previous studies e.g., hypertension and diabetes, however other undiscovered possible pattern variations might be linked to the diagnosis ability available of the selected health facilities. Therefore, multimorbidity studies should be mindful of the diagnostic ability of the study area before evaluating the types and pattern multimorbidity.

- In low-resource and low literacy setting like the study area, the processes phase of Donabedian model of care supersedes the structure in determining the satisfaction with the quality of service received and as such should be of top priority in this part of the world. It should be incorporated into designing the healthcare model for multimorbid patients in Nigeria.

- This report is   to informs policymakers and related stakeholders, in order to ensure equitable access and improve the health outcomes of multimorbid patients and the overall population's health.

9.4 Future research in the area

- The study contributed to the existing literature and raises a number of opportunities for future research. Firstly, to break the vicious cycle of ACEs, BHRF, and multimorbidity, there is a need for further study to access the knowledge, attitude, and practice of elderly Nigerians with respect to emotional neglect which was found to be the most prevalence ACE in the study.

- More research will be needed to explore in detail the causal relationship between ACEs and BHRF longitudinally.

- There is a need to study other casual relationships of BHRF outside ACEs in the Nigerian context.

- Although an association of modifiable and non- modifiable risk factors with multimorbidity was noted in relation to other studies, future research should investigate comparing the health outcome (multimorbidity) in the last 5 years of employment that normally correspond to the peak of earning and compare to the point of retirement. The goal is to observe whether there is additional morbidity at the point or immediately after retirement.

References

Abdulazeez, Z.U., Grema, B.A., Michael, G.C. and Abdulkadir, Z. (2021) 'Multimorbidity and Functional Status of the Elderly in a Primary Care Setting of Northern Nigeria: A Cross-Sectional Study.', *West African journal of medicine,* 38(7), pp. 620-628.

Abdulraheem, I.S., Amodu, M., Salami, S.K., Adegboye, A., Fatiregun, A. and Tobin-West, C. (2017) 'Prevalence and Pattern of Multi-Morbidity among Elderly People in Rural Nigeria: Implications for Health Care System, Research and Medical Education', *Journal of Community Medicine & Health Care,* 2(3), pp. 1019.

Abdulsalam, A. and Khan, H.T. (2020) 'Hospital services for ill patients in the middle-belt geopolitical zone, Nigeria: Patient's waiting time and level of satisfaction', *Illness, Crisis & Loss,* 28(1), pp. 18-37.

Abebe, F., Schneider, M., Asrat, B. and Ambaw, F. (2020a) 'Multimorbidity of chronic non-communicable diseases in low-and middle-income countries: A scoping review', *Journal of comorbidity,* 10, pp. 2235042X20961919.

Abebe, F., Schneider, M., Asrat, B. and Ambaw, F. (2020b) 'Multimorbidity of chronic non-communicable diseases in low-and middle-income countries: a scoping review', *Journal of comorbidity,* 10, pp. 2235042X20961919.

Adams, O. and Abubakar, I. (2019) 'Morbidity Patterns of Elderly Patients Attending the General Out-Patient Clinic of a Tertiary Centre in North-Central – Nigeria', *Texila*

International Journal of Public Health, , pp. 1-7. doi: 10.21522/TIJPH.2013.08.03.Art034.

Afshar, S., Roderick, P.J., Kowal, P., Dimitrov, B.D. and Hill, A.G. (2015a) 'Multimorbidity and the inequalities of global ageing: a cross-sectional study of 28 countries using the World Health Surveys', *BMC public health,* 15(1), pp. 1-10.

Afshar, S., Roderick, P.J., Kowal, P., Dimitrov, B.D. and Hill, A.G. (2015b) 'Multimorbidity and the inequalities of global ageing: a cross-sectional study of 28 countries using the World Health Surveys', *BMC public health,* 15(1), pp. 1-10.

Agborsangaya, C.B., Lau, D., Lahtinen, M., Cooke, T. and Johnson, J.A. (2012) 'Multimorbidity prevalence and patterns across socioeconomic determinants: a cross-sectional survey', *BMC public health,* 12(1), pp. 1-8.

Åkesson, A., Weismayer, C., Newby, P.K. and Wolk, A. (2007) 'Combined effect of low-risk dietary and lifestyle behaviors in primary prevention of myocardial infarction in women', *Archives of Internal Medicine,* 167(19), pp. 2122-2127.

Alaba, O. and Chola, L. (2013) 'The social determinants of multimorbidity in South Africa', *International journal for equity in health,* 12(1), pp. 1-10.

Alimohammadian, M., Majidi, A., Yaseri, M., Ahmadi, B., Islami, F., Derakhshan, M., Delavari, A., Amani, M., Feyz-Sani, A. and Poustchi, H. (2017) 'Multimorbidity as an important issue among women: results of a gender difference investigation in a large population-based cross-sectional study in West Asia', *BMJ open,* 7(5), pp. e013548.

Allen, D., Gillen, E. and Rixson, L., 2009. Systematic review of the effectiveness of integrated care pathways: what works, for whom, in which circumstances?. International Journal of Evidence-Based Healthcare, 7(2), pp.61-74.

Amuna, P. and Zotor, F.B. (2008) 'Epidemiological and nutrition transition in developing countries: impact on human health and development: The epidemiological and nutrition transition in developing countries: evolving trends and their impact in public health and human development', *Proceedings of the Nutrition Society,* 67(1), pp. 82-90.

Anda, R.F., Butchart, A., Felitti, V.J. and Brown, D.W. (2010) 'Building a framework for global surveillance of the public health implications of adverse childhood experiences', *American Journal of Preventive Medicine,* 39(1), pp. 93-98.

Anda, R.F., Felitti, V.J., Bremner, J.D., Walker, J.D., Whitfield, C.H., Perry, B.D., Dube, S.R. and Giles, W.H. (2006) 'The enduring effects of abuse and related adverse experiences in childhood', *European archives of psychiatry and clinical neuroscience,* 256(3), pp. 174-186.

Ataguba, J.E., Akazili, J. and McIntyre, D. (2011) 'Socioeconomic-related health inequality in South Africa: evidence from General Household Surveys', *International journal for equity in health,* 10(1), pp. 1-10.

Autenrieth, C.S., Kirchberger, I., Heier, M., Zimmermann, A., Peters, A., Döring, A. and Thorand, B. (2013) 'Physical activity is inversely associated with multimorbidity in elderly men: results from the KORA-Age Augsburg Study', *Preventive medicine,* 57(1), pp. 17-19.

Balabanova, D., McKee, M., Koroleva, N., Chikovani, I., Goguadze, K., Kobaladze, T., Adeyi, O. and Robles, S. (2009) 'Navigating the health system: diabetes care in Georgia', *Health policy and planning,* 24(1), pp. 46-54.

Banjare, P. and Pradhan, J. (2014) 'Socio-economic inequalities in the prevalence of multi-morbidity among the rural elderly in Bargarh District of Odisha (India)', *PloS one,* 9(6), pp. e97832.

Barnes, P.J. (2015) 'Mechanisms of development of multimorbidity in the elderly', *European Respiratory Journal,* 45(3), pp. 790-806.

Barnett, K., Mercer, S., Norbury, M., Watt, G., Wyke, S. and Guthrie, B. (2012) 'The epidemiology of multimorbidity in a large cross-sectional dataset: implications for health care, research and medical education', *Lancet,* 380(9836), pp. 37-43.

Barnett, K., Mercer, S.W., Norbury, M., Watt, G., Wyke, S. and Guthrie, B. (2012a) 'Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study', *The Lancet,* 380(9836), pp. 37-43.

Barnett, K., Mercer, S.W., Norbury, M., Watt, G., Wyke, S. and Guthrie, B. (2012b) 'Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study', *The Lancet,* 380(9836), pp. 37-43.

Barnett, K., Mercer, S.W., Norbury, M., Watt, G., Wyke, S. and Guthrie, B. (2012c) 'Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study', *The Lancet,* 380(9836), pp. 37-43.

Barnett, K., Mercer, S.W., Norbury, M., Watt, G., Wyke, S. and Guthrie, B. (2012d) 'Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study', *The Lancet,* 380(9836), pp. 37-43.

Basto-Abreu, A., Barrientos-Gutierrez, T., Wade, A.N., Oliveira de Melo, D., Semeão de Souza, A.S., Nunes, B.P., Perianayagam, A., Tian, M., Yan, L.L. and Ghosh, A. (2022) 'Multimorbidity matters in low and middle-income countries', *Journal of multimorbidity and comorbidity,* 12, pp. 26335565221106074.

Bellis, M.A., Hughes, K., Leckenby, N., Hardcastle, K.A., Perkins, C. and Lowey, H. (2015) 'Measuring mortality and the burden of adult disease associated with adverse childhood experiences in England: a national survey', *Journal of public health,* 37(3), pp. 445-454.

Bellis, M.A., Hughes, K., Leckenby, N., Jones, L., Baban, A., Kachaeva, M., Povilaitis, R., Pudule, I., Qirjako, G. and Ulukol, B. (2014a) 'Adverse childhood experiences and associations with health-harming behaviours in young adults: surveys in eight eastern European countries', *Bulletin of the World Health Organization,* 92, pp. 641-655.

Bellis, M.A., Hughes, K., Leckenby, N., Jones, L., Baban, A., Kachaeva, M., Povilaitis, R., Pudule, I., Qirjako, G. and Ulukol, B. (2014b) 'Adverse childhood experiences and associations with health-harming behaviours in young adults: surveys in eight eastern European countries', *Bulletin of the World Health Organization,* 92, pp. 641-655.

BeLue, R., Okoror, T.A., Iwelunmor, J., Taylor, K.D., Degboe, A.N., Agyemang, C. and Ogedegbe, G. (2009) 'An overview of cardiovascular risk factor burden in sub-

Saharan African countries: a socio-cultural perspective', *Globalization and health,* 5(1), pp. 1-12.

Bertaux, D. (1981) 'From the life-history approach to the transformation of sociological practice', *Biography and society: The life history approach in the social sciences,* , pp. 29-45.

Bethell, C.D., Davis, M.B., Gombojav, N., Stumbo, S. and Powers, K. (2017) 'Issue brief: Adverse childhood experiences among US children', *Child and Adolescent Health Measurement Initiative, Johns Hopkins Bloomberg School of Public Health,* .

Bhutta, Z.A., Ahmed, T., Black, R.E., Cousens, S., Dewey, K., Giugliani, E., Haider, B.A., Kirkwood, B., Morris, S.S. and Sachdev, H. (2008) 'What works? Interventions for maternal and child undernutrition and survival', *The lancet,* 371(9610), pp. 417-440.

Boeckxstaens, P., Peersman, W., Goubin, G., Ghali, S., De Maeseneer, J., Brusselle, G. and De Sutter, A. (2014) 'A practice-based analysis of combinations of diseases in patients aged 65 or older in primary care', *BMC family practice,* 15(1), pp. 1-6.

Boullier, M. and Blair, M. (2018) 'Adverse childhood experiences', *Paediatrics and Child Health,* 28(3), pp. 132-137.

Boutayeb, A. (2006) 'The double burden of communicable and non-communicable diseases in developing countries', *Transactions of the Royal Society of Tropical Medicine and Hygiene,* 100(3), pp. 191-199.

Boutayeb, A., Boutayeb, S. and Boutayeb, W. (2013) 'Multi-morbidity of non communicable diseases and equity in WHO Eastern Mediterranean countries', *International journal for equity in health,* 12(1), pp. 1-13.

Boyd, C.M., Boult, C., Shadmi, E., Leff, B., Brager, R., Dunbar, L., Wolff, J.L. and Wegener, S. (2007) 'Guided care for multimorbid older adults: kathleen Walsh Piercy, PhD, editor', *The Gerontologist,* 47(5), pp. 697-704.

Boyd, C.M., Darer, J., Boult, C., Fried, L.P., Boult, L. and Wu, A.W. (2005) 'Clinical practice guidelines and quality of care for older patients with multiple comorbid diseases: implications for pay for performance', *Jama,* 294(6), pp. 716-724.

Boyd, C.M. and Fortin, M. (2010a) 'Future of multimorbidity research: how should understanding of multimorbidity inform health system design?', *Public health reviews,* 32(2), pp. 451-474.

Boyd, C.M. and Fortin, M. (2010b) 'Future of multimorbidity research: how should understanding of multimorbidity inform health system design?', *Public health reviews,* 32(2), pp. 451-474.

Brayne, C. (2007) 'The elephant in the room—healthy brains in later life, epidemiology and public health', *Nature Reviews Neuroscience,* 8(3), pp. 233-239.

Britt, H.C., Harrison, C.M., Miller, G.C. and Knox, S.A. (2008) 'Prevalence and patterns of multimorbidity in Australia', *Medical Journal of Australia,* 189(2), pp. 72-77.

Campbell, J.A., Walker, R.J. and Egede, L.E. (2016a) 'Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood', *American Journal of Preventive Medicine,* 50(3), pp. 344-352.

Campbell, J.A., Walker, R.J. and Egede, L.E. (2016b) 'Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood', *American Journal of Preventive Medicine,* 50(3), pp. 344-352.

Carter, B.D., Abnet, C.C., Feskanich, D., Freedman, N.D., Hartge, P., Lewis, C.E., Ockene, J.K., Prentice, R.L., Speizer, F.E. and Thun, M.J. (2015) 'Smoking and mortality—beyond established causes', *New England journal of medicine,* 372(7), pp. 631-640.

Cassell, C. and Symon, G. (2004) *Essential guide to qualitative methods in organizational research.* sage.

Castleberry, A., 2014. NVivo 10 [software program]. American Journal of Pharmaceutical Education, 78(1), pp.1-3.

Catala-Lopez, F., Alonso-Arroyo, A., Page, M.J., Hutton, B., Tabares-Seisdedos, R. and Aleixandre-Benavent, R. (2018) 'Mapping of global scientific research in comorbidity and multimorbidity: a cross-sectional analysis', *PloS one,* 13(1), pp. e0189091.

Cavalcanti, G., Doring, M., Portella, M.R., Bortoluzzi, E.C., Mascarelo, A. and Dellani, M.P. (2017) 'Multimorbidity associated with polypharmacy and negative self-perception of health', *Revista Brasileira de Geriatria e Gerontologia,* 20(5), pp. 634-642.

Centers for Disease Control and Prevention (2017) 'No title', *Chronic disease overview,* .

Centre for Policy on Ageing, 2014. The effectiveness of care pathways in health and social care.

Charlson, M.E., Pompei, P., Ales, K.L. and MacKenzie, C.R. (1987) 'A new method of classifying prognostic comorbidity in longitudinal studies: development and validation', *Journal of chronic diseases,* 40(5), pp. 373-383.

Chetley, A. (1990) 'A healthy business?: world health and the pharmaceutical industry', .

Cimarras-Otal, C., Calderón-Larrañaga, A., Poblador-Plou, B., González-Rubio, F., Gimeno-Feliu, L.A., Arjol-Serrano, J.L. and Prados-Torres, A. (2014) 'Association between physical activity, multimorbidity, self-rated health and functional limitation in the Spanish population', *BMC public health,* 14(1), pp. 1-10.

Cockerham, W.C. (2021) *The social causes of health and disease.* John Wiley & Sons.

Cockerham, W.C., Hamby, B.W. and Oates, G.R. (2017) 'The social determinants of chronic disease', *American Journal of Preventive Medicine,* 52(1), pp. S5-S12.

Cooperberg, M.R., Birkmeyer, J.D. and Litwin, M.S. (2009) *Defining high quality health care.* Elsevier, pp. 411.

Cornell, J.E., Pugh, J.A., Williams Jr, J.W., Kazis, L., Lee, A.F., Parchman, M.L., Zeber, J., Pederson, T., Montgomery, K.A. and Noël, P.H. (2008) 'Multimorbidity

clusters: clustering binary data from multimorbidity clusters: clustering binary data from a large administrative medical database', *Applied multivariate research,* 12(3), pp. 163-182.

Creswell, J.W. and Poth, C.N. (2016) *Qualitative inquiry and research design: Choosing among five approaches.* Sage publications.

Crimmins, E.M. and Beltrán-Sánchez, H. (2011) 'Mortality and morbidity trends: is there compression of morbidity?', *The Journals of Gerontology: Series B,* 66(1), pp. 75-86.

Cucinotta, D. and Vanelli, M. (2020) 'WHO declares COVID-19 a pandemic', *Acta Bio Medica: Atenei Parmensis,* 91(1), pp. 157.

Cuenca-García, M., Ortega, F.B., Ruiz, J.R., González-Gross, M., Labayen, I., Jago, R., Martínez-Gómez, D., Dallongeville, J., Bel-Serrat, S. and Marcos, A. (2014) 'Combined influence of healthy diet and active lifestyle on cardiovascular disease risk factors in adolescents', *Scandinavian Journal of Medicine & Science in Sports,* 24(3), pp. 553-562.

Czibula, G., Marian, Z. and Czibula, I.G. (2014) 'Software defect prediction using relational association rule mining', *Information Sciences,* 264, pp. 260-278.

Dalal, S., Beunza, J.J., Volmink, J., Adebamowo, C., Bajunirwe, F., Njelekela, M., Mozaffarian, D., Fawzi, W., Willett, W. and Adami, H. (2011) 'Non-communicable diseases in sub-Saharan Africa: what we know now', *International journal of epidemiology,* 40(4), pp. 885-901.

Danese, A. and McEwen, B.S. (2012a) 'Adverse childhood experiences, allostasis, allostatic load, and age-related disease', *Physiology & Behavior,* 106(1), pp. 29-39.

Danese, A. and McEwen, B.S. (2012b) 'Adverse childhood experiences, allostasis, allostatic load, and age-related disease', *Physiology & Behavior,* 106(1), pp. 29-39.

DePaolo, C.A. and Wilkinson, K. (2014) 'Get your head into the clouds: Using word clouds for analyzing qualitative assessment data', *TechTrends,* 58(3), pp. 38-44.

Dobriansky, P.J., Suzman, R.M. and Hodes, R.J. (2007) 'Why population aging matters: A global perspective', *National Institute on Aging, National Institutes of Health, US Department of Health and Human Services, US Department of State,* .

Donabedian, A. (2002) *An introduction to quality assurance in health care.* Oxford University Press.

Donabedian, A. (1992) 'The role of outcomes in quality assessment and assurance', *QRB-Quality Review Bulletin,* 18(11), pp. 356-360.

Donabedian, A. (1980) 'Exploratings in quality assessment and monitoring definition of quality and approaches to its assessment', *Ann Arbor,* .

Dong, M., Anda, R.F., Felitti, V.J., Dube, S.R., Williamson, D.F., Thompson, T.J., Loo, C.M. and Giles, W.H. (2004) 'The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction', *Child abuse & neglect,* 28(7), pp. 771-784.

Downey, J.C., Gudmunson, C.G., Pang, Y.C. and Lee, K. (2017) 'Adverse childhood experiences affect health risk behaviors and chronic health of Iowans', *Journal of Family Violence,* 32(6), pp. 557-564.

Du Toit, A. (2020) 'Outbreak of a novel coronavirus', *Nature Reviews Microbiology,* 18(3), pp. 123.

Duerden, M., Avery, T. and Payne, R. (2013) 'Polypharmacy and medicines optimisation', *Making it safe and sound.London: The King's Fund, .*

Ermogenous, C., Green, C., Jackson, T., Ferguson, M. and Lord, J.M. (2020) 'Treating age-related multimorbidity: the drug discovery challenge', *Drug discovery today,* 25(8), pp. 1403-1415.

Fabbri, E., Zoli, M., Gonzalez-Freire, M., Salive, M.E., Studenski, S.A. and Ferrucci, L. (2015a) 'Aging and multimorbidity: new tasks, priorities, and frontiers for integrated gerontological and clinical research', *Journal of the American Medical Directors Association,* 16(8), pp. 640-647.

Fabbri, E., Zoli, M., Gonzalez-Freire, M., Salive, M.E., Studenski, S.A. and Ferrucci, L. (2015b) 'Aging and multimorbidity: new tasks, priorities, and frontiers for integrated gerontological and clinical research', *Journal of the American Medical Directors Association,* 16(8), pp. 640-647.

Faronbi, J., Ajadi, A. and Gobbens, R. (2020a) 'Associations of chronic illnesses and socio-demographic factors with health-related quality of life of older adults in Nigeria: A cross-sectional study', *Ghana medical journal,* 54(3), pp. 164-172.

Faronbi, J., Ajadi, A. and Gobbens, R. (2020b) 'Associations of chronic illnesses and socio-demographic factors with health-related quality of life of older adults in Nigeria: A cross-sectional study', *Ghana medical journal,* 54(3), pp. 164-172.

Felitti, V.J. (2009) 'Adverse childhood experiences and adult health', *Academic pediatrics,* 9(3), pp. 131.

Felitti, V.J. and Anda, R.F. (2010) 'The relationship of adverse childhood experiences to adult medical disease, psychiatric disorders, and sexual behavior: Implications for healthcare', *The impact of early life trauma on health and disease: The hidden epidemic,* , pp. 77-87.

Felitti, V.J., Anda, R.F., Nordenberg, D., Williamson, D.F., Spitz, A.M., Edwards, V. and Marks, J.S. (1998) 'Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study', *American Journal of Preventive Medicine,* 14(4), pp. 245-258.

Ferrer, A., Formiga, F., Sanz, H., Almeda, J. and Padrós, G. (2017) 'Multimorbidity as specific disease combinations, an important predictor factor for mortality in octogenarians: the Octabaix study', *Clinical interventions in aging,* 12, pp. 223.

Flaherty, E.G., Thompson, R., Litrownik, A.J., Zolotor, A.J., Dubowitz, H., Runyan, D.K., English, D.J. and Everson, M.D. (2009) 'Adverse childhood exposures and reported child health at age 12', *Academic pediatrics,* 9(3), pp. 150-156.

Flatley Brennan, P. (2006) 'Work system design for patient safety: The SEIPS model', *Quality & Safety in Health Care,* 15.

Forman, J.P., Stampfer, M.J. and Curhan, G.C. (2009) 'Diet and lifestyle risk factors associated with incident hypertension in women', *Jama,* 302(4), pp. 401-411.

Formiga, F., Ferrer, A., Sanz, H., Marengoni, A., Alburquerque, J., Pujol, R. and Octabaix Study Members (2013) 'Patterns of comorbidity and multimorbidity in the oldest old: the Octabaix study', *European journal of internal medicine,* 24(1), pp. 40-44.

Fortin, M., Bravo, G., Hudon, C., Vanasse, A. and Lapointe, L. (2005a) 'Prevalence of multimorbidity among adults seen in family practice', *The Annals of Family Medicine,* 3(3), pp. 223-228.

Fortin, M., Bravo, G., Hudon, C., Vanasse, A. and Lapointe, L. (2005b) 'Prevalence of multimorbidity among adults seen in family practice', *The Annals of Family Medicine,* 3(3), pp. 223-228.

Fortin, M., Haggerty, J., Almirall, J., Bouhali, T., Sasseville, M. and Lemieux, M. (2014a) 'Lifestyle factors and multimorbidity: a cross sectional study', *BMC public health,* 14(1), pp. 1-8.

Fortin, M., Haggerty, J., Almirall, J., Bouhali, T., Sasseville, M. and Lemieux, M. (2014b) 'Lifestyle factors and multimorbidity: a cross sectional study', *BMC public health,* 14(1), pp. 1-8.

Fortin, M., Haggerty, J., Almirall, J., Bouhali, T., Sasseville, M. and Lemieux, M. (2014c) 'Lifestyle factors and multimorbidity: a cross sectional study', *BMC public health,* 14(1), pp. 1-8.

Fortin, M., Hudon, C., Haggerty, J., van den Akker, M. and Almirall, J. (2010) 'Prevalence estimates of multimorbidity: a comparative study of two sources', *BMC health services research,* 10(1), pp. 1-6.

Fortin, M., Stewart, M., Poitras, M., Almirall, J. and Maddocks, H. (2012) 'A systematic review of prevalence studies on multimorbidity: toward a more uniform methodology', *The Annals of Family Medicine,* 10(2), pp. 142-151.

France, E.F., Wyke, S., Gunn, J.M., Mair, F.S., McLean, G. and Mercer, S.W. (2012) 'Multimorbidity in primary care: a systematic review of prospective cohort studies', *British Journal of General Practice,* 62(597), pp. e297-e307.

Frenk, J. and Gómez-Dantés, O. (2017) 'False dichotomies in global health: the need for integrative thinking', *The Lancet,* 389(10069), pp. 667-670.

Fried, L.P., Bandeen-Roche, K., Kasper, J.D. and Guralnik, J.M. (1999) 'Association of comorbidity with disability in older women: the Women's Health and Aging Study', *Journal of clinical epidemiology,* 52(1), pp. 27-37.

Frodl, T., Janowitz, D., Schmaal, L., Tozzi, L., Dobrowolny, H., Stein, D.J., Veltman, D.J., Wittfeld, K., van Erp, T.G. and Jahanshad, N. (2017) 'Childhood adversity impacts on brain subcortical structures relevant to depression', *Journal of psychiatric research,* 86, pp. 58-65.

Frølich, A., Ghith, N., Schiøtz, M., Jacobsen, R. and Stockmarr, A. (2019) 'Multimorbidity, healthcare utilization and socioeconomic status: a register-based study in Denmark', *PloS one,* 14(8), pp. e0214183.

Garin, N., Koyanagi, A., Chatterji, S., Tyrovolas, S., Olaya, B., Leonardi, M., Lara, E., Koskinen, S., Tobiasz-Adamczyk, B. and Ayuso-Mateos, J.L. (2016) 'Global multimorbidity patterns: a cross-sectional, population-based, multi-country study', *Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences,* 71(2), pp. 205-214.

Garrido, E.F., Weiler, L.M. and Taussig, H.N. (2018) 'Adverse childhood experiences and health-risk behaviors in vulnerable early adolescents', *The Journal of early adolescence,* 38(5), pp. 661-680.

Gilbert, L.K., Breiding, M.J., Merrick, M.T., Thompson, W.W., Ford, D.C., Dhingra, S.S. and Parks, S.E. (2015) 'Childhood adversity and adult chronic disease: an update from ten states and the District of Columbia, 2010', *American Journal of Preventive Medicine,* 48(3), pp. 345-349.

Glynn, L.G., Valderas, J.M., Healy, P., Burke, E., Newell, J., Gillespie, P. and Murphy, A.W. (2011) 'The prevalence of multimorbidity in primary care and its effect on health care utilization and cost', *Family practice,* 28(5), pp. 516-523.

Golder, S., Loke, Y.K. and Bland, M. (2011) 'Meta-analyses of adverse effects data derived from randomised controlled trials as compared to observational studies: methodological overview', *PLoS medicine,* 8(5), pp. e1001026.

Greenfield, E.A. (2010) 'Child abuse as a life-course social determinant of adult health', *Maturitas,* 66(1), pp. 51-55.

Gruenewald, T.L., Karlamangla, A.S., Hu, P., Stein-Merkin, S., Crandall, C., Koretz, B. and Seeman, T.E. (2012) 'History of socioeconomic disadvantage and allostatic load in later life', *Social science & medicine,* 74(1), pp. 75-83.

Gupta, K.S. and Rokade, V. (2016) 'Importance of quality in health care sector: A review', *Journal of Health Management,* 18(1), pp. 84-94.

Ha, N.T., Le, N.H., Khanal, V. and Moorin, R. (2015) 'Multimorbidity and its social determinants among older people in southern provinces, Vietnam', *International journal for equity in health,* 14(1), pp. 1-7.

Hajat, C. and Stein, E. (2018) 'The global burden of multiple chronic conditions: a narrative review', *Preventive medicine reports,* 12, pp. 284-293.

Harrison, C., Britt, H., Miller, G. and Henderson, J. (2014) 'Examining different measures of multimorbidity, using a large prospective cross-sectional study in Australian general practice', *BMJ open,* 4(7).

Head, A., Fleming, K., Kypridemos, C., Pearson-Stuttard, J. and O'Flaherty, M. (2021) 'Multimorbidity: the case for prevention', *J Epidemiol Community Health,* 75(3), pp. 242-244.

Heiby, J. (2014) 'The use of modern quality improvement approaches to strengthen African health systems: a 5-year agenda', *International Journal for Quality in Health Care,* 26(2), pp. 117-123.

Hien, H., Berthe, A., Drabo, M.K., Meda, N., Konate, B., Tou, F., Badini-Kinda, F. and Macq, J. (2014) 'Prevalence and patterns of multimorbidity among the elderly in

Burkina Faso: cross-sectional study', *Tropical Medicine & International Health,* 19(11), pp. 1328-1333.

Hien, H., Berthé, A., Drabo, M.K., Meda, N., Konaté, B., Tou, F., Badini-Kinda, F. and Macq, J. (2014a) 'Prevalence and patterns of multimorbidity among the elderly in Burkina Faso: cross-sectional study', *Tropical Medicine & International Health,* 19(11), pp. 1328-1333.

Hien, H., Berthé, A., Drabo, M.K., Meda, N., Konaté, B., Tou, F., Badini-Kinda, F. and Macq, J. (2014b) 'Prevalence and patterns of multimorbidity among the elderly in Burkina Faso: cross-sectional study', *Tropical Medicine & International Health,* 19(11), pp. 1328-1333.

Hudon, C., Soubhi, H. and Fortin, M. (2008) 'Relationship between multimorbidity and physical activity: secondary analysis from the Quebec health survey', *BMC public health,* 8(1), pp. 1-8.

Hughes, K., Bellis, M.A., Hardcastle, K.A., Sethi, D., Butchart, A., Mikton, C., Jones, L. and Dunne, M.P. (2017) 'The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis', *The Lancet Public Health,* 2(8), pp. e356-e366.

Hughes, L.D., McMurdo, M.E. and Guthrie, B. (2013) 'Guidelines for people not for diseases: the challenges of applying UK clinical guidelines to people with multimorbidity', *Age and Ageing,* 42(1), pp. 62-69.

Hunt, T.K., Slack, K.S. and Berger, L.M. (2017) 'Adverse childhood experiences and behavioral problems in middle childhood', *Child abuse & neglect,* 67, pp. 391-402.

Hunter, D.J. and Reddy, K.S. (2013) 'Noncommunicable diseases', *New England Journal of Medicine,* 369(14), pp. 1336-1343.

Huntley, A.L., Johnson, R., Purdy, S., Valderas, J.M. and Salisbury, C. (2012) 'Measures of multimorbidity and morbidity burden for use in primary care and community settings: a systematic review and guide', *The Annals of Family Medicine,* 10(2), pp. 134-141.

Ingram, E., Ledden, S., Beardon, S., Gomes, M., Hogarth, S., McDonald, H., Osborn, D.P. and Sheringham, J. (2021) 'Household and area-level social determinants of multimorbidity: a systematic review', *J Epidemiol Community Health,* 75(3), pp. 232-241.

Javanmardi, F., Keshavarzi, A., Akbari, A., Emami, A. and Pirbonyeh, N. (2020) 'Prevalence of underlying diseases in died cases of COVID-19: A systematic review and meta-analysis', *PloS one,* 15(10), pp. e0241265.

Jerliu, N., Toçi, E., Burazeri, G., Ramadani, N. and Brand, H. (2013) 'Prevalence and socioeconomic correlates of chronic morbidity among elderly people in Kosovo: a population-based survey', *BMC geriatrics,* 13(1), pp. 1-9.

Joanna Briggs Institute (2017) 'The Joanna Briggs Institute critical appraisal tools for use in JBI systematic reviews: checklist for prevalence studies', *Crit Apprais Checkl Preval Stud,* 7, pp. 65-72.

Johnson, R.B. and Onwuegbuzie, A.J. (2004) 'Mixed methods research: A research paradigm whose time has come', *Educational researcher,* 33(7), pp. 14-26.

Johnson, R.B., Onwuegbuzie, A.J. and Turner, L.A. (2007) 'Toward a definition of mixed methods research', *Journal of mixed methods research,* 1(2), pp. 112-133.

Johnston, M.C., Crilly, M., Black, C., Prescott, G.J. and Mercer, S.W. (2019) 'Defining and measuring multimorbidity: a systematic review of systematic reviews', *European journal of public health,* 29(1), pp. 182-189.

Joshi, K., Kumar, R. and Avasthi, A. (2003) 'Morbidity profile and its relationship with disability and psychological distress among elderly people in Northern India', *International journal of epidemiology,* 32(6), pp. 978-987.

Kabir, R., Khan, H.T., Kabir, M. and Rahman, M.T. (2013) 'Population ageing in Bangladesh and its implication on health care', *European Scientific Journal,* 9(33), pp. 34-47.

Kaeberlein, M. (2019) 'It is time to embrace 21st-century medicine', *Public Policy & Aging Report,* 29(4), pp. 111-115.

Kasirye, F. (2021) 'An Overview of Mixed and Multi Method Research', .

Kassouf, A.L. (2005) 'Acesso aos serviços de saúde nas áreas urbana e rural do Brasil', *Revista de economia e Sociologia Rural,* 43, pp. 29-44.

Kessler, R.C., McLaughlin, K.A., Green, J.G., Gruber, M.J., Sampson, N.A., Zaslavsky, A.M., Aguilar-Gaxiola, S., Alhamzawi, A.O., Alonso, J. and Angermeyer, M. (2010a) 'Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys', *The British journal of psychiatry,* 197(5), pp. 378-385.

Kessler, R.C., McLaughlin, K.A., Green, J.G., Gruber, M.J., Sampson, N.A., Zaslavsky, A.M., Aguilar-Gaxiola, S., Alhamzawi, A.O., Alonso, J. and Angermeyer, M. (2010b) 'Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys', *The British journal of psychiatry,* 197(5), pp. 378-385.

Khan, H.T. (2019) 'Population ageing in a globalized world: Risks and dilemmas?', *Journal of evaluation in clinical practice,* 25(5), pp. 754-760.

Khan, H.T. and Ahmed, S. (2017) 'Healthcare workforce caring for older adults across the world: an overview', *Medicina,* , pp. 75-80.

Khanam, M.A., Streatfield, P.K., Kabir, Z.N., Qiu, C., Cornelius, C. and Wahlin, Å (2011) 'Prevalence and patterns of multimorbidity among elderly people in rural Bangladesh: a cross-sectional study', *Journal of health, population, and nutrition,* 29(4), pp. 406.

Kirchberger, I., Meisinger, C., Heier, M., Zimmermann, A., Thorand, B., Autenrieth, C.S., Peters, A., Ladwig, K. and Döring, A. (2012) 'Patterns of multimorbidity in the aged population. Results from the KORA-Age study', *PloS one,* 7(1), pp. e30556.

Kivimäki, M., Batty, G.D., Pentti, J., Shipley, M.J., Sipilä, P.N., Nyberg, S.T., Suominen, S.B., Oksanen, T., Stenholm, S. and Virtanen, M. (2020) 'Association between socioeconomic status and the development of mental and physical health conditions in adulthood: a multi-cohort study', *The Lancet Public Health,* 5(3), pp. e140-e149.

Lapin, A. (2008) 'Why should Byzantium be considered as a cradle of clinical geriatrics?', *Wiener medizinische Wochenschrift (1946),* 158(17-18), pp. 471-480.

Lateef, F. (2011) 'Patient expectations and the paradigm shift of care in emergency medicine', *Journal of emergencies, trauma and shock,* 4(2), pp. 163.

Lehman, B.J., David, D.M. and Gruber, J.A. (2017) 'Rethinking the biopsychosocial model of health: Understanding health as a dynamic system', *Social and personality psychology compass,* 11(8), pp. e12328.

Lehnert, T., Heider, D., Leicht, H., Heinrich, S., Corrieri, S., Luppa, M., Riedel-Heller, S. and König, H. (2011) 'Health care utilization and costs of elderly persons with multiple chronic conditions', *Medical Care Research and Review,* 68(4), pp. 387-420.

Li, J., Green, M., Kearns, B., Holding, E., Smith, C., Haywood, A., Cooper, C., Strong, M. and Relton, C. (2016) 'Patterns of multimorbidity and their association with health outcomes within Yorkshire, England: baseline results from the Yorkshire Health Study', *BMC public health,* 16(1), pp. 1-9.

Lincoln, Y.S. and Guba, E.G. (1986) 'But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation', *New directions for program evaluation,* 1986(30), pp. 73-84.

Lohr, K.N. and Schroeder, S.A. (1990a) 'A strategy for quality assurance in Medicare', *New England Journal of Medicine,* 322(10), pp. 707-712.

Lohr, K.N. and Schroeder, S.A. (1990b) 'A strategy for quality assurance in Medicare', *New England Journal of Medicine,* 322(10), pp. 707-712.

MacMahon, S., Calverley, P., Chaturvedi, N., Chen, Z., Corner, L., Davies, M., Ezzati, M., Guthrie, B., Hanson, K. and Jha, V. (2018) 'Multimorbidity: a priority for global health research', *The Academy of Medical Sciences: London, UK,* , pp. 127.

Marengoni, A., Angleman, S., Melis, R., Mangialasche, F., Karp, A., Garmen, A., Meinow, B. and Fratiglioni, L. (2011a) 'Aging with multimorbidity: a systematic review of the literature', *Ageing research reviews,* 10(4), pp. 430-439.

Marengoni, A., Angleman, S., Melis, R., Mangialasche, F., Karp, A., Garmen, A., Meinow, B. and Fratiglioni, L. (2011b) 'Aging with multimorbidity: a systematic review of the literature', *Ageing research reviews,* 10(4), pp. 430-439.

Marengoni, A., Rizzuto, D., Wang, H., Winblad, B. and Fratiglioni, L. (2009) 'Patterns of chronic multimorbidity in the elderly population', *Journal of the American Geriatrics Society,* 57(2), pp. 225-230.

Marengoni, A., Winblad, B., Karp, A. and Fratiglioni, L. (2008a) 'Prevalence of chronic diseases and multimorbidity among the elderly population in Sweden', *American Journal of Public Health,* 98(7), pp. 1198-1200.

Marengoni, A., Winblad, B., Karp, A. and Fratiglioni, L. (2008b) 'Prevalence of chronic diseases and multimorbidity among the elderly population in Sweden', *American Journal of Public Health,* 98(7), pp. 1198-1200.

Marmot, M. (2015) 'The health gap: the challenge of an unequal world', *The Lancet,* 386(10011), pp. 2442-2444.

Marshall, G.N. and Hays, R.D. (1994) *The patient satisfaction questionnaire short-form (PSQ-18).* Rand Santa Monica, CA.

Martin, L.A., Nelson, E.C., Lloyd, R.C. and Nolan, T.W. (2007) 'Whole system measures', *IHI Innovation Series white paper, .*

McDonald, K.M., Sundaram, V., Bravata, D.M., Lewis, R., Lin, N., Kraft, S.A., McKinnon, M., Paguntalan, H. and Owens, D.K. (2007) 'Closing the quality gap: a critical analysis of quality improvement strategies (Vol. 7: Care Coordination)', .

McDonald, S., Daniels, K. and Harris, C. (2004) 'Using templates in the thematic analysis of texts', *Essential guide to qualitative methods in organizational research,* , pp. 73-85.

McEniry, M. (2013) 'Early-life conditions and older adult health in low-and middle-income countries: a review', *Journal of developmental origins of health and disease,* 4(1), pp. 10.

McQuestion, M.J. and Velasquez, A. (2006) 'Evaluating program effects on institutional delivery in Peru', *Health Policy,* 77(2), pp. 221-232.

Melo, L.A.d., Braga, L.d.C., Leite, F.P.P., Bittar, B.F., Oséas, J.M.d.F. and Lima, K.C.d. (2019) 'Factors associated with multimorbidity in the elderly: an integrative literature review', *Revista Brasileira de Geriatria e Gerontologia,* 22(1).

Mercer, S., Furler, J., Moffat, K., Fischbacher-Smith, D. and Sanci, L. (2016a) *Multimorbidity: technical series on safer primary care.* World Health Organization.

Mercer, S., Furler, J., Moffat, K., Fischbacher-Smith, D. and Sanci, L. (2016b) *Multimorbidity: technical series on safer primary care.* World Health Organization.

Mersky, J.P., Topitzes, J. and Reynolds, A.J. (2013a) 'Impacts of adverse childhood experiences on health, mental health, and substance use in early adulthood: A cohort study of an urban, minority sample in the US', *Child abuse & neglect,* 37(11), pp. 917-925.

Mersky, J.P., Topitzes, J. and Reynolds, A.J. (2013b) 'Impacts of adverse childhood experiences on health, mental health, and substance use in early adulthood: A cohort study of an urban, minority sample in the US', *Child abuse & neglect,* 37(11), pp. 917-925.

Metzler, M., Merrick, M.T., Klevens, J., Ports, K.A. and Ford, D.C. (2017) 'Adverse childhood experiences and life opportunities: Shifting the narrative', *Children and youth services review,* 72, pp. 141-149.

Millar, L., Robertson, N., Allender, S., Nichols, M., Bennett, C. and Swinburn, B. (2013) 'Increasing community capacity and decreasing prevalence of overweight and obesity in a community based intervention among Australian adolescents', *Preventive medicine,* 56(6), pp. 379-384.

Miller, M.D., Paradis, C.F., Houck, P.R., Mazumdar, S., Stack, J.A., Rifai, A.H., Mulsant, B. and Reynolds III, C.F. (1992) 'Rating chronic medical illness burden in geropsychiatric practice and research: application of the Cumulative Illness Rating Scale', *Psychiatry research,* 41(3), pp. 237-248.

Minas, M., Koukosias, N., Zintzaras, E., Kostikas, K. and Gourgoulianis, K.I. (2010) 'Prevalence of chronic diseases and morbidity in primary health care in central Greece: an epidemiological study', *BMC health services research,* 10(1), pp. 1-8.

Mini, G.K. and Thankappan, K.R. (2017) 'Pattern, correlates and implications of non-communicable disease multimorbidity among older adults in selected Indian states: a cross-sectional study', *BMJ open,* 7(3), pp. e013529.

Mitchell, P.H., Ferketich, S., Jennings, B.M. and American Academy of Nursing Expert Panel on Quality Health Care (1998) 'Quality health outcomes model', *Image: The Journal of Nursing Scholarship,* 30(1), pp. 43-46.

Moffat, K. and Mercer, S.W. (2015) 'Challenges of managing people with multimorbidity in today's healthcare systems', *BMC family practice,* 16(1), pp. 1-3.

Moffitt, T.E. and Caspi, A. (2001) 'Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females', *Development and psychopathology,* 13(2), pp. 355-375.

Moher, D. (2009) 'Liberati A, Tetzlaff J, Altman DG, Group TP', *Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement.PLoS Med,* 6(7), pp. 1000097.

Monterrubio-Flores, E., Ramírez-Villalobos, M.D., Espinosa-Montero, J., Hernandez, B., Barquera, S., Villalobos-Daniel, V.E. and Campos-Nonato, I. (2021) 'Characterizing a two-pronged epidemic in Mexico of non-communicable diseases and SARS-Cov-2: factors associated with increased case-fatality rates', *International journal of epidemiology,* 50(2), pp. 430-445.

Morse, J.M. (1994) 'Designing funded qualitative research.', .

Mounce, L.T., Campbell, J.L., Henley, W.E., Arreal, M.C.T., Porter, I. and Valderas, J.M. (2018) 'Predicting incident multimorbidity', *The Annals of Family Medicine,* 16(4), pp. 322-329.

Mountford, J. and Shojania, K.G. (2012) 'Refocusing quality measurement to best support quality improvement: local ownership of quality measurement by clinicians', *BMJ quality & safety,* 21(6), pp. 519-523.

Muka, T., Imo, D., Jaspers, L., Colpani, V., Chaker, L., van der Lee, S.J., Mendis, S., Chowdhury, R., Bramer, W.M. and Falla, A. (2015) 'The global impact of non-communicable diseases on healthcare spending and national income: a systematic review', *European journal of epidemiology,* 30(4), pp. 251-277.

Munn, Z., Moola, S., Riitano, D. and Lisy, K. (2014) 'The development of a critical appraisal tool for use in systematic reviews addressing questions of prevalence', *International journal of health policy and management,* 3(3), pp. 123.

Nagel, G., Peter, R., Braig, S., Hermann, S., Rohrmann, S. and Linseisen, J. (2008) 'The impact of education on risk factors and the occurrence of multimorbidity in the EPIC-Heidelberg cohort', *BMC public health,* 8(1), pp. 1-10.

Naples, J.G. and Hajjar, E.R. (2016) 'Multimorbidity and polypharmacy'*Developing drug products in an aging society* Springer, pp. 549-561.

Navickas, R., Petric, V., Feigl, A.B. and Seychell, M. (2016a) 'Multimorbidity: what do we know? What should we do?', *Journal of comorbidity,* 6(1), pp. 4-11.

Navickas, R., Petric, V., Feigl, A.B. and Seychell, M. (2016b) 'Multimorbidity: what do we know? What should we do?', *Journal of comorbidity,* 6(1), pp. 4-11.

Newcomer, J.W. (2007) 'Antipsychotic medications: metabolic and cardiovascular risk', *Journal of Clinical Psychiatry,* 64(4), pp. 8-13.

Nguyen, H., Manolova, G., Daskalopoulou, C., Vitoratou, S., Prince, M. and Prina, A.M. (2019a) 'Prevalence of multimorbidity in community settings: A systematic review and meta-analysis of observational studies', *Journal of comorbidity,* 9, pp. 2235042X19870934.

Nguyen, H., Manolova, G., Daskalopoulou, C., Vitoratou, S., Prince, M. and Prina, A.M. (2019b) 'Prevalence of multimorbidity in community settings: A systematic review and meta-analysis of observational studies', *Journal of comorbidity,* 9, pp. 2235042X19870934.

Nicola, M., O'Neill, N., Sohrabi, C., Khan, M., Agha, M. and Agha, R. (2020) 'Evidence based management guideline for the COVID-19 pandemic-Review article', *International Journal of Surgery,* .

Nützel, A., Dahlhaus, A., Fuchs, A., Gensichen, J., König, H., Riedel-Heller, S., Maier, W., Schäfer, I., Schön, G. and Weyerer, S. (2014) 'Self-rated health in multimorbid older general practice patients: a cross-sectional study in Germany', *BMC Family practice,* 15(1), pp. 1-12.

Nwani, P.O. and Isah, A.O. (2016a) 'Chronic diseases and multimorbidity among elderly patients admitted in the medical wards of a Nigerian tertiary hospital', *Journal of Clinical Gerontology and Geriatrics,* 7(3), pp. 83-86.

Nwani, P.O. and Isah, A.O. (2016b) 'Chronic diseases and multimorbidity among elderly patients admitted in the medical wards of a Nigerian tertiary hospital', *Journal of Clinical Gerontology and Geriatrics,* 7(3), pp. 83-86.

O'Brien, R., Wyke, S., Guthrie, B., Watt, G. and Mercer, S. (2011) 'An 'endless struggle': a qualitative study of general practitioners' and practice nurses' experiences of managing multimorbidity in socio-economically deprived areas of Scotland', *Chronic illness,* 7(1), pp. 45-59.

Odegaard, A.O., Koh, W., Gross, M.D., Yuan, J. and Pereira, M.A. (2011) 'Combined lifestyle factors and cardiovascular disease mortality in Chinese men and women: the Singapore Chinese health study', *Circulation,* 124(25), pp. 2847-2854.

Olawumi, A.L., Grema, B.A., Suleiman, A.K., Omeiza, Y.S., Michael, G.C. and Shuaibu, A. (2021) 'Nutritional status and morbidity patterns of the elderly in a Northwestern Nigerian hospital: A cross-sectional study', *Nigerian Postgraduate Medical Journal,* 28(3), pp. 160.

Oleribe, O.O., Momoh, J., Uzochukwu, B.S., Mbofana, F., Adebiyi, A., Barbera, T., Williams, R. and Taylor-Robinson, S.D. (2019) 'Identifying key challenges facing healthcare systems in Africa and potential solutions', *International journal of general medicine,* 12, pp. 395.

Oni, T. and Unwin, N. (2015) 'Why the communicable/non-communicable disease dichotomy is problematic for public health control strategies: implications of multimorbidity for health systems in an era of health transition', *International Health,* 7(6), pp. 390-399.

O'Rand, A.M. and Hamil-Luker, J. (2005) 'Processes of cumulative adversity: Childhood disadvantage and increased risk of heart attack across the life course', *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences,* 60(Special_Issue_2), pp. S117-S124.

Osmond, C. and Barker, D.J. (2000) 'Fetal, infant, and childhood growth are predictors of coronary heart disease, diabetes, and hypertension in adult men and women.', *Environmental health perspectives,* 108(suppl 3), pp. 545-553.

Ouzzani, M., Hammady, H., Fedorowicz, Z. and Elmagarmid, A. (2016) 'Rayyan—a web and mobile app for systematic reviews', *Systematic reviews,* 5(1), pp. 1-10.

Palmer, K., Marengoni, A., Forjaz, M.J., Jureviciene, E., Laatikainen, T., Mammarella, F., Muth, C., Navickas, R., Prados-Torres, A. and Rijken, M. (2018) 'Multimorbidity care model: Recommendations from the consensus meeting of the Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life Cycle (JA-CHRODIS)', *Health Policy,* 122(1), pp. 4-11.

Parekh, A.K. and Barton, M.B. (2010) 'The challenge of multiple comorbidity for the US health care system', *Jama,* 303(13), pp. 1303-1304.

Pathirana, T.I. and Jackson, C.A. (2018) 'Socioeconomic status and multimorbidity: a systematic review and meta-analysis', *Australian and New Zealand Journal of Public Health,* 42(2), pp. 186-194.

Pati, S., Mahapatra, P., Kanungo, S., Uddin, A. and Sahoo, K.C. (2021) 'Managing multimorbidity (multiple chronic diseases) amid COVID-19 pandemic: a community based study from Odisha, India', *Frontiers in public health,* 8, pp. 1026.

Pati, S., Swain, S., Hussain, M.A., Van Den Akker, M., Metsemakers, J., Knottnerus, J.A. and Salisbury, C. (2015) 'Prevalence and outcomes of multimorbidity in South Asia: a systematic review', *BMJ open,* 5(10).

Pechtel, P. and Pizzagalli, D.A. (2011) 'Effects of early life stress on cognitive and affective function: an integrated review of human literature', *Psychopharmacology,* 214(1), pp. 55-70.

Pietkiewicz, I. and Smith, J.A. (2014) 'A practical guide to using interpretative phenomenological analysis in qualitative research psychology', *Psychological journal,* 20(1), pp. 7-14.

Piette, J.D. and Kerr, E.A. (2006) 'The impact of comorbid chronic conditions on diabetes care', *Diabetes care,* 29(3), pp. 725-731.

Prados-Torres, A., Poblador-Plou, B., Calderón-Larrañaga, A., Gimeno-Feliu, L.A., González-Rubio, F., Poncel-Falcó, A., Sicras-Mainar, A. and Alcalá-Nalvaiz, J.T. (2012) 'Multimorbidity patterns in primary care: interactions among chronic diseases using factor analysis', *PloS one,* 7(2), pp. e32190.

Quiñones, A.R., Markwardt, S. and Botoseneanu, A. (2016) 'Multimorbidity combinations and disability in older adults', *Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences,* 71(6), pp. 823-830.

Ramiro, L.S., Madrid, B.J. and Brown, D.W. (2010) 'Adverse childhood experiences (ACE) and health-risk behaviors among adults in a developing country setting', *Child abuse & neglect,* 34(11), pp. 842-855.

Reis, J.P., Loria, C.M., Sorlie, P.D., Park, Y., Hollenbeck, A. and Schatzkin, A. (2011) 'Lifestyle factors and risk for new-onset diabetes: a population-based cohort study', *Annals of Internal Medicine,* 155(5), pp. 292-299.

Reyes-Sánchez, F., Basto-Abreu, A., Torres-Alvarez, R., Canto-Osorio, F., González-Morales, R., Dyer-Leal, D.D., López-Ridaura, R., Zaragoza-Jiménez, C.A., Rivera, J.A. and Barrientos-Gutiérrez, T. (2022) 'Fraction of COVID-19 hospitalizations and deaths attributable to chronic diseases', *Preventive medicine,* 155, pp. 106917.

Roman Lay, A.A., Ferreira do Nascimento, C., Caba Burgos, F., Larraín Huerta, A.d.C., Rivera Zeballos, R.E., Pantoja Silva, V. and Duarte, Y.A.d.O. (2020) 'Gender differences between multimorbidity and all-cause mortality among older adults', *Current gerontology and geriatrics research,* 2020.

Rubin, H.R., Pronovost, P. and Diette, G.B. (2001) 'The advantages and disadvantages of process-based measures of health care quality', *International Journal for Quality in Health Care,* 13(6), pp. 469-474.

Ruel, G., Shi, Z., Zhen, S., Zuo, H., Kröger, E., Sirois, C., Lévesque, J. and Taylor, A.W. (2014) 'Association between nutrition and the evolution of multimorbidity: the importance of fruits and vegetables and whole grain products', *Clinical Nutrition,* 33(3), pp. 513-520.

Ryan, A., Murphy, C., Boland, F., Galvin, R. and Smith, S.M. (2018) 'What is the impact of physical activity and physical function on the development of multimorbidity in older adults over time? A population-based cohort study', *The Journals of Gerontology: Series A,* 73(11), pp. 1538-1544.

Sakib, M.N., Shooshtari, S., St John, P. and Menec, V. (2019) 'The prevalence of multimorbidity and associations with lifestyle factors among middle-aged Canadians:

an analysis of Canadian Longitudinal Study on Aging data', *BMC Public Health,* 19(1), pp. 1-13.

Salawu, M.M. and Owoaje, E.T. (2020) 'Prevalence and Predictors of Adverse Childhood Experiences among Youths in Rural communities of Oyo State, South-west, Nigeria', *Journal of Community Medicine and Primary Health Care,* 32(2), pp. 27-41.

Salisbury, C., Johnson, L., Purdy, S., Valderas, J.M. and Montgomery, A.A. (2011a) 'Epidemiology and impact of multimorbidity in primary care: a retrospective cohort study', *British Journal of General Practice,* 61(582), pp. e12-e21.

Salisbury, C., Johnson, L., Purdy, S., Valderas, J.M. and Montgomery, A.A. (2011b) 'Epidemiology and impact of multimorbidity in primary care: a retrospective cohort study', *British Journal of General Practice,* 61(582), pp. e12-e21.

Salmons, J.E. (2015) 'Conducting multimethod and mixed methods research online', *The Oxford handbook of multimethod and mixed methods research inquiry,* , pp. 522-547.

Sasazuki, S., Inoue, M., Iwasaki, M., Sawada, N., Shimazu, T., Yamaji, T., Tsugane, S. and JPHC Study Group (2012) 'Combined impact of five lifestyle factors and subsequent risk of cancer: the Japan Public Health Center Study', *Preventive medicine,* 54(2), pp. 112-116.

Schäfer, I., Hansen, H., Schön, G., Höfels, S., Altiner, A., Dahlhaus, A., Gensichen, J., Riedel-Heller, S., Weyerer, S. and Blank, W.A. (2012a) 'The influence of age, gender and socio-economic status on multimorbidity patterns in primary care. First

results from the multicare cohort study', *BMC health services research,* 12(1), pp. 1-15.

Schäfer, I., Hansen, H., Schön, G., Höfels, S., Altiner, A., Dahlhaus, A., Gensichen, J., Riedel-Heller, S., Weyerer, S. and Blank, W.A. (2012b) 'The influence of age, gender and socio-economic status on multimorbidity patterns in primary care. First results from the multicare cohort study', *BMC health services research,* 12(1), pp. 1-15.

Schäfer, I., von Leitner, E., Schön, G., Koller, D., Hansen, H., Kolonko, T., Kaduszkiewicz, H., Wegscheider, K., Glaeske, G. and van den Bussche, H. (2010) 'Multimorbidity patterns in the elderly: a new approach of disease clustering identifies complex interrelations between chronic conditions', *PloS one,* 5(12), pp. e15941.

Schellevis, F.G. (1993) *Chronic diseases in general practice: Comorbidity and quality of care.* [Sl: sn].

Schrijvers, G., van Hoorn, A. and Huiskes, N., 2012. The care pathway: concepts and theories: an introduction. International journal of integrated care, 12(Special Edition Integrated Care Pathways).

Schury, K. and Kolassa, I. (2012) 'Biological memory of childhood maltreatment: current knowledge and recommendations for future research', *Annals of the New York Academy of Sciences,* 1262(1), pp. 93-100.

Shakoori, I.S., Aslam, F., Ashraf, G. and Akram, H. (2020) 'Understanding chronic disease risk factors and multimorbidity', *International Journal Of Community Medicine And Public Health,* 5(7), pp. 1990-1993.

Shamseer, L., Moher, D., Clarke, M., Ghersi, D. and Liberati, A. (2015) 'Research methods & reporting', *BMJ,* , pp. 1-25.

Sharma, P. and Maurya, P. (2021) 'Gender differences in the Prevalence and Pattern of Disease Combination of Chronic Multimorbidity among Indian Elderly', *Ageing International,* , pp. 1-19.

Shetty, S. (2020) 'No title', *Determining sample size for qualitative research: What is the magical number,* .

Simões, D. and Lucas, R. (2020) 'Exploring the Role of Rheumatic and Musculoskeletal Diseases in Multimorbidity'*An Overview and Management of Multiple Chronic Conditions* IntechOpen.

Sinclair, A.J. and Abdelhafiz, A.H. (2020) 'Age, frailty and diabetes–triple jeopardy for vulnerability to COVID-19 infection', *EClinicalMedicine,* 22.

Singer, L., Green, M., Rowe, F., Ben-Shlomo, Y. and Morrissey, K. (2019) 'Social determinants of multimorbidity and multiple functional limitations among the ageing population of England, 2002–2015', *SSM-population health,* 8, pp. 100413.

Skou, S.T., Mair, F.S., Fortin, M., Guthrie, B., Nunes, B.P., Miranda, J.J., Boyd, C.M., Pati, S., Mtenga, S. and Smith, S.M. (2022) 'Multimorbidity', *Nature Reviews Disease Primers,* 8(1), pp. 1-22.

Smith, J.A. and Fieldsend, M. (2021) *Interpretative phenomenological analysis.* American Psychological Association.

Smith, J.A. and Shinebourne, P. (2012) *Interpretative phenomenological analysis.* American Psychological Association.

Souza, D.L., Oliveras-Fabregas, A., Minobes-Molina, E., de Camargo Cancela, M., Galbany-Estragués, P. and Jerez-Roig, J. (2021) 'Trends of multimorbidity in 15 European countries: a population-based study in community-dwelling adults aged 50 and over', *BMC Public Health,* 21(1), pp. 1-10.

St John, P.D., Tyas, S.L., Menec, V. and Tate, R. (2014) 'Multimorbidity, disability, and mortality in community-dwelling older adults', *Canadian family physician,* 60(5), pp. e272-e280.

Steinman, M.A., Lee, S.J., John Boscardin, W., Miao, Y., Fung, K.Z., Moore, K.L. and Schwartz, J.B. (2012) 'Patterns of multimorbidity in elderly veterans', *Journal of the American Geriatrics Society,* 60(10), pp. 1872-1880.

Stoltenborgh, M., Bakermans-Kranenburg, M.J., Alink, L.R. and van IJzendoorn, M.H. (2015) 'The prevalence of child maltreatment across the globe: Review of a series of meta-analyses', *Child Abuse Review,* 24(1), pp. 37-50.

Sturmberg, J.P., Bennett, J.M., Martin, C.M. and Picard, M. (2017) ''Multimorbidity'as the manifestation of network disturbances', *Journal of evaluation in clinical practice,* 23(1), pp. 199-208.

Suhonen, R., Papastavrou, E., Efstathiou, G., Tsangari, H., Jarosova, D., Leino-Kilpi, H., Patiraki, E., Karlou, C., Balogh, Z. and Merkouris, A. (2012) 'Patient satisfaction as an outcome of individualised nursing care', *Scandinavian Journal of Caring Sciences,* 26(2), pp. 372-380.

Sum, G., Salisbury, C., Koh, G.C., Atun, R., Oldenburg, B., McPake, B., Vellakkal, S. and Lee, J.T. (2019) 'Implications of multimorbidity patterns on health care utilisation and quality of life in middle-income countries: cross-sectional analysis', *Journal of global health,* 9(2).

Suzman, R., Beard, J.R., Boerma, T. and Chatterji, S. (2015) 'Health in an ageing world—what do we know?', *The Lancet,* 385(9967), pp. 484-486.

Tashakkori, A. and Teddlie, C. (2008) 'Introduction to mixed method and mixed model studies in the social and behavioral sciences', *The mixed methods reader,* , pp. 7-26.

Teo, K., Chow, C.K., Vaz, M., Rangarajan, S., Yusuf, S. and PURE Investigators-Writing Group, 2009. The Prospective Urban Rural Epidemiology (PURE) study: examining the impact of societal influences on chronic noncommunicable diseases in low-, middle-, and high-income countries. American heart journal, 158(1), pp.1-7.

Terrell, S.R. (2012) 'Mixed-methods research methodologies.', *Qualitative report,* 17(1), pp. 254-280.

Thacher, T.D. (2005) 'Outpatient waiting time in Jos University Teaching Hospital', *Highland Medical Research Journal,* 3(1), pp. 36-42.

Tomasdottir, M.O., Sigurdsson, J.A., Petursson, H., Kirkengen, A.L., Krokstad, S., McEwen, B., Hetlevik, I. and Getz, L. (2015) 'Self-reported childhood difficulties, adult multimorbidity and allostatic load. A cross-sectional analysis of the Norwegian HUNT study', *PloS one,* 10(6), pp. e0130591.

Turabian, J.L. (2020) 'A Theory of Multimorbidity', *International Research in Medical and Health Sciences,* 3(6), pp. 9-16.

Turner, G. and Clegg, A. (2014) 'Best practice guidelines for the management of frailty: a British Geriatrics Society, Age UK and Royal College of General Practitioners report', *Age and Ageing,* 43(6), pp. 744-747.

Uwaifo, F. and John-Ohimai, F. (2020) 'Body weight, organ weight, and appetite evaluation of adult albino Wistar rats treated with berberine', *INTERNATIONAL JOURNAL OF HEALTH AND ALLIED SCIENCES,* 9(4), pp. 329-331. doi: 10.4103/ijhas.IJHAS_9_20.

Valderas, J.M., Gangannagaripalli, J., Nolte, E., Boyd, C.M., Roland, M., Sarria-Santamera, A., Jones, E. and Rijken, M. (2019) 'Quality of care assessment for people with multimorbidity', *Journal of internal medicine,* 285(3), pp. 289-300.

van den Akker, M., Buntinx, F. and Knottnerus, J.A. (1996) 'Comorbidity or multimorbidity: what's in a name? A review of literature', *The European journal of general practice,* 2(2), pp. 65-70.

Van den Akker, M., Buntinx, F., Metsemakers, J.F., Roos, S. and Knottnerus, J.A. (1998) 'Multimorbidity in general practice: prevalence, incidence, and determinants of co-occurring chronic and recurrent diseases', *Journal of clinical epidemiology,* 51(5), pp. 367-375.

Van den Bussche, H., Koller, D., Kolonko, T., Hansen, H., Wegscheider, K., Glaeske, G., von Leitner, E., Schäfer, I. and Schön, G. (2011a) 'Which chronic diseases and disease combinations are specific to multimorbidity in the elderly?

Results of a claims data based cross-sectional study in Germany', *BMC public health,* 11(1), pp. 1-9.

Van den Bussche, H., Koller, D., Kolonko, T., Hansen, H., Wegscheider, K., Glaeske, G., von Leitner, E., Schäfer, I. and Schön, G. (2011b) 'Which chronic diseases and disease combinations are specific to multimorbidity in the elderly? Results of a claims data based cross-sectional study in Germany', *BMC public health,* 11(1), pp. 1-9.

Van Oostrom, S.H., Picavet, H.S.J., Van Gelder, B.M., Lemmens, L.C., Hoeymans, N., Van Dijk, C.E., Verheij, R.A., Schellevis, F.G. and Baan, C.A. (2012) 'Multimorbidity and comorbidity in the Dutch population–data from general practices', *BMC public health,* 12(1), pp. 1-9.

Vander Weg, M.W. (2011) 'Adverse childhood experiences and cigarette smoking: The 2009 Arkansas and Louisiana behavioral risk factor surveillance systems', *Nicotine & Tobacco Research,* 13(7), pp. 616-622.

Vannorsdall, T.D. and Munro, C.A. (2017) 'The link between childhood adversity and late-life mental health: evidence for the influence of early-life experiences or illusory correlations?', *International Psychogeriatrics,* 29(3), pp. 357-358.

Violan, C., Foguet-Boreu, Q., Flores-Mateo, G., Salisbury, C., Blom, J., Freitag, M., Glynn, L., Muth, C. and Valderas, J.M. (2014a) 'Prevalence, determinants and patterns of multimorbidity in primary care: a systematic review of observational studies', *PloS one,* 9(7), pp. e102149.

Violan, C., Foguet-Boreu, Q., Flores-Mateo, G., Salisbury, C., Blom, J., Freitag, M., Glynn, L., Muth, C. and Valderas, J.M. (2014b) 'Prevalence, determinants and patterns of multimorbidity in primary care: a systematic review of observational studies', *PloS one,* 9(7), pp. e102149.

Violan, C., Foguet-Boreu, Q., Flores-Mateo, G., Salisbury, C., Blom, J., Freitag, M., Glynn, L., Muth, C. and Valderas, J.M. (2014c) 'Prevalence, determinants and patterns of multimorbidity in primary care: a systematic review of observational studies', *PloS one,* 9(7), pp. e102149.

Violan, C., Foguet-Boreu, Q., Flores-Mateo, G., Salisbury, C., Blom, J., Freitag, M., Glynn, L., Muth, C. and Valderas, J.M. (2014d) 'Prevalence, determinants and patterns of multimorbidity in primary care: a systematic review of observational studies', *PloS one,* 9(7), pp. e102149.

Vogel, I., Miksch, A., Goetz, K., Ose, D., Szecsenyi, J. and Freund, T. (2012) 'The impact of perceived social support and sense of coherence on health-related quality of life in multimorbid primary care patients', *Chronic illness,* 8(4), pp. 296-307.

Vogeli, C., Shields, A.E., Lee, T.A., Gibson, T.B., Marder, W.D., Weiss, K.B. and Blumenthal, D. (2007) 'Multiple chronic conditions: prevalence, health consequences, and implications for quality, care management, and costs', *Journal of general internal medicine,* 22(3), pp. 391-395.

Wade, A.N., Payne, C.F., Berkman, L., Chang, A., Gómez-Olivé, F.X., Kabudula, C., Kahn, K., Salomon, J.A., Tollman, S. and Witham, M. (2021) 'Multimorbidity and mortality in an older, rural black South African population cohort with high prevalence of HIV findings from the HAALSI Study', *BMJ open,* 11(9), pp. e047777.

Waldron, I., Hughes, M.E. and Brooks, T.L. (1996) 'Marriage protection and marriage selection—prospective evidence for reciprocal effects of marital status and health', *Social science & medicine,* 43(1), pp. 113-123.

Wallace, E., Salisbury, C., Guthrie, B., Lewis, C., Fahey, T. and Smith, S.M. (2015) 'Managing patients with multimorbidity in primary care', *Bmj,* 350.

Weiss, K.B. (2007) 'Managing complexity in chronic care: an overview of the VA state-of-the-art (SOTA) conference', *Journal of General Internal Medicine,* 22(3), pp. 374-378.

Wetterling, T. (2021) 'Pathogenesis of multimorbidity—what is known?', *Zeitschrift für Gerontologie und Geriatrie,* 54(6), pp. 590-596.

Whitty, C.J. and Watt, F.M. (2020) 'No title', *Map clusters of diseases to tackle multimorbidity,* .

WHO (2022) *International Statistical Classification of Diseases and Related Health Problems (ICD) 11th Revision.* Available at: https://www.who.int/standards/classifications/classification-of-diseases (Accessed: 29/12/2021).

Wikström, K., Lindström, J., Harald, K., Peltonen, M. and Laatikainen, T. (2015) 'Clinical and lifestyle-related risk factors for incident multimorbidity: 10-year follow-up of Finnish population-based cohorts 1982–2012', *European journal of internal medicine,* 26(3), pp. 211-216.

Willadsen, T.G., Bebe, A., Køster-Rasmussen, R., Jarbøl, D.E., Guassora, A.D., Waldorff, F.B., Reventlow, S. and Olivarius, N.d.F. (2016) 'The role of diseases, risk

factors and symptoms in the definition of multimorbidity–a systematic review', *Scandinavian journal of primary health care,* 34(2), pp. 112-121.

Windle, M., Haardörfer, R., Getachew, B., Shah, J., Payne, J., Pillai, D. and Berg, C.J. (2018) 'A multivariate analysis of adverse childhood experiences and health behaviors and outcomes among college students', *Journal of American college health,* 66(4), pp. 246-251.

Woodcock, J., Franco, O.H., Orsini, N. and Roberts, I. (2011) 'Non-vigorous physical activity and all-cause mortality: systematic review and meta-analysis of cohort studies', *International journal of epidemiology,* 40(1), pp. 121-138.

World Health Organization (2014) *Global status report on noncommunicable diseases 2014.* World Health Organization.

Xu, X., Mishra, G.D. and Jones, M. (2017) 'Mapping the global research landscape and knowledge gaps on multimorbidity: a bibliometric study', *Journal of global health,* 7(1).

Yamane, T. (1967) 'Statistics: an introductory analysis, 2nd edn, Harper and Row, New York', .

Yoon, J., Zulman, D., Scott, J.Y. and Maciejewski, M.L. (2014) 'Costs associated with multimorbidity among VA patients', *Medical care, ,* pp. S31-S36.

Zeeb, H., Rothgang, H. and Darmann-Finck, I. (2018) 'No title', *Ageing, health and equity—broad perspectives are needed to understand and tackle health challenges of ageing societies, .*

Zhang, J., Tang, B., Liu, M., Yuan, S., Yu, H., Zhang, R., Huang, X., Nzala, S.H., Chikoya, M. and Wang, P. (2020) 'Association of adverse childhood experiences with health risk behaviors among college students in Zambia', *International Journal of Behavioral Medicine,* 27(4), pp. 400-405.

Zhang, R., Lu, Y., Shi, L., Zhang, S. and Chang, F. (2019) 'Prevalence and patterns of multimorbidity among the elderly in China: a cross-sectional study using national survey data', *BMJ open,* 9(8), pp. e024268.

Zheng, Z., Xie, Y., Huang, J., Sun, X., Zhang, R. and Chen, L. (2022) 'Association rules analysis on patterns of multimorbidity in adults: based on the National Health and Nutrition Examination Surveys database', *BMJ open,* 12(12), pp. e063660.

Zhou, B., Chen, K., Wang, J., Wang, H., Zhang, S. and Zheng, W. (2011) 'Quality of life and related factors in the older rural and urban Chinese populations in Zhejiang province', *Journal of Applied Gerontology,* 30(2), pp. 199-225.

GANTT CHART

YEARS	2020												2021												2022												2023											
Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
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Task	Timeline
Proposal Preparation submission	
Proposal presentation	
Annual progress report	
Conferences	
Seminal and training attended	
12-month milestone presentation	
Transfer chapter submission from MPhil to PhD	
Transfer from MPhil to PhD presentation and viva	
Plan and work on publication	
One to one supervision	
Final thesis review and abstract	
Viva preparation and submission	

Addendums

Appendix 1 Participant information sheet

Title of Study

Understanding Multimorbidity of Older Adults in Niger State North Central Nigeria

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Purpose of Study

You are being asked to take part in the research. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. Please read the following information carefully. And ask the researcher if there is anything that is not clear or if you need more information. The purpose of this study is to have a better understanding of multimorbidity among older adults in Nigeria.

Study Procedures

Data collection will be carried out with the use of a structured, pre-coded questionnaire to be administered by the principal investigator and a trained assistant. Participants will be assured of the confidentiality of the information they will provide. Interviews will be conducted in English or Hausa language, the most popular language in Niger state, Nigeria (whichever the respondent felt comfortable with).

Risks

You may decline to answer any or all questions and you may terminate your involvement at any time if you choose.

Benefits

There will be no direct benefit to you for your participation in this study. However, we hope that the information obtained from this study may benefit you in the future.

Confidentiality

Your responses to this study will be anonymous. Please do not write any identifying information. Every effort will be made by the researcher to preserve your

confidentiality including the following: Assigning code names/numbers for participants that will be used on all research notes and documents. Keeping notes, interview transcriptions, and any other identifying participant information in a locked file cabinet in the personal possession of the researcher. Participant data will be kept confidential except in cases where the researcher is legally obligated to report specific incidents. These incidents include, but may not be limited to, incidents of abuse and suicide risk.

Contact Information

If you have questions at any time about this study, or you experience adverse effects as a result of participating in this study, you may contact the researcher whose contact information is provided on the first page. If you have questions regarding your rights as a research participant, or if problems arise which you do not feel you can discuss with the Primary Investigator, please contact the Institutional Review Board of the university of west London.

Voluntary Participation

Your participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

Appendix 2 Consent form

I have read and understood the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature _____ Date _____

Investigator's signature _____ Date _____

Appendix 3 Quantitative study questionnaire

University of West London

Understanding morbidity among elderly Nigerians

This questionnaire is for assessing morbidity among older people. We would like to invite you to take part in this study. It is only for research purposes and your response will be confidentially kept.

Date ……………………………   Department …………………………………

Hospital name…………………………   Serial number …………………………

Section 1 Sociodemographic characteristics of the participants			Code
Age	…………. years (completed)		
Gender	1. Male	2. Female	
Marital status	Never married		1
	Currently married		2
	Divorced		3
	Separated		4
	Widow/er		5
Family structure	Nuclear Family (Father, mother, and children)		1
	Three Generation Family (Grandparents, Father, mother, and children)		2

	Extended Family (Grandparents, parents, children, and other relatives		3
1.5 The education level of the respondent	Illiterate		1
	Can read and write		2
	Primary school level		3
	secondary school		4
	Tertiary school		5
	Post-graduate		6
1.6 Occupation of the respondent	Government staff		1
	Own business		2
	Involve in the family business		3
	Company staff/ worker		4
	Dependent		5
	Retired		6
	Others (specify)		7

1.7 Average monthly family income (Naira)	………………………………….			

1.8 The ethnicity of the respondent	1. Gwarri	2. Hausa	3. Nupe	4. Others (specify)…………	

Section 2 Questions asking about chronic conditions or diseases of the older people within the previous 12 months adopted from the PURE (prospective urban and rural epidemiology) studies

2.1 During the last year, did you have any chronic condition or disease told by the doctor and other health persons such as a nurse, health assistant, lady health visitor, and midwife			Code
	Yes	No	

2.2 If YES, what is /are the chronic condition(s) or disease(s)? (Please read the list and also ask "Do you have other diseases that did not mention in the list?")

1 Diabetes		7. Cancer		11. Cataract	
2 Hypertensions		8. COPD		12. Glaucoma	
3. Stroke		9. Asthma		13. Depression	
4. Angina/heart attack/CHD		10. tuberculosis		14. Emotional & mental illness	
5. Heart failure		11. Arthritis		15. Other (specify)………	
6. Other heart diseases		12. Osteoporosis			

2.3 Which of the condition made you come to the hospital	

2.4 Have you ever regularly taken western medicine to control the above-mentioned chronic condition(s) or disease(s)?		
Yes	No	

2.5 Do you have anyone else to look after when you feel sick?		
Yes	No	

2.6 If you have, please mention it. (Multiple responses)

Spouse	Son/ daughter	Neighbours	Nephew/ Niece	Relatives	Other specify

2.7 Can you do your daily activity without help from anyone else?	Yes	1
	No	2

2.8 Do you have a good relationship with other family members?	Yes	1
	No	2
2.9 Do you take part in any social/ welfare activity?	Yes	1
	No	2
2.10 Do you satisfy your current life condition?	Satisfactory	1
	Unsatisfactory	2
	Fair	3

Section 3 Patient experiences on quality of healthcare services

Please rate the statements below that relate to the communication with your healthcare providers. (Answer options: Always, Very Often, Sometimes, Rarely, Never)	Always	Very often	sometimes	Rarely	Never
I'm adequately informed by healthcare providers about my treatment options					
I'm involved in decisions regarding my care by my healthcare providers					
My healthcare providers give me the information I need about the safety of my treatment					
My healthcare provider adapts my care according to my changing needs					
My healthcare providers are capturing my feedback on the quality of care provided (through satisfaction survey or other means)					
I'm satisfied with the safety of care provided to me					
I'm satisfied with continuity in my care over time					
Have you ever felt stigmatized when seeking or receiving healthcare because of (mark all that apply)?	Yes Specify		No		

What type of stigma or discrimination did you experience? Mark all that apply.
The attitude of healthcare staff
Denial of my rights
Inappropriate language
Lack of healthcare facility in my community
Refusal to provide me with treatment
Other (please specify)

What measures need to be taken to prevent this situation?

Section 4 Childhood Experience

Physical abuse	Did a parent, guardian, or other household member spank, slap, kick, punch or beat you up?	
Emotional abuse	Did a parent, guardian, or other household member yell, scream, or swear at you, insult or humiliate you?	
Contact sexual abuse	Did someone touch or fondle you in a sexual way when you did not want them to?	

Alcohol and/or drug abuser in the household	Did you live with a household member who was a problem drinker or alcoholic, or misused street or prescription drugs?	
Incarcerated household member	Did you live with a household member who was ever sent to jail or prison?	
Someone chronically depressed, mentally ill, institutionalized, or suicidal	Did you live with a household member who was depressed, mentally ill, or suicidal?	
Household member treated violently	Did you see or hear a parent or household member in your home being yelled at, screamed at, sworn at, insulted, or humiliated?	
One or no parents, parental separation, or divorce	Were your parents ever separated or divorced?	
Emotional neglect	Did your parents/guardians understand your problems and worries?	
Physical neglect	Did your parents/guardians not give you enough food even when they could easily have done so?	
Bullying	Were you bullied?	
Community violence	Did you see or hear someone being beaten up in real life?	
Collective violence	Were you forced to go and live in another place due to any of these events?	

Section 5 Lifestyle-Related
Use of tobacco
Have you smoked at least 100 cigarettes in your entire life? 1. Yes   2. No   3. Don't know/Not Sure   4. Refused
2. Do you now smoke cigarettes every day, some days, or not at all? Every day 2. Some days 3. Not at all 4. Don't know / Not sure 5. Refused
During the past 12 months, have you stopped smoking for one day or longer because you were trying to quit smoking?   1 Yes 2 No 3 Don't know / Not sure 4 Refused
How long has it been since you last smoked a cigarette, even one or two puffs? less than 1 month ago 1 month but less than 3 months ago 3 months but less than 6 months ago 6 months but less than 1 year ago 1 year but less than 5 years ago 5 years but less than 10 years ago 10 years or more
Use of alcohol

During the past 30 days, how many days per week or per month did you have at least one drink of any alcoholic beverage such as beer, wine, a malt beverage, or liquor? _ _ Days per week _ _ Days in past 30 days No drinks in past 30 days Don't know / Not sure
One drink is equivalent to a 12-ounce beer, a 5- ounce glass of wine, or a drink with one shot of liquor. During the past 30 days, on the days when you drank, how many drinks did you drink on average? 1 ………Number of drinks 2 None 3 Don't know / Not sure 4 Refused
During the past 30 days, what is the largest number of drinks you had on any occasion? 1 ………Number of drinks 2 None 3 Don't know / Not sure 4 Refused
Exercise (Physical Activity)
During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise? 1. Yes 2. No, don't know/Not Sure 4. Refused
How many times per week or month did you take part in this activity during the past month? 1_ _ Times per week 2_ _ Times per month 3 Don't know / Not sure 4 Refused
. What other type of physical activity gave you the next most exercise during the past month 1._ ……. Specify from Physical Activity List 2 no other activity 3 Don't know / Not sure 4 Refused
Fruits and vegetables
Not including juices, how often did you eat fruit? You can tell me times per day, times per week, or times per month. 1_ _ Day 2_ _ Week 3_ _ Month 300 Less than once a month 4 Never 5 Don't Know 6 Refused
How often did you eat a green leafy or lettuce salad, with or without other vegetables? 1_ _ Day 2_ _ Week 3_ _ Month 300 Less than once a month 4 Never 5 Don't Know 6 Refused
How often did you eat any kind of fried potatoes, including French fries, home fries, or hash browns? 1_ _ Day 2_ _ Week 3_ _ Month 300 Less than once a month 4 Never 5 Don't Know 6 Refused
Not including lettuce salads and potatoes, how often did you eat other vegetables? 1_ _ Day 2_ _ Week 3_ _ Month 300 Less than once a month 4 Never 5 Don't Know 6 Refused

Interviewer: name _____   Roll number   _____Signature _____
Counter check by   Interviewer name _____Roll number _____Signature _____

Appendix 4 Qualitative template questionnaire

Interview guide for patients Adapted from Coventry et al., (2011)

Experience with long-term health conditions

Can you tell me briefly?

how do you live with your chronic conditions?

how did your long-term health conditions begin?

can you tell me about your treatment and follow up?

1.1 In the past two years, could you briefly tell me about the <u>care</u> you have received for your long-term health conditions?

- health care services

- persons / professionals / other care providers

- the clinic(s) where you had your consultations

- frequency of medical visits and duration

- usually on appointment / frequent walk-in visits

1.2 <u>Health care experience</u>: Tell me briefly about your experience and your satisfaction with the care you have received for your long-term health condition:

- **Access to care:** What are the strengths and weaknesses of the care and services you received? Have you ever struggled to get help for your anxiety or depressive symptoms (e.g., access, efficiency)? If so, what problems have you had and how did you cope or deal with them?

- **Efficiency:** To help you manage your anxiety or depressive symptoms, were there some treatments or services that worked better than others?

- **Patient preferences** discussed or considered.

- **Opinions** on the treatments / care / services received.

- **Shared decision making**: Do you think you have contributed and participated in decisions about your treatments / care? Were significant others involved (if desired)?

- **Communication**: Did health care professionals take the time to listen to you? Did you experience difficulties communicating with health care professionals? If yes, what could be the reasons?

1.3 Coordination of care:

- Do you feel health professionals work together / in collaboration to help you?

- Is there room for improvement in the way professionals work together / coordinate your care?

1.4 What are you finding Most challenging or stressful each time you go to hospital?

1.5 What is bringing you joy or comfort each time you go to hospital.

Appendix 5 Data Management and Storage Statement

As required by the Economic and Science Research Council (ESRC), for the data management plan I will prepare the project data for future sharing. Consequently, it will be deposited for archiving and re-use with the ESRC data service provider, United Kingdom data archive (UKDA), at the end of the project and within three months of the end of the research. The data management plan will be reviewed during the life of the project to ensure the success of the long-term strategy. Before archiving, the data files will be converted to suitable open formats long-term preservation.

UNIVERSITY OF
WEST LONDON
The **Career** University

College of Nursing, Midwifery and Healthcare
Research Ethics Panel
Paragon House
Boston Manor Road
Brentford TW8 9GA
Tel: +44 (0)20 8209 4154
Email: cnmh.ethics@uwl.ac.uk

Name: Abdulsalam Ahmed
Student No: 21443681
Date: 27th September 2021

Dear Abdulsalam

Re: Application for Ethical Approval No. 1055
Understanding Multimorbidity of Older Adults in Outpatient Department of General Hospital
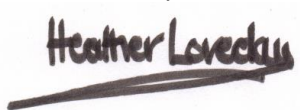**Minna, Niger State North Central Nigeria**

Thank you for sending in your application for approval. The Panel has considered this and conditionally approved the research without major amendment. However, please act upon the following:

'The researcher and the supervisors must ensure that potential participants have the opportunity to consider participating with at least a 24-hour gap between being provided with information about the study and being involved in interviews'

If the research does not progress, or if you make any changes to your research proposal or methodology can you please inform the Panel in writing as this may entail the need for additional review. It is your responsibility, as the principal investigator, to submit a report on the progress/completion of the research twelve months from the date of this letter. Please find attached a blank report form to be completed by
September 2022.

The Panel wish you well with your research and look forward to your report.

Yours sincerely

Heather Loveday

Professor Heather Loveday
Director of Research
Chair, College Research Ethics Panel

Appendix 7 Authorization by Research ethics and publication committee

(REPC) of hospital management board, Minna Niger state.

NIGER STATE HOSPITALS MANAGEMENT BOARD
GENERAL HOSPITAL MINNA

ADDRESS:
No 1 Hospital Road,
P.M.B 2 Minna
Niger State, Nigeria.
Tel: 09053899102

Our Ref: _____ *Your Ref:* _____ *Date:* _____

17th September, 2021
HMB/GHM/136/VOL.III/588

The Head of Department,
College of Nursing, Midwifery and Healthcare,
University of West London,
Paragon House, Boston Manor Road,
Brentford TW8 9GB,
United Kingdom.

Sir,

ETHICAL APPROVAL

IN RESPECT OF ABDULSALAM AHMED (ID: 21443681)

The Research, Ethics and Publication Committee (REPC) has given approval for the implementation of your research protocol titled: "Understanding Multimorbidity of Older Adults in Niger State North Central Nigeria". You are required to submit periodically a review of the study to this committee. On completion of the study, the committee must be informed before your research findings are published and a copy of the published article (s) must be submitted to the committee.

Furthermore, do not hesitate to inform the committee of any difficulties or unwanted effects that might arise in the course of the studies.

Best regards.

17-9-2021

Dr. Wey George D MBBS, Cert Derm, FMCFM,
Chairman Research, Ethics and Publication Committee

E-mail: genhospminna@yahoo.com genhospminna@gmail.com

Appendix 8 S2 File (PRISMA CHECKLIST)

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	58
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	58- 59
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	59 – 60
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	60
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	61
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	59
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	62 -64
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	62
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	62-64
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	62
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	70 -71
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	65 &70
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	70 & 71

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Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	66
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	70
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	

Section and Topic	Item #	Checklist item	Location where item is reported
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	67
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	68
Study characteristics	17	Cite each included study and present its characteristics.	69
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	69

Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	70 & 71
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	70
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	71 & 72
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	74
	23b	Discuss any limitations of the evidence included in the review.	76
	23c	Discuss any limitations of the review processes used.	76
	23d	Discuss implications of the results for practice, policy, and future research.	76
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	61
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	61
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	

Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	77
Competing interests	26	Declare any competing interests of review authors.	
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	

Appendix 9

Section and topic	Item No	Checklist item
ADMINISTRATIVE INFORMATION		
Title:		
Identification	1a	Identify the report as a protocol of a systematic review
Update	1b	If the protocol is for an update of a previous systematic review, identify as such
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number
Authors:		
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments
Support:		
Sources	5a	Indicate sources of financial or other support for the review
Sponsor	5b	Provide name for the review funder and/or sponsor
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol
INTRODUCTION		
Rationale	6	Describe the rationale for the review in the context of what is already known
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)
METHODS		
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage

Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated
Study records: Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)

*It is strongly recommended that this checklist be read in conjunction with the PRISMA-P Explanation and Elaboration (cite when available) for important clarification on the items. Amendments to a review protocol should be tracked and dated. The copyright for PRISMA-P (including checklist) is held by the PRISMA-P Group and is distributed under a Creative Commons Attribution Licence 4.0.

Appendix 10

S1 Table: Articles screened for full text

S/N	Author	Title	Decision	Reason
1	Nwani and Isah, 2016 (Anambra state)	Chronic diseases and multimorbidity among elderly patients admitted in the medical wards of a Nigerian tertiary hospital	Included	Meets eligibility criteria
2	Adams and Abubakar, 2018 (Abuja)	Morbidity Patterns of Elderly Patients Attending the General Out-Patient Clinic of a Tertiary Centre in North-Central – Nigeria	Included	Meets eligibility criteria
3	Osunkwo *et al.,* 2018	Mortality Pattern at the National Hospital: A Hospital-Based Study in Abuja, Nigeria	Excluded	Wrong study design
4	Olawumi *et al.,* 2021 (Kano)	Nutritional Status and Morbidity Patterns of the Elderly in a North-western Nigerian Hospital: A Cross-sectional Study	Included	Meets eligibility criteria
5	Abdulraheem et al., 2017 (Niger)	Prevalence and Pattern of Multi-Morbidity among Elderly People in Rural Nigeria: Implications for Health Care System, Research and Medical Education	Included	Meets eligibility criteria
6	Nguyen *et al.,* 2019	Prevalence of multimorbidity in community settings: A systematic review and meta-analysis of observational studies	Excluded	Wrong study design
7	Disang, Weller and Campbell, 2021	Prevalence and patterns of chronic communicable and noncommunicable diseases multimorbidity in sub-Saharan Africa: protocol for a systematic review	Excluded	Wrong study design
8	Faronbi, Ajadi and Gobbens, 2020 (Osun state)	Associations of chronic illnesses and socio-demographic factors with health-related quality of life of older adults in Nigeria: A cross-sectional stud	Included	Meets eligibility criteria
9	Agofure, Okandeji-Barry and Ogbon, 2020	Pattern of Diabetes Mellitus Complications and Co-morbidities in Ughelli North Local Government Area, Delta State, Nigeria	Excluded	Wrong study outcome
10	Akpa *et al.,* 2013	Profile and Outcome of Medical Emergencies in a Tertiary Health Institution in Port Harcourt, Nigeria	Excluded	Wrong study outcome
11	Salako *et al.,* 2018	The pattern of comorbidities in cancer patients in Lagos, South-Western Nigeria	Excluded	Wrong study outcome
12	Amedu and Sale, 2020	Prevalence of psychiatric disorders among elderly in-patients in non-psychiatric wards of a teaching hospital in Northern Nigeria	Excluded	Wrong study design
13	Abdulazeez *et al.,* 2021 (Kano)	Multimorbidity and Functional Status of the Elderly in a Primary Care Setting of Northern Nigeria: A Cross-Sectional Stud	Included	Meets eligibility criteria
14	(Cadmus *et al.,* 2017)	A descriptive study of the morbidity pattern of older persons presenting at a Geriatric Centre in Southwestern Nigeria', *Nigerian journal of clinical practice,* 20(7), pp. 873-878.	Excluded	Wrong study outcome

Appendix 11

Achievements during studies

- Award-winning oral presentation at the annual doctoral student's conference 2022
- First Vice president Nigeria society University of West London 2020/2021 session
- University of West London scholarships (complete tuition fees waiver) 2020 to 2023
- Reviewer PLOS ONE public health journal
- Reviewer BMJ public health journal
- Reviewer BMC public health journal

Appendix 12

Publications
- Effective Hospital Care Delivery Model for Older People in Nigeria with Multimorbidity: Recommendations for Practice. *Healthcare* DOI: 10.3390/HEALTHCARE10071268. A. Abdulsalam, Hafiz T.A and Muili 2022
- Examining the association between adverse childhood Experiences and harmful health behavioral risk factors Among older adults with multimorbidity in northern Nigeria: X. International symposium of social and applied gerontology: Faculty of Health Sciences Department of Gerontology. A. Abdulsalam, Hafiz T.A and Muili 2022
- The Nexus between Adverse Childhood Experiences, Adult Factors, and Multimorbidity among Older Adults in North Central Nigeria. Accepted for publication in plos one journal.
- Systematic literature review of the prevalence, pattern, and determinant of multimorbidity among older adults in Nigeria. Accepted for publication in Healthcare Services and Managerial Epidemiology Journal

Publications under review

- Effect of childhood conditions on trajectories of chronic conditions among older adults in Nigeria
- The prevalence, pattern and burden of multimorbidity among older people in Nigeria