



**COLLEGE OF MEDICINE**

**AN EXPLORATION OF THE PREDICTORS OF DEPRESSION AND  
ANXIETY IN OLDER PEOPLE (60+YEARS) USING SECONDARY DATA  
COLLECTED FROM THE MALAWI LONGITUDINAL STUDY ON  
FAMILIES AND HEALTH**

**BY**

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*(Bachelor of Science in Mental Health and Psychiatric Nursing)*

**A Dissertation Submitted in Partial Fulfilment of the Master of Public Health Degree**

**December, 2020**

## DECLARATION

I, **Justice Khosa**, hereby declare that this thesis is my original work and has not been presented for any other awards at the University of Malawi or any other university.

Signature:

A handwritten signature in black ink, appearing to read 'Justice Khosa', is written on a light-colored rectangular background.

Date: December, 2020

## **CERTIFICATE OF APPROVAL**

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## ABSTRACT

Depression and anxiety are amongst the common mental health problems amongst the elderly population and contributes greatly to poor quality of their life. Depression alone was projected to become the second leading cause of morbidity and mortality in older adults by the year 2020. A better understanding of these two conditions is vital for planning appropriate interventions for such special populations. However, there are limited studies focusing on these conditions in low and middle-income countries including Malawi. The purpose of this study was to examine the occurrence and predictors of depression and anxiety amongst older persons ( $\geq 60$  years) in Malawi. A cross-sectional study was conducted utilizing secondary data collected by the Malawi Longitudinal study on families and health. Data was extracted from the parent study on depression and anxiety utilizing the Patient Health Questionnaire module 9 (PHQ-9) and the Generalized Anxiety module 7 (GAD-7) respectively. Chi-Square test and logistic regression explored the association between the two conditions and the social as well as physiological variables. Data was analyzed using Stata version 14.0. Mean age was 72 years with SD of 8.5. Overall, about 24.69% (n=200) of participants were depressed with 40.49% having minimal depression, 26.47% mild depression, 9.01% moderate depression, and 2.43% having moderate to severe depression. On the other hand, about 19.63% had anxiety, with 24.53% (n=171) having mild anxiety, 5.16% (n=36) moderate anxiety, and 1.43% (n=10), a severe form of anxiety. Marital status (widows, divorced), having high blood pressure, experiencing pain, and age were found to be predictors of both anxiety and depression.

There is a need for programs that can effectively address the needs of older adults focusing on both physical and mental wellbeing in Malawi.

**Keywords;** Predictors, Depression, Anxiety, elderly.

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## GLOSSARY OF TERMS

- Depression** A mood disorder characterized by a persistent low mood, changes in appetite and weight, changes in sleep and activities, lack of energy, feelings of guilt, problems with thinking and decision making, sometimes with persistent thoughts of death (suicide) with these symptoms lasting at least 2 weeks (*DSM-IV-TR*).
- Anxiety** An emotional mental health disorder characterized by strong feelings of worry, nervousness, uneasiness, and uncertainty of an outcome which significantly interferes with one's ability to carry out activities of daily living
- Geriatrics** The branch of medicine concerned with the diagnosis, treatment and prevention of diseases common in older people and the problems specific to older persons.

## ABBREVIATIONS AND ACRONYMS

AID's	Acquired Immunodeficiency Syndrome
BP	High Blood Pressure
Chi	Chi-Square
DA	Depression and Anxiety
GAD-7	Generalized Anxiety Disorder-module 7
GDS	Geriatric Depression Scale
HIV	Human Immunodeficiency Virus
MLSFH	Malawi Longitudinal study on family and health
OR	Odds Ratio
PHQ-9	Patient Health Questionnaire-9
SANE	Surviving An Epidemic study
WHO	World Health Organization
YLD	Years lived with Disability

# CHAPTER ONE: BACKGROUND INFORMATION

## 1.1 Introduction

Worldwide depression and anxiety are reported to be a significant contributor to the global disease burden with depression only contributing about 7.5% of all years lived with disability (YLD). In 2015 depressive disorders contributed over 50 million burdens to YLD's globally [1]. On the other hand, large population based surveys in 2010 also reported a 33.7% lifetime prevalence of anxiety disorders which also contributed 26.8 million to disability adjusted life years (DALY's) according to the Global Burden Disease (GBD) study [2].

Depression is projected to increase by 5.7% by the year 2020 and consequently become the second leading cause of disability after ischemic heart disease with approximately 7.1% lifetime risk [3]. Depression is also reported to be a significant contributor to reduced functionality, increased risk for non-communicable diseases, suicide rates, and cognitive disabilities (dementia) in older adults [2,4].

Although these conditions affect anyone regardless of age and gender, global health estimates indicate a high prevalence in those aged between 60-64 years both males and females [1]. Other studies also report peak prevalence in older adulthood with an estimated rate of above 7.5% in females (55-74 years) and above 5.5% amongst males [5].

On the other hand, large population based surveys, report a lifetime prevalence of anxiety of up to 33.7% in the global population [2]. In 2010, The Global Burden of Disease (GBD) study

estimated that anxiety disorders contributed to 26.8 million disability adjusted life years globally [2].

Although these conditions affect any person regardless of age and gender differences, global estimates indicate a high prevalence of depressive episodes in those aged between 60-64 years both males and females [1]. Other scholars also report that prevalence rates vary by age, peaking in older adulthood with an estimated rate of above 7.5% in females (55-74 years) and above 5.5% amongst males [5].

According to a United Nations Aging report of 2015, it is estimated that there are about 962 million people aged 60 years and above worldwide [6]. These figures are as twice as large as was the case in 1980 where only 382 million older persons lived worldwide. It is also projected that the figures will likely reach 2.1 billion; almost twice the current state by the year 2050 [7].

In Malawi, Healthy Ageing (living  $\geq$  60 years) is becoming a new "phenomenon". It is anticipated that more people will have to live longer than it was previously. In 1980s, on average, a healthy Malawian was expected to live approximately 45 years according to the World development indicators of 2011 [8]. This was the case because of high early mortality rate due to the high prevalence of HIV/AIDs, poor immunization programs, high fertility rate, and extreme poverty levels e.g. in 2004, almost 90.5% of Malawians lived below \$2-a-day and 73.9% below \$1.25-a-day [8].

However, from the 1980s to date, data in Malawi shows a tremendous improvement in life expectancy. Around 2009, a healthy Malawian could live approximately 54 years [8]. Furthermore, the current World Health Organization estimates of 2018 indicate that life expectancy has steadily risen from 63.9 years in 2017 to about 64.2 years in 2018. These strides have been attributed to the introduction of Government programs such as the Malawi Growth and Development Strategy in 2006 in conjunction with its development partners e.g. World Bank. These programs critically revamped vital sectors such as agriculture, nutrition, HIV/AIDs, Water, Energy and integrated rural development [8]. These interventions improved quality of life; reduced HIV prevalence, fertility rate to 4.4 children per woman, and improved literacy levels [9].

In Europe and America, the population of the aged recorded is much higher than in the other continents. However, the trend is expected to spread across the continents due to among other things are the reduction in fertility rate and advancement in the health sector. In Malawi and other African countries such as Rwanda, and Zimbabwe, the number of old persons is projected to quadruple by the year 2050 [7].

Although there is this anticipated transition towards an aging population in Malawi, it is worth noting that advanced age is also associated with specific age-related physical, social, and psychological evolutionally related vulnerabilities which affect the quality of life[2,10,11]. Some notable psychological issues in advanced ages include; depression and anxiety [12].

In low and middle-income countries the problem is reported to be almost double compared to developed countries contributing at least 80% total non-fatal total global health losses due to low resource allocation in the health sector [1,13].

A study conducted in Malawi by Udedi revealed a high magnitude of depression (30.3%) in out-patients services at a primary health care settings with detection ability of the condition by health personnel at (0%) meaning that most patients get undiagnosed and get mismanaged in such situations [14]. This scenario might even be worse in older adults as most studies report that depression in the elderly goes mostly unnoticed, unreported, or misdiagnosed. This is a common phenomenon amongst health workers confusing symptoms of depression with the natural process of aging [15–17]. Patients also have lack of awareness of such symptoms as signs of illness [18]. As such, the burden of depression amongst the elderly in Malawi might even be higher than projected in other studies [19].

A study in Nigeria-Delta State revealed that the prevalence of depression amongst the elderly was quite high; about 44.7%. Similarly, in Ethiopia, a prevalence of 28.5% was also reported whilst Kerala-India a prevalence of 39.1% was also reported [13]. Therefore, conducting a similar study in Malawi which is one of the least developed countries in the Sub Saharan region will help to come up with country-specific results of the situation.

In economic terms, the continuous rise in the aging population impacts heavily on the economy and development due to a reduction in the young active labor workforce which contributes greatly to macroeconomic growth aggregates. Poverty levels are likely to rise in advanced age

affecting proper handling of common healthcare needs of the aged. In Asia, a positive correlation between aging and consumption of health resources was found with high Government expenditure on consumption [21]. In Czech Republic increased health care needs of older persons were compensated by lowering health expenditures during healthy life, increased government share towards increased health care, private savings, the introduction of contributory pension schemes during youthful periods to fund older generation at retirement age and governments medical and social reforms to address such needs. This led to reforms to include life expectancy variables in later models [21].

Recognizing the challenges that most elderly persons face in sub-Saharan region, in 2002 United Nations Madrid International Plan of Action on Ageing (MIPAA) and the 2003 African Union Policy Framework and Plan of Action on Ageing (AU-Plan), advocated for the development of strategies to enhance health service provision for Africa's older persons as a way to realize their right to health and to encourage their valuable contributions to families and societies, as well as prevention of disease and disability. The summit also advocated for policies that can ensure full access to adequate curative and rehabilitative care for older persons who suffer from diseases or disability to enhance their quality of life [22].

Similarly, the world aging report of 2016 also called upon governments to come up with policies for the aged focusing on investments towards human and social resources than only focusing on cost containment. The report further recommended better alignment and integration of services shifting from disease-based reactive services to models of care that prioritize the functioning of

the older person. Governments were also asked to put in place mechanisms to ensure quality of care that might be contracted either by private care givers or institutions [11].

In line with the above call, in 2001 the Malawi Government developed a mental health policy to guide the delivery of mental health services in the country. The document later got revised in 2020. The policy among other things advocates delivery of timely and quality services in the areas of health promotion, prevention, curative, rehabilitative services and research. The policy also recognizes the elderly population as one of the vulnerable populations that require protection from various forms of harms including stigma and discrimination [23]. Despite the policy recognizing such issues, it doesn't stipulate the exact interventions that are specific to such populations e.g. treatment pathways.

In 2007, the Government of Malawi also established the Ministry of persons with disabilities and the elderly to improve their wellbeing and address issues that affects them at policy level. The silver-gray foundation was then established to improve the social, economic, political, ecological, and cultural well-being of old people [9].

Although these initiatives were introduced, there is still a need to explore other needs especially their psychological wellbeing to guide the implementation of such programs. This therefore calls for the need to conduct a study in this area as the results of this study will inform policy and interventions for such populations in Malawi utilizing the available data (MLSF mature adult 2018 dataset) to promote quality life and longevity as reported in other studies [24].

## **1.2 Rationale/justification**

This study was designed to isolate the magnitude of depression and anxiety as well as factors that have a significant bearing on these two conditions in Malawi amongst the elderly population. The results of this study will help to come up with interventions or programs that might help to address the needs of the aged, reduce the burden of such conditions and improve quality of life for the elderly population.

## **1.3 Study objectives**

### **1.3.1 Broad objectives**

The main aim of this study was to determine the occurrence as well as predictors of depression, and anxiety amongst people aged 60 years and above (the elderly) in Malawi.

### **1.3.2 Specific objectives**

- i. To investigate the prevalence of depression and anxiety amongst people aged 60 and above in Malawi.
- ii. To isolate the social predictors of depression and anxiety amongst people aged 60 and above in Malawi.
- iii. To establish the physiological (physical conditions) predictors of depression and anxiety in people aged 60 and above in Malawi.

## **1.4 Research questions**

- i. What is the prevalence of depression and anxiety amongst people aged 60 years and above in Malawi?

- ii. What are the social and physiological predictors of depression and anxiety in people aged 60 years and above in Malawi?

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Prevalence of depression and anxiety in older adults**

The World Health Organization Global estimates of 2015 indicate that in the general population depressive disorders affect approximately 4.4% of the total global population whilst anxiety disorders affect about 3.3% of the same population. These estimates vary according to regions, for example, the African region accounts about 5.4% prevalence rate for depressive disorders whilst the western pacific region has a rate of about 3.6% [5].

Anxiety disorders on the other hand are ranked as the sixth-largest contributor to non-fatal health loss globally and appear in the top 10 causes of years Lived with Disability in all WHO Regions. The American region rate of anxiety disorders was at 5.8% compared to the western pacific which is at 2.9% [5].

A Global Burden of Disease Study conducted in 2015, revealed that the prevalence of depression in the African Region and America exceeded the world average total percentage of the total population by almost 4.4% [1].

Another systematic review in United Kingdom revealed that about 18% of the population in United states of America and over 60 million people in European Union are affected by anxiety disorders in a given year, making it the most prevalent psychiatric condition in the region[2].

Global estimates also indicate a peak in prevalence of depression between the ages of 60-64 years both in males and females [1]. Prevalence rates are believed to vary by age, peaking in older adulthood with an estimated rate of above 7.5% in females (55-74 years) and above 5.5%

amongst males. Although depression also affects children and adolescents below the age of 15, the rates are much lower than those registered in older adults [5].

Some studies in low and middle-income countries have also shown that older persons between the ages of 60 years and above usually experience moderate to severe depressive episodes almost three times higher than those aged between 15-59 years of life [16]. A Cross-sectional study in Jordan in non-institutionalized adults aged 60 years and above found that older individuals in good health have a greater sense of personal wellbeing and can participate fully in the development activities of societies. This study used tools to capture depression, social support, life satisfaction, and psychological distress [16].

In Nepal, a study of adults aged 60 years and above in elderly homes found a high prevalence of depression (57.8%) with a mean depression score of about 5.6 ( $\pm 2.19$ ) ranging from 3 to 13. Similarly, in India, a high prevalence of depression amongst the elderly (63.8%) was reported, with the mean GDS score of 6.86 ( $\pm 0.17$ ) [20].

A study in South Africa and Ghana in 2015 on depression and its correlates amongst people aged 50 and above from the WHO Study findings on global AGEing and adult health, found a 12 months' prevalence of 6.7% and 2.7% for mild depression in Ghana and South Africa respectively. These rates of depression were statistically different between men and women; in Ghana (5.1% vs. 8.5%,  $p < .05$ ), but not in South Africa (2.4% vs. 2.9%) [25].

In Malawi, World Health Organization estimates of 2015, revealed that there were 679,385 cases with depression (4,1%), 501 153 cases for anxiety (3,0%) which contributes to Years Lived with Disability (YLD) of about 125 773 Cases (8.8%) in a population for depression and 46 617 cases (3,2%) for anxiety respectively [5].

Although studies in most parts of the world including Africa report high prevalence of depression and anxiety, some reports have indicated lack of seriousness in implementing public health policies in low-income countries (sub-Saharan Africa) hence contributing to epidemiological transition towards increased disease burden (NCDs) with greater early-life mortality. [26]

## **2.2 Social predictors of depression in older adults**

Several social factors are linked to the development of depression, however, certain social factors are heavily associated with the development of depression in adulthood. These factors include extreme poverty, unemployment, loss of a loved one [1].

A study in Jordan examined psychological and social demographic predictors of depression in older adults (60 years and above) and found a prevalence of 22% for depression mostly mild levels. Divorce and widowhood were some of the risk factors whilst availability of good family social support, satisfaction with life, and working actively as some of the protective factors [16].

A study in China isolated lack of social engagement such lack of participation in social activities, discussions on political and social interests, insufficient family support and connections, and sleep problems as some of the factors associated with depression in old cadres [27].

In Greece, a study on socio-demographic details associated with depression amongst community-dwelling adults (65 to 85) revealed a prevalence of depression of about 31%. The study also found that having good social-economic status, being married, cohabitating, and attending church services were associated with good health outcomes whilst higher education attainment was associated with the worst outcomes for depression [5].

A community-based cross-sectional study in North Talminadu amongst persons aged 60 years and above found a prevalence of rate of 52.5% of depression among the study participants as measured by geriatric depression scale. Among them, 37.2% got a score between 6 to 10, and 17.3% had a score of 11 and above. The variables which were found to be significantly associated with depression included increasing age with an odds ratio (OR) of 2.4. Single status, being unmarried, being a widow, or widower was also associated with depression [28].

A study conducted in Gondar-Ethiopia amongst the elderly to isolate the psychological issues they experience found that age differences had a bearing on anxiety only, whilst marital status was statistically significant with both depression and anxiety [29].

In Ghana, bivariate analysis in advanced age found that living without a partner, never having been to school, living in an urban setting, migration, not currently working, lower quality of life,

and harmful use of alcohol was associated with depression especially in women whilst the lower quality of life and current smoking were common in men. On the other hand, multivariate analyses showed a lack of current employment and migration to be associated with depression in women, whereas only smoking was associated with depression among men in Ghana [25].

Although some studies report that good social support is a protective factor against depression, a study in Pakistan showed that depression was more common amongst the elderly who had children (31.6%) than those who did not have (16.6%) [30].

An empirical review of literature from almost all the continents except Antarctica isolated some psychosocial factors such as negative life events where some papers reported that the elderly are subjected to increased stressors whilst some studies had a contrary view of the situation. This review went further to check whether there was a difference in exposure to these negative stressors amongst men and women. Other studies did not analyze the gender differences between men and women in negative life events [31].

Differences in cognitive coping skills between men and women have also been linked to gender differences in the development of depression. Other studies show that women respond to negative mood responses by focusing on their cause and implications, avoidance than problem-solving (Rumination). Though most studies report that women ruminate more than men, other studies show that the trend reduces with advanced age [31]. Though this has been isolated in other parts of the world little is known in Malawi and most sub-Saharan countries.

Some studies have also isolated social support as another buffering variable that has a bearing on gender differences in the development of depression. Social networks and contacts are crucial in terms of protection as well as predisposition to depression. It is on record that women have higher social contacts, networks, and participation than men. However, they seem to be more affected by depression than men. Other studies have shown that due to less social contacts men are at greater risk of depression. With the other variables analyzed such as rumination, other studies find that levels of depression between men and women are the same. Other studies emphasize that social contacts and the quality of such contacts are crucial in protecting people from such negative outcomes [31].

Although social support which also includes the number of social contacts and quality of such connections has been seen to have a bearing on the development of depression and anxiety, little is known about how some social arrangements e.g. marriage arrangements contribute to the same. For instance, in Malawi, there are two commonly practiced cultural marriage arrangements i.e. Chikamwini and Chitengwa. In the Chikamwini arrangement, a man is expected to leave his parents' home and stay's at his wife's place. The responsibility of taking care and ownership of children mostly goes to the wife and the uncle from the wife's side. In Chitengwa, the woman (wife) settles at the husbands' home. These marriage arrangements are practiced in different tribes and regions of the country, e.g. Chitengwa is practiced by Ngoni's, Tumbuka, Ngonde, Lambya from the Northern region, and some Ngoni's from the central region, whilst some tribes such as Chewa from central region practice mostly Chikamwini. The MLSFH 2018 dataset has such data variables captured in all the three districts hence providing a better platform to explore

and get some insights on how such living arrangements impacts on psychological resilience and vulnerability of people in such arrangements including the elderly.

The earlier MLSFH- 2010-2012 published data on depression and anxiety amongst adults 45 years [24] only looked at tribe as a single variable. Therefore, it might be important to expound further on the fore-mentioned area.

Another notable social factor that has also been seen to predict depression and anxiety amongst adults is marital status. Some studies investigated widowhood as a life event that would predict geriatric depression but found no difference in these genders [31].

### **2.3 Physiological predictors of depression in older adults**

A study conducted in Nepal showed a prevalence of 57.8% among the elderly (60 years and above) living in the Devghat area where age, sex, ethnicity, and previous family type were found to be statistically significant and correlated to depression [20].

In Northern Western Nigeria, a study on socio-demographic correlates of depression which included age, sex, marital status, and educational level reported a statistically significant relationship between increasing age and depression. Depression was also found to be more prevalent in the female sex, amongst married people and people with low socioeconomic status. The study also reported a lack of relationship between depression and employment status, as well as positive family history of mental illness. The study further highlighted that those over 40 years

of age, female, married, having a low level of education, and suffering from a chronic medical condition were more likely to develop depression than the rest in the general population [32].

Some studies have also shown that the prevalence of depressive disorders is much more common in women than in men [25]. For instance, a study done in Korea found a prevalence of 63% among the elderly, with 21% having severe depressive symptoms, the majority being women. The mean score for depression was 6.21 (SD = 3.83). [33]. These trend has been observed in almost every part of the world both western and non-western and usually the burden being as twice as much in women than men [34].

A systematic review and meta-analysis of Fifty-one studies from 16 States of India aimed at estimating the prevalence of depression among the elderly population found a prevalence of 34.4% (95% CI: 29.3–39.7). The pooled prevalence was found to be higher amongst females and those in rural populations of the country [31].

In one of the studies done in China, after controlling for age and widowhood, the results showed that both widowed men and women had significant episodes of depression than those who were married [34]

A measure of one's health has also been linked to the development of depression. In most studies of the elderly report decline in health states due to the aging process. Health status is mostly evaluated in terms of the number of chronic conditions one has, ability to perform activities of daily living [31].

The difference in health states has also been linked to the gender difference in terms of the development of depression in elderly men and women. It is believed that women experience more chronic conditions than men hence impairing their ability to perform tasks. However, other studies show no difference in the two genders [31,35]. Therefore, it is necessary to find out if this also applies to the Malawian context using the available data.

Other studies have also reported that some medical conditions common in adulthood have a link to the development of depression. For example, diabetes. Diabetes mellitus is reported to be one of the most prevalent conditions worldwide. The condition is also heavily linked with increased morbidity and mortality. Most patients with diabetes mellitus have also been found to have most psychological conditions such as depression. For example, in the United States, the adult general population is reported to have a prevalence of 8.3% for major depression. Bangladesh had a prevalence of about 22% for males and 30.5% for females. Other studies report at least half of patients diagnosed with diabetes having clinical symptoms of depression [36].

A hospital study at Shahid Mohammad diabetic clinic in Iran revealed a 50 and 67 percent prevalence for depression and anxiety respectively. Both depression and anxiety were seen mostly in women participants, those who had type 2 diabetes those with at least one complication of the condition [36].

Anxiety was also found to be more common in patients with diabetes compared to those without the condition. People with anxiety present with various forms of neurotic disorder e.g. generalized anxiety, panic attacks, obsessive-compulsive disorder as well as a post-traumatic

stress disorder. On the other hand, Diabetes mellitus and depression are recognized as two of the most important public health issues in the United Kingdom and other countries. Most studies from cross-sectional data sources report that diabetes increases the risk of depression 2-fold compared to those without the condition [37].

A cross-sectional study done between March 2010 and July 2010 at a tertiary care facility in South London (King's College Hospital) on anxiety and depression using a validated and widely used Hospital Anxiety and Depression Scale (HADS) found increased risk levels of 42% for patients, both for anxiety and depression. The study also found that there was a significantly higher level of anxiety and depression ( $6.4 \pm 4$  and  $6.3 \pm 3.6$  scores respectively) and mostly amongst women. The dichotomization of age to 60 years old and older showed that both anxiety and depression scores for the older group were a bit lower [37].

A cross-sectional study done in Jordan on the prevalence of depression and anxiety in the general adult population ( $\geq 60$  years) with diabetes found a prevalence of 37.7% for anxiety and depression was at 39.6%. Multiple logistic regression analysis showed that anxiety was positively associated with a duration of diabetes of  $< 10$  years ( $P = 0.01$ ). Univariate analysis for anxiety also indicated that patients with  $\geq 7$  months' duration of foot ulcer, duration of diabetes of  $\geq 10$  years, HbA1c level of  $\geq 7\%$ , and patients with three chronic diseases or more had significantly higher rates of anxiety than their counterparts ( $P = 0.01, 0.02, 0.00,$  and  $0.00$ , respectively); other variables such as age, gender, education level, marital status, income, smoking status were not significantly associated with depression [38].

Depression and chronic pain are also seen as highly prevalent and linked in elderly populations. It is estimated that 13% of the elderly population suffer simultaneously from the two conditions. Chronic pain is believed to increase the risk for depression between 2.5 and 4.1 times. Evidence suggests that neuro-inflammation is the main culprit in the development of the two conditions [39].

In the general population, chronic pain varies from region to region; for instance, in Canada, the prevalence was found to be 15.1% whilst 48.9% in Sweden. Most studies report that the condition is much prevalent amongst women than males. After categorizing according to age groups in the general population, the prevalence of chronic pain is seen to be high in the elderly population in the following age categories; 55% after the age of 60 years and 62% after the age of 75 years [39].

Apart from diabetes mellitus and chronic pain, another medical condition reported to have an association with depression is Hypertension. Approximately, studies project that one-fourth of the adults are diagnosed with hypertension, and the proportion is expected to reach about 1/3 by 2025. Many people diagnosed with hypertension usually have tough experiences such as somatic symptoms, lower quality of life, and role impairment. Above all, these factors may make them prone to psychological distress, especially depression [3]. Many studies have reported the prevalence of depression in hypertensive patients, but quantitative estimation for the overall prevalence of depression is scarce [3].

## **CHAPTER THREE: METHODOLOGY**

### **3.1 Study design**

A cross-sectional study was conducted. Data from a single cohort (MLSFH 2018 dataset) was used.

### **3.2 Study site**

Data for this study was collected from Mchinji, Rumphu, and Balaka representing all the three administrative regions of Malawi i.e. Central, North, and Southern region respectively. Data was originally collected from these areas to represent 85% of Malawians who are believed to be living in rural areas.

### **3.3 Study population**

This study targeted all the elderly persons in the MLSFH “Mature Adult” dataset aged 60 years and above.

### **3.4 Inclusion and exclusion criteria**

All participants who were only 60 years and above in the dataset, who successfully consented voluntarily, took part in the previous MLSFH study, and were engaged in a meaningful conversation were included in the current study.

The parent MLSFH 2018 dataset also had mature adults aged below 60 years, as such these were dropped from the new dataset for analysis.

### 3.5 Study period

This study has been conducted for about twelve months. Although this study did not involve the actual field data collection, the fore-mentioned period includes the time from conceptualization of the research topic to the dissemination of results. Refer to the Gantt chart attached below for a detailed breakdown of activities.

*Table 1: Gantt Chart showing details of activities and time frames*

Activity	Time in Months												
	2020					2021							
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Protocol development & submission	■	■	■										
Ethical approval		■	■	■									
Data collection		■	■	■	■								
Data Analysis					■	■	■	■					
Thesis write up						■	■	■	■	■	■		
Thesis Submission											■	■	■
Dissemination of findings											■	■	■

### 3.6 Sample size

The study included all the 810 participants found in the MLSFH 2018 dataset who were aged 60 years and older at the time of data collection. This study maintained the multistage sampling approach as initially used in the parent study and thus all the participants in the three districts representing all the three regions of Malawi to ensure an adequate sample size for analysis.

### **3.7 Data collection**

Secondary data from MLSFH 2018 dataset “Surviving an Epidemic-SANE Study”- Mature Adult Dataset was used. The SANE study is a longitudinal study instituted around 1998 to understand the life events and wellbeing of people in the era of HIV/AIDs pandemic. A single cohort (2018 dataset) was extracted and analyzed cross-sectionally. The extracted dataset contained participant’s social demographic details such as age, gender, religion, occupation, marital status, family arrangement, tribe, region, and whether they had any other physical conditions or not e.g. Hypertension, diabetes, chronic pain.

This study used secondary data from MLSFH 2018 dataset “Surviving an Epidemic-SANE Study” specifically the “Mature Adult Dataset”. The SANE study is a longitudinal study which has data collected as far as 1998 to date which was instituted to understand the life events and wellbeing of people in the era HIV/AIDs pandemic. Such being the case, the researcher only extrapolated data of a single cohort (2018 dataset) to analyze it cross-sectionally. The researcher abstracted data from the *parent study* to include only the elderly aged 60 years and above in the new dataset. The study also included the participant’s social demographic details such as age, gender, religion, occupation, marital status, family arrangement, tribe, region, and whether they had any other physical conditions or not e.g. Hypertension, Diabetes, Chronic Pain. These factors were then against the formally obtained PHQ-9 and GAD-7 module scores from the parent study. The newly abstracted dataset was then put in an excel sheet and uploaded in Stata for analysis. Refer to appendix 3 for the new data extraction sheet.

### **3.7.1 Data collection tools**

This study only tabulated the results from the earlier scores obtained from the MLSFH 2018 dataset and followed the currently self-developed data extraction sheet. The original MLSFH data was captured using the validated Patient Health Questionnaire-9 (PHQ-9) for Depression and GAD-7 for anxiety. Refer to appendix 4 and 5 for the original PHQ-9 and GAD-7 sample questionnaires.

#### ***Patient Health Questionnaire-9 (PHQ-9)***

PHQ-9 is a self-administered diagnostic tool for making criteria-based diagnoses of common mental health disorders e.g. depression. It assesses whether one has had feelings of being hopeless, depressed, having little interest, feeling bad about self, wanting to hurt self/wanting to be dead within a period of two weeks. The official PHQ-9 guidelines classify the clinical scores according to the severity and prescribe treatment options for each score category as follows: (0–4) = minimal depression and require no treatment, (5–9) = mild depression requires watchful monitoring of symptoms and a repeat of PHQ-9 assessment at follow-up. A score of (10–14) = moderate depression, requires counseling, follow-up and, or introduction of medications, (15–19) = moderately severe depression, requires active treatment with pharmacotherapy and or psychotherapy). A score of between 20–27 = severe depression, requires immediate initiation of pharmacotherapy. The total score on the PHQ-9 module is 27. Refer to Appendix 4 showing the PHQ-9 sample questionnaire.

### ***Generalized Anxiety Disorder- 7 (GAD-7)***

GAD-7 module is a screening tool for anxiety. It has seven questions that assess whether one has had feelings of being bothered for the past four weeks; e.g., feeling anxious, nervous, feeling afraid, getting annoyed easily, feeling awful, etc. GAD-7 has a total of 21 scores. The official guidelines for GAD 7 module for severity has cut-off points such as 5, 10, and 15 representing mild, moderate, and severe anxiety respectively. The total score on the PHQ-9 module is 27. Refer to Appendix 5 showing the GAD-7 questionnaire.

NB- All the tools from the parent study used were validated, modified, and translated into Chichewa to suit the local context.

### **3.7.2 Data management**

The original data from MLSFH- Mature adult dataset and the new abstracted data were kept in a password-protected computer only accessed by the researcher. An abstracted dataset did not bear the names of participants. This ensured that study participant's information is kept private, confidential, and protected.

### **3.7.3 Data analysis**

Data was rechecked, cleaned and analyzed using Stata software version 14.0. Descriptive statistics were performed to describe the distribution of the participant's social demographic characteristics such as age, gender, religion, marital status, district, family arrangement, and primary language. A set cut off point of 10 was used to tabulate overall depression and anxiety. Classified cut-off points for severity for each module were also used. Cross tabulations using

Pearson Chi-Square test were executed to identify the association between the independent variables (social and physiological variables) against depression and anxiety. The association was determined at 5% significance level and statistical test of significance at 95% confidence interval with p-value at  $p < 0.05$ . The independent variables associated with depression and anxiety were then included in a binary logistic regression to determine the magnitude and direction of the association with anxiety and depression. Two Logistic regression models were run to determine factors that predicted depression and anxiety. The first model included social or physiological variables run separately to determine association with depression and anxiety. The second model had all the variables found to be statistically significant in the first model to isolate variables that were strongly associated with the two conditions. The strength of association was presented using odds ratio.

### **3.8. Result presentation**

Results have been presented in form of tables and figures.

#### **3.8.1 Anticipated results and use**

Results of this study have added further knowledge to the existing published results by MLSFH and other researchers in Malawi on mature adults utilizing similar or different data variables. The results will help in designing proper programs and interventions that will help to improve care and treatment pathways for the elderly in Malawi.

#### **3.8.2 Dissemination of findings**

The results of this study will be disseminated during conferences and in communities. Copies of dissertations will be made available at the College of Medicine library through COMREC and

district health offices for the three districts where MLSFH data was collected. The results of this study will also be published in a peer-reviewed medical journal.

### **3.9 Participant's protection**

The protocol for the current study was sent to COMREC to obtain a waiver to utilize the previously collected MLSFH Dataset. The *parent study* MLSFH "Surviving An Epidemic"-SANE-study already got approval from the National Health Research Committee (NHRC). Privacy and confidentiality was maintained at every stage of this study by ensuring that data was only handled by the researcher and kept in a password-secured laptop.

### **3.10 Study Limitations**

This study was cross-sectional in design therefore it fails to tell the direction of the relationship between the variables (causal-effect relationship) as data was collected at one point in time (extracted data from one cohort). Secondly, this study being cross-sectional, cannot fully describe the trend regarding the two conditions as such there is a need to exercise caution when generalizing the results to the general population. It requires further studies to build on it. The newly extracted dataset also had some other variables missing which are an important element in determining inequalities in health as well as predict the health status of participants.

## **CHAPTER FOUR: RESULTS**

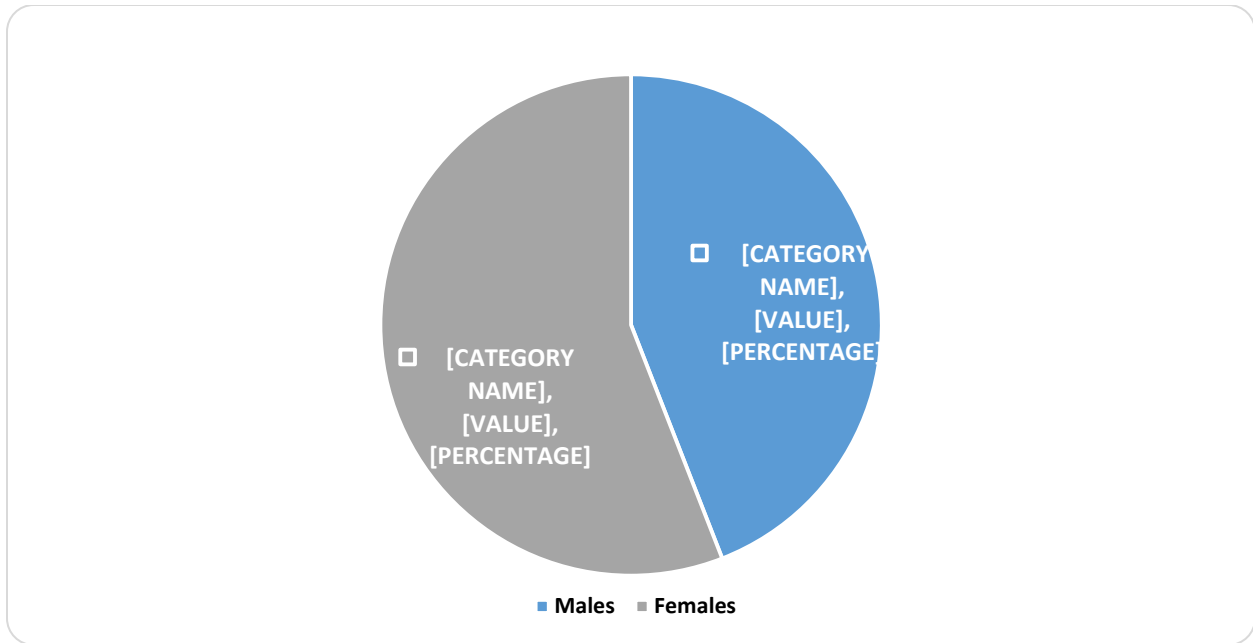
### **4.1 Introduction**

This chapter describes the social demographic details of the study participants in the Malawi Longitudinal study on family and health 2018 dataset (abstracted dataset) aged 60 years and above. The chapter further presents results on the occurrence as well as the social and physiological predictors of depression and anxiety of the study participants.

### **4.2 Social demographic details of participants**

#### **4.2.1 Gender of participants**

The new dataset had 810 participants aged 60 years and above captured from all the three sites in the parent data; Rumphu 30.82% (n=217), Mchinji 31.53% (n=222) and Balaka 37.64% (n=265), 44.07% (n=357) were males and 55.93% (n=453) were females. Refer figure 1 for the distribution of participant's gender.



**Figure 1: Distribution of participants by gender**

#### **4.2.2 Participants age distribution**

The dataset had participants aged between 60 and 100 years plus with a majority being in the age categories of 60-64 (24.07%) and 65-69 (22.72%) with mean age of 71 (SD=8.5) years. Age distribution of participants from the dataset was categorized with an age category of five in between each group. Computation of the dataset showed that a majority of participants were between the age categories of 60-64 (24.07%) and 65-69 (22.72%). Refer to table 1 for the distribution of participants according to age categories.

#### **4.2.3 Participants by religion**

Further analysis of variables showed that participants belonged to the following denominations; CCAP 24.50% (n=172), followed by Quadiriya Muslims 24.36% (n=171), indigenous Christians 15.38% (n=108), Catholic 15.4% (n=107), Church of Christ 6.84% (n=48), Sukutu Muslims 3.56% (n=26), Anglican 1.14% (n=8), Jehovah's Witness and those not belonging to any religion

had 0.57% (n=4) each, Baptist 0.43% (n=3) and the remaining percentage 3.99% (n=28) was distributed across the other denominations. Refer to table 1 for the distribution of participants according to religion.

#### **4.2.4 Marital status and marriage arrangement of participants**

On marital status, 62.41% (n=440) of participants were married or living together with their spouse whilst 29.22% (n=206) were widowed and the rest were either separated or divorced. Further analysis revealed that about 61.02%, (n=429) participants were from a patrilineal family arrangement, 38.69% (n=272) were from matrilineal family structure and 0.28% (n=2) did not know where they belonged. Refer to table 1 for the distribution of the other socio-demographic details.

**Table 2: Summary of distribution of participants' socio-demographic details**

Variable	Category	Frequency(n)	Percent %
<b>Age</b>	60 to 64	195	24.07
	65 to 69	184	22.72
	70 to 74	113	13.95
	75 to 79	85	10.49
	80 to 84	63	7.78
	85 to 89	46	5.68
	90 to 94	8	0.99
	95+	116	14.32
<b>District/Region</b>	Rumphi-North	217	30.82
	Mchinji-Central	222	31.53
	Balaka-South	265	37.64
<b>Marital Status</b>	Married	440	62.41
	Separated	8	1.13
	Divorced	51	7.23
	Widowed	206	29.22
<b>Religion</b>	No Religion	4	0.57
	Roman Catholic	107	15.4
	CCAP	172	24.50
	Quadiriya Muslims	171	24.36
	Church of Christ	48	6.84
	Sukutu Muslims	26	3.56
	Anglican	8	1.14
	Jehovah's Witness	4	0.57
	Baptist	3	0.43
	Indigenous Christians	108	15.38
	Other Religions	28	3.99
<b>Language</b>	Chewa	262	37.32
	Tumbuka	197	28.06
	Yao	187	26.64
	Other	56	7.98
<b>Marital Status</b>	Married/spouse	440	62.41
	Separated	8	1.13
	Divorced	51	7.23
	Widowed	206	29.22

### 4.3 Occurrence of depression and Anxiety

The scores abstracted from the parent study on depression and anxiety were as follows.

#### 4.3.1 Depression

The tabulated results showed that about 24.69% (n=200) out of 810 the participants were depressed. The results furthermore showed that about 40.49% (n=283) had minimal depression, 26.47% (n=185) had mild depression, 9.01% (n=63) moderate depression whilst 2.43% (n=17) had moderate to severe depression. Refer to table 2 for the prevalence of depression amongst study participants.

**Table 3: Prevalence of depression among participants**

Depression level	Cut off point	Frequency	Percentage
<b>Overall</b>	<b>&gt;=10</b>	<b>200</b>	<b>24.69</b>
Not depressed	0	142	20.31
Minimal	1-4	283	40.49
Mild	5-9	185	26.47
Moderate	10-14	63	9.01
Moderate to Severe	15-19	17	2.43

#### 4.3.2 Anxiety

Tabulated results for anxiety showed that about 19.63% (n=159) of the participants were anxious at an overall set cut-off point of 10. The analysis further categorized the symptoms using the cut-off points for symptom severity. The results revealed that about 51.08% (n=351) of participants had minimal anxiety, 24.53% (n=171) had mild anxiety, 5.16% (n=36) moderate anxiety, and 1.43% (n=10) had a severe form of anxiety. Refer to table 3 for the prevalence of anxiety amongst participants.

**Table 4: Prevalence of anxiety amongst study participants**

Anxiety level	Cut off point	Frequency	Percentage
<b>Anxious (Overall)</b>	>10	159	19.63
<b>Not anxious (Overall)</b>	<10	651	80.37
No anxiety	0	124	17.79
Minimal	1-4	356	51.08
Mild	5-9	171	24.53
Moderate	10-14	36	5.16
Moderate to Severe	15-21	10	1.43

#### **4.4 Association between Social-demographic factors on depression and anxiety**

Chi-square tests were tabulated to assess the association between the social demographic details against depression and anxiety. The results showed that age, gender, and marital status were significantly associated with depression and anxiety. On the other hand, family arrangement, language, the district/region, and religion were not associated with any of the two conditions. Refer to tables 4 and 5 showing the association between social-demographic factors against depression and anxiety respectively.

**Table 5: Association between social demographic factors and depression**

<b>Variable</b>	<b>Depression &lt; 10 (Not Depressed)</b>	<b>Depression &gt;=10 (Depressed)</b>	<b>Pearson chi2</b>	<b>Chi-Square (P-value)</b>
<b>Age category</b>				
60 to 64	185	10	390.6384	0.000**
65 to 69	167	17		
70 to 74	98	15		
75 to 79	73	12		
80 to 84	45	18		
85 to 89	33	13		
90 to 94	3	5		
95+	6	110		
<b>Gender</b>				
Male	287	70	8.8714	0.003**
Female	323	130		
<b>Marital status</b>				
Married / living together	400	40	19.9088	0.000**
Separated	6	2		
Divorced	42	9		
Widowed	162	44		
<b>Primary Language</b>				
Chewa	223	39	1.6879	0.640
Tumbuka	172	25		
Yao	166	21		
Other	47	9		
<b>Family arrangement</b>				
Matrilineal	238	34	2.5133	0.285
Patrilineal	371	58		
Do not know	1	1		
<b>Region/District</b>				
Mchinji	188	34	1.1543	0.562
Balaka	231	34		
Rumphu	191	26		

<b>Religion</b>				
No region	4	0	16.1276	0.185
Catholic	99	8		
Quadiriya Muslim	147	24		
Sukutu Muslim	24	1		
CCAP	147	25		
Baptist	3	0		
Anglican	5	3		
Pentecostal	17	0		
Seventh-Day Adventist	6	1		
Jehovah's witness	4	0		
Church of Christ	42	6		
Indigenous Christian	89	19		
Other	23	5		
<b>** Significant at 5% significance level</b>				

**Table 6: Association between social demographic factors and anxiety**

<b>Variable</b>	<b>Anxiety &lt; 10 (Not Anxious)</b>	<b>Anxiety ≥10 (Anxious)</b>	<b>Pearson chi2</b>	<b>Chi-Square (P-value)</b>
<b>Age category</b>				
60 to 64	184	11	371.7135	0.000**
65 to 69	171	13		
70 to 74	94	19		
75 to 79	70	15		
80 to 84	47	16		
85 to 89	30	16		
90 to 94	3	5		
95+	8	108		
<b>Gender</b>				
Male	282	75	5.5842	0.018**
Female	325	128		
<b>Marital status</b>				
Married / living together	391	49	14.3910	0.002**
Separated	8	0		
Divorced	46	5		
Widowed	162	44		
<b>Primary Language</b>				
Chewa	228	34	0.6879	0.876
Tumbuka	170	27		
Yao	158	29		
Other	49	7		
<b>Family arrangement</b>				
Matrilineal	238	34	2.5133	0.285
Patrilineal	371	58		
Do not know	1	1		
<b>Region/District</b>				
Mchinji	191	31		

Balaka	228	37	0.0453	0.978
Rumphi	188	29		
<b>Religion</b>				
No region	3	1	8.3556	0.757
Catholic	96	11		
Quadiriya Muslim	146	25		
Sukutu Muslim	20	5		
CCAP	147	25		
Baptist	3	0		
Anglican	6	2		
Pentecostal	16	1		
Seventh-Day Adventist	5	2		
Jehovah's witness	4	0		
Church of Christ	43	5		
Indigenous Christian	92	18		
Other	26	2		
<b>** Significant at 5% significance level</b>				

#### 4.4.1 Social predictors of depression amongst people aged 60 and above in Malawi

A logistic regression model run on all the social variables such as marital status, religion, language, marriage arrangement, and district showed that marital status i.e. being widowed, separated, and divorced were associated with depression. For instance, widows were 3.08 times at risk of developing depression compared to those who were married or living together (p-value <0.001), those who were divorce had 2.38 times risk of developing depression compared to those who were married or living together (p-value 0.038). Refer to table 6 below for a detailed logistic regression model on the effect of social factors on depression.

**Table 7: Logistic Regression Model on the effect of social factors on depression**

<b>Overall depression</b>	<b>Odds Ratio</b>	<b>Std. Err.</b>	<b>z</b>	<b>p&gt; z </b>	<b>[95% Conf. Interval]</b>	
<b>Marital status</b>						
<i>Married/Living together</i>	1	Base				
Separated	4.128857	3.657491	1.60	0.109	.7274527	23.43446
Divorced	2.380909	.9937735	2.08	0.038	1.050649	5.395453
Widowed	3.077805	.7791055	4.44	0.000	1.874005	5.054887
<b>Religion</b>						
<i>No religion</i>	1	Base				
Catholic	.3076361	.1964422	-1.85	0.065	.0880034	1.075413
Quadiriya Muslim	1.680582	1.225019	0.71	0.476	.4027142	7.0133
Sukutu Muslim	.4815576	.6126325	-0.57	0.566		.0397886
CCAP	5.828245					
Anglican	.6869163	.3839685	-0.67	0.502		.2296699
Seventh-Day Adventist	4.05878	3.783609	1.50	0.133		.652984
Church of Christ	25.22833					
Indigenous Christian	.8247411	1.010424	-0.16	0.875		.0747267
	9.102478					
	.540272	.370449	-0.90	0.369	.1409206	2.071335
	.8405705	.4831229	-0.30	0.763	.272484	2.593028
<b>Family arrangement</b>						
<i>Patrilineal</i>	1	(base)				
Matrilineal	1.069389	.1085647	0.66	0.509	.8764387	1.304818
<b>Language</b>						
<i>Chewa</i>	1	(base)				
Tumbuka	1.196819	.8179225	0.26	0.793		.313549
Yao	4.568265					
	.3515217	.1885563	-1.95	0.051		.1228478

Other	1.005858					
	.9855299	.4661858	-0.03	0.975	.3899648	
	2.490659					
<b>Region</b>	.7190132	.241527	-0.98	0.326	.3722252	1.38889

#### 4.4.2 Social predictors of anxiety amongst people aged 60 and above in Malawi

A multiple logistic model test executed to identify the social factors that were predicting the development of anxiety in the elderly population showed that marital status was statistically significant with anxiety. For instance, being a widow was strongly associated with anxiety (p-value 0.001), with a 2.24 times risk of developing anxiety compared to those who were married. Refer to table 7, for the effect of social factors on anxiety.

**Table 8: Logistic Regression Model on the effect of social factors on anxiety**

<b>Overall _anxiety</b>	<b>Odds Ratio</b>	<b>Std. Err.</b>	<b>z</b>	<b>p&gt; z </b>	<b>[95% Conf.</b>	
	<b>Interval]</b>					
<b>Marital Status</b>						
<i>Married/ living together</i>						
Divorced	1	(base)				
Widowed	0.8659169	.4343001	-0.29	0.774	.3240086 2.314173	
	2.244305	.5339159	3.40	0.001	1.407935 3.577512	
<b>Religion</b>						
<i>No religion</i>	1	(base)				
Catholic	0.203682	.2608392	-1.24	0.214	.0165534 2.506213	
Quadiriya Muslim	.3476733	.4785557	-0.77	0.443	.0234171 5.161898	
Sukutu Muslim	.5135549	.7538928	-0.45	0.650	.028909 9.123073	
CCAP	.294198	.3703358	-0.97	0.331	.0249545 3.468409	
Anglican	.6965605	1.06049	-0.24	0.812	.0352398 13.76844	
Pentecostal	.1110394	.1803291	-1.35	0.176	.0046038 2.678161	
Seventh-Day Adventist	.7228127	1.100544	-0.21	0.831	.0365593 14.29069	
Church of Christ	.2218511	.2940769	-1.14	0.256	.0165098 2.981125	
Indigenous Christians	.2963946	.3769937	-0.96	0.339	.0245019 3.585423	
Other	.1335517	.193369	-1.39	0.164	.0078247 2.279463	
<b>Marriage Arrangement</b>						
Matrilineal	1.087365	.2124511	0.43	0.668	.7414231 1.59472	

<b>Language</b>						
<i>Chewa</i>	1	(base)				
Tumbuka	1.279781	1.072426	0.29	0.768	.2476562	6.613364
Yao	.9888868	.5532939	-0.02	0.984	.3302853	2.960765
Other	.7857318	.4260951	0.44	-0.657	.2714411	2.274433
<b>Region</b>						
<i>Mchinji</i>	1	(base)				
Balaka	1.279781	1.072426	0.29	0.768	.2476562	6.613364
Rumphhi	.9888868	.5532939	-0.02	0.984	.3302853	2.960765
	.7857318	.4260951	0.44	-0.657	.2714411	2.274433

#### **4.5 Association between physiological factors, depression and anxiety**

To examine the association between physiological variables and the two conditions (depression and anxiety), a Pearson Chi-Square test was conducted. Results showed that having physical conditions for example experiencing pain, having a diagnosis of High Blood Pressure and Diabetes was associated with the two conditions. Having experience of pain was associated with both conditions with p-value of <0.001. High Blood pressure was mainly associated with anxiety (p-value <0.001) but marginally associated with depression (p-value of 0.066). Having a diagnosis of Diabetes was also associated with both depression and anxiety but only in women (p-value 0.006). Refer to table 8 below for the association between physiological factors against depression and anxiety.

**Table 9: The association between physiological factors against depression and anxiety**

Physiological factors	Depression		Anxiety	
	Pearson chi2	P-value	Pearson chi2	P-value
Age	390.6394	0.000**	371.7135	0.000**
Gender	0.8714	0.003**	5.5842	0.018**
Pain	39.6777	0.000**	29.2795	0.000**
High Blood Pressure	5.4459	0.066*	18.2654	0.000**
<b>Diabetes</b>				
Males	0.1182	0.943	0.4211	0.810
Females	6.2509	0.044**	10.3041	0.006**
<b>** Significant at 5% significant level</b>				

#### **4.5.1 Physiological predictors to depression**

A logistic model done on the physiological variables such Age, Gender, Diagnosis of high blood pressure, and pain showed that all the variables were associated with depression with the following p-values; age (p-value <0.001), gender (p-value 0.008), and having a diagnosis of pain (p-Value <0.001). Refer to table 9 for logistic regression on the effect of physiological factors on depression.

**Table 10: Logistics Regression Model of the effect of physiological factors on depression**

<b>Overall Depression</b>	<b>Odds Ratio</b>	<b>Std. Err</b>	<b>z</b>	<b>P&gt; z </b>	<b>[95% Conf. interval]</b>	
Age category	1.451719	.0937723	5.77	0.000	1.279087	1.64785
Gender	1.997274	.5175666	2.67	0.008	1.201878	3.31906
High Blood pressure	1.010617	.0181381	0.59	0.556	.9756849	1.046799
Pain	.7115988	.055538	-4.36	0.000	.6106631	.829218
_cons	.0852472	.0346218	-6.06	0.000	.0384572	.1889653

#### **4.5.2 Physiological factors on anxiety**

Logistic regression done on all the physiological factors against anxiety showed that all the physiological variables such as age, gender having pain and High Blood pressure were statistically significant. The results further showed that as age was increasing the level of anxiety was also increasing. Gender also had a significant bearing on anxiety in which females were 1.62 times at risk of developing anxiety compared to males. Those who had a diagnosis of Hypertension had a 1.75 risk of developing anxiety than those without the diagnosis. Experiencing pain was also found to be statistically significant where an increase in the intensity of pain was found to have a corresponding increase in the level of anxiety. For instance, those experiencing disabling pain had 2.80 times risk of developing anxiety compared to those without pain (p-value 0.004), those with severe pain had 2.49 risk (P-value 0.015), those with moderate pain had 4.08 risk (p-value <0.001), and those with slight pain had 1.31 times risk of developing anxiety compared to those who did not experience any pain in that particular year. See the table below for logistic regression showing the effect of physiological factors on anxiety.

**Table 11: Logistic Regression Model on the effect of physiological factors on *anxiety***

<b>Overall anxiety</b>	<b>Odds Ratio</b>	<b>Std. Err.</b>	<b>z</b>	<b>p&gt; z </b>	<b>[95% Conf. Interval]</b>	
<b>Gender</b>						
Female	1.624435	.4126359	1.91	0.056	.9873745	2.672532
<b>Age Category</b>						
65 to 69	1.07624	.4740718	0.17	0.868	.4539043	2.551843
70 to 74	2.873051	1.221613	2.48	0.013	1.248576	6.611071
75 to 79	3.917474	1.712644	3.12	0.002	1.662943	9.228581
80 to 84	4.476887	1.962958	3.42	0.001	1.895632	10.573
85 to 89	8.366178	3.934467	4.52	0.000	3.328296	21.02966
90 to 94	28.07799	24.6523	3.80	0.000	5.023615	156.9335
95+	4.0458	3.552237	1.59	0.111	.7238432	22.61332
<b>Pain-experienced</b>						
Disabling pain	2.800757	.9882109	2.92	0.004	1.40262	5.592563
Severe pain	2.487358	.9357368	2.42	0.015	1.189923	5.199455
Moderate pain	4.084595	1.457121	3.94	0.000	2.029995	8.218696
Slight pain	1.306115	.5532308	0.63	0.528	.5694273	2.995882
<b>H/Blood pressure</b>						
Yes	1.705205	.4323619	2.10	0.035	1.037411	2.802866
_cons	.0203246	.0085742	-9.24	0.000	.0088906	.046438

#### **4.6 Combined modeling for both social and physiological factors on depression and anxiety**

Using a predictive model, all the variables that were found to be statistically significant in the separate modules of depression and anxiety were aggregated in a single model for logistic regression in the second model to isolate those that still had a strong association with the two conditions to qualify as the main predictors of either depression or anxiety.

The variables such as age, gender, high blood pressure, the experience of pain, and marital status were included in the logistic model for depression. These variables were controlled for age and gender to identify the final variables that were the main predictors of depression according to the extracted dataset.

In the anxiety model, variables such as gender, age, marital status, and physical conditions such as high blood pressure, the experience of pain, and diabetes were included in the second model.

The results from the depression predictive model revealed that having pain, high blood pressure, and age was found to be the main predictors of depression. Further to that, results also revealed that an increase in age and intensity of the pain had a corresponding resultant increase in the level of depression. For instance, those in the age category of 80 to 84 were 5.77 times at risk of developing depression compared to those in a lower category of 60 to 64 years (p-value <0.001), those between 85 to 89 years' category were 5.53 times at risk compared to the 60 to 64 category (P-Value 0.001) and those in the 90 to 94 years' category had 28.79 times risk of developing depression compared to those in the lower category of 60 to 64 years (P-value < 0.001). Pain also had a similar effect on depression, i.e. an increase in pain levels had a corresponding effect on

depression. For example, those that had severe and disabling pain had a 2.85 times risk of developing depression compared to those without any experience of pain (p-value 0.002). Those with severe pain had 3.26 times risk of developing depression than those without pain (p-value 0.001) and those with moderate pain had a 2.25 times risk of developing the condition than those without pain (p-value 0.028)

On the other hand, factors such as age, having pain, high blood pressure were also found to be strong predictors of anxiety. After controlling for the other variables such as age, the gender of participants was found to be a marginal predictor of anxiety with a p-value of 0.099, with females being 1.69 times at risk of developing anxiety than their male counterparts.

The results also revealed that increased pain levels had increased risks of developing anxiety compared to those that had not experienced pain in that particular year. For instance, those that had severe disabling pain were 2.78 times at risk of developing anxiety compared to those without pain, those with severe pain had a 2.44 times risk, those with moderate pain had 4.00 times risk whilst those with slight pain had 1.26 times risk of developing anxiety than those who did not experience pain. The p-value for all these parameters was statistically significant. Those who had high blood pressure were also found to be 1.69 times at risk of developing anxiety compared to those without a diagnosis of high blood pressure (p-value of 0.041).

Results of modeling also revealed that age was associated with anxiety as well as a predictor for the same. The model still found that as age was increasing the risk of developing depression was also increasing. The categorical age groups showed that those between the ages of 90 to 94 years

had 28.37 times the risk of developing anxiety compared to those who were between 60 to 64 years with a p-value of  $<0.001$ . Those in the age category of 85 to 89 had a 7.97 times risk, p-value  $<0.001$  compared to those who were 60 to 64 years of age. Refer to tables 11 and 12 showing logistic regression on the effect of both social and physiological factors on depression and anxiety respectively. Refer to tables 11 and 12 for a combined predictive model for depression and anxiety respectively.

**Table 12: Logistic Regression Model on the effect of social and physiological factors on depression**

<b>Overall depression</b>	<b>Odds Ratio</b>	<b>Std. Err.</b>	<b>z</b>	<b>p&gt; z </b>	<b>[95% Conf. Interval]</b>	
<b>Marital status</b>						
Separated	4.253802	3.752939	1.64	0.101	.7547448	23.97477
Divorced	1.662399	.7805089	1.08	0.279	.06623532	4.172351
Widowed	1.305353	.4429642	0.79	0.432	.6712398	2.538507
<b>Gender</b>						
Female	1.628253	.5414396	1.47	0.143	.8485422	3.124425
<b>Age Category</b>						
65 to 69	1.457907	.6271035	0.88	0.381	.6274722	3.387391
70 to 74	2.102579	.9631166	1.62	0.105	.8567366	5.160092
75 to 79	2.836159	1.339618	2.21	0.027	1.123772	7.15786
80 to 84	5.771707	2.684092	3.77	0.000	1.123772	14.35984
85 to 89	5.533691	2.794748	3.39	0.001	2.056469	14.35984
90 to 94	28.79175	25.76067	3.76	0.000	4.985146	166.287
95+	9.821403	7.735974	2.90	0.004	2.097548	45.987
<b>Pain-experienced</b>						
Disabling pain	2.864472	.9792775	3.08	0.002	1.465697	5.598156
Severe pain	3.264208	1.156338	3.34	0.001	1.630204	6.536031
Moderate pain	2.25716	.8370926	2.20	0.028	1.091151	4.669171
Slight pain	.4106812	.2372259	-1.54	0.123	.1323782	1.274069
<b>H/Blood pressure</b>						
Yes	1.430366	.3775946	1.36	0.175	.8525954	2.399668

**Table 13: Logistic Regression Model on the effect of both social and physiological factors on anxiety**

<b>Overall anxiety</b>	<b>Odds Ratio</b>	<b>Std. Err.</b>	<b>z</b>	<b>p&gt; z </b>	<b>[95% Conf. Interval]</b>	
<b>Marital status</b>						
Divorced	.644614	.3555849	-0.80	0.426	.2186533	1.900393
Widowed	.9974337	.3261188	-0.01	0.994	.5255052	1.893176
<b>Gender</b>						
Female	1.690617	.5375715	1.65	0.099	.906537	3.152861
<b>Age Category</b>						
65 to 69	1.0741	.4742671	0.16	0.871	.4520662	2.552038
70 to 74	2.772298	1.188891	2.38	0.017	1.196203	6.425028
75 to 79	3.868503	1.718851	3.04	0.002	1.619339	9.241623
80 to 84	4.395264	2.001409	3.25	0.001	1.800468	10.72962
85 to 89	7.97372	3.848513	4.30	0.000	3.096198	20.53493
90 to 94	28.36614	25.26318	3.76	0.000	4.951207	162.5135
95+	3.799856	3.410057	1.49	0.137	.6544616	22.06227
<b>Pain-experienced</b>						
Disabling pain	2.776972	.9856131	2.88	0.004	1.385032	5.567793
Severe pain	2.443729	.9214942	2.37	0.018	1.167018	5.117155
Moderate pain	4.000675	1.430971	3.88	0.000	1.984602	8.064792
Slight pain	1.260672	3.410057	0.55	0.585	.5485093	2.89747
<b>H/Blood pressure</b>						
Yes	1.685358	.4294906	2.05	0.0426	1.022763	2.77721

## CHAPTER FIVE: DISCUSSION

In this study, the prevalence of depression and anxiety were found to be 24.69% and 19.63% respectively. The main predictors of the two conditions were age, gender, marital status, diagnosis of pain, and high blood pressure.

Results of this study agree with another study conducted in Malawi utilizing the MLSF 2012/2013 dataset. The earlier study also found that age was associated with depression and anxiety (mostly mild to moderate levels) amongst the adults. The previous study also found a similar positive age gradient pattern in terms of depression and anxiety development i.e. as age increases the level of depression and anxiety also increases [24]. This trend is reported to be common in low and middle-income countries as compared to what is observed in high-income regions where there is a steady decline in the level of DA as age increases [24].

Although this study did not isolate factors to explain the present positive age gradient, the trend could be as a result of poor resource allocation in resource-poor or deficient regions for screening and management of the psychological and physical conditions, establishment of proper referral, and care pathways in for the elderly populations. For example, in other countries such as Austria, there are well-established systems and programs aimed at improving geriatric psychiatry as a specialty on its own [17]. The country also has adequate medical personnel, proper laws and policies that guide the management of older persons. This is not the case in Malawi and of course other less-resourced countries.

Although these two studies (MLSFH) had some similarities, the observed prevalence of the current study was a bit higher 24.69% compared to the previous one. The current study also differed from the one conducted earlier in terms of the study population as the previous study used the general adult population from the age of 45 years and above. The rates might be different due to differences in participant's characteristics i.e. the previous study had a bit of a youthful population who are a bit at a reduced risk of developing anxiety and depression hence having such a lower recorded prevalence.

The results of this study also concurred with several studies that have reported high levels of depression and anxiety amongst women compared to their male counterparts. For instance, a study done in the Netherlands (Amsterdam) found that the level of depression amongst women was almost twice as much compared to men [40]. Similarly, in Nigeria a high incidence of these two conditions and psychiatric morbidities were reported especially amongst females [15].

A study conducted in Malaysia to explore the prevalence and determinants of depressive disorders in community-dwelling adults also found that women were more vulnerable to depressive disorders (56.6%) compared to men (43.4%). The study isolated hypertension, poor fitness level, and osteoarthritis (an inflammatory condition involving bones, and muscles) as factors that have a bearing on the development of depression. Although these results are in line with the current study, the latter had found a bit a lower prevalence of 16.5%. The other study also assessed neurotic disorders and education level where they found that less education and neurotic disorders were also other determinants of depression [41]. However, the current study did not explore such factors.

The results of this study are also in agreement with a study done in Jordan amongst adults 60 years and above where about 22% of older adults had depression, especially mild levels. The study also found that divorce and widowhood as risk factors for the development and severity of depression. Although the results of these two studies look similar, this study has a slightly increased rate of depression (24.69%). These two studies also utilized different tools to assess the condition i.e. Geriatric Depression Scale and PHQ-9 respectively [16].

Across-sectional study done in the Livno area in Bosnia and Herzegovina to explore the prevalence of anxiety and depression amongst adults 60 years and above found that 90% of the respondents had bolder-line anxiety and depression [42]. Results from these two studies had some commonalities, i.e., both found a significant occurrence of depression and anxiety amongst those age 60 years and above, that religion had no significant influence on the development of the two conditions. Despite these two similarities, these studies reported different findings in terms of incidences between males and females where the latter found high incidence of depression amongst males whilst anxiety was higher amongst females. The current study only found high incidences amongst females for both conditions. Differences in sample sizes might have contributed to such results e.g. the latter only had 100 respondents from just one location whilst the current study had 810 respondents from three different districts. The studies also utilized different assessment tools.

A study in Greece on the social demographic predictors of depression found a slightly increased prevalence of about 31% but also found that being married or cohabiting was associated with good outcomes against depression [5]. Similarly, a community-based study in North Talminadu

in India also found that increase in age, being divorced, unmarried, being a widow or widower was associated with depression [20]. These two studies also support the current study findings despite the other differences.

A cross-sectional comparison study in Ghana and Nigeria on determinants of depression among patients with hypertension, found a prevalence of depression of about 41.7% and 26.6% among the Ghanaian and Nigerian cohorts, respectively. Predictors of depression in the Nigerian cohort were age in years, concern about medications and poor BP control. Young age was the only independent predictor of depression in the Nigerian cohort but none of the factors included in the study predicted depression in the Ghanaian cohort. The prevalence for depression in Ghana is in agreement with the current study but that of Nigeria is a bit higher than the current study. However, both studies isolated age and hypertension as significant predictors of depression [43].

Some of the results in this study are in sharp contrast with what was found in Nepal where they found a high prevalence of depression of about 57.8% amongst the adults aged 60 years and above. The study also found association between family type and depression which was not the case with the current study. However, both studies found association between age, sex and depression [20].

A study done in Ouagadougou, Burkina Faso, also found results contrary to the current study where the prevalence of major depressive episodes was at 4.3 % (95 % CI: 3.1–5.5 %) among adults in five outlying neighborhood of the city [26]. These differences could have been due to the differences in the social demographic details of study participants as the later recruited

participants from the age of 15 and above. These people have different needs and also cope differently. However, both studies identified a strong association between major depressive episode and chronic health problems, and functional limitations.

Several studies have also found the association between anxiety, depression, and hypertension. For instance, a study in India (Punjab) in institutionalized adults and those living with their families found a prevalence of 68.5% in institutionalized services and 31.5% in those being managed by their relatives. The study also found an association between depression and hypertension [44]. The results of the current study concur with the findings of this study specifically for the community-based adults and the association between depression and hypertension. However, these studies were different in design as the latter was comparing institutionalized and community-based adults specifically men, and excluded women from the study.

A systematic review and meta-analysis study done in china using online databases such as PubMed, Web of knowledge, China Internet of Knowledge e.t.c, found an association between depression and hypertension. Prevalence of depression in hypertensive patients was found to be 26.8% and it was slightly higher for males 24.6% compared to females 24.4%. The results also showed that hospital-based studies had a higher score of 27.2% compared to the community studies which had a prevalence of 26.3% [45]. The results of this study are different from the current study where it found a higher prevalence in men than women whereas the current results show an increased risk in women compared to men. Although these studies are different in

approach, strength, and setting, they all acknowledge the association between hypertension and depression.

Other studies have also looked at the impact of insomnia and short sleep duration which are typical symptoms of depression. The results show that depression has an impact on the development of hypertension subsequently due to structural changes in the cardiovascular system and chemical mediators. This kind of association might be a contributing factor to the co-morbidity of these two conditions. However, the current study didn't look at this aspect to isolate the causal-effect relationship [35,46]

Another retrospective cohort study in Wisconsin- USA, also found an association between anxiety, depression, hypertension, and cardiac-related condition with an overall prevalence of about 13% at baseline diagnosis of anxiety and depression. The study further recommended that prompt treatment of mental health problems was key to the management of hypertension.[47]. Although the previous study was focusing on the causal-effect relationship, the results still support the current study that depression and anxiety exist between these two conditions. Although the prevalence of the current study is slightly higher, these two studies differed in the approach as the current one was cross-sectional, had many variables to assess and also had a different population under investigation i.e. the current study used adults 60 years and older whilst the cohort study had participants aged 18 years and above. These might have contributed to the differences in the results.

The current study further found that experiencing pain in adulthood was associated with both anxiety and depression. An increase in the intensity of the pain had a corresponding result in the degree of anxiety and depression. This could be so because of the perceived effect on their quality of life as physical conditions limit one's ability to do activities of daily living hence being anxious with resultant depression as also found in other studies [25]. Kohler et al also observed a similar trend in Malawi in the earlier study [24].

Another cross-sectional community-based study in 47 low and middle-income countries utilizing data from the world health survey for adults above the age of sixty, also found that adults with physical conditions such as arthritis, chronic back pain were associated with depression and anxiety [48]. This phenomenon could be a result of poor quality of life as a result of pain and limitation in doing some activities of daily living resulting in excessive worries hence the development of psychological disorders.

Though as seen from the several studies, results from these studies are similar whilst some are different. These might be due to different methods used, settings, culture, differences in socio-cultural pressure, and assessment tools.

## **CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS**

### **6.1 Conclusion**

This study has found a significant percentage of older rural Malawians who are affected by anxiety and depression. Therefore, it proposes that there must be proper programs specific for the aged persons to address their specific physical and mental health needs as these two states have an impact on others with resultant compromise on the quality of life of the elderly.

### **6.2 Recommendations**

#### **6.2.1 Policy**

At the policy level, there is a need to come up with policies and measures that specifically address the needs of the elderly. The policies should specifically focus on improving the quality of life and welfare of the aged by improving geriatric care. This can be done by coming up with laws and policies that aim at protecting the elderly, improve referral and care pathways for the elderly into different care pathways for their physical and mental healthcare.

#### **6.2.2 Research**

There is a need for further research in this area to build on the existing studies conducted in this area in Malawi to come up with more evidence to guide policies and practice. For example, subsequent studies might focus on identifying the direction of the relationship between the variables, to establish the causal-effect relationship, the actual magnitude of the problem, isolate the main factors contributing to gender differences for the two conditions in Malawi.

There is a need for following up the trend of these two conditions longitudinally help in confirming the global projection/ assumptions made in other studies as to whether such projections apply in the Malawian context so that appropriate interventions are carried out to control the trend. For instance, the global indicators project that depression will be the second leading cause of disability contributing to the QALY' s and DALY's by the year 2020. The trend in Malawi can be established by using the same MLSFH by extracting data at intervals as done in the current study which only utilized 2018 dataset.

It might also be important to conduct similar studies in other settings for example, in urban settings or extend to other districts in Malawi. Such an approach can help to identify the differences or similarities in magnitude, sociodemographic characteristics and other factors that might have a bearing on the prevalence and development of the two condition in different settings. This can help in the design and planning of interventions as well as allocation of resources based on the need. The current study population mainly focused on the rural population where it is believed that almost 85% of Malawians live.

There is also a need to utilize different study designs, methods, tools and variables to come up with proper picture of the situation in the country for proper generalization to the general population. Utilization of such approaches (Triangulation) can enrich data in this area. Inclusion of other variables in the designs can also help to isolate other important variables that have a significant bearing on quality of life for such populations. For instance, other studies have reported that anxiety and depression are transient in nature, meaning their development depends the kinds of stressors that people are passing through at that particular time. In the meantime, it

might also be important to explore how Covid-19 has impacted the elderly population in terms of development of anxiety, depression or any other significant psychological conditions in Malawi.

### **6.2.3 Practice**

There is also a need to come up with programs and interventions that can effectively address the physical and psychological needs of the elderly. As seen from different studies, it is evident that psychological and physical conditions affect each other from different directions which makes the cycle difficult to break sometimes. Hence management of these conditions should always take a holistic approach.

There is also a need to invest in training and having an adequately qualified workforce, ensure multi-sectoral and multidisciplinary approach to ensure that the needs of the elderly are properly handled. These may include, physicians, psychiatrists, psychologists, counselors, social workers, nurses, speech therapists, nutritionists, occupational therapists, inclusion of other significant sectors, etc.

There is also a dire need to invest in elderly-specific infrastructure specifically to address their needs e.g. respite centers, daycare centers, or nursing homes.

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## APPENDICES

### Appendix 1: Budget and justification

The estimated budget for the entire study is MK 839, 300. See the table below

	Description	Quantity	Unit price (MK)	Total amount (Mk)
Stationery	Item Reams of Paper	4	4,500	18, 000
External hard-drive for data storage and backup	500GB	1	60,000	60,000
Communication	Internet/transport & Airtime	Lump-sum	60,000	60,000
Printing and copying services	5 copies	5,000	25,000	25,000
Laptop		1	400,000	400,000
Linguistic Care		1 copy	70, 000	70, 000
Binding dissertations		5 copies	10,000	50, 000
Research statistician	Allowance for one person	7 days	10, 000/day	70,000
<b>Sub-total</b>				<b>763,000</b>
COMREC administration fee	10 % of the budget			76,300
<b>Total</b>				<b>MK 839, 300</b>

## **Appendix 2: Budget justification**

**Stationery:** The project shall require papers for the printing of drafts as well as final documents (research dissertation). Approximately the project shall produce about 5 hard copies hard of the research dissertation which might require 4 rims of papers costing MK4500 each.

**External hard drive:** The project will require a portable hard drive (500GB) for storage and backup of research data and other relevant research journals or documents. An external hard drive costs approximately MK60, 000.

**Communication Costs:** The whole process of doing the research shall require communication with research supervisors, custodians/owners of data, peers, Ethics committee, statistician, etc. communication can either be through phones, emails, zoom/Skype meetings as well as an actual physical meeting which might require transportation costs hence the need for communication and internet costs. Approximately MK60, 000 might curter for all the costs.

**Laptop:** A laptop shall be used for various purposes such as storage of data, communication, and installation of relevant software for analysis of the data.

**Printing and photocopying services:** The study shall require printing and photocopying of some other documents relevant documents including copies of dissertations. Each copy might cost about MK5000.

**Research statistician:** During research data analysis, an external statistician shall also be outsourced and engaged to assist in the other areas during analysis hence requiring a payment.

**Linguistic Care:** as per requirement every research dissertation is supposed to undergo some external scrutiny for language and grammatical review as such the reviewer's services shall require payment of MK70, 000.

**Binding dissertations:** binding of the 5 documents in readiness for submission shall attract a fee of MK12, 000 per document with a total of MK60, 000 for all the 5 documents

**COMREC administration fee:** As per protocol, the research ethics committee gets 10% of the total cost of the total research project budget. Therefore, a total of MK 76, 300 shall go to COMREC as a research administrative/processing fee.

### Appendix 3: Data abstraction / extraction tool

<b>Participants social-Demographic Details</b>	1. Age <input type="checkbox"/> 2. Gender Male <input type="checkbox"/> Female <input type="checkbox"/> 3. Educational level Primary <input type="checkbox"/> Secondary <input type="checkbox"/> Tertiary <input type="checkbox"/> 4. Tribe Tumbuka <input type="checkbox"/> Chewa <input type="checkbox"/> Yao <input type="checkbox"/> 5. Religion CCAP <input type="checkbox"/> Catholic <input type="checkbox"/> Anglican <input type="checkbox"/> 6. Marital Status Married <input type="checkbox"/> Separated <input type="checkbox"/> Widow <input type="checkbox"/> 7. Region North <input type="checkbox"/> Central <input type="checkbox"/> South <input type="checkbox"/> 8. Occupation Farmer <input type="checkbox"/> Employed <input type="checkbox"/> Business <input type="checkbox"/> 9. Number of children <input type="checkbox"/> 10. Marriage Arrangement Chikamwini <input type="checkbox"/> Chitengwa <input type="checkbox"/>									
<b>Physiological Conditions</b>	1. Diabetes Yes <input type="checkbox"/> No <input type="checkbox"/> 2. Hypertension Yes <input type="checkbox"/> No <input type="checkbox"/> 3. Chronic Pain Yes <input type="checkbox"/> No <input type="checkbox"/> 4. Stroke Yes <input type="checkbox"/> No <input type="checkbox"/> 5. Cardiac Conditions Yes <input type="checkbox"/> No <input type="checkbox"/>									
<b>PHQ-9 Questionnaire</b>	Scores				<b>GAD-7 Questionnaire</b>	Scores				
<i>Over the last 2 weeks, how often have you been bothered by any of the following problems?</i>	0	1	2	3	<i>Over the last 2 weeks, how often have you been bothered by the following problems?</i>	0	1	2	3	
a. Little interest or pleasure in doing things					1. Feeling nervous, anxious, or on edge					
b. Feeling down, depressed, or hopeless					2. Not being able to stop or control worrying					
c. Trouble falling/staying asleep, sleeping too much					3. Worrying too much about different things					
d. Feeling tired or having little energy					4. Trouble relaxing					
e. Poor appetite or overeating					5. Being so restless that it's hard to sit still					
f. Feeling bad about yourself or that you are a failure or have let yourself or your family down					6. Becoming easily annoyed or irritable					
g. Trouble concentrating on things, such as reading the newspaper or watching television					7. Feeling afraid as if something awful might happen					
h. Moving or speaking so slowly that other people could have noticed. Or the opposite; being so fidgety or restless that you have been										

moving around a lot more than usual.									
i. Thoughts that you would be better off dead or of hurting yourself in some way									

## Appendix 4: PHQ-9 Questionnaire

### Patient Health Questionnaire (PHQ-9)

Patient Name: \_\_\_\_\_

Date: \_\_\_\_\_

	Not at all	Several days	More than half the days	Nearly every day
1. Over the <i>last 2 weeks</i> , how often have you been bothered by any of the following problems?				
a. Little interest or pleasure in doing things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Feeling down, depressed, or hopeless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Trouble falling/staying asleep, sleeping too much	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Feeling tired or having little energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Poor appetite or overeating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Feeling bad about yourself or that you are a failure or have let yourself or your family down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Trouble concentrating on things, such as reading the newspaper or watching television.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Moving or speaking so slowly that other people could have noticed. Or the opposite; being so fidgety or restless that you have been moving around a lot more than usual.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Thoughts that you would be better off dead or of hurting yourself in some way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. If you checked off any problem on this questionnaire so far, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?				
	Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Appendix 5: GAD-7 Questionnaire

### Generalized Anxiety Disorder 7-item (GAD-7) scale

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all sure	Several days	Over half the days	Nearly every day
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it's hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3
<i>Add the score for each column</i>	+	+	+	
Total Score ( <i>add your column scores</i> ) =				

If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all \_\_\_\_\_

Somewhat difficult \_\_\_\_\_

Very difficult \_\_\_\_\_

Extremely difficult \_\_\_\_\_

## Appendix 6: MLSFH data use agreement form



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Hans-Peter Kohler  
MLSFH Study Director &  
E.J. Warren Professor of Demography  
hpkohler@pop.upenn.edu

### Data Use Agreement for Restricted Data Collected as Part of the Malawi Longitudinal Study of Families and Health (MLSFH):

- (1) 2019– Surviving an Epidemic Data
- (2) 2012– Mature Adults Cohort (MLSFH MAC) Data
- (3) 2017– Adverse Childhood Experiences (MLSFH ACE) Data
- (4) Any other MLSFH data not included in the MLSFH public use data files

The Malawi Longitudinal Study of Families and Health (MLSFH) has collected Restricted Data that are not yet made publicly available. The MLSFH Restricted Data currently include (1) the 2019– Surviving an Epidemic (MLSFH SANE) Data, (2) the 2012– Mature Adults Cohort (MLSFH MAC) Data, and (3) the 2017– Adverse Childhood Experiences (MLSFH ACE) Data, and other MLSFH data not included in the MLSFH public use data files (e.g., 2020 MLSFH Covid-19 Surveys, MLSFH Health Care Provider and Health Care Facility Surveys, etc).

These MLSFH Restricted Data are shared with interested researchers for **collaborative analyses and joint publication** that involve relevant key investigators from the MLSFH Surviving an Epidemic (MLSFH SANE), MLSFH Mature Adults Cohort (MLSFH MAC) and/or MLSFH Adverse Childhood Experiences (MLSFH ACE) projects.

By signing this form and obtaining the requested data set from the **Malawi Longitudinal Study of Families and Health (MLSFH)**, the user of the 2012–17 MLSFH Mature Adults Data agrees:

1. Coordinate research activities and research papers with the PIs of the MLSFH SANE, MLSFH MAC and MLSFH ACE Projects: Hans-Peter Kohler (mailto:hpkohler@pop.upenn.edu), Iliana Kohler (mailto:iliana@pop.upenn.edu) and Rachel Kidman (mailto:Rachel.Kidman@stonybrookmedicine.edu)
2. Co-author all publications with relevant key investigators from the Malawi Longitudinal Study of Families and Health (MLSFH) and/or its subprojects (MLSFH-MAC, MLSFH-ACE, MLSFH-SANE, etc.), with co-authorship based on adequate contributions to analyses and/or writing-up of results.
3. To use any MLSFH data, including the restricted-use MLSFH SANE, MLSFH MAC and MLSFH ACE Data, solely for research purposes, including statistical reporting and analysis.

4. To obtain relevant IRB and possibly other required approvals before using MLSFH data.
5. Not to share these data with, or provide copies of these data to, any other person or organization. Data are to be used exclusively and without exceptions by the signatory of this form. Distribution/sharing of these data is exclusively through the MLSFH Principle Investigator subject to review and data use agreement.
6. To return or destroy any MLSFH data, including the restricted-use MLSFH SANE, MLSFH MAC, MLSFH ACE Data and other restricted-use MLSFH data, as well as any derivative data files, upon request from MLSFH.
7. To make no attempt to link this data set with individually identifiable records from any source, or in any other way attempt to identify the persons in this or other MLSFH datasets.
8. That if the identity of any person or establishment in this data set is inadvertently discovered, then (a) no use will be made of this knowledge, (b) the Principle Investigator of the MLSFH (Hans-Peter Kohler) will be advised of this incident immediately, (c) the information that would identify any individual or establishment will be safeguarded or destroyed, as requested by the MLSFH, and (d) no one else will be informed of the discovered identity.
9. No data or results will be reported in any papers, publications, presentations, maps, etc. that will allow the identification of individuals who have participated in the MLSFH, the households of MLSFH participants and/or their villages of residence. This includes adhering to the following guidelines when producing tabulations for distribution:
  - Magnitude Data: Ensure that no cells/strata with  $n < 5$  are produced.
  - Frequency Data: Apply a marginal threshold of  $n \geq 5$  and cell threshold of  $n \geq 5$  to all tabulations.
  - Protecting against complementary disclosure: Additional cells may be suppressed, i.e., complementary disclosure, to make sure the primary suppressions cannot be derived by subtraction from published marginal totals.
10. Aggregate statistical summaries of the data and analyses (frequency tabulations, magnitude tabulations, means, variances, regression coefficients, and correlation coefficients): These are approved under this agreement and may be freely published by the User, subject to the provisions above.
11. To cite the MLSFH as the data source in any publications or research based upon these data, and to provide a copy of any publications to the MLSFH (mailto:hpkohler@pop.upenn.edu, mailto:ciliana@pop.upenn.edu and mailto:rachel.kidman@stonybrookmedicine.edu). The following citation should be included in any research reports, papers, or publications based on these data:  
Kohler, Hans-Peter et al. (2015). "Cohort Profile: The Malawi Longitudinal Study of Families and Health (MLSFH)." *International Journal of Epidemiology* 44(2), 394-404. DOI: 10.1093/ije/dyu089.
12. In addition, the funding for the MLSFH should be acknowledged, for instance using the following acknowledgments (or appropriate modifications thereof):  
**For MLSFH SANE and MLSFH MAC related projects:** "The Malawi Longitudinal Study of Families and Health (MLSFH) Mature Adults Project has been supported by the National Institute of Child Health and Human Development (NICHD, grant numbers R05 HD05 8976, R21 HD050653, R01 HD044228, R01 HD053381, NICHD R01 HD087391), the National Institute on Aging (NIA, grant numbers R21 AG053763 and P30 AG12836).

the Boettner Center for Pensions and Retirement Security at the University of Pennsylvania, and the NICHD Population Research Infrastructure Program (grant number R24 HD-044964), all at the University of Pennsylvania. We are also grateful for support through the Swiss Programme for Research on Global Issues for Development (SNF r4d grant 400640\_160374), as well as pilot funding received through the Penn Center for AIDS Research (CFAR), supported by NIAID AI 045008, and the Penn Institute on Aging."

**For MLSFH ACE-related projects:** "The Malawi Longitudinal Study of Families and Health (MLSFH) Adverse Childhood Experiences (ACE) Project has been supported by the National Institute of Child Health and Human Development (NICHD, grant numbers R01 HD090988, PIs R. Kalwan and H-P. Kohler). In addition, the MLSFH has been supported by the National Institute of Child Health and Human Development (NICHD, grant numbers R03 HD05 8976, R21 HD050653, R01 HD044228, R01 HD053781, NICHD R01 HD087391), the National Institute on Aging (NIA, grant numbers R21 AG053763 and P30 AG12836), the Boettner Center for Pensions and Retirement Security at the University of Pennsylvania, and the NICHD Population Research Infrastructure Program (grant number R24 HD-044964), all at the University of Pennsylvania. We are also grateful for support through the Swiss Programme for Research on Global Issues for Development (SNF r4d grant 400640\_160374), as well as pilot funding received through the Penn Center for AIDS Research (CFAR), supported by NIAID AI 045008, and the Penn Institute on Aging."

13. To maintain a secure computing environment for storage and use of this data set and any data sets derived from it.
14. To hold harmless and indemnify the MLSFH and the University of Pennsylvania, its agents and employees, for any claims of breaches of confidentiality arising out of my research, defined as failure to abide by any section of this agreement or any accidental or intentional violation of privacy of any contributor to any MLSFH data resource.

  
Signature

27/08/20  
Date

MC  
Title

JUSTICE UHOSA  
Name (printed or typed)

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Phone

Please indicate:  
Add Email to Malawi Research Group Listserv?

Yes  No

**Appendix 7: COMREC Ethical Approval Certificate**

