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FARMING RISK FACTORS, GENDER, SOCIAL SUPPORT, AND MENTAL HEALTH OF CROP FARMERS IN GHANA

BY

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DECLARATION

I hereby declare that this thesis titled 'Farming risk factors, gender, and social support and mental health of crop farmers in Ghana' is the result of my independent work undertaken under supervision at the Institute of Statistical Social and Economic Research (ISSER), University of Ghana. To the best of my knowledge, no part or whole of this thesis has been submitted for the award of another degree elsewhere. References to other works have been duly acknowledged.

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We, the undersigned, certify that this thesis is the original work produced by the candidate under our supervision. We are convinced that the thesis meets the requirements of the University of Ghana for the award of a Doctor of Philosophy degree.

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ABSTRACT

The crop production sectors face many challenges that impact the productivity of farmers in Ghana. However, one critical health component which has received less attention is the impact of the challenges such as the attack of pests and diseases, loss of crops, and the lack of access to farm inputs on the mental health of crop farmers. This study aimed at exploring the institutional and ecological risk factors influencing the mental health of crop farmers, gender differences in the risk factors, as well as the role of social support in the mental health of the crop farmers in Ghana. A national scope of the problem was assessed with the 2009/2010 and 2013/2014 panel data of the Ghana Socioeconomic Panel Survey (GSEPS) and qualitative data gathered in the then Western and Eastern regions of Ghana. The fixed-effects panel regression model and thematic analysis were used to analyze both data.

The findings revealed significantly high depression among crop farmers, with females being highly depressed. Farming risk factors including lands watered from a source other than rainwater, loss of crops, agricultural media extension, and the access to agricultural assets put farmers at risk of depression. Contrarily, urban farmers, farm rights, security on plots, and the number of farmlands decrease the risk of depression. Furthermore, social support comprising of social networking and institutional (social) services acts as a buffer for the mental health of the farmers. Nonetheless, media extension service (extension service through the radio, television and newspaper) put farmers at risk of depression. Generally, depression was more common among food (maize) compared to cash (cocoa) crop farmers.

The findings are relevant to stakeholders to consider promoting mental health education among farming populations, and possibility the development of a comprehensive agricultural mental health policy. It is important to intensify gender-sensitive programmes in agriculture and equip crop farmers, particularly food and cash crop farmers with access to farm tools, irrigational avenues and extension services in the ongoing structural changes in the agricultural sector.

Keywords: Mental health, depression, farmers, social support, gender, Ghana

DEDICATION

I dedicate this thesis to my life companion and beloved, Kwame Essien, my children, Adwoba, Yaaba, and Papa Kofi Essien, and my Dad, Mr. Felix Boateng of blessed memory. They all, by some means, sacrificed to get me through.

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LIST OF ACRONYMS

ACC	Accident Compensation Corporation
ANOVA	Analysis of Variance
CES-D	Center for Epidemiology Studies Depression
CESD-R	Center of Epidemiology Scale for Depression- Revised
Cocobod	Ghana Cocoa Board
CODAPEC	National Cocoa Diseases and Pest Control
CRIG	Cocoa Research Institute of Ghana
DOA	Department of Agriculture
DSM	Diagnostic Statistical Manual
EGC	Economic Growth Center
FAO	Food and Agriculture Organization of the United Nations
GCB	Ghana Cocoa Board
GDP	Gross Domestic Product
GDS-S	Geriatric Depression Scale- Short
GHQ	General Health Questionnaire
GHS	Ghana Health Service
GLSS	Ghana Living Standards Survey
GSEPS	Ghana Socioeconomic Panel Survey
GSS	Ghana Statistical Service
HADS-D	Hospital Anxiety and Depression Scale
IEA	Institute of Economic Affairs
ILO	International Labour Organization,
ISSER	Institute of Statistical Social and Economic Research
JDC	Job Demand Control

JDCS	Job Demand-Control Support Models
JD-R	Job Demand and Resources
K10	Kessler Psychological Distress scale (K10)
MHA	Mental Health Authority
MoFA	Ministry of Food and Agriculture
MOH	Ministry of Health
MOS	Medical Outcome Studies
MSPSS	Multidimensional Scale of Perceived Social Support
OLS	Ordinary least squares
P. E	Person-Environment (P.E)
PFJ	Planting for Food and Jobs
PHC	Population and Housing Census
SDGS	Sustainable Development Goals
SSA	Sub-Saharan Africa
UN	United Nations
USA	United States of America
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background

The mental health of farmers has become an interest to mental health researchers in recent times. Farmer mental health has generated much concern in some parts of the world but became a significant public health issue after the 19th Annual Meeting of the North American Agro Medicine Consortium at the University of Alabama in 2007 (Olsen, Kirkhorn, & Guin, 2008). At the annual meeting, the mental health needs of farmers were identified to be unmet because farmers refuse to seek health care and assistance, although the adverse events and challenging working conditions difficulties negatively affect their mental health.

Numerous studies conducted in developed countries show that farmers tend to be worse off and more affected by mental health disorders than any other occupation (Hossain et al., 2008; Torske et al., 2016). Farmers bore a higher proportion of mental health disorders compared to persons in other professions such as teaching, building and construction etc. (Kolstrup et al., 2008; Hounsome et al., 2012; Arcury et al., 2018; Yazd et al., 2019). High mental health morbidity is reported among farming households (Hagen et al., 2019; Jones-Bitton et al., 2019; Leonard et al., 2013; Hounsome et al., 2012) compared to non-farming households in Canada and Australia (Hounsome et al., 2012). Several other agricultural agencies have shared similar sentiments on the existence of farmers' mental health and its effects on their work (Fuller et al., 2007). A cross sectional analysis of the data (Ghana Socioeconomic Panel Survey, 2011) indicates that agricultural and fishery workers, and elementary occupations including labourers in the mining, manufacturing, construction and transport sectors have increased risk of depression.

Scholars like Dzator (2013), Gregoire (2002), Fraser et al. (2005), and King et al. (2015) argue that the hardships and adverse effects in farming, as well as specific unique characteristics, increase farmers' vulnerability to poor mental health. Seligman and Hovey (2006) also claim that 'intrinsic difficulties' in farming expose farmers to mental health problems, whereas Stallones et al. (1995) attribute farmer mental health to profound changes in agriculture. Theoretically, farmer mental health is linked to the demands in the farming environment, the personal characteristics of the farmers and the social support available to farmers. Some likely consequences of farmer mental health include food insecurity, risk of social challenges, work absence rates, work deficits, farmers engaging in risky behaviours, and not exploring diverse farming practices (Boyes et al., 2019; Barrett et al, 2017; Lerner & Mosher, 2008; Stallones & Beseler, 2004).

The agriculture remains a substantial contributor to the gross domestic product (GDP) of developing countries such as Ghana. One cannot think of Ghana without thinking of its cocoa sector, which contributes significantly to economic growth and poverty reduction, and livelihoods for agricultural households since 1957 (Kolavalli & Vigneri, 2011; Mondelez International Ghana [MIG] 2015). Ghana is the second producer of cocoa globally and contributes 21% to the world's cocoa production (Afrane & Ntiamoah, 2011; Boateng, Nana, Codjoe & Ofori, 2014). In Ghana, cocoa is one of the essential cash crops that contribute to the socio-economic development of the country (Afrane & Ntiamoah, 2011; Ghana Cocoa Board, 2019). Similarly, maize represents one of the most critical and significant crops after cocoa, with a 50% constitution of total cereal production in Ghana (Ragasa et al., 2014). Hence, cocoa and maize farmers in Ghana have a peculiar role in the agriculture and national development.

However, the cocoa and maize production sectors face many challenges that influence farmers' productivity (Kolavalli & Vigneri, 2011; Ragasa et al., 2014). Some reports show adverse effects of environmental, ecological, social, and economic factors such as deforestation, drought, outbreaks of diseases and pests, geographic shifts in production, migration, poor harvest, and limited access to loans and credits on the mental health of farmers (Asante, Acheampong, Kyereh & Kyereh, 2017; Amanor, 2010; Gregoire, 2002; Kolavalli & Vigneri, 2011; Polain, Berry & Hoskin, 2018; Wessel, & Quist-Wessel, 2015). A high average percentage of cocoa lost to pests and diseases is currently reported in Ghana, with an average cocoa yield of 13% (Barry Callebaut Organization, 2019).

Available studies on crop production in Ghana reveal the impact of massive deficits, the outbreak of pests and diseases, agrochemicals use, and financial loss on farmers' physical health (Acharibasam & Anuga, 2018; Okoffo et al., 2016). Nonetheless, one critical health component which has received minimal attention in the literature is farmers' mental health. Farmers constitute the fulcrum of the agriculture industry, and mental health is an indicator of development, which impacts on work productivity and socio-economic development not only of the individual farmer and his/her family but of the country as a whole. So, the mental health issues of farmers are beneficial not only to researchers but also to policy makers as well as public and private actors in the agricultural chain. A study conducted in 2017 revealed that some farmers are profoundly affected by psychological distress in the Northern Region of Ghana (Atuoye & Luginaah, 2017) as a result of climate change. Other studies conducted in India, Canada, Australia, Norway, and Nigeria have verified substantially high levels of farmer mental health problems (Das, 2009; Olowogbon et al., 2019; Jones-Bitton, 2019; Letnes et al., 2016; Logstein, 2016), and intervened. Nonetheless, there are limited studies on farmers' mental health globally, especially in the developing world.

This study investigates the influence of farming risk factors on the mental health of cash and food crop farmers. It explores the gender differences in the risk factors on the mental health of male and female crop farmers and the role of social support on the mental health of crop farmers. It tries to draw out the differences in the societal division of labour along gender lines and social support for the mental health of crop farmers. The mixed research design (sequential explanatory design) comprising of a panel research study (where the same respondents are studied longitudinally) and a qualitative design (narratives) is used for the study analysis. A search of the relevant literature shows minimal attention to farmer mental health in Ghana and Africa (Olowogbon et al., 2019), depicting potential differences (Brigance et al., 2018) in different contexts.

Gender and social support play pivotal roles in farmers' mental health outcomes (Plaisier et al., 2007; Roy et al., 2013; Torske et al., 2016). There are reports of high rates of mental health disorders among female farmers in other parts of the world, explaining that women provide a support base for their husbands but have the least adaptive strategies (Roy et al., 2013; Torske et al., 2016). On the contrary, results from other studies contradict the high rates of mental health disorders among female farmers (Park et al., 2015), masculinities and power embedded in the socialization process increasing the mental health disorders of male farmers and preventing them from seeking help for their illness. Tsikata (2009) argues that farming in Ghana involves gender-based discrimination regarding differences in access to resources and power, division of labour, and gender roles. This gender inequality in the agricultural system is likely to influence the mental health of male and female farming populations differently. The conflicting results necessitates its investigation particularly in the developing world. Gender in this study refers to the social and cultural differences in the

characteristics of male and female farmers and access to and control of agricultural resources in their field of work.

Social support is another crucial determinant of mental health that plays a buffering role (Plaisier et al., 2007). McLaren and Challis (2009) report that multiple social support resources protect individuals from experiencing poor mental health. It is also emphasized that social support enhances job control and positively impacts the workforce's psychological well-being and performance (Park, Wilson, & Lee, 2004). Social network, on the other hand, is a potential source of social support (Revenson et al., 1991) which includes relationships with the family, friends, neighbours and others. Stain et al, (2008) discovered in their study that support from the community is an essential protective factor for poor mental health among farming populations.

Social support in this study is categorised into social network and social service or institutional support. It is conceptualized as the time spent with or assistance received from or given to family, friends, neighbours, work colleagues, and organizations. It also includes information seeking and sharing, agricultural extension services, and interaction with agricultural organizations. Some studies report a positive relationship between support from close friends and family and farmers' mental health (Plaisier et al., 2007). Other studies indicate a negative relationship (McPhedran and De leo, 2013) between social support and farmer mental health. Nonetheless, the inconsistency in research findings and other essential reasons including the existing sources of social support for crop farmers, the relationship of the person providing the support (source of social support) to crop farmers, and the period (frequency) of social support to farmers (Boyes et al., 2019), and the context of the farmers,

augment the need to investigate the role social support plays in the mental health of crop farmers.

The proxy for mental health is depression because it is the most typical mental health disorder among farmers (Reed & Claunch, 2020; Torske et al., 2016; Hanklang et al., 2016). Secondly, the choice of depression is also influenced by the measure of mental health (Kessler Psychological Distress Scale (K10)) in the Ghana Socioeconomic Panel Survey (GSPS), which was readily available and afforded the student a rich data to use.

Depression is a mental health disorder defined as a long-lasting mood fluctuation that causes people to suffer much and function poorly at work and in the family (WHO, 2018). Some symptoms of depression in K10 include tiredness, hopelessness, nervousness, worthlessness, thoughts of committing suicide etc.

1.2 Problem Statement

Farmers are a vulnerable population whose work is described as more intensive. Their work and free time are difficult to separate from each other compared to any other work sector. Farmers are known to live on their farms, which most often restricts interaction, communication with others, and access to social support (Kallioniemi et al., 2022). This population also receive little attention to their occupational health needs and problems (Poletto & Gontijo, 2012).

In the agriculture industry, farmers are the centre of the sector, and their mental health issues and productivity are less widely known (Bjornestad & Brown, 2015). Even within agro medicine and occupational studies, there are a handful of studies on farmer mental health

(Yazd et al., 2019). Some key potential risk factors negatively impacting the farmers' mental health include pesticide exposure, climate change, financial difficulties and poor physical ill health (Singh et al., 2013; Caknur, 2014; Kearney et al., 2014; Ramos et al., 2015; Ellis & Albrecht, 2017; Yazd et al., 2019). Farmer mental health is a developing issue that continuous to affect many farmers, their productivity and the people (spouses, children and extended family members) who depend on them for their livelihoods. Thus, any psychological ailments which affect the farmers has dire consequences not only for the farmers themselves but also for all their dependents, involving a large proportion of the country's population. Workers in the agriculture and farming sector have been rated to have the highest proportion of suicides in the US, France India (Jansseen, 2016; Maeght-Lenormand, 2015; Merriott, 2016).

Agriculture in Ghana remains one of the fundamental means of poverty reduction (Targowski, 2014) and contributes about 35% of Ghana's Gross Domestic Product (GDP) and a total of 44.4% of employment, higher than all sectors in the economy (Afrane & Ntiamoah, 2011; Ghana Statistical Service (GSS), 2019). Recent research into climate change and mental health among smallholder farmers in the Northern Region of Ghana (Acharibasam & Anuga, 2018) and psychological distress, employment and productivity (Canavan et al., 2013) indicate psychological distress (depression) among the employed including farming populations, which requires a concerted effort in dealing with the issue.

Many researchers and stakeholders in other countries have expressed considerable interest in the critical nature of farmer mental health. Besides, others have also verified farmer mental health as a determinant of low productivity in cash crop farming (Brigance et al., 2018; Scarth et al., 2008; Torske et al., 2016). The Indian government is implementing

measures in its agriculture sector to curb depression and other mental health disorders that have led many farmers to commit suicide and have impacted rice and coffee productivity (Das, 2009; Viswanathan, & Kumarasamy, 2019). Yet, very few studies have examined the problem in the developing context. A systematic review of farmer mental health has documented less than 1% of research studies in a group of countries, including African countries such as Ghana, Nigeria, and Egypt and other Asia countries like Japan, and Malaysia, etc., whereas 27% of studies exist in the USA, 17% in Australia, and 8% in the UK (Yazd et al., 2019). Farmer mental health studies in developed countries are quite numerous compared to developing countries.

In Ghana, tomato farmers have made several attempts to commit suicide due to lack of access to credit, access to market, and the attack of pests and diseases (The New Humanitarian, 2009). However, three tomato farmers committed suicide in 2008 as a result of mounting debts and lack of access to the market. The government's directive to cocoa farmers to cut down swollen shoot-infested trees due to an outbreak of diseases on cocoa farms (Dzahini-Obiatey et al., 2006) is likely to put many farmers at risk of depression due to the loss incurred and considerable reduction of cocoa production in the areas affected.

Also, the invasion of fall armyworms that destroyed many hectares of cocoa, maize, and cowpeas farmlands in the Western, Brong Ahafo, and Ashanti regions (Modern Ghana, 2017) is likely to have influenced the mental health of the affected farmers. However, the substantive association of the risk factors and mental health effects on the farmers was not studied. In other parts of Africa, farmers have concentration and relaxation problems, excessive tiredness, irregular sleeping, and inattention when performing farm tasks

(Olowogbon et al., 2019). These are symptoms of depression specified in the K10 psychological distress scale (Kessler & Mroczek, 1992).

As Ghana desires to achieve the sustainable development goal (SDG) 3 of good health and wellbeing, this study calls for a deeper understanding of mental health issues among farmers in the country, as low yields, especially in the cocoa production sector, are reported (Wessel & Quist-Wessel, 2015). Farmers common mental health issues include stress, anxiety, depression, and suicide. Studies have established that dealing with farmers' mental health will help achieve sustainable agriculture (Battams et al., 2014; Bjornestad & Brown, 2015). Previous studies have primarily investigated environmental influences on farmers' mental health such as climate change issues including drought (Acharibasam & Anuga, 2018; Ellis & Albrecht, 2017). However, the literature indicates that risk factors, including institutional (farm-related) factors including mechanization, security on plot, access to farm inputs and assets, the number of farms, size of farm, and ecological factors, including the loss of crops, use of pesticides, ecological zone and rural/urban residence have not been critically studied (Bjornestad & Brown, 2015). On the contrary, a recent systematic review revealed four main risk factors: exposure to pesticides, financial difficulties, physical health, and climate issues as the most-cited influences on farmers' mental health across the world (Yazd et al., 2019).

Methodologically, several studies on farmer mental health have been solely conducted quantitatively. Cross-sectional studies that limit the researcher's ability to make a causal inference or assess the incidence of a problem are hugely in existence. In addition, the available cross-sectional studies on farmer mental health have small sample sizes (Lee et al., 2019; Leonard et al., 2013: Pulgar et al., 2016; Roblyer et al., 2016). This shows a huge gap of longitudinal/panel studies on farmer mental health. However, panel studies allow

researchers to assess a problem from many different individuals at different points in time or time intervals to understand interrelationships between the events and outcomes and make causal inferences (Baltagi, 2011). Additionally, panel studies allow the length of the problem within some particular periods to be assessed to better understand the extent of the causal factors (Baltagi, 2011). Lastly, with panel research designs a comprehensive data is assured.

Furthermore, the use of mixed research designs which incorporates quantitative and qualitative research designs for farmer mental health studies have been minimal. The main principle of the mixed research design approach is that mixing both quantitative and qualitative methods provides a better understanding of the phenomenon under study than using a single research approach (Creswell, 2009). The nature of mental health makes it difficult to study it only quantitatively (Read & Doku, 2012), because the researcher is required to capture the emotional states of the individual. The quantitative studies explain the figures or numbers (prevalence) of the problem under study, and the qualitative studies explain the whys and how's of the interrelationships between the risk factors and the outcome. Within the Ghanaian context, a mixed research design has been used to investigate climate change and mental health risks among cereals farmers in Northern Ghana (Acharibasam & Anuga, 2018). In the end, effective mental health care and interventions were proposed for rural farmers because of the psychological impacts of climate change. Globally, qualitative studies on farmer mental health have focused on legal problems and work-life balance and workload (Brigance et al., 2018) relegating institutional and ecological issues, including land irrigation, farm size, number of farms, mechanization, farm yields, and loss of crops.

This study critically examines the influence of institutional and ecological risk factors, gender differences in the risk factors, and the role of social support on the mental health of crop farmers. Empirical evidence has shown that depression (mental health) impacts productivity through absences and impairs work performance, work functioning, and work participation (Beck et al., 2011; Lagerveld et al., 2010). This study argues that institutional, ecological factors, and gender put farmers at risk of mental health disorders and could lead to absences, reduced work performance, and functioning. The role of social support is to ascertain the influence of the state institutions, organizational, and family/friend support in terms of social interactions, agricultural extension services, and information seeking. The choice of cocoa and maize depends on the fact that both are major cash and food crops that significantly contribute to Ghana's GDP, employment and export earning generation.

The research gaps provide the opportunity for a study to be conducted in farmer mental health in Ghana by asking the main research question, which is: To what extent do farming risk factors (institutional and ecological) and social support influence the mental health of cocoa and maize farmers in Ghana, and what is the differential effect of gender in the risk related factors.

1.3 Research Objectives

The general objective of the study is to investigate the influence of farming risk factors, social support, and gender on the mental health of cocoa and maize farmers in Ghana.

From the foregoing, the study pursued the following specific objectives:

1. Explore the institutional and ecological risk factors influencing the mental health of cocoa and maize farmers in Ghana

2. Assess the differential effect of gender on the institutional and ecological risk factors influencing the mental health of farmers in Ghana.
3. Investigate existing social support systems and their role in the mental health of cocoa and maize farmers in Ghana.

1.4 Research Questions

The study focused on the following research questions:

1. What institutional and ecological risk factors influence the mental health of cocoa and maize farmers in Ghana?
2. What are the gender differences in the risk factors influencing the mental health of cocoa and maize farmers in Ghana?
3. How does social support influence the mental health of cocoa and maize farmers in Ghana, and what social support systems exist for them in Ghana?

1.5 Justification of the study

Over the years, mental health has been one of the most discussed public health issues globally. Mental health is an indicator of development because it greatly impacts work productivity and socio-economic development (Ambileke & Iseselo, 2017). To achieve the goal of the betterment of the lives of all people in the country, farmers' mental health issues, which primarily affect their well-being in the pursuit of their work, require close attention by researchers and policy makers to enhance the attainment of development outcomes in Ghana's agriculture sector. In other jurisdictions, discussions at various levels on farmers' mental wellbeing issues are underway (Stone at al., 2018).

Mental health is a state of wellbeing in which individuals recognize their abilities, cope with stresses in life, work productively, and contribute sufficiently to their communities (World Health Organisation [WHO], 2016). The state of an individual's mental health is inseparable from their physical health (Mitchell and Tihonen, 2009) and their economic status (Doku et al., 2008). Therefore, an interdependent relationship exists between mental health, physical health, and an individual's social and economic status. Yet mental health has received very little attention relative to the proportion of the suffering it produces (Fournier, 2011). It is absent in the development discourse on poverty (Ofori-Atta et al., 2010) and overlooked in some country's development agendas (Doku et al., 2008).

In a review of mental health research in Ghana by Read and Doku (2012), they conclude that research on mental disorders, notably, population-based epidemiological studies on depression conducted with quantitative and qualitative methodologies in the social sciences, remains a mental health research priority. Furthermore, a quest for multidisciplinary research on the social and psychological factors affecting mental health within the Ghanaian context (Read and Doku, 2012) generated interest in investigating this problem. Thirdly, the need for evidence on the nature and causes of mental disorders from different scientific disciplines (Patel et al., 2018) supports this research. Besides, the idea that developed countries primarily dominate mental health research (Yazd, Wheeler, & Zuo, 2019) also supports the basis for this research.

Additionally, the interest in investigating the risk factors, social support, and gendered differences in the mental health of cocoa and maize farmers in Ghana is because farmers constitute the backbone of Ghana and every nation. They experience pests and diseases that destroy their farmlands, loss of huge incomes, debt accruement, and the emotional challenge

of lack of access to agricultural inputs and resources, etc. With the introduction of the Planting for Food and Jobs (PFJ) programme in the country and the ongoing negotiations for structural changes in the cocoa industry (Wessel & Quist-Wessel, 2015), it is essential to investigate farmers' mental wellbeing to inform the development of efficient, effectiveness and equity in agricultural programmes.

Furthermore, the study builds on the work of Canavan et al. (2013) on mental health and employment with a focus on the relationship between mental health (depression) and risk factors involved in farming, where mental health becomes the dependent variable. The research is especially crucial because factors influencing farmers' mental health are poorly understood (Kelly et al., 2011). Besides, mental health research is highly needed in Ghana because existing research is limited, political will is low, and resources and services are limited (Read & Doku, 2012; Institute of Statistical, Social and Economic Research (ISSER), 2019; Owusu & Asante, 2020). Also, the prevalence and determinants of farmer mental health and individual and contextual factors are primarily unknown in sub-Saharan Africa (Kelly et al., 2011; Oppong & Andoh-Arthur, 2015).

The search for answers for farming risk factors, social support, and gendered differences in farmer mental health relates explicitly to the five domains stipulated in the global mental health and sustainable development document (Patel et al., 2018). The demographic domain, which includes sex, ethnicity, and age, is linked to sociodemographic characteristics, including the gender variable in this current study. The economic domain, which includes employment, income, and food insecurity, relates to the work of cocoa and maize farmers, where the farmers generate income from the proceeds from the farm. The third domain, the neighbourhood, includes housing and community infrastructure, the built environment, and

water and sanitation. The neighbourhood domain relates to farmers' rural or urban settings, agricultural extension services, and interaction with agricultural organizations and community associations. The environmental domain includes ecological zones of the farmers, natural disasters, migration, war, the attack of pests and diseases, the use of pesticides, and lack of access to agricultural inputs. Lastly, the social and cultural domain, which include social support, social stability, and education are coherent with the social support variable of this current study.

Ultimately, the study results will benefit public, private, and non-profit actors throughout the cocoa and maize value chain to design more effective policies and provide adequate support for both cocoa and maize farmers. As such, these policies and developments will improve the living conditions of farmers in both the major and minor cocoa and maize growing areas in the country and extend to other farmers engaged in other crops.

1.6 Organization of the Study

The study had seven (7) chapters. Chapter one introduces the background of the study. The problem statement, research questions and objectives, and the study's relevance are also included in this chapter. Chapter two reviews the literature on the prevalence and burden of mental health disorders, policy framework, and resource indicators for mental health in Ghana and agriculture in Ghana, and the challenges in agricultural production. It also explores the theoretical concept of farmer mental health and reviews literature from empirical studies to identify the gaps in the literature, theories, and methodological approaches. This chapter also discusses the theoretical and conceptual frameworks of the study, emphasizing gender, social support, and ecological and institutional risk factors of farmer mental health. The third chapter deals with the research design and sources of data.

The chapter includes the methods of data collection and procedure, data analysis, and the presentation and analysis of the results of the empirical chapters. Chapter four analyzes the ecological and institutional risk factors of cocoa and maize farmers' mental health in Ghana. Chapter five follows suit with the analyzes of the results on the gender differences in the risk factors influencing the mental health of both cash (cocoa) and food (maize) farmers. Chapter six examines the effects of the social support systems available to the farmers and understand its role in their mental health, concluding the empirical chapters. The last chapter of the study focuses on the summary, conclusion, recommendation of the study, and areas for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The previous chapter introduced the study by presenting the research problem, research objectives, questions, and justification of the study. This chapter discusses the prevalence and burden of mental health, gender as a social determinant of mental health, an overview of mental health in Ghana in terms of prevalence, available mental health resources and services, and challenges of mental health care in Ghana. The chapter also reviews the literature on agriculture and gender dynamics, mental health as a developing issue in agriculture globally, and the role of gender and social support in farmer mental health. The chapter concludes with a summary of the gaps in the state of farmer health research.

2.2 Mental Health- A Concern for All

Mental health has grown to become a critical health concept and an area of concern in the developed world (WHO, 1996; World Bank, 1996; Prince et al., 2007) mainly because of its profound effect of disability on individuals, communities, and nations (Lahtinen et al., 1999). Yet, it is not prioritized in developing countries, as problems like lack of political priority, limited and inequitable services, and stigma (Gilbert et al., 2015; Plagerson, 2015) affect mental health systems. Currently, many developing countries have increased their level of commitments for mental health (Patel et al., 2018). These countries have initiated strategies to improve good mental health and wellbeing.

Mental and physical health are essential components of health that share similar social, economic, and environmental risk factors (WHO, 2004). There is growing evidence of the buffering role of positive mental health to physical health (Sturgeon, 2007). Hence, dealing

with a physical health condition relates to positive mental health (Sturgeon, 2007). The WHO (2018) defines mental health as a state of wellbeing in which an individual realizes his abilities, can cope with the everyday stresses of life, work productively, and contribute to his or her community. Mental health is further seen as a foundation for wellbeing and effective functioning for individuals and communities (Lahtinen et al., 1999). Additionally, mental health is also viewed as "a resource that provides and promotes an individual's wellbeing to achieve his or her full potential" (Patel et al., 2018, p. 10).

According to WHO (2017), mental health is everyone's business because it is integral to health and connected with peace, stability, and success. It also contributes to building accountable, resilient, and inclusive institutions and societies for sustainable development (Thornicroft & Patel, 2014). However, given the importance of mental health to sustainable development, it is overlooked in many developmental programmes worldwide (Funk et al., 2010; Silva, 2018). Even the objectives of the WHOs Mental Health Action Plan 2013-2020, which include effective leadership, community mental health care, prevention strategies, and research and information dissemination of member states are not sufficiently realized. In terms of research, 'mental health has remained at the margins of health research, systems, and practice' (Plagerson, 2015, p164).

Notwithstanding, mental health and behavioural disorders are among the leading five causes of disability (Simsek, Ersin, & Kirmizitoprak, 2016). It is estimated to constitute 15% of the total disease burden in 2020 (Sturgeon, 2007; Simsek, Ersin, & Kirmizitoprak, 2016). It commonly affects people between 15 to 44 years in all communities (WHO, 2014), and people over 45 years. Schizophrenia, intellectual disabilities, psychoses, drug abuse, alcohol use disorders, and depression are mental health diseases (WHO, 2018). However, from 1990

to 2017, depression and anxiety have been the most frequent and the leading causes of disability globally (James et al., 2018).

2.3 Depression- A Mental Health Disorder

Depression is a mental health disorder defined as a long-lasting mood fluctuation that causes people to suffer much and function poorly at work and in the family (WHO, 2021). The characteristics of depression include persistent sadness, loss of interest in exciting activities, and inability to carry out daily activities. The WHO (2021) reports that depression affects more women than men and, at its worst, leads to suicide. Other reports also show its enormousness in developed and developing countries (Canavan et al., 2013). Depression affects more than 350 million people worldwide (Hanklang et al., 2016). In Ghana, the prevalence rate of depression is 20% among specified groups of the population (Canavan et al., 2013; Sipsma et al., 2013), decreasing growth in development and productivity (Dzator, Dzator, Asante & Ahiadeke, 2016).

2.4 Physical, Social, and Economic Implications of Mental Health

Empirical evidence over the years has shown various negative consequences of mental health. Mental health disorders increase the risk of other health conditions such as communicable and non-communicable diseases, including hepatitis B, Parkinson's disease, strokes and heart diseases, and many other health conditions (Plagerson, 2015). Kessler (2012) and Kessler and Bromet (2013) draw attention to the adverse effects of mental health on developmental transitions such as marital timing and functioning, childbearing, and financial success and employee performance, particularly when work complexities increase. Other negative consequences include premature deaths, poverty, and limited opportunities (Funk et al., 2010). Dixon (2012) and Thornicroft and Patel (2014) emphasize the severe impacts of mental health on global urbanization associated with diverse social problems in

the larger society. Other studies report an increased economic burden of high treatment costs and social costs on development (Bloom et al., 2011; Thornicroft & Patel, 2014; Silva, 2018). In the USA, major depression disorders previously cost $173.2 billion in 2005 but increased to $210.5 billion in 2010; 47% is attributable to direct costs (Greenberg et al., 2015).

Some ethical issues of justice, peace, and respect for individuals and nations are associated with the negative consequences of mental health within the society's social and economic context. These inequalities within mental health care continue the cycle of long-suffering of lack of access to mental health care, stigma, and marginalization (Ngui et al., 2010). The negative consequences of mental health stress the relevance of investigating the social determinants (Silva, 2018) as well as the environmental determinants which could increase the risk for mental health disorders among farmers. These determinants are critical because farmers often live and work under harsh weather conditions, and are influenced by societal norms and public policies which shape opportunities (Shim & Compton, 2020) available to them as farmers. Therefore, the institutional and ecological farming factors, gender and support on mental health require in-depth understanding for the greater good of the farming population affected with mental health conditions.

2.5 Mental Health in Ghana

Ghana is a low-middle-income country in the African region and had a total population of 30.8 million as of 2021 (Ghana Statistical Service, 2022). The country has over 2 million Ghanaians suffering from different mental disorders (WHO, 2015). Still, information on prevalence rates and determinants among population groups is generally not known, although it is likely to affect the development of appropriate interventions for diverse populations (Oppong & Andoh-Arthur, 2015).

Ghana has a mental health disability-adjusted life years per 100,000 populations of 2323.29, while the suicide mortality rate per 100,000 population is 5.4 (WHO, 2018). A report indicates that 19% of Ghanaians have mental health issues, and 40% of persons who present these problems in the hospitals mostly have severe mental health issues (Dr. Akwasi Osei, Daily Graphic 20th March, 2018). Furthermore, there is evidence that about 21% of adult Ghanaians experience moderate to severe psychological distress (Canavan et al., 2013). The Ghana Socioeconomic Panel Survey (GSEPS) report also indicates that about 6.8% of the population is severely depressed, 11.7% moderately depressed, 22.3% mildly depressed, and 59.3% has low or no depression (Aryeetey et al., 2011). However, the female population is more depressed than the male population in Ghana. The report also indicates that the Northern and Eastern regions have high depressed populations while the Greater Accra and Western regions have low depressed populations. In addition, rural dwellers are more depressed than urban dwellers (Tables 1 and 2).

Table 2.1: Depression measure by locality, gender, and severity of depression in Ghana

Group	Low/None	Mild	Moderate	Severe	Total
Urban	67.0	18.9	9.2	4.9	100
Rural	54.4	24.4	3.3	7.9	100
Male	64.4	20.5	9.3	5.8	100
Female	55.1	23.7	13.7	7.5	100
All	59.3	22.3	1.7	6.8	100

Source: Aryeetey et al., (2011)

Table 2.2: Depression measure by region and severity of depression in Ghana

Region	Low/None	Mild	Moderate	Severe	Total
Western	59.7	13.6	12.3	4.5	100
Central	58.6	22.6	11.7	7.0	100
Greater Accra	73.3	18.2	6.2	2.4	100
Volta	63.5	19.1	12.4	5.0	100
Eastern	50.8	22.1	15.0	12.1	100
Ashanti	75.1	12.6	7.6	4.7	100
Brong Ahafo	44.4	35.3	14.1	6.2	100
Northern	28.6	33.0	19.5	18.9	100
Upper East	51.2	24.6	16.5	7.8	100
Upper West	50.6	31.8	9.6	8.1	100

Source: Aryeetey et al., (2011)

Suicide rates have also increased in Ghana. More than 1500 cases of suicide across the country are reported annually (ISSER, 2019). Yet, there is limited budget allocation, human resources, and infrastructure for mental health care in Ghana (Roberts et al., 2013; ISSER, 2019; Owusu & Asante, 2020).

In Ghana, government commitment to mental health care is low (ISSER, 2019; Owusu & Asante, 2020) though recommendations for legitimacy, feasibility, and support for mental health programmes have been made (Bird et al., 2011). The country in 2012 passed a Mental Health Act 846, which contained several and specified indicators on human rights and community mental health care. The bill's passage increased the training of mental health professionals even though the professional mental health workforce is still inadequate (Thornicroft & Patel, 2014). Ghana's mental health workforce per 100,000 population is 9.3% (WHO, 2017) and includes psychiatrists (0.06%), psychologists (0.07%), and mental health nurses (7.73%). However, information on occupational therapists and social workers is under-reported. Given the size of the mental health workforce and the prevalence of mental health disorders in Ghana, the needs of most people with mental health disorders will be unmet. Dixon (2012) reports high treatment gaps, inadequately trained mental health professionals, and insufficient funds to manage the sector.

Presently, a total expenditure of 1.10% of the government's health expenditure is allocated for mental health. Besides, there is a Mental Health Authority (MHA), an independent body, established under the Ministry of Health in Ghana, to assess the compliance of mental health rights and legislation and ensure accessibility, affordability, and availability of mental health care to all despite a person's location. The country also has three (3) mental health hospitals, 648 community mental health treatment centres, 302 psychiatric units in general hospitals,

and four residential care facilities (WHO, 2017). Furthermore, there are non-professional treatment centres such as prayer camps, and traditional and spiritualist healing centres all over the country that offer alternative care to mentally ill patients. However, there are reports of treatment meted out to mental health patients in those facilities (Read et al., 2009). Many believe that mental health disorders are associated with spiritual ideas, so people with mental health disorders are beaten and chained in homes and at community health treatment centres. The psychiatric centres, located in the south of the country, are also faced with overcrowding and inadequate mental health professionals (Read et al., 2009). Yet, the total prevalence of treated cases of mental disorders was 17,371 (62.98%) per 100,000 population in 2016 (WHO, 2017). The number of treated cases of mental disorders refutes the misconception that mental health disorders are untreatable and unmanageable.

In the Ghanaian society, individuals with mental disorders are marginalized and excluded from social and economic activities, though this is likely to affect the attainment of core development objectives (Funk et al., 2010). Besides that, access to psychiatric care is quite cumbersome, so primarily the family takes the responsibility of providing care to persons with mental health disorders (Read et al., 2009).

Research on mental health is limited in both quantity and quality, particularly population and context-specific research (Read & Doku, 2012). Recent work by Dzator et al. (2016) has been helpful in mental health, economic growth, and development in Ghana. They discovered a significant relationship between mental health and Gross Domestic Product (GDP) in Ghana.

Results from other studies indicate an impact of gender, education, and social support on mental health (Read & Doku, 2012; Canavan et al., 2013). A recent study involving the Centre for Epidemiological Studies Short Depression Scale (CES-D) showed a prevalence rate of 39.2% depression among the respondents (university students) in Ghana. There were moderate and severe mental health rates of 31.1% and 8.1% respectively (Oppong & Andoh-Arthur, 2015). Traumatic experiences, alcohol consumption, and lack of social support had significantly impacted students' mental health (Oppong & Andoh-arthur, 2015). Besides, a cross-sectional analysis of the 2009-2010 data of the Ghana Socioeconomic Panel Survey (GSEPS) showed 13% moderate and 8% severe psychological distress respectively among Ghanaian adults (Canavan et al., 2013). The results further showed a positive correlation between psychological distress and gender, where men are more likely to be psychologically distressed than women (Canavan et al., 2013). The authors concluded that individuals experiencing mental health disorders are more likely to stay away from work for 2 or 3 days a month (Canavan et al., 2013).

Other critical mental health studies on social capital (Adjaye-gbewonyo et al., 2019) and geriatric depression investigated in Ghana showed a statistical significance of social capital on depression among the elderly (Kugbey et al., 2018). The study which assessed depression among the aged with the Geriatric Depression Scale- Short (GDS-S) Form revealed a 37.8% prevalence rate (23% mild depression, 9.2% moderate depression, and 5.3% severe depression) (Kugbey et al., 2018). Further analysis revealed the positive influence of age, marital status, and education on the mental health outcomes of the elderly.

2.6 Gender and Mental Health in Perspective

"Gender is an important element in health inequities in developing countries and influences both the material and symbolic positions men and women occupy in the social hierarchy as well as experiences which condition their lives" (Patel, 2005, p. 1850). It distinguishes the social features of men and women (Patel, 2005; Roy et al., 2013). Gender is one of the main social determinants of health-related socio-demographic characteristics, including age, income, education, and other behavioural factors. Gender interacts with age to produce differences in health risks and health outcomes among women and men (WHO, 2004) and aids in investigating health inequities in developing countries (Patel, 2005). WHO (2004) recommends investigating the effect of gender on health, gender roles, norms and discrimination, and access to resources and power between males and females. These require exploration for better policies and programmes.

According to WHO (2004), there are significant differences in prevalence and types of mental disorders among men and women (WHO, 2004; Hwan & Lee, 2011) in different countries (Afifi, 2007). Generally, females exceed males in the risk of depression (WHO, 2004), mainly because of deferential exposure to stressors (Beauregard et al., 2016). Women's limited access to social and economic opportunities, the burden of poverty, violence, and gendered organizations lead to more significant mental health-related consequences (WHO, 2004; Beauregard et al., 2016).

A study conducted in low-income townships of Harare, Zimbabwe, revealed a positive relationship between high rates of depression and severe adverse life events among women. Women's challenges of family conflict due to their role as caregivers and full-time workers outside the home significantly affect their physical and mental health compared to men

(TePoel, Rohlman & Shaw, 2017). A similar study among rice farmers in Thailand revealed a high prevalence rate of 48% depression among women and 39% for male respondents (Beauregard et al., 2016). According to Beauregard et al. (2016), higher depressive symptoms among women than men result from the interaction between work and family life issues known as Work-Family Conflict.

It is further explained that mental disorders such as depression and eating disorders are highly prevalent in boys during the childhood developmental stages. In contrast, girls suffer from poor mental health in later life (WHO, 2004). Substance abuse disorders, schizophrenia, and bipolar disorders are also highly prevalent in adult men than women. A cross-sectional survey conducted in Wales and Scotland in England among 8979 adults aged 16-74 showed no significant relationship between men's and women's social role(s) occupancy and mental health (Weich, Sloggett & Lewis, 1998).

On the contrary, a Pakistani study among 145 women with a self-rating questionnaire shows a significant relationship between education, housing, financial difficulties, and depression (Husain et al., 2004). The study established that women with low educational status and who have been separated from their parents at a very young age, with four or more children, and or divorced, widowed, or separated, could be at risk of depression. While women with some form of education and encountering adverse difficulties such as housing and financial challenges could also be at risk of depression (Husain et al., 2004; Paper, 2004).

Additionally, a longitudinal and ethnographic study conducted in urban households in Delhi, India, revealed that adverse reproductive outcomes in women's cycle and stress build-up from illnesses contribute to the gender gap in mental health (Das, Kumar, & Das, 2012).

Thus, women are scientifically proven to be more depressed than men. However, men with depression often rely on traditional male roles and male socialization to suppress depression and other health risks (Fraser et al., 2005; Das, Kumar, & Das, 2012). Girgus and Yang (2015) attribute gender differences in depression to gender differences in individual characteristics and vulnerabilities to stressors experienced at different ages and cultures. They referred to an association between personal demographic characteristics and stressors in depression concerning the context (Girgus & Yang, 2015). Similarly, a cohort study in Ghana revealed an association between gender differences in education, family or marital status, and economic factors on depression (Psaki, 2013).

Weich, Sloggett, and Lewis (1998) used a General Health Questionnaire (GHQ) to assess mental health in England. They discovered that mental health disorders were most prevalent among women than men. There was a positive relationship between higher social roles among women and common mental health disorders. The authors explained that women perform more household chores, child and family care, and management, which are more emotionally and physically demanding. The study's findings also show that men's performance of domestic duties is associated with mental health disorders. Similar conclusions are drawn by Atuoye and Luginaah (2017) that differences in men's and women's social roles in society and masculinity and femininity conceptions play significant roles in gender disparities in mental health.

With about 436 farmers in a Korean study, the use of a psychosocial well-being index scale showed gender differences regarding psychosocial stress (Lee et al., 2019) and depression (Hwan & Lee, 2011). To further explain, the educational and income level of older women farmers were associated with depression because of the disadvantaged position of attaining

education and working outside the home for income, while wealth was associated with the depressive symptoms of older men farmers due to a reduction in income in retirement (Hwan & Lee, 2011). More so, married older women farmers were more likely to have depressive symptoms than widowed, divorced, or separated older women farmers, and older married men farmers in the study (Jang et al., 2009). Another cross-sectional study among women in Ghana showed a positive effect of age, education, and other disease symptoms on their mental health outcomes (Frempong-Ainguah et al., 2018). The researchers explained that, unlike older women, younger women get stressed with child caring and other responsibilities that limit their ability to seek family support and build wider networks (Frempong-Ainguah et al., 2018). Furthermore, a clinical and community-based study conducted among women respondents in Ghana showed a positive correlation between education and mental health (Atefoe, 2013). This is most likely to have a devastating effect on society and national productivity (Afifi, 2007).

2.7 Gender Differences in Mental Health Disorders

The differences in the prevalence of mental health disorders between males and females are attributed to several explanations. According to WHO (2004), the differences could be specific to the types of mental health disorders and the different stages of human development. For example, mental disorders during childhood tend to be more prevalent among males but tend to be far greater among females in later life. Secondly, mental health problems such as depression and eating disorders tend to be far more prevalent among females than males; whiles substance abuse tends to be far greater among males than females. Nonetheless, men are particularly exposed to alcohol use disorders due to psychosocial and biological factors (WHO, 2004). Similarly, drunkenness and drinking are linked to masculinity in society and are common among culturally inclined men. More so,

the habit of drinking serves as a coping strategy for men experiencing adverse life events (WHO, 2004).

In addition, high levels of mental health problems are typical among women because women suffer from more than one mental health disorder, with most co-occurring (WHO, 2004). According to Das (2012), the high percentage rates of mental health disorders among women are embedded in a society where women accumulate stress from adverse life events such as the death of a child, abortion, miscarriages, and illness. Likewise, women's comparatively limited social and economic opportunities, and increased risk of violence often predispose women to adverse mental health problems. This generally affects all, especially the caregiving role of women to the elderly and children in the society, and national productivity (Afifi, 2007). For instance, women exposed to life events without social support are more vulnerable than men in similar circumstances (Afifi, 2007), but Jang et al. (2009) found the opposite. Afifi (2007), therefore, emphasizes that overlooking these differences in gender-based issues could have drastic consequences.

2.8 The Agriculture Sector in Ghana

Almost 50% of the labour force is engaged in agriculture in Ghana (Ghana Statistical Service [GSS], 2019). According to the Food and Agriculture Organization of the United Nations (FAO) (2020), agriculture provides over 90% of Ghana's food needs and contributes to 54% of Ghana's GDP. In Ghana, most of the poor are involved in agriculture because it is proven to be effective in reducing poverty compared to the other two major sectors of the economy (service and industry) (FAO, 2015).

Ghana's total agricultural land area is about 238,539 kilometres squared (km^2). Out of this, 58,000 km^2 and 11,000 km^2 are under cultivation and irrigation. Most farms in the country are mainly between 1.2 to 2.0 hectares, with just a few above 2.0 hectares (FAO, 2020). Ghana's agriculture is mostly smallholder farming, which constitutes less than two hectares of land size (Ministry of Food and Agriculture (MoFA), 2017). However, large farms often used for commercial purposes are also quite existent.

The agro-ecological zones in the country include rain forests, deciduous forests, coastal and savannah zones across the regions of Ghana. The transitional, coastal, and savannah zones somehow influence a particular farming system. The forest zone, in particular, is noted for tree and cash crops such as cocoa, palm oil, coffee, and rubber cropping. The tree crops in the forest zone are intercropped with maize, cocoyam, plantain, and cassava. The middle or coastal zone, on the other hand, characterizes maize, cocoyam, yam, and other cash crops such as cotton and tobacco. While the northern or savannah zone represents the sole cropping of food crops such as millet, maize, groundnuts, cowpeas, rice, and yam. Notably, the areas of the north of Ghana experience harsh environmental conditions as compared to the southern areas.

The agriculture system in Ghana characterizes the traditional method of farming, where tools such are hoes and cutlasses are mainly used (MoFA, 2017). Mechanized farming is practised but to a lesser extent. Within the agriculture sector, crop production contributes about 23% of Ghana's GDP and one-fourth of the country's employment rate (MoFA, 2015).

Apart from crop farming, livestock production contributes to meeting Ghana's food needs and monetary income, draught power, and manure for the soil sector. Major livestock rearing includes poultry and ruminants. Many farming communities engage in livestock production for either subsistence or commercial reasons in the southern part of the country. On the other hand, ruminant livestock production serves as wealth for dowry and insurance for debt payment (FAO, 2020). Ruminant production, widely engaged in Ghana, involves cattle, goats, and sheep and is predominantly in the northern and savannah agro-ecological zones (Animah, 2017).

However, farmers encounter problems that prevent them from realizing their full potential. Among them are a lack of access to crop management information, fertilizer, improved technologies, credit, and poor infrastructure (Scheiterle & Birner, 2018), especially in cocoa and maize farming.

2.8.1 Agricultural Households in Ghana

The population of agricultural households constitutes 54.2% of the country's total population, with a high proportion of 73% in the rural areas (Aryeetey, Osei-Akoto, Osei, & Udry, 2011). Ghana's highest agricultural household proportions are in the then Upper East, Upper West, and Northern Regions. Other regions like the then Brong-Ahafo, Eastern, Volta, Central, Ashanti, and the then Western regions in the middle forest and coastal zones also have high proportions of agricultural households with the least in the Greater Accra region. Many farming households constitute economically active age groups between 15 years and older persons of 65 years and over. Males, however, dominate the agrarian heads of households relative to females. There is also low education among agricultural households compared to the general population (MoFA, 2017). The working hours of

farmworkers in rural areas are between 40-49 hours per week, while agrarian workers spend 30-39 hours in the urban areas (Aryeetey et al., 2011).

In Ghana, many agricultural households engage in crop farming than any other agricultural activity, such as tree growing, fish farming, and livestock rearing. The primary agricultural produce includes industrial crops (cocoa, coffee, coconut, and rubber), staples, cereals, and legumes (cassava, yam, maize, and rice), and fruits and vegetables (pineapple, citrus, tomato, pepper).

Also, agricultural extension officers' information and advice are higher among rural dwellers than urban dwellers in many regions. But agricultural extension advice through radio is more prevalent in the Northern, Eastern, Central, and Upper East regions (Aryeetey et al., 2011). Yet, the number of agricultural extension agents in the country has been inadequate in most agricultural areas (Aryeetey et al., 2011). Plans to recruit additional agricultural extension agents under the Planting for Food and Jobs Programme (PFJP) is in-progress.

2.8.2 Cocoa and Maize Growing Areas in Ghana

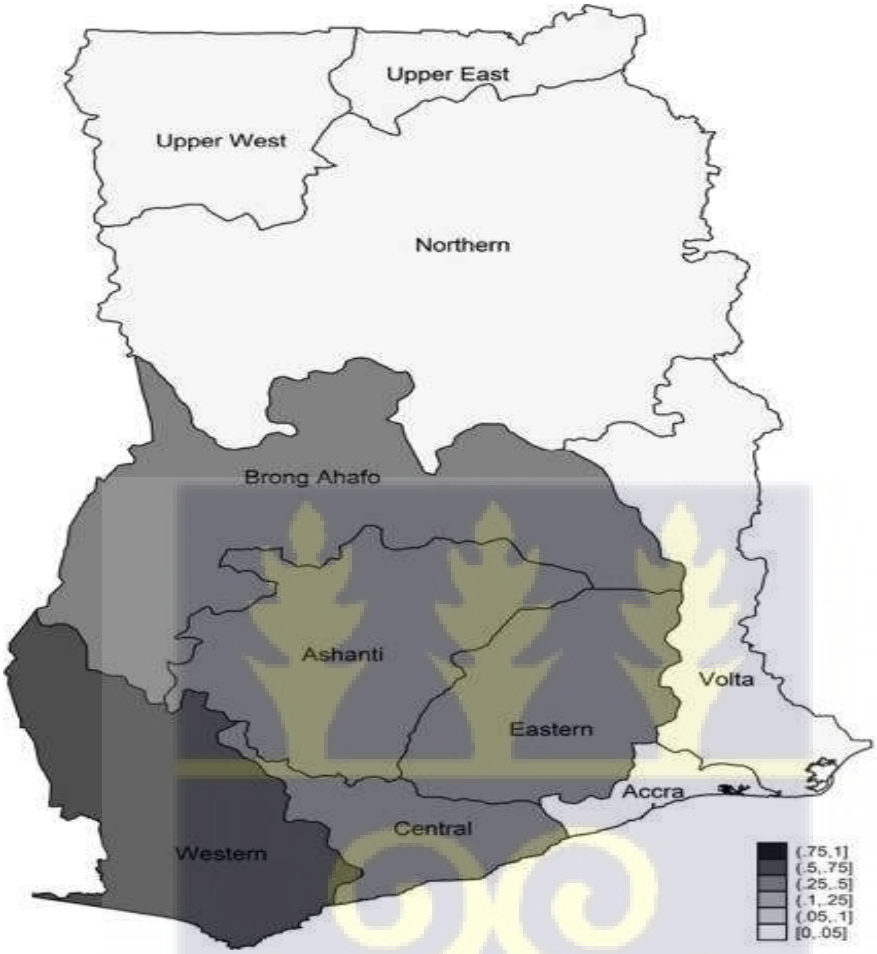
Cocoa and maize are the most widely grown crops in terms of acreage, accounting for 2,315,421 acres (23.4%) and 1,756,273 acres (18.1%), respectively (MoFA, 2015). However, there has been a consistent annual increase in the acreage used for planting cocoa and maize (MoFA, 2015). In 2015, the yearly planting area for cocoa was 1,717,440 hectares (Cocobod, 2016), and maize was 1,000,000 hectares (Votomobile, 2015). Maize is among the top three performing crops in Ghana, because its output growth is 16%.

Similarly, the high cocoa production in the country has enabled Ghana to be placed as the second largest cocoa producer in Africa and the world. Ghana is among countries like Cote d'Ivoire and Indonesia that export large volumes of cocoa beans. Cocoa is predominantly grown by smallholder farmers who account for 70% of farming populations in forest areas in the then Western, Eastern, Ashanti, And Brong Ahafo regions (Ghana Cocoa Board (Cocobod), 2019). Figure 2.1 shows cocoa producing regions in Ghana. In 2017, cocoa alone contributed 8.8% to agricultural GDP (Cocobod, 2019). Nonetheless, the growth rates of cocoa since 2007 have been fluctuating. Currently, the growth rate in the cocoa sector is (-7%) from 969,000 tonnes during the 2016/2017 season to 904,000 tonnes for the 2017/2018 season (ISSER, 2018). According to ISSER (2019), the cocoa yield is currently about 0.5 tonnes/ hectare.

The most significant staple crop, maize, also remains second to cocoa as the most important commodity crop. Maize plays an essential role in Ghana's agricultural sector and food security (Votomobile, 2015) by constituting over 50% of Ghana's total cereal production. It has high economic value and is used in large varieties of food and non-food products and animal feeds (Votomobile, 2015). Maize is grown in the forest and transition agro-ecological zones in Ghana, particularly Southern regions such as the then Brong Ahafo, Eastern and Ashanti, and the Northern, Upper West, and Upper East regions. The leading regional average producer of maize from 2013-2015 includes the then Northern, Brong Ahafo, Eastern, Ashanti, and Central regions. According to Votomobile (2015), the Eastern Region was the region with the highest average yield performance of maize. Despite these achievements, Ragasa, Chapoto, and Kolavelli (2014) report that the average maize yield in Ghana is lower in both Africa and the world. In 2012, Ghana's average maize yields of 1.2-

1.8 metric tons (mt) per hectare (ha) were far below potential yields achieved in on-station trials (Ragasa, Chapoto, & Kolavelli, 2014).

Figure 2.1: Ghana's leading cocoa-producing regions



Source: Economic Growth Center – Institute of Statistical and Social and Economic Research (ECG-ISSER) data in Adhvaryu and Fenske (2019)

2.8.3 Challenges in the Cocoa Production Sector in Ghana

According to Dormon et al. (2004), cocoa is no longer a prosperous business for many cocoa farmers because there is a lack of access to agricultural inputs and the ability to improve the farm. Cocoa farmers still face the challenge of limited knowledge and access to farm resources to apply good agricultural practices (Mondelez International Organization, 2015). Gyawu, Brako, and Adzimah (2015) report that yearly cocoa yields are significantly low despite the support of fertilizer, viable seedlings, and chemical distribution to cocoa farmers

by the government of Ghana to the sector. Women actively engaged in cocoa farming equally face many challenges, as the subordination of women and gender inequality is deep-rooted in cocoa farming (Cocoa Life Report, 2015).

Using an action research approach, Dorman et al. (2004) concluded that cocoa farmers in Ghana recognize low yield as a significant issue confronting the industry. In their study, cocoa farmers explained that about 15-20 years ago, they obtained a production rate of 496-620 kilograms per hectare against the production rate of 248 kilograms per hectare in 2004. The study participants identified socio-economic and technical causes of low cocoa production and emphasized holistically dealing with both. The socio-economic factors included lack of electricity and labour, high cost of delivery, poor road network, low producer price, and lack of access to farm inputs. On the other hand, the technical factors included the persistent attack of pests and diseases, inadequate control of weeds, and over shading. The researchers discovered that due to low producer prices paid by the government, high costs of pesticides, labour, and spraying equipment, cocoa farmers were unable to control pests and diseases. In some cocoa growing areas in Ghana, millions of cocoa trees have been infected and destroyed by the Cocoa Swollen Shoot Virus Disease (Wessel & Quist-wessel, 2015). Generally, mistletoe Tapinanthus bangwensis is the leading cause of low productivity in cocoa production in Ghana (Anang, Adusei & Mintah, 2011).

In another study, farmers, and key partners in the cocoa industry, including Ghana Cocoa Board and Licensed Buying Companies, identified a lack of adequate credit and storage facilities, pests and diseases, unsatisfactory loan agreement conditions by creditors, late distribution of farm inputs by the government, insufficient agricultural extension officers, land degradation issues, poor road network, and irregular rainfall pattern as significant challenges facing cocoa production in Ghana (Gyawu et al., 2015). These challenges

eventually reduce production and revenue, decrease foreign exchange reserves, loss of jobs, low income, migration, and child labour (Dormon et al., 2004; Gyawu et al., 2015). Moreover, the challenges make it difficult for cocoa farmers to learn more mechanized systems, as many have a low level of education. The study further showed that many cocoa farmers were aged, as 60% were between 30-40 years and 24% above 50 years (Gyawu et al., 2015). The challenges faced by cocoa farmers on their mental health is mostly missing in this regard, although it is important to meet their psychological needs.

Wessel and Quist-Wessel (2015) also discuss inadequate control of high incidence of pests and diseases, old age cocoa farms, soil nutrients problems, and insufficient use of fertilizer as common causes of low yield in West Africa. A similar study conducted in the Ashanti Region of Ghana revealed that cocoa diseases representing 32%, were the biggest challenge facing cocoa farmers as against the lack of funds and bush fires. However, Wessel and Quist-Wessel (2015) suggest that rehabilitation and replanting schemes initiated by the government to improve and protect planting materials can resolve the challenges discussed. In the work of Kyei, Foli, and Ankoh (2011), the age of cocoa farmers became a contending issue. In their study, the highest age range of farmers was 61 and above, compared to 20 to 30 years. The researchers indicated that only about 14% of cocoa farmers had access to credit because of the stringent measures attached to acquisition. The majority of cocoa farmers, representing 64.8%, finance their farming activities with support from family members; others (4%) receive bank loans to support their activities on the farm (Mohammed, Asamoah, & Asiedu-Appiah, 2012). This then explains why cocoa farmers prefer using family and friends for farm labour activities to save the cost of hired labour (Anang, Adusei & Mintah, 2011).

Furthermore, cocoa farmers in some cocoa-producing districts in Ghana's Eastern and Western regions encounter insufficient agricultural extension support and inadequate capital

(Cocoa Research Institute of Ghana (CRIG), 2011). A cross-sectional study conducted in Ghana has shown a positive relationship between agricultural extension services and farmers' farm productivity and household income (Abbeam et al., 2018). Yet, many crop farmers are unable to receive adequate agricultural extension services, especially in the country's rural areas. Furthermore, Tawiah (2015) identified bad weather conditions (rainfall and wind) affecting cocoa trees, pests and diseases, lack of pesticides, late fertiliser application, and ageing farming population as reasons for low cocoa production. He further emphasised increased national foreign debt as a result of accruing interest on a loan secured for cocoa operations by Cocobod, reduction in cocoa revenues and foreign exchange reserves, unemployment, and inflation as impacts of the shortfall in cocoa production rate. Similarly, a mixed research study revealed corruption in internal cocoa marketing, land degradation, and inflation as contributing factors to low cocoa production in Ghana (Peprah, 2015).

Lastly, other factors affecting cocoa production in Ghana are diseases and illnesses of cocoa farmers. A baseline survey on child labour in some cocoa-growing districts in Ghana showed illnesses and injuries as common and prevalent general health conditions among older men and women cocoa farmers (International Labour Organization (ILO), 2013). The study further showed that about one-third of older household members in cocoa-producing districts are affected by malaria, perceived as the most dominant illness.

2.8.4 Challenges in the Maize Production in Ghana

Maize production is one of the few areas of agriculture that has witnessed persistent low productivity from 1961 to 2012 (Ragasa et al., 2014). Ragasa et al., (2014), report that maize farmers lack access to fertilizers because they are costly, and funds are unavailable to purchase subsidized fertilizers. Also, maize farmers face the challenge of accessing new

seed varieties or certified seeds, though its use increases yields (Ragasa, Chapoto, & Kolavalli, 2014).

In 2015, there was a shortfall between domestic production and the consumption of maize. This affected growth in the animal feed industry and led to an increase in imports of poultry for consumption. Scheiterle and Birner (2018), and Ragasa, Chapoto, and Kolavalli (2014), report low yields and a huge production gap of maize, leading to high import bills and low yield achievement rate in sub-Saharan Africa and the world at large. For instance, in Ghana, the annual maize yields, particularly in 2012, were 1.2-1.8 metric tonnes per hectare against the potential yield of 4-6 metric tonnes per hectare. This low productivity in 2012 resulted from the low usage of hybrid seeds among maize farmers and the lack of access to quality hybrid maize seeds (Scheiterle & Birner, 2018).

2.9 Gender and Agriculture in Perspective

The role of women in agriculture cannot be underemphasized as they constitute a crucial resource in agriculture and the economy. In Africa, women constitute more than half of the agricultural labour force, and for that matter, they play an extremely important role in the sector. However, there is the difficulty of empirically determining women's share of labour because household members' range of resources and inputs is not gendered (Doss et al., 2011). Some variations in women's age, tribe, crop-grown, and production cycle among and within countries in sub-Saharan Africa (Doss et al. 2011) could determine women's position in the agrarian space.

Among women in agriculture, some common agricultural activities particularly associated with them include weeding, land preparation, fertilizer application, and harvesting. Tsikata (2016), therefore, points out that understanding the gender implications in the agrarian sector, especially the contributions of women and the difficulties associated with their

positions in the sector, is crucial. Accordingly, this section uncovers the roles of men and women farmers, the differences in working conditions, and the control of resources.

Two main gender concepts are reviewed: gender division of labour and gendered control over resources. According to Anaglo, Boateng and Boateng (2014), these are essential concepts used for determining farm households' wellbeing.

2.9.1 Gender Division of Labour in Agricultural Production

The gender division of labour explains four main issues; the gender division between men and women, the differences in value attached to tasks performed, the fundamental and functional nature of the divisions in the society, as well as the differential access to and control over resources by men and women (Dancer & Tsikata, 2015). In the agrarian sector, men are generally involved in the production, which is valued and rewarded more in society (Ampofo, 2014; Dancer & Tsikata, 2015). Production includes activities that produce commodities and contribute to the GDP of the country. At the same time, reproduction involves activities that ensure the care and survival of the household (Dancer & Tsikata, 2015).

Notably, women generally are involved in reproduction activities such as harvesting, providing care to domestic animals, and performing purely domestic work (Boserup, 1970; Haugen & Brandth, 1994). For example, in the Northern region of Ghana, women take up reproductive roles such as cleaning, cooking, child nurturing and harvesting, sowing, and selling farm proceeds (Apusigah, 2009). But Dancer and Tsikata (2015) argue that these reproductive activities are not remunerated, although they contribute to GDP. They, therefore, recommend a focus on reproductive activities performed by women in economic policies.

In most sub-Saharan African countries, women constitute a significant number of the agricultural labour force, yet the productivity of women farmers is lower than men farmers (Morgado & Salvucci, 2016). In the Asian regions, women's participation in agricultural work is high, but other regions exempt women from working in the fields (Boserup, 1970). Nonetheless, farming systems in sub-Saharan Africa are arranged along gender lines, affecting differentiation in farm sizes and crops grown among men and women (Ampofo, 2014).

In Norway, women farmers are both farmers and housewives, as they undertake a wide range of household tasks and farm work, unlike men farmers who handle only farm work (Haugen & Brandth, 1994). Young women farmers in Norway are mainly responsible for domestic work, and their husbands' income supports the households' upkeep (Haugen & Brandth, 1994). While men performed more substantial work of clearing the farms (tree felling), women, on the other hand, took up the sowing and planting, weeding, harvesting, and storing of crops in the Asian regions and Ghana (Beneria & Sen, 1981; Ampofo, 2014). Besides, clearing of lands remains the responsibility of men, but women help in extreme situations in Ghana (Tsikata, 2016).

Furthermore, women play more significant roles than men in shifting cultivation, whiles men mostly take up plough cultivation (Boserup, 1970). In addition to working on farms, women participate in reproductive work including cooking, collecting of fuel and water, and food processing for households' survival in Africa (Tsikata, 2009). On average, women spend more hours working in a day than men in Zambia (Whitehead, 1999). In Haugen and Brandeth's (1994) Norwegian study, young women farmers who are unable to have enough time for all their responsibilities are mostly frustrated. According to one participant in their study, "Being a farmer, a housewife, and a mother means just too much work. I never have the feeling that I work sufficiently in any of the areas" (Anna -39 years old) (Haugen &

Brandeth, 1994, p. 221). Interestingly, the differentiation in farm activities affect women and men, farmers, differently, and further create systemic discrimination, women's subordination, reinforces unpaid labour, prevents women from benefitting from useful opportunities, enables women to receive low returns on paid labour (Tsikata, 2016), and minimizes women's diverse and vital roles (Apusigah, 2009).

However, the current economic challenges and change in the structure of agriculture have caused a change in the roles of women in farming in Kansas (Beach, 2013). Women's roles in farming are currently diverse and critical, as they are involved in a combination of many farm and household activities (Beach, 2013).

2.9.2 Access and Control Over Resources in Agricultural Production

Since the 1970s, many scholars have tried to examine the relative position of women and men concerning access to economic, social, and political resources. There are clear gender differences in access to resources (Ampofo, 2014). The disparity in access to resources in society is more substantial among women than men because of the structural nature of the society where men are more privileged than women (Ampofo, 2014). Women enjoy less power, wealth, and social position compared to men (Ampofo, 2014). Also, certain specific practices, such as early marriage, wife inheritance, polygyny, and widowhood rites, have implicitly subordinated women to men in traditional societies (Ampofo, 2014).

Many agrarian studies have revealed that men often control more resources and have more power to make essential decisions in households, communities, workplaces, and states (Dancer & Tsikata, 2015). Also, the access to agricultural inputs, including improved seeds and fertilizer, lands, human capital, agricultural finance, agricultural extension, and advisory services, are woefully less among female farmers (Anaglo, Boateng & Boateng, 2014). For

example, in the typical Ghanaian society, household lands are supervised and owned by men who are often household heads, unlike women (Apusigah, 2009).

According to Tsikata (2016), the physical and social demands of childbearing and rearing, male preference of many African societies, and the questions of marital residence practices affect the nature of access to and control over land and labour among both sexes. Similarly, the socialization process in Ghana offers men the opportunity to make decisions concerning production and reproduction, while most women depend on men for resources (Apusigah, 2009).

Furthermore, Doss and Morris (2000), clearly show that land ownership is related to gender in rural Ghana. The majority of women tend to be landless or own smaller plots of land compared to men (Doss & Morris, 2000). Results from a survey in Ghana showed that men (71.5%) have better access to land than women (68%) (Anaglo, Boateng & Boateng, 2014). According to Anaglo, Boateng, and Boateng (2014), traditional inheritance systems prevent females from inheriting land because of the transference of lands to other family members in emergencies. For example, patrilineal inheritance systems are practiced by the Ewes and Northerners in Ghana. Women's primary source of land is from spouses and family members because finances mainly restrict their access to market transacted lands (Tsikata, 2016). Even so, redistribution of lands between family members in households and intra-households' neglects women's land interests (Tsikata, 2016).

Furthermore, access to labour for land preparation activities such as ploughing, burning, and clearing is often difficult among women in many parts of sub-Saharan Africa (Doss & Morris, 2000). This is especially prevalent among women within the patrilineal system of inheritance. Most women depend solely on their labour and family labour since they cannot afford hired labour in Ghana. Additionally, Doss and Morris (2000) add that there is a

relationship between the gender of the farmer and the frequency of contact with agents responsible for providing improved agricultural services. From their results, agricultural extension services for women were very low or none at all. The majority of the agricultural extension workers are males, and the cultural norm of contact restrictions between males and females exists (Doss & Morris, 2000). The study concluded there exit unequal access to land, agricultural extension services, and labour among male and female maize farmers in Ghana. This unavailability of farm labour causes the biggest challenge in the farming sector, as family and contract labourers have found greater recompense in other sectors (Parry et al., 2005).

Again, Anaglo et al. (2014) assessed smallholder farmers' access to agricultural resources and established the case of insufficient access to credit among farming populations. However, female farmers had 19.5% more access than male farmers. In Ghana, a request for credit application is a cumbersome process. Farmers are not provided credit on time upon requests, and procedures for the application are too stressful. This makes it difficult for farmers to purchase the inputs needed for their work. Sometimes, repayment conditions are unsuitable (Anaglo et al., 2014). Anaglo et al. (2014) further explained that new technologies' access and adoption rates are high among males due to greater access to agricultural inputs such as improved seeds and insecticides than female farmers. More male farmers than female farmers received information through the radio concerning access to agricultural information. This was mainly because after the close of farm work; women took up caring roles while men listened to the radio. Apart from the radio, females had no or very little access to television, mobile phone, and the internet compared to men. However, access to the internet and other electronic devices has become more handy because of education, urbanization, and industrialization.

In the work of Yiadom-Boakye, Owusu-Sekyere, Nkegbe, and Ohene-Yankyera (2013), gender was a significant factor in reducing the inefficiency of rice farmers. They concluded that the opportunity of access to a high level of education and credit to finance the acquisition of farm inputs among male farmers enabled them to be more technically efficient than female farmers who had less access or no access to credit and education. It is also important to note that the differences in endowments and disproportionate access to resources affect the productivity of women farmers (Mukasa & Salami, 2016; Morgado & Salvucci, 2016) and render women insufficient power to influence production decisions or the allocation of agricultural incomes (Dancer & Tsikata, 2015). Therefore, gender equality, sustainable growth in the economy, women's participation in decision making, agricultural productivity, and food security would improve women's access to productive inputs in sub-Saharan Africa's agriculture (Dancer & Tsikata, 2015; Mukasa & Salami, 2016).

2.10 Global Farmer Mental health in Perspective

There has been a growing concern about farmers' mental health in the past twenty years (Pulgar et al., 2016). Researchers around the world have found the impact of climate issues, government legislations and regulations, the outbreak of diseases and pests, exposure to pesticides, economic and financial hardships, long hours of work, work overload, and social support on the mental health of farmers (Jones-Bitton, 2017; Goffin & Accident Compensation Corporation, 2014; Moffatt & Baker, 2014; Pulgar et al., 2016; Simkin, Hawton, Fagg, & Malmberg, 1998). The consequences gradually affect farm productivity and increase suicide rates among farming populations.

Brigance et al. (2018) argue that farmers are a group of people faced with mental health issues due to psychosocial and contextual problems. Generally, stress, depression, anxiety, and suicides among farmers in developed countries have received much concern (Jones-

Bitton et al., 2019; Raine, 1999; Simkin et al., 1998; Yazd et al., 2019). Notably, high levels of farmer mental ill-health were reported during the Millennium drought that occurred in Australia from the mid-2000s (Yazd et al., 2019).

Furthermore, during the 19th Annual Meeting of the North American Agro Medicine Consortium at the University of Alabama in 2007, farmer mental health became a primary public health concern (Olsen et al., 2008). According to a panel presenter at the meeting, Micheal Rossman of AgriWellness Inc, the mental health needs of the agricultural population are unmet. This is because farmers refuse to seek health assistance or lack health insurance, or medical professionals lack expertise (Olsen et al., 2008). In Canada, clinicians acknowledge the benefits and challenges of mental health in farming but emphasize farmers' non-healthcare-seeking behaviours (Cole & Bondy, 2020).

Numerous scientific investigations have verified the relationship between agricultural populations and mental health (Thomas et al., 2003), but available works are dated (Seligman & Hovey, 2006). Many studies have indicated the stressful and dangerous nature of farming as a result of some compounding stressors in the form of uncertainties, financial difficulties, family conflict, environmental problems, and changes in farming practices and regulations (Fraser et al., 2005; Parry et al., 2005; Roy et al., 2013; Yazd, Wheeler, & Zuo, 2019). Mcphedran and Leo (2015) suggest the need to investigate farmers' mental health and their access to mental health services, as these substantial issues contribute to the wellbeing of farmers. Yazd, Wheeler, and Zuo (2019) also recommend research on farmers' mental health and impact as they are essential for decreasing the burden of mental health and efficiently improving prevention efforts. They also seek to encourage and promote

future research in farmer mental health and help-seeking barriers to mental health care among farmers in developing countries.

In understanding the underlying issues in farmers' mental health, several studies have been conducted in countries including the US, Australia, UK, Mexico, India, Norway, Canada, South Korea, Brazil (Yazd, Wheeler, & Zuo, 2019), and very few in sub-Saharan Africa, precisely Ghana, Egypt, and Nigeria (Claire et al., 2017; Wezanamo & Weniga, 2018; Olowogbon et al., 2019). Fraser et al. (2005) confirm farming populations as most affected with mental health problems in several developed countries. Similarly, Yazd et al. (2019) recent systematic review augment mental health issues among farming populations than other occupations or working populations.

Farmers worldwide experience high levels of depression, anxiety, and suicide, as a result of the psychosocial demands on their work. These psychosocial or work demands, including finances, lack of access to farm inputs, long work hours, environmental issues, the sense of control or independence, and social support, are essentials for farmers' mental health (Logstein, 2016).

Gregoire (2002) supports this emerging problem with evidence of economic stress among farmers in Europe, leading to psychiatric morbidity and mortality. A similar study conducted among seasonal and immigrant Latino women in farmworker families residing in North Carolina in the USA showed significant depressive symptoms as a result of economic hardships (Pulgar et al., 2016). However, the sample size (248) and the context of the study are limited and could not be generalized. Furthermore, another study conducted in North Carolina showed the influence of family conflict, perceived discrimination, residential

mobility, and economic insecurity on the depressive symptoms of Latinas women in farmworker families (Roblyer et al., 2016). The study, therefore, suggested the need to create supportive family functioning interventions and policies that would reduce discrimination of all sorts among Latinas farmworkers and their families.

Within the body of researchers in occupational health studies, a number of researchers have established increasing farmer's mental health among palm plantation farmers in Malaysia (Leonard et al., 2013), smallholder farmers in Northern Ghana (Acharibasam & Anuga, 2018), farmers in Iowa (Scarth et al., 2008), Western Norway (Sanne et al., 2004), Murray-Darling Basin in Australia (Yazd et al., 2020), New Mexico (Brigance et al., 2018) North Carolina, US (Hawes et al., 2019) and Gyeongsangbuk-do Province in Korea (Lee et al., 2019).

Nonetheless, there are still methodological gaps in the study areas and research methods. A systematic review has documented less than 1% of research studies in a group of countries, including African countries (Ghana, Nigeria, and Egypt), Japan, and Malaysia, etc. whereas 27% of studies exist in the USA, 17% in Australia, and 8% in the UK. There are huge farmer mental health studies in developed countries compared to developing countries. Furthermore, quantitative studies of farmer mental health are generally common, with cross-sectional designs (Lee et al., 2019; Leonard et al., 2013), and small sample sizes (Pulgar et al., 2016; Roblyer et al., 2016).

On the other hand, qualitative studies have focused on general issues, including legal problems work-life balance workload (Brigance et al., 2018), rather than farm-related issues, including access to land, farm assets, labour, chemicals irrigation, land size, etc.

Also, few longitudinal (panel) and mixed research studies (both quantitative and qualitative) exist within the agromedicine and occupational studies literature. Nonetheless, within the Ghanaian context, a mixed research design has been used to investigate climate change and mental health risks among yam, millet, and maize farmers in Northern Ghana (Acharibasam & Anuga, 2018). However, effective mental health care and interventions are proposed for rural farmers because of the psychological impacts of climate change.

2.11 Farmers: A High-Risk Group

Several studies have reported high mental health disorders for farmers, such as stress, depression, anxiety, and suicides (Jones-Bitton et al., 2019; Merriott, 2016) compared to other occupations (Scarth et al., 2008). The mental health symptoms of farmers often include unhappiness, tiredness, anxiousness, irritability, crying more than usual, not getting pleasure from the job, feeling worthless, lack of sleep, and having thoughts of committing suicide (Raine, 1999; Parry et al., 2005; Poletto & Gontijo, 2012). Other outcomes of farmer mental health include loss of self-esteem, fatigue, substance abuse, relationship breakdown, withdrawal from social activities, insomnia, and nervousness (Yazd, Wheeler, & Zuo's, 2019). Further symptoms and outcomes are feelings of loss of control, loneliness, worthlessness, hopelessness, despair, and alcohol misuse (Greenhill, King, Lane, & MacDougall, 2009).

A study of farmers in Brazil reports a 33.8% prevalence rate of mental health disorders among farmers, with women farmers representing (39.7%) higher than men farmers (26.1%). The study's findings also showed that both men and women farmers' mental health became worse in older age, specifically after 40 years (Poletto & Gontijo, 2012). The researchers explained that a higher prevalence of mental health problems is attributed to

women's schedule of work, including caring for family and children, managing the home, and working on the farm, which can be tedious. A similar study conducted in North Carolina showed that women in farmworker families experience 31.3% higher prevalence rate of depression compared to the US household female population (9.3%) and the general Hispanic population (11.4%) (Pulgar et al., 2016). Atuoye and Luginaah (2017) argue that women in the Upper West Region of Ghana, are reluctant to share stressor-related issues, hence the potential to affect their mental health outcomes. Fuller et al. (2007) put across that male farmers are profoundly affected by mental health disorders than women in Australia due to life and work pressures. They also reported generally that, male farmers do not share their mental health concerns or seek mental health care (Cole & Bondy, 2020).

A research project conducted in the southern United States showed a 45% prevalence of depressive symptoms among women and children of Latino farmworkers living with families in North Carolina (Grzywacz et al., 2011). With the use of linear regression analysis, a significant relationship between poor sleep patterns and depression was established among older farmers and their spouses because of their lifestyles and schedules of the farmers (Labrash et al., 2008**;** Hawes, Wiggins, Reed, & Fanning, 2019). Here, poor sleep pattern is a contributing factor and an outcome of depression among farmers because of their patterns of work. But poor sleep could also be an outcome variable for depression.

Like Ghana, suicide cases are reported among tomato farmers in the Upper East Region (The New Humanitarian, 2009). Further reports in 2008 also showed the attempts of suicides among farmers in the Upper East and Ashanti regions of Ghana (The New Humanitarian 2009). They explained the farmers had lost about 40% of their produce due to a lack of storage facilities and buyers to buy their produce, and as a result, the farmers incurred

mounting debts. Consequently, Prof Asafu Adjaye of the Institute of Economic Affairs (IEA) of Ghana in 2013 predicted a rise in Ghanaian farmer suicides as a result of the adverse climatic conditions across the country with an average of 21% decrease per annum in agricultural output over 30 years (Ghana News, 2013). These high rates of suicides, which have been consistently attributed to mental health among the farming populations in other contexts, provide the platform for investigating farmer mental health, the impact of farming-related issues, and the location of farmers, for farmer mental wellbeing interventions and the population at large (Fraser et al., 2005).

Generally, within farmer mental health research, risk factors related to finances are well researched by American researchers due to the agricultural crises in the USA in the past decades. Climate variability factors such as water scarcity, weather conditions, and droughts have been the focus of Australian researchers as a result of the millennium drought that occurred in the early 2000s (Yazd, Wheeler, & Zuo, 2019).

However, in Ghana, researchers in occupational health have failed to report extensively on the mental health of farmers. Findings from a study on urban agriculture and health problems in Ghana showed bacterial diseases, malaria, cholera, respiratory, visual, headaches, and cardiac issues as common farmer health problems (Ackerson & Awuah, 2010). The activities, behaviours, and tools associated with farming put considerable strain on the minds and bodies of farmers through high incidences of pain, injury, and illness (Muilerman, 2013).

2.12 Prevalence of Mental Health among Farming Populations

High levels of anxiety and depression are reported amongst farmers worldwide. Results from a cross-sectional study conducted across Canada revealed high levels of stress, anxiety, and depression among agricultural producers. Of the 1132 agricultural producers assessed with Hospital Anxiety and Depression Scale (HADS-D), two-thirds representing 69.1% were depressed, with 20% mildly depressed, 12% moderately, and 3% severely depressed (Jones-Bitton et al., 2019). Additionally, 57% and 33% were respective proportions of high and low anxiety for the agricultural producers. The researchers concluded that farmer mental health had become a significant public health issue that require effective interventions and policies to promote the wellbeing of farmers.

Furthermore, a survey conducted in Iowa, the US, with the Center for Epidemiology Studies Depression (CES-D) scale revealed that 12.1% of the 367 samples were severely depressed with depression. Among the farmers in Iowa, predisposing factors to depression included indebtedness, poor general health, unmarried status, legal problems, and the use of insecticides (Scarth et al., 2008). The study further showed an insignificant association between depression and other factors, including education, social support, smoking, and alcohol drinking. The high prevalence of depressive symptoms among farmers in Iowa was attributed to a poor crop season caused by the floods of 1993.

Similarly, the use of the Center of Epidemiology Scale for Depression- Revised (CESD-R) in a study conducted in Mexico revealed 28.1% of Latino farmworkers studied had depression (Terrazas & Mccormick, 2018). However, 59.4% had experienced depression within the past 12 months. Further analysis of frequencies and percentages for each symptom showed that 18.8% of the study participants reported between seven (7) and ten

(10) symptoms, and 20.3% reported no symptoms of depression (Terrazas & Mccormick, 2018). Feelings of fatigue, sadness, and hopelessness were reported mainly among the Latino farmworkers studied compared to the other symptoms of depression.

In their study, scores for mild and severe depressive symptoms were 10.8% and 2.9%, respectively, among rural adults in South Dakota, USA (Roh et al., 2015). These depression scores are extremely low compared to Iowa farmers in the USA and could result from the Geriatric Depression Scale (GDS)- Short Form used in collecting the data, which had a low internal consistency of GDS-SF 9.1. Roh et al., (2015), however, attributed the scores for depression symptoms to functional disability (problems performing daily physical activities). A similar study in southern Malaysia revealed 8.5% mild to moderate depression and a high prevalence rate of 27% mild to moderate anxiety among male plantation farmers (Leonard et al., 2013). The results of the study of Leonard et al. (2013) could be attributed to the exclusion of women from the study and the study's small sample size.

2.13 Defining Farming Risk Factors and the Mental Health of Farmers

Rousmasset defines farm risk as any environmental or socioeconomic event that makes a household income or crop yield fall below a minimum level (Taal, 1989). These risk factors in farming are related to the economic, social, psychosocial, and environmental stressors in the daily work of farmers (Kolstrup et al., 2013). For Logstein (2016:1), demands in agricultural production are 'aspects of the work environment such as exacting task requirement and time pressures. He contributes to the discourse on farmer mental health that demands in farming are likely determinants of mental health issues among farmers in Norway. Logstein (2016) discovered that an increase in the workload of farmers is associated with an increase in their mental health problems. Nonetheless, the number of

hectares operated on remained insignificant to the mental health of the farmers in his study. Taal (1989) recommends that other farm risks and stressors that affect the farmers' vulnerability and coping strategies require investigation.

Therefore, farming risk factors are conceptualized in this study as farm-related or institutional risk factors, including the security of the farm, the number of farms operated by a farmer, size of the farms, irrigation of the farm, access to agricultural assets mechanization, etc. The ecological factors, which are environmentally inclined, include the attack of pests and diseases, quantity of crop loss, ecological zones, region, and locality of residence. Other risk factors in farming include pest-related diseases, low harvests, fluctuating markets, lack of social support, unfavourable weather conditions, mining, regulations from government authorities, legal problems, increasing cost of farm inputs (fertilizers, seeds, and labour), non-access to credits, and decline in health status of farmers (Scarth, Zerling, Lewis, & Burmeister, 2008; Kolstrup et al., 2013; Roy et al., 2013; Moffatt & Baker, 2014; Das, 2017).

In this study, mental health is the main dependent variable, but it is referenced as depression. Depression was measured with the Kessler-10 scale (psychological stress scale). This Kessler-10 scale was modelled in four levels as low, mild, moderate, and severe depression, per the scores of depression, ranked from 10 to 50. However, the scores of depression were used in estimating the panel regression models. The depression score variable is important because it aided panel regression analysis with the longitudinal or panel data. The scores of depression were obtained at the individual farmer level, as depression affects individuals and not a household as a group.

Several other scales of measurements for depression are adopted to ascertain depressive symptoms among different sections of the general population. Scarth et al. (2008) employed the Center for Epidemiology Studies Depression Scale (CES-D) based on a cut-off point of 16 and used logistic regression analyzes to assess the prevalence and magnitudes of risk factors for depressive symptoms and their associations among farm operators. They found out that 12% of the sample of Iowa farm operators had high depressive symptoms. The likelihood of high depressive symptoms is 2.91 times greater among farm operators experiencing a substantial decline in income. Also, the sample of farm operators in Iowa, the USA, were not married, had low general health status, and legal problems were 3.89, 5.41, and 7.35 times more susceptible to high depressive symptoms.

In a UK survey on psychological morbidity of farmers and their spouses, the use of the General Health Questionnaire (GHQ- 12) with a cut-off point of 12 revealed 35% high depression among the farmers, with risk factors including being a male, aged from 45 to 64 years, living in a rural area and self-employed (Hounsome et al., 2012). The authors, however, proposed that different cut-off points for psychological or mental health scales should be set for different population groups. The context of study respondents could also be considered.

Given the prevalence of farmer mental health (psychological) disorders, mostly measured with different psychological scales, it is important to utilize the Kessler 10 (K-10) psychological scale to study the influence of farming risk factors, gender, and social support on the mental health of crop farmers to improve agricultural crop production and public mental health in Ghana. The K-10 psychological scale affords the opportunity to have a detailed assessment of individuals. Additionally, a similar study on psychological distress

in Ghana utilised this scale (Canavan et al., 2013). The independent variables for the farmer mental health conceptual model include variables established in the literature as demands, stressors, determinants, or risk factors of farmer health (Gregoire, 2002; Roy et al., 2013; Torske et al., 2016). These risk factors are ecological and institutional.

2.13.1 Risk-Related Factors of Farmer Mental Health

According to Goffin and Accident Compensation Corporation (ACC) (2014), risk factors affecting the mental wellbeing of farmers include controllable events (events within the farmer's control) such as workload and finances; and uncontrollable events (events beyond the farmer's control) such as climate change and government regulations. Most of these risk factors are similar across countries and cultures (Goffin & ACC, 2014). Kelly et al. (2011) argue that the analysis of the locality or contextual factors at the individual, household, and community levels have been less relevant in the interrogation of the mental health of rural communities.

In a blueprint for promoting mental health and wellbeing among farmers in South Wales, Australia, risk factors documented included family, economic, and regulatory issues and climatic conditions (Greenhill, King, Lane, & MacDougall, 2009). Additionally, a recent systematic review has identified four main risk factors influencing the mental health of farmers (Yazd, Wheeler, & Zuo, 2019). The factors include climate and financial matters, pesticide exposure, and poor physical health. From the above studies, health, environmental, and economic factors could be inferred as common predictors of farmer mental health among farming populations requiring comprehensive mental health intervention.

Other predictors of farmer mental health discovered in a systematic review of male-dominated industries such as agriculture revealed individual factors, team environment, and work and home conditions such as work overload, and changes in working conditions and responsibilities associated with workers' mental health outcomes (Battams, Roche, Fischer, Lee, & Cameron, 2014). In particular, the most commonly identified risk factors was related to job conditions. Similarly, high workloads in farming and off-farm, and the level of farm income were the prevalent risk factors associated with the mental health of farmers in Norway in a national study (Logstein, 2016). Unlike a recent qualitative study among organic farmers in New Mexico, USA, where long working hours, work-life balance, isolation, performing the dual role of owner and work responsibilities, and social network were discovered to be associated with the mental health of organic farmers (Brigance et al., 2018). The researchers argued about the similarity in farmer mental health risk factors between organic and non-organic farmers.

Raine (1999), in his qualitative study conducted in Yorkshire, UK, found risk factors that included time pressures during harvesting, paperwork, and physical isolation as significant contributors to stress among some particular farmers. He explained that numerous paperwork that involves form-filling was complex and challenging to understand. Also, the high cost of land, fluctuation in prices, farmers' inability to access subsidies, and agriculture losses affected the profit of farmers and their ability to thrive in agriculture (Raine, 1999; Parry et al., 2005). Consequently, borrowing money from the banks becomes stressful as repayments of loans may be difficult for farmers (Raine, 1999; Parry et al., 2005; Terrazas & Mccormick, 2018).

Additionally, farmworkers in New Mexico and Western Texas, the USA, experience stressors caused by systemic issues such as unfair policies, oppression, racism, marginalization, and discrimination (Terrazas & Mccormick, 2018). However, the research established no relationship between racism/oppression and depression, although the study reported 67% racism among the farmworkers in a cross-sectional mixed-method survey (Terrazas & Mccormick, 2018). The researchers explained that the farmworkers experienced racism and discrimination vastly at the workplace. Furthermore, remoteness is another significant risk-related factor in the mental health of farmers. An Australian Rural Mental Health longitudinal study revealed worse mental health problems among farmers who lived remotely from towns compared to non-farmers in the same location (Brew et al., 2016). The researchers emphasized that rural-specific mediating factors or vulnerabilities such as community and personal support and perception of infrastructure and services do not mediate the findings in the rural area studied.

In a mental health study conducted in a rural and remote community in New South Wales, Australia, the use of Kessler 10 depression scale, a scale for measuring psychological distress or depression, showed that marital status, trait neuroticism, social support, and rural adverse events largely contribute to rural residents' mental wellbeing (Kelly et al., 2011). Additionally, Hanklang et al.'s (2016) study on the risk factors influencing the depressive symptoms of rice farmers in a province in Thailand revealed risk factors including financial hardship, sound from loud machines in the working environment, lack of family connection, community integration, and acceptance, and support from governmental organizations.

Multiple regression analysis established the associated factors of depression between male and female rice farmers. The factors associated with the depression of male farmers included

the hearing of loud machines, the use of protective equipment during work with chemical substances, community integration, and eating healthily. The predictors of depression symptoms among the female rice farmers included family connection, connection with an acceptable person in the community, and financial difficulties. In particular, the female farmers were more associated with personal and social support (non-farm) factors of depression, which differ from the on-farm and non-farm factors of depression for the male farmers.

Furthermore, farmers' seasonal variations in mental health issues have also received some attention. Seasonality periods in farming play a role in farmers' mental health (Hanklang et al., 2016). Seasonality periods in farm work are peak periods that involve long hours of work and poor quality sleep (Labrash et al., 2008). According to Tepoel, Rohlman, and Shaw (2017), seasonal variation often creates additional depressive symptoms for farmers as a result of an increase in agricultural activities and work demands.

However, a study conducted among Hispanic farmers in the USA revealed low depressive symptoms and no significant difference in depression during seasonal periods (Copeland, Holte, Thompson, & Mc, 2018). The researchers argued that the low depressive symptoms among the Hispanic farmers might be due to the farmers living with their close families for many years. Living and sharing dwelling with close families could provide great support to the farmers. Similarly, in the eastern Washington State area, results from a study showed that stress among Latinos studied widely varies by season and occupation (Copeland et al., 2018). The study explains that higher stress levels exist among Latino farmers during the agricultural pre-thinning season than and non-spray seasons. Some of the stressors of farmers discovered included lack of enough money to pay bills, long-distance from family

members, and the inability to speak the English language (Copeland et al., 2018). These factors were found because Latinos may be immigrant or seasonal farmers, who have settled in farm areas away from their homes to work for a living.

In India, the rising cost of farm inputs such as seeds, fertilizers, and electricity (Das, 2017), cash crop farming, and indebtedness (Merriott, 2017) have been the main predictors of mental health issues among farming populations in the country. Similarly, a large population-based Hordaland Health Study on depression and anxiety among farmers and non-farmers in western Norway revealed higher levels of depression and anxiety among farmers than non-farmers (Sanne et al., 2004). Long hours of work, education, lower income, high job demands, and low levels of independent control had a significant influence on the depression and anxiety of farmers (Sanne et al., 2004). Likewise, in the work of Parry et al. (2005), several Latino farmers studied were diagnosed with clinical depression as a result of pressures of farming. Another study using Center for Epidemiology Studies Depression (CES-D) in a Korean longitudinal study showed a positive correlation between different kinds of pesticide exposure or poisoning and depression among the Korean farmers studied (Koh et al., 2017).

Regarding the mental health experiences of farmers, a study conducted in Australia has revealed that just 9% of the farmers were likely to visit a mental health professional within a year (Brew et al., 2016). This is because rural farm workers that were studied preferred to manage their illness themselves rather than seek professional help (Brew et al., 2016). For Terrazas and Mccormick (2018), positive thinking, focusing on work, use of distractions such as movies, reading and chores, religion, rest, physical activity, and seeking support from family and friends are some coping strategies that farmers adopt to help mitigate

depression and other mental health problems. Alternatively, agro medicine researchers have proposed mental health policies and interventions for the agricultural industries (Battams et al., 2014). In developing countries like India, modern farming education, fair loan provision, farmer and crop insurance, and additional income avenues for farmers have been developed (Das, 2017).

2.13.2 Socio-demographic Factors Associated with Farmer Mental Health

In Australia, farmers are a population who are generally males, older, married, live remotely in a disadvantaged area, and have the attitude of managing their illness themselves (Brew et al., 2016). In contrast, a study conducted in New Mexico, USA, also shows that the majority of farmers were younger than 50 years old (90%), single (62.5%), and about 43% had been working in agriculture for five years or less (Brigance et al., 2018). However, within the farmer mental health literature, gender, age, and marital status are the most common demographic predictors of mental health problems among agricultural workers. According to Brigance et al. (2018), age and sex are crucial biological determinants of health outcomes and behavioural disposition.

In their study, predictors of farmer mental health included age, sex, ethnicity, marital status, and obesity (Kelly et al., 2011; Hanklang et al., 2016; Hawes et al., 2019). Another study conducted in the US among women in Latino farmworker families showed the influence of age and marital status (Pulgar et al., 2016). Also, Yazd, Wheeler and Zuo's (2019) systematic review of farmer mental health revealed sex, particularly females, increased age, and type of farming system as risk factors of farmer mental health. Other risk factors included marital status, regional differences, and farming experiences. Nonetheless, age, gender, education, and marital status were not associated with the depression of farmers in

Muar Johor, Malaysia (Jafarzadeh, Mohan, & Velu, 2012). This might partly be due to the depression scale used in measuring the psychological wellbeing of the farmers or the method of analysis of the data. The researchers utilised the self-report Depression, Anxiety and Stress Scale (DASS-21,) widely used among workers, and used descriptive analysis for the data.

In particular, several agricultural mental health studies have shown a significantly higher proportion of poor mental health among females than male farmers (Hanklang et al., 2016; Lee et al., 2019). With the CES-D, 31% of women farmworkers were significantly depressed, and their depression scores were higher than male farmworkers. The researchers explained that the primary caregiver roles, in addition to farm work performed by the female farmworkers, are likely contributors to the rate of depression (Pulgar et al., 2016).

In Nakhon Ratchasima, a province in Thailand, a cross-sectional study conducted among rice farmers revealed higher depression among females (48.1%) compared to male farmers (39.0%) (Hanklang et al., 2016). The results further showed that younger male farmers and lower educated female farmers were more depressed. The researchers argued that the depression of farmers is dependent on the type of crop grown, the personal factors of farmers, and the cut-off point of the scale used in measuring the mental health problem (Hanklang et al., 2016). A similar study on the risk factors associated with depression and suicidal ideation conducted in Gongju City, Korea, among a rural population, showed 2.8% males and 7.6% females with depression (Joo & Roh, 2016). Further findings from the study showed no significant association between education and the income of the rural population.

Female farmers in specific areas like Canada experience higher stress, anxiety, and depression scores. In their work, women, particularly in Canada and the USA, experience more depressive symptoms (Tepoel, Rohlman, & Shaw, 2017; Jones-Bitton, Best, MacTavish, Fleming, & Hoy, 2019) as a result of work-family conflict and less support from family and friends (Tepoel, Rohlman, & Shaw, 2017). Other studies have documented significantly higher levels of depression and anxiety for male farmers compared to female farmers (Sanne et al., 2004) because of patriarchal systems, males are reluctant to share their concerns or seek help.

When it comes to the age of farmers, a study conducted in Norway showed that farmers between the age of 50 to 59 years were discovered to be highly depressed because they worked more than 2,550 hours annually (Logstein, 2016). The study further showed that an increase in work demands with a low sense of independence is related to higher mental health complaints, confirming the Job Demand Control (JDC) and Job Demand and Resource (JDR) Models (Logstein, 2016). Both models explain the role of job demands, control, and support on one's psychological wellbeing. High job demands, low sense of control, and inadequate support increase depression, and low job demands, high sense of control, and high support decrease depression. In Korea, depression is more prevalent among the elderly in rural populations (Joo & Roh, 2016) because it increases with aging (Torske, Hilt, Glasscock, & Lundqvist, 2016).

Regarding the level of education and income on depression, Joo and Roh's (2016) study found no significant association. However, within the Ghanaian context, an analysis of a population study on the social determinant of food on the mental health of households in the northern part of the country revealed that being female, single, and high level of education

correlates with better mental health (Atuoye & Luginaah, 2017). Similarly, a national comparative study on ageing and adult health conducted in Ghana and South Africa revealed a 7.5% and 4.0% prevailing rate of depression among female and male adults and rural resident farmers (Adjaye-gbewonyo et al., 2019). Sex, age, marital status, and education are confirmed correlates of farmer mental health in studies conducted in the USA, Korea, Australia, Malaysia, Norway, and Ghana.

2.13.3 Environmental or Ecological Risk-Related Factors

Several studies have documented varied associations between the environmental and ecological factors on the mental health of agricultural and rural populations in the global world (Cherry, Burstyn, Beach, & Senthilselvan, 2012; Obrien, Berry, Coleman, & Hanigan, 2014; Koh et al., 2017; Hayes et al., 2018; Polain, Berry, & Hoskin, 2018; Wezanamo & Weniga, 2018). Issues of the environment such as drought, exposure to pesticides, dryland salinity, and water scarcity are associated with the mental health of agricultural populations.

A population census study conducted in Australia has shown an association between depression and dryland salinity (Speldewinde et al., 2009). The researchers explained that unusable land for farming as a result of dryland salinity results in productivity and financial loss, which consequently affects the mental health outcomes of farmers. The study also showed a correlation between the socially disadvantaged or indigenous population and the risk of depression (Speldewinde et al., 2009).

Another recent national longitudinal survey conducted in the period of the Millennium Drought in Australia revealed worse mental health among farmers who experienced rainfall

scarcity, low water allocations, and higher summer temperatures (Yazd et al., 2020a). The consequences of the risk factors included a decrease in agricultural productivity, reduced employment and livelihoods, and changed environmental conditions. But severe impacts on mental health were reported among farmers who experienced water scarcity and financial difficulties during the drought (Yazd et al., 2020).

2.14 Social Support in Farming Populations

People living and working on farms are exposed to environmental, ecological, economic, and social-related challenges. For example, Wessel and Quist-wessel's (2015) study conducted in the Ashanti Region revealed that, currently, cocoa diseases remain the biggest challenge for the farmers in Ghana. Major pests and diseases also affect maize by reducing maize yield and creating a huge maize production gap (Ragasa, Chapoto, & Kolavalli, 2014). About these setbacks in the work of farmers, the government, organizations, friends, and family offer physical or emotional resources to improve farmers' physical and psychological wellbeing. Many farmers in the UK prefer to seek more support from close friends or colleagues than with support organizations (Parry et al., 2005).

Social support is described as "support to an individual through social ties to other individuals, groups, and the larger community" (Lin et al., 1979, p.109). Social networks are a sub-dimension of social support (Brigance at al., (2018), and it is defined as supportive social structures that promote interactions and personal relationships. The theoretical models of social support postulate two important dimensions: (1) a structural dimension which includes the size and frequency of social networking or interactions, and (2) functional dimension, which includes the emotional (love and empathy) and instrumental (material gifts or practical help) resources (Ozbay et al., 2007).

Farmers benefit from the structural and functional forms of social support from the family, friends, work colleagues, community, farmer group associations, and agricultural organizations. For instance, the government provides support services to cocoa farmers through the Ghana Cocoa Board (Cocobod). Several support programmes, including pests and diseases control programmes, and provision of subsidized fertilizers and insecticides to farms are in place to enhance the rates of cocoa production. International and private organizations in agriculture also support the sector with educational, financial literacy, and training on farming management to sustain crop production (Mondelez International Organization, 2015). Furthermore, the majority of the farmers receive financial and labour assistance from family members (Mohammed, Asamoah, & Asiedu-Appiah, 2012) to sustain crop production.

2.15 Social Support and Farmer mental health

High rates of stress, anxiety, depression, and suicide are reported among farming populations. The potential contributory factors have been attributed to specific unique characteristics of the farmers, changing farming practices, and the adverse effects in farming (Gregoire, 2002; Hossain et al., 2009; King et al., 2015). Nonetheless, social support has played a protective role in preventing farmer mental health. Some studies on rural and remote communities have highlighted the importance of social support in protecting individual mental health over time (Kelly et al., 2011; Romans, Cohen & Forte, 2011). There is strong evidence of the beneficial effects of social support on psychological wellbeing (Ozbay et al., 2007). Higher wellbeing is significantly associated with higher social support (Kelly et al., 2011). Alternatively, low depression rates tend to be associated with higher social support and a sense of community belonging among farmers (Mclaren & Challis,

2009; Romans et al., 2011). A Korean study on depression and suicide showed that 11.5% of the farmers were depressed as a result of low social support (Joo & Roh, 2016).

Social support and networks are essential in the agricultural industry because of agricultural workers' long hours of work. Social support is a resource in protecting the well-being of individuals (Pearlin & Skaff, 1996). Generally, the common kinds of support are emotional, instrumental, informal, and formal support (Pearlin & Skaff, 1996; Parry et al., 2005). Informal sources of support include having time for leisure activities, relaxation, and meeting friends and family while formal support encompassed support and information from agricultural groups and organizations. Such organizations provide opportunities for socialization and relaxation (Parry et al., 2005). But many farmers preferred to share information with close friends rather than seek support or share information with the local support organizations (Parry et al., 2005).

Brigance et al. (2018) define social networks as supportive social structures that promote interactions and personal relationships. According to Plaisier et al. (2007), social networks are essential resources that act as a buffer against the development of depression amidst poor working conditions. There are vital roles of interpersonal relationships within the agricultural populations with family, friends, and community networks in farming and social systems such as community gardening, business partnerships, and educational workshops (Terrazas & Mccormick, 2018; Brigance et al., 2018). Empirical evidence shows a significant association between mental health and wellbeing, higher social support, and fewer adverse events (Kelly et al., 2011). Similarly, the perceived social support of 261 rural older adults in South Dakota, the USA, predicted fewer depressive symptoms in a cross-sectional study (Roh et al., 2015). Also, the resultant effect of social isolation or lack of

social contact on suicide among farmers has been established in a nationally representative study in Australia (Mcphedran & De leo, 2013).

On the other hand, using logistic regression analysis on a sample of 543 farmers has shown a negative impact of low social support on farmers' depression levels (Joo & Roh, 2016). The study, however, concludes that social networks, trust, and social participation reduce the risk of depression, hence the need to organize social programmes to improve the mental health of farmers (Joo & Roh, 2016).

Within the social support literature on farmer mental health, evidence of the supportive role of the family is reported. Farmers' wives played a critical role in providing emotional care (Goffin & Accident Compensation Corporation, 2014). The family's supportive and attachment role in their lives, friends, and close allies within the farming business and outside farming is also documented (Parry et al., 2005). Hanklang et al. (2016) and Logstein (2016) recently reported an association between work demands and social support from the friends of farmers with mental health issues.

In a related study conducted in the Northern part of Ghana on food insecurity and mental health among rural household heads, social support concerning group membership and remittance receipt were significantly associated with mental distress (Atuoye & Luginaah, 2017). A Korean study on depression and suicide also showed that 11.5% of farmers were depressed as a result of low social support (Joo & Roh, 2016). Furthermore, a pilot study revealed low organizational support among agricultural producers with mental health issues in Canada (Jones-Bitton, 2017). The analyses of the study confirmed other studies that agrarian producers are reluctant to seek help because of stigmatization in their various

communities (Fraser et al., 2005; Jones-Bitton, 2017). Fraser et al. (2005) also discuss the resultant demands of familial conflict on farmers' mental health due to the responsibility of care and support for members of the family and dependent relatives.

Other social support risk factors include lack of family connection, lack of community integration and acceptance, and lack of support from governmental organizations (Hanklang et al., 2016). The researchers pointed out that the feeling of community integration and acceptance prevents depression among rice farmers in Thailand (Hanklang et al., 2016). Furthermore, in a study conducted in Norway, Logstein (2016) found a significant association between mental health outcomes, job demands, and social relationships. The Job Demand-Control (JDC) Model and Job Demand-Resource (JDR) Model utilized in the study verified that resources and a sense of independence buffer the effect of work demands on farmers' mental health (Logstein, 2016).

On the contrary, others have had conflicting findings that social support is negatively related to depressive symptoms (Lin, Simeone, Ensel, & Kuo, 1979). Nonetheless, most mental health studies have highlighted the essential role of social support to farmers worldwide (Bjornestad et al., 2021; Lunner Kolstrup et al., 2013). The supportive roles of the different social support networks in the mental health of farmers are well documented. Neighbourhood and community (Stain et al. 2008), agricultural professionals (Stanley-Clarke, 2019), agricultural extension agents (Hossain et al., 2009), and family members and friends (Bjornestad, Brown & Weidauer, 2019) have all been instrumental in addressing farmer mental health. Numerous social programmes that pertain to increasing social participation and building social networks and trust need to be organized to improve the mental health of farmers (Joo & Roh, 2016).

Social support in mental health studies is assessed with several research instruments including, Coping Resources Inventory (Mclaren & Challis, 2009), Medical Outcomes Study (MOS) social support survey items (Romans et al., 2011), and the Multidimensional Scale of Perceived Social Support (MSPSS) (Bjornestad, Brown & Weidauer, 2019), etc.

But this thesis interrogated social support with two concepts; social network (social relationships with significant others) and access to social service (accessibility to agricultural support services). The social network concept pertained to crop farmers spending time with others outside their households, the support they receive and provide to other households, and the advice about agriculture they receive and provide to others. Also, the access to social service concept was concerned with contacts crop farmers have made with agricultural organizations for information and agricultural extension services received. Some of the survey questions on social support included "Do you or others in your household spend more than one hour per week with any member(s) of this household", "Do you or others in your household receive advice about agriculture from any member(s) of this household" "If you or others in your household needed help or assistance in any way, would this household help you", "Did you receive an extension service through any mass media in the past year" "Has your household had any contact with the agricultural organizations in the last 12 months?"

The thesis, therefore, argues that existing social networks and access to social services interact with the risk factors in farming to influence the mental health of the crop farmers. It is, however, expected that social support would act as a protective resource or buffer against the mental health of the crop farmers.

2.16 Theoretical Underpinnings of Farmer Mental Health

Within occupational health studies, several theories explain the underlying health issues among the farming population. However, the selected theories and models underpinning the study are the Person-Environment Fit theory, the Job Demands-Resources (JD-R) model, and the Gender Role theory. The three selected theoretical models underpinning the study complement each other in explaining the factors influencing farmer mental health in Ghana.

2.17 Theoretical Framework

The key models widely used to ascertain job distress in various occupational groups and contexts are the Job Demand-Control (JDC) and Job Demand-Control Support Models (JDCS) (Mojzisch, Niesel, & Schulz-hardt, 2010; Ibrahim & Ohtsuka, 2012; TePoel, Rohlman, & Shaw, 2017). These models explain the role of individuals' ability to exert control over work demands in the environment and the buffering role of social support on work demands. But these models are criticized for essentially lacking or predicting low additive effects on job-related wellbeing in longitudinal data (Mojzisch et al., 2010). Hence, the Job Demand-Resources (JD-R) model (Schaufeli & Bakker, 2004), which builds on the JDC (Karasek, 1979) and the JDCS models (Johnson & Hall, 1988), was adapted to investigate the institutional and ecological risk factors in farming, as well as the role of social support on the wellbeing of cocoa and maize farmers.

2.17.1 Person-Environment (P.E) Fit theory of Stress

The person-environment (P.E) fit theory is one of the earliest interactional theories of work that explained the interaction of a person and the environment on psychological stress. This theory was formally proposed by French, Rogers, and Cobb (1974) and later refined (Caplan, 1983; Harrison, 1985; Edwards, 1996). The P.E fit theory is well utilized in

occupational behaviour, health, stress, and wellbeing literature, and numerous practical applications and interventions (Kang, 2007; Dewe et al., 2012).

The main tenet of the P.E fit theory is that an optimal fit or match or interaction between a person and environment is required for effective human functioning. But, a lack of fit or match between a person and the environment would lead to mental or psychological distress (Van Vianen, 2018). The theory puts across three theoretical properties that make it possible in understanding the working environment or organizational contexts.

Firstly, the P.E fit theory looks at the commensurate relationship between the characteristics of the person and the environment of work to identify the discrepancy between the person and the environment. In the theory, a person refers to the characteristics or attributes of the person in existence; in contrast, the environment refers to the physical and social situations and events individuals encounter and perceive (Edwards, Caplan, & Harrison, 1998). Thus, it focuses on the personal characteristics of individuals and the difficulties faced in the environment.

Secondly, the theory explains the objectivity and subjectivity in the components, person and environment, and the processes of fit or match. According to the P.E theory, an interaction occurs between the objective realities in the environment and individuals' subjective perceptions (Pezaro, 2018).

The third theoretical property of the theory projects two dimensions of the fit: abilities-environmental demands and needs-environmental supplies. The demands-abilities fit entails the match between the demands in the environment, which could be role expectations,

workload, and job requirements. In contrast, the abilities of the person include time, energy, and training to meet the demands in the environment (Edwards, Caplan, & Harrison, 1998). The needs are defined in needs-supplies fit as requirements, values, and motives to achieve, while supplies are the resources and rewards to be achieved by persons. Examples of supplies may include social support and other available opportunities. Dewe et al. (2012) further explain the needs-supplies fit by defining needs as physical and psycho-social necessities and supplies as resources available to satisfy the needs of persons. Dewe et al. (2012) further described demands as the issues people confront at work and abilities as skills and knowledge required to meet those demands.

The theory argues that psychological distress occurs when a mismatch exists between an individual's needs and resources and between abilities and demands (Edwards, Caplan, & Harrison, 1998; Dewe, Driscoll, & Cooper, 2012). In other words, when there are high demands and low abilities, a mismatch will occur. However, a match occurs when demands are high, and abilities are low. In the environment of work, some possible outcomes of the mismatch or misfit may include lack of job satisfaction, lack of commitment to the work, and increased turnover intentions.

Most studies have focused on the needs-supplies fit within occupational research studies (Edwards, Caplan, & Harrison, 1998; Dewe et al., 2012). Nonetheless, Caplan (1987) notes that any of the two dimensions can be used to explain the association between the attributes of the person and the environment as a result of the occurrence of the change. This study also focuses on one dimension (need- supplies fit) in investigating the problem under review.

The two concepts, person and environment, are key inseparable factors to understanding the nature and consequences of behaviour, stress, and wellbeing (Edwards, Caplan, & Harrison, 1998). According to Edwards, Caplan, and Harrison (1998), a deviation from normal functioning as a result of a misfit between the person and environment could lead to psychological, physiological, and behavioural outcomes such as anxiety, restlessness, hopelessness, depression, absenteeism, smoking, overeating, coping and defence. They explain that stress as a subjective phenomenon is caused by a misfit between the person and environment, which results from insufficient supplies to meet the needs of individuals.

Furthermore, an increase in depression is due to the deviation of supplies for needs or insufficient supplies, whereas a decrease in depression is a consequence of high supplies and needs (Edwards, Caplan, & Harrison, 1998). Dewe et al. (2012) add that a match or fit between abilities and demands is required to enhance psychological well-being. Moreover, peoples' fundamentals and what they receive to satisfy those needs are equally important to avoid misfits within the dimension (Dewe et al., 2012).

The P.E fit theory has been used to investigate the student volunteerism motivations (Sergent & Sedlacek, 1990). The study established that differences in student characteristics and motivational needs influence their satisfaction or dislike for volunteering in campus organizations in Holland. Sergent and Sedlacek (1990) recommended the need for other studies to identify different rewards and incentives (motivational needs) in organizations that may increase the level of satisfaction for student volunteers. Furthermore, the person-environment fit model has been used to study youth employment and psychological health in two rural towns in Scotland (Pavis, Platt & Hubbard, 2002). The employment sectors included agriculture, forestry, fishing, manufacturing, construction and public services etc.

The study emphasized the need to consider the degree of fit between the perceived needs of the youth, their employment and the availability of labour market opportunities. Because the current job of the youth and employment opportunities satisfies their needs to give them good psychological health and wellbeing.

Therefore, the use of the P.E fit theory in studying the mental health of cocoa and maize farmers provides the opportunity to understand the relations between the characteristics of farmers and their environment of work. The dimension of the fit theory, needs-supplies fit, relates to the concepts in the study. The needs may encompass access to farm inputs, ownership of farm assets, and farm output; and supplies also encompass the resources and services available to cocoa and maize farmers, such as agricultural extension services, interaction with organizations, information seeking, and social networks. Adopting the needs-supplies fit dimension is essential to understanding the fit between cocoa and maize farmers and their work environment. More importantly, most studies on work or job-related issues adopt the person-environment fit theory to explain the association between demands and abilities on employees and their work environments (Caplan, 1987).

One major milestone of adapting the theory is its use in the farming context to study farmers other than employees in an organization. Nonetheless, the P.E Fit theory has received criticisms, including a lack of content specificity of person and environment dimensions (Kang, 2007; Van Vianen, 2018). Also, the definition of the concepts is borrowed from other theories. Lastly, the P.E fit theory does not allow logical association predictions among the concepts of the theory because the relationship between person and environment is not predicted (Edwards, Caplan, & Harrison, 1998), so predictions on mental health might be a challenge.

2.17.2 The Job Demands-Resources (JD-R) Model

In the work and health research field, the Job Demands-Resources (JD-R) model is among the work stress models that explain the relationship between work and stress, depression, exhaustion, and burnout (Schaufeli & Bakker, 2004; Bakker, Demerouti, & Euwema, 2005; Chandrasekar, 2006; Xanthopoulou, Bakker, Dollard, Demerouti, & Schaufeli, 2007; Mojzisch, Niesel, & Schulz-hardt, 2010; Keser, 2017). The JD-R model incorporates the tradition of the Demand-Control-Support model (DCS) and the Effort-Reward-Inbalance model (Xanthopoulou et al. 2007; Ribeiro et al. 2007) by looking at a broader scope of variables that may be relevant for a wide range of occupational settings and groups and acts as a theoretical base for the study of the antecedents of employee wellbeing and performance (Bakker & Demerouti, 2007; Rensburg et al., 2007). This model assesses both the positive and negative well-being of employees and can be applied to different occupational contexts (Bakker & Demerouti, 2007).

Firstly, the JD-R model is a theoretical framework that takes on an interactional approach by incorporating two independent research traditions, stress and motivation. The theory suggests that in the environment of work, two fundamental categories emerge from the working environment, namely job demands and job resources (Bakker & Demerouti, 2007; Demerouti & Bakker, 2011). The job demands that specifically initiate a health impairment process are defined as 'physical, psychological, social and organizational aspects of the job that require sustained physical and psychological effort or skills associated with certain physiological and or psychological costs'. Examples include workload, high work pressure, and long working hours (Demerouti & Bakker, 2011, p.2). Job demands could also refer to the 'things that have to be done' (Schaufeli & Bakker, 2004, p.296). According to Schaufeli and Bakker (2004), job demands elicit negative outcomes such as depression, burnout, and

anxiety, though the outcomes are not always negative. However, they acknowledge that high effort and resources with high costs are required for meeting demands.

In contrast, job resources initiate a motivational process (Demerouti & Bakker, 2011). It refers to the 'physical, psychological, social or organizational aspects of the job that are functional in achieving work goals, reduces job demands and the associated physiological and psychological costs, and stimulate personal growth, learning, and development'(Demerouti & Bakker, 2011, p.2). Schaufeli and Bakker (2004) identify three levels of job resources as resources at the task, interpersonal, and organizational levels as critical to dealing with job demands.

In the first premise of the JD-R model, there is an assumption that the demands and resources in a working environment interact to predict organizational outcomes, such as job strain and motivation (Demerouti & Bakker, 2011). For example, Demerouti et al. (2001) predicted high job demands to increased exhaustion and low resources to high levels of disengagement, and an association between high job demands and low levels of resources to exhaustion and disengagement among employees. Similarly, the findings from Demerouti et al.'s (2001) study showed a differential pattern of relationships between specific job demands and job resources on burnout. In other words, burnout is dependent on some particular job conditions, where high job demands and low job resources could lead to exhaustion and disengagement among employees. The findings from the study showed that the working conditions of employees are dependent on employee development of burnout symptoms or not. Demerouti, Nachreiner, and Schaufeli (2001) recommended the development of specific job interventions to address particular working conditions because job demands and resources differ. Furthermore, Bakker and Demerouti (2007) argue that

high work engagement and excellent performance occur as a result of the intrinsic and extrinsic motivational role of job resources and the potential to achieve growth in employees learning and work goals. Nonetheless, the job resources are available to deal with the job demands and relevant in their own right in the working environment (Bakker & Demerouti, 2007; Demerouti & Bakker, 2011).

The second premise of the JD-R model considers the potential ability of job resources to influence motivation when there are high job demands (Demerouti & Bakker, 2011). For example, emotional demands and workload interact with job resources such as organization support, colleague support, and participation in decision-making to influence motivation. Other researchers discovered that the interaction between job demands and job resources to predict job well-being is dependent on the job function and specific job characteristics (Bakker et al., 2005; Xanthopoulou et al., 2007; Demerouti & Bakker, 2011). Furthermore, the right organizational context or psychological climate is important in the JD-R model. For Dollard et al. (2012), organizational context is critical in the interaction between job demands and job resources. They argued that safety in an organizational context would lead to better resource utilization and low job demands (Dollard et al., 2012). Demerouti and Bakker (2011) also consider broader working conditions focusing on both positive and negative indicators of the wellbeing of organizational members and performance at work.

Occupational studies with theoretical and practical evidence of the JD-R model include a study on how high work demands in farm-work and lack of or low resource predict mental health complaints among Norwegian male farmers (Logstein, 2016). The study revealed that workload and off-farm work, and lack of social support or social relationships contribute to mental health complaints among Norwegian farmers. The researchers concluded that work

demands and social relationships (number of close friends) are associated with mental health complaints. The researchers suggested the need to investigate other aspects of farming that could affect farmers' mental health. Additionally, the JD-R model was used to study two farmer job demands including workload and a lacking resource, loneliness on the burnout of dairy farmers in Finland. The findings from the study supported the theoretical model by indicating a direct connection between workload and loneliness on the burnout of the Finnish farmers (Kallioniemi et al., 2022). The researchers suggested the need to develop projects that would support the farmers and the sustainability of farming in Finland.

Another study on work engagement and job resources among employees of call centres in South Africa established a significant relationship between personal and job resources to substantial levels of work engagement (Rensburg et al., 2007). The study utilized the JD-R model to investigate job-related factors that affect the voluntary turnover of women chartered accountants in South Africa and the relationship between job resources and turnover intentions. The researchers discovered the significant mediating role of personal resources such as sense of coherence and job resources to work engagement (Ribeiro et al., 2007).

Other studies confirmed the high levels of fatigue, disengagement, and burnout as a result of high job demands and low job resources among three occupational groups; human services, industry, and transport, within an institute for higher professional education in the Netherlands (Demerouti et al. 2001; Bakker et al. 2005). In the same way, the JD-R model has been used to study burnout among employees in-home care organizations (Xanthopoulou et al., 2007). The buffering role of job resources between job demands and burnout was evident, with emotional demands playing a significant effect on burnout than

physical demands (Xanthopoulou et al., 2007). The study substantiated the role of job resources as a critical buffer in a relationship between any demand and outcome. Additionally, the JD-R model predicts early retirement intentions, incidences of health infections, and workplace bullying in several occupational studies. On the contrary, the JD-R model is criticized for not incorporating personal resources or characteristics as resources that lead to job motivation (Bakker & Demerouti, 2007).

2.17.3 Gender Role Theory

Within the social sciences, gender is seen as a broad system of social inequality that incorporates individual and family development (Ridgeway, 2001). Gender, however, plays an important role in farmer mental health (Hanklang et al., 2016; Pulgar et al., 2016; Tepoel, Rohlman, & Shaw, 2017; Lee et al., 2019; Jones-Bitton, Best, MacTavish, Fleming, & Hoy, 2019; Yazd, Wheeler, & Zuo, 2019). The roles performed by farm workers are associated with societal stereotypes that emerged from the gender division of labour in society (Eagly, 1997) and consequently impacted the mental health of the farmers.

The gender role theory was proposed by Eagly and Wood (Eagly, 1997; Eagly & Wood, 2012). Essentially, the theory analyzes the influences of culture and social structure on gender differences in behaviour (Eagly & Wood, 2012). Most importantly, it applies to the interaction of all contexts, including socioemotional behaviours such as feeling and assertive and power-related behaviours (Hobson, 1990).

According to the theory, males and females are expected to engage in activities (gender roles) consistent with society's division of labour (Eagly, 1997; Eagly & Wood, 2012). Thus, the behaviours of both sexes are dependent on society's gender roles emanating from

the socialization process and division of labour. These behavioural tags, labelled for men and women, eventually affect the behaviours of both men and women and the perception and evaluation of the behaviours by others.

Also, apart from the psychosocial differences between men and women, the theory acknowledges the biological differences in size and strength between men and women (Hyde, 2013). Often men are socialized to engage in warfare activities and develop qualities such as assertiveness, aggressiveness, and task-oriented behaviours that would enable them to gain wealth, power, and status over women. Women are socialized to develop emotional, communal, nurturant, and tender qualities and engage in child and household care (Hyde, 2013; Ngo et al., 2014). Men enjoy higher power and status as a result of the positions they occupy, unlike women, whose roles are influenced by gender stereotypes characterized by society (Ridgeway, 2001).

Within the workspace, gender role expectations are evident, as different work roles that require other skills and capabilities are shared along gender lines (Ngo et al., 2014). However, these expectations for male and female behaviours are bound to change and can affect the type of work and family roles played by both sexes (Eagly & Wood, 2012). Likewise, in most farming societies, the nurturing roles performed by women in addition to farming work affect their mental health (Pulgar et al., 2016).

In Africa, men's production role is valued and rewarded more in the agrarian sector (Ampofo, 2014; Dancer & Tsikata, 2015), unlike women who constitute a significant number in the agrarian sector with their roles overlooked. Generally, women in crop farming are well known for growing vegetables and tubers other than cash crops and are primarily

involved in farm activities during harvesting and post-harvesting periods. In the Ghanaian context, farming is gendered, and allocation of resources is done along gender lines (Ampofo, 2014). Hence, men have power and control over resources and decisions in farm households. For instance, men have greater access to land, labour, agricultural inputs, human capital, agricultural extension, and advisory services (Morris & Doss, 2004; Apusigah, 2009; Anaglo, Boateng & Boateng, 2014). This is likely the consequence because of the socialization process and the stereotypes in our society. According to Ridgeway (2001), the association of men with an agency allows greater participation in high power and status positions. Women with communion in lower status roles such as nurturant roles result from societal stereotypes. This has led to systemic discrimination, the subordination of women (Tsikata, 2016), and low attitudinal and self-recognition among women.

Specifically, the gender role theory was used to explain the relationship of gender and the mental health of the farmers. The theory aides in understanding the differential effect of gender in the mental health cases of the farmers. As male and female farmers often take up different work roles because of the different ways they were socialized and their specific skills and abilities.

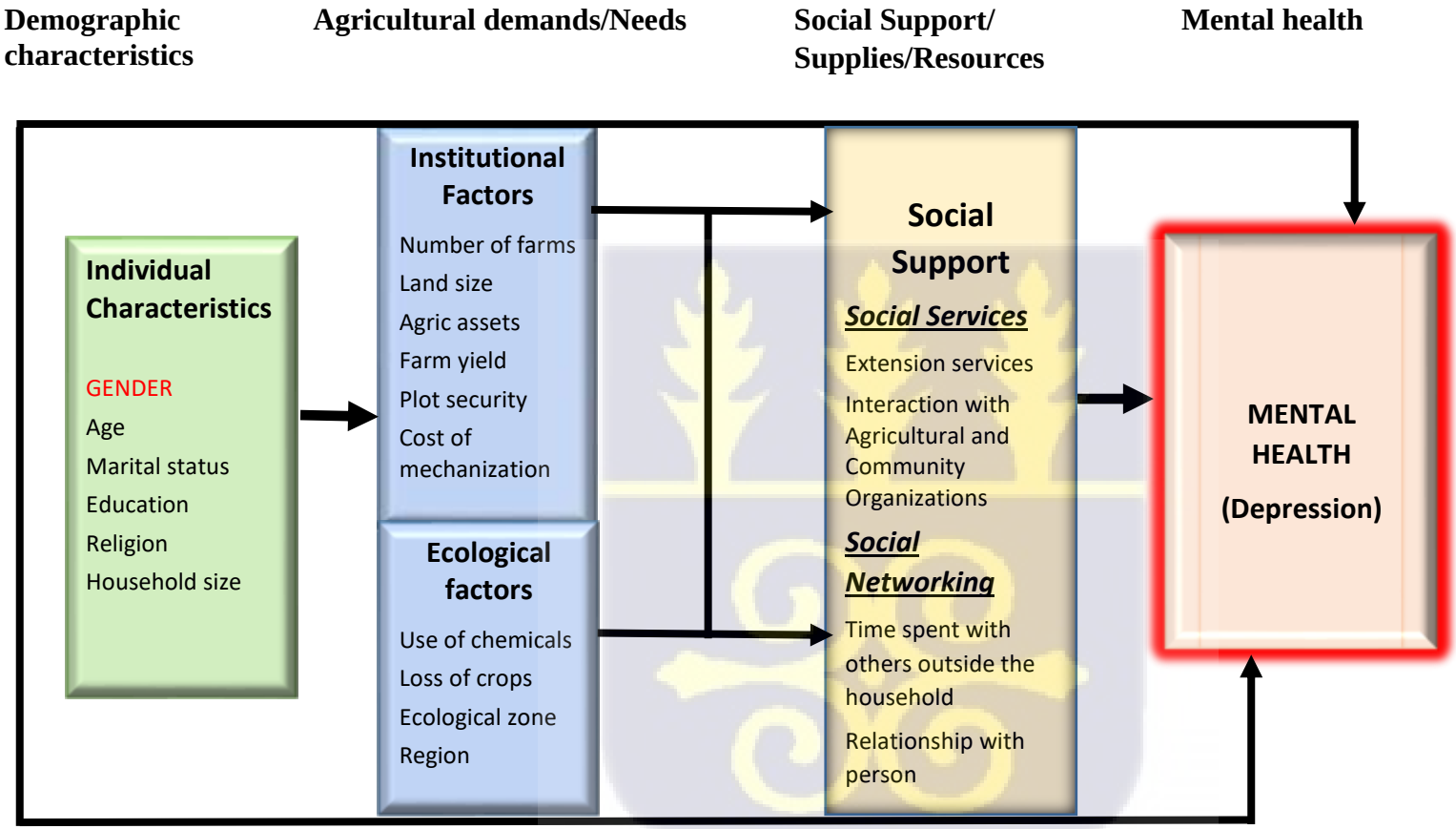
Notwithstanding, the gender dimension has been used in several studies on gender and farmer mental health (Fraser et al. 2005; Roy et al., 2013). Both studies reveal that both male and female farmers experience mental health issues. Roy et al. 2013 particularly argues that male farmers experience mental health challenges because of the power of masculinity and the lack of help-seeking. However, a systematic review of the socio-demographic characteristics and farmer mental health revealed that female farmers experience more mental health issues compared to male farmers (Yazd et al., 2019). This is because many

farm women are engaged in several farm roles including farm management, home management and child care. Besides, the gender theory has also been used to study intimate partner violence in an organizational context (Kwesiga et al., 2007). The study concluded that the experiences of women in high-wage positions emerge from society's division of labour, which negatively impacts the ability of women to work.

In conclusion, the JD-R model has a narrow scope to deal with the phenomenon under study; hence the P.E fit theory addresses the limitations of the JD-R model by providing a broader scope of demands to include personal characteristics and needs. The gender lens is also used to explain the gender differences in the mental health issues. The three theories adapted for the study complement each other to help explain the relationships among the variables in the study. A gap has also been identified in the literature on farmer mental health, particularly with these three theories. Figure 2.1 presents the conceptual framework for the study.

2.18 Conceptual Framework

Figure 2.2: Conceptual model of Farmer mental health



Source: Author's construct, 2020

In light of the three theoretical models underpinning the study, namely, the person-environment fit model, job demands-resources model, and the gender role theory, as well as the discussions in the entire literature reviewed, the mental health of crop farmers is determined by the interaction between the risk factors involved in farming and social support available for the farmers, which is mediated by the socio-demographic characteristics of the farmers, particularly the gender of the farmers, (as shown in Figure 2.1). This conceptual framework indicates that the mental health of crop farmers is dependent on the relationship between the institutional and ecological risk factors in farming and the social support available to crop farmers. Additionally, the risk factors and social support are both embedded in the farming environment and are likely to influence the mental health of the farmers independently. Farmers' characteristics such as gender, age, religion, and marital status independently influence the mental health of the farmers (Hanklang et al., 2016; Hawes et al., 2019; Lee et al., 2019; Pulgar et al., 2016).

These characteristics of farmers interact with the risk factors involved in farming to affect the mental health of farmers. For example, farmers who are females, matured, unmarried, uneducated, and living in remote areas show depressive symptoms because they lack the needed knowledge and information to apply to challenges involved in farming. Also, older and unmarried farmers are likely to experience loneliness and isolation due to the lack of support from their social networks comprising of the family, friends, colleague farmers, community, and agricultural organizations (Brew et al., 2016).

Beyond the sociodemographic characteristics of farmers that impact the mental health of farmers, institutional and ecological risk factors, also referred to as psychosocial risk factors or agricultural demands in this study, influence the mental health of farmers. These

psychosocial risk factors refer to the controllable or uncontrollable challenges farmers face in their field of work. The institutional factors refer to the farm-related risk factors, including long working hours, access to land, land size, access to farm inputs, and ownership of farm assets. Whilst ecological factors refer to the environmentally related risk factors and include loss of crops in the field, use of pesticides, rural area, and ecological zone.

The conceptual framework for this thesis holds the view that the mental health of farmers is influenced by both or either institutional or ecological risk factors (Freeman & Schwab, 2008; Hayes et al., 2018; Hounsome et al., 2012; Obrien et al., 2014; Seligman & Hovey, 2006). The literature shows that farmers who work long hours in a day, specifically more than nine (9) hours in a day, are more likely to show depressive symptoms or other mental health symptoms than farmers who work less than nine hours in a day (Leonard et al. 2013; Logstein, 2016).

Secondly, the loss of crops on the field, either due to the attack of pests and diseases or bad weather conditions, is likely to influence farmers' psychological wellbeing. This most likely cause farmers to quit farming, exhibit unhealthy smoking behaviours, and cultivate the habit of absenteeism at work. More often, farmers who lack access to agrochemicals such as pesticides and insecticides to protect their crops often lose a substantial amount of crops in the event of an outbreak of pests and diseases. But when these risk factors (ecological and institutional) are managed well with agricultural and social support resources, and farmers utilize and maintain access to services, good mental health behaviours are likely to be maintained.

Social support is also another key concept as presented in the conceptual framework for this thesis. Social support is the protective factor or resource expected to positively influence the mental health of cocoa and maize farmers in the event of agricultural demands. Social support in the context of this study refers to the general support networks and agricultural extension services and market and information services farmers receive from the community, friends, family, state, and agricultural organizations. Thus, the availability of support from family, friends, colleague farmers, and community members is likely to buffer the effect of farmers' risk factors on their mental health. Therefore, farmers receiving continuous support from private and public institutions and other agricultural organizations are likely to influence their mental health positively. On the other hand, farmers exhibit depressive symptoms or remain mentally ill, their productivity will be negatively affected. For example, the farmers would spend less time working on the farm or completely stay out of work.

The conceptual framework for this thesis also indicates a relationship between farmer characteristics (gender and marital status etc.) and social support (social networking and access to social services) on the mental health of farmers. Evidence shows that the gender of farmers influences the access to agricultural resources and services such as land and agricultural extension services in Ghana (Dancer & Tsikata, 2015). Hence, Mcphedran and De leo (2013) advise promoting social connectedness and social support among farmers.

2.19 Conclusion

Mental health is indeed a worldwide public health concern that has a significant burden on the socio-economic development of the country (Canavan et al., 2013; Dzator, 2013; Owusu & Asante, 2020). The role of agriculture in the economy of Ghana and its mental health-related issues prevent their relegation to the background. Although the agricultural sector faces numerous challenges that can negatively influence the immense contribution of the

sector to the development of the country, holistic measures are required to deal with the challenges for the sustainability of farming. Some issues including gender division of labour and access to agricultural resources, economic, ecological and institutional, and other work-related risk factors that significantly influence crop farming need a critical psychosocial and developmental perspective.

This second chapter of the thesis also examined the literature on the prevalence and the general risk factors influencing the mental health of farmers, as well as the critical impact of social support on farmers' mental health. A theoretical account of farmer mental health revealed conflicting results that complicate the understanding of farmer mental health. The personal factors of the farmers such as age, marital status, and education were inconsistent across many studies. Also, some environmental and farm-related factors require examination with different methodologies in different contexts.

The second chapter of the thesis also reviewed the theoretical and conceptual framework of the institutional and ecological risk factors involved in crop farming, the social support networks, services, and the gendered differences in farmer mental health. The mental health of crop farmers is conceptualized as a mental or psychological condition with varying interactions of psycho-social factors related to the three theories discussed.

The person-environment fit theory, the job demands-resources model, and the gender role theory were applied to help explain the agricultural work demands and interactions, which entail farming risk factors, social support, and gender influences. Empirically, the main factors affecting the mental health of crop farmers is classified into situational factors (risk factors in farming) and social support, as well as other mediating factors (personal characteristics),) in the conceptual framework of the study.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter examines the methodology used to achieve the objectives of the study. The chapter is organized in four sections and begins with the research design (explanatory mixed-method design) and presents details of the philosophical approach of the study; pragmatic philosophical paradigm. The second section examines the selected study area, the previously ten regions of Ghana. Additionally, the Western and Eastern Regions were critically examined qualitatively because both regions are among the leading cocoa and maize growing areas (Adhvaryu & Fenske, 2019; Kumi & Daymond, 2015). The next section of the chapter describes the population sampling for the study, sources of data, and the data collection methods. The last section details the analytical techniques used in the study.

3.2 Research Design

The pragmatic philosophical paradigm, which is problem-centred and focuses on the research outcomes by drawing knowledge from actions, situations, and consequences (Creswell, 2013), provided the opportunity to investigate farmer mental health from different realities. To further explain the pragmatic paradigm, Ormston et al. (2013) explain that it takes account of the aims and context of the study in the best possible way that best answers the research questions. As a result, the context of the research and the opportunity to make an informed choice of methods and procedures that best suit the research purpose were well-considered (Creswell, 2013). Creswell and Creswell (2017) also argues that the pragmatic philosophical paradigm approves multiple sources of data and a mixed research method.

The study aimed at investigating the influence of ecological and institutional farming risk factors and social support on the mental health of cocoa and maize farmers in Ghana, exploring gendered differences. By this, the study assessed the actions and inactions of the state, agricultural organizations, market institutions, the community, and the family that could affect the mental health of cocoa and maize farmers. Therefore, the mixed-method design, which allows different research tools, was adopted to gather data from varied sources. The mixed-method design allows for incorporating both existing secondary data and primary data. The main principle of this approach is that mixing both quantitative and qualitative methods provides a better understanding of the phenomenon under study than the use of a single research approach (Creswell, 2011). Yet, some researchers have raised concerns about the challenges involved in using mixed methods to obtain an objective view of a phenomenon under study (Tashakkori & Creswell, 2007).

Consequently, the sequential explanatory mixed-method design was adopted. The choice of the sequential explanatory mixed-method provided the opportunity to explore the research questions from different perspectives by using both the quantitative and qualitative research methods for a broader understanding of the problem. Additionally, using a mixed research method, the biases in either research method are complemented by the other (Creswell, 2003).

The quantitative research method provided the opportunity to make inferences about the given population and explore the research questions better statistically (Creswell, 2003). However, such a research approach is limited because it does not capture participants' experiences, subjective meanings, and stories within a specific context (Creswell, 2003). Therefore, the qualitative method of inquiry, the narrative research method, complemented

to make up for the deficiency. In conducting the sequential explanatory mixed-method procedure, the quantitative research method, which incorporated the testing of variables, was initially performed. The qualitative approach, which involved exploring details from individuals (Creswell, 2009), followed to elaborate issues in the quantitative study. The longitudinal or panel design (quantitative) and the narrative (qualitative) methods were adopted for the study.

According to Hsiao (2007) and Baltagi (2011), panel data involves multidimensional data, where multiple observations are available for each sampling unit or individual over time. Panel data characteristics include more extensive data sets, lesser collinearity, lesser heterogeneity, and lesser bias, more variability among explanatory variables, and degrees of freedom (Baltagi, 2011) as well as efficient economic estimates. The choice of using panel data provides the opportunity to uncover the dynamic relationships in behavioural issues surrounding the mental health of cocoa and maize farmers (Hsiao, 2003; Hsiao & Yanan, 2006). Furthermore, panel data could help understand the risk factors influencing farmers' mental health and the periods surrounding the particular psychological problem (Roy et al., 2013b), contrasting with cross-sectional surveys (Patel et al., 2006). The strengths mentioned earlier of panel data make it reliable despite the limitations of using panel data.

3.3 Study Areas

Ghana is the study area for the study, and it is located in the West African Region. It shares boundaries with Togo, Cote d'Ivoire, Burkina Faso, and the Gulf of Guinea. Ghana's total land area is 238,537 square kilometres (Quartey et al., 2008). It has three ecological zones: coastal plains, middle rainforests, and northern savannah. The total annual rainfall in all

country areas is between 780 millimetres and 2,200 millimetres. The rainfall pattern is both uni-modal and bi-modal. The country has hot temperatures and a bimodal rainfall system from March to October in the south and a mono-modal rainfall system from July to September in the northern part of the country (Asare-Nuamah & Botchway, 2019).

Currently, Ghana has sixteen regions made up of Ashanti, Eastern, Central, Western, Western North, Greater Accra, Brong Ahafo, Bono, Bono East, Northern, North East, Savannah, Upper East, Upper West, Oti, and Volta Regions. Each of the regions consists of districts. The districts in the country make up a total of 216 districts (Ministry of Food and Agriculture (MoFA), 2017), with a maximum number of 25 districts in the then Brong Ahafo and Volta Regions, and a minimum of 8 districts in the Upper West Region (Ghana Statistical Service (GSS), 2019).

Ghana's population was about 24,648,823, with males and females representing 13,886,734 and 14,421,567, respectively, in the 2010 Population and Housing Census (PHC) (GSS), 2019). However, it increased to 29.8 million in 2019 (Trading Economics, 2020). Regarding regional population size, the Ashanti, Eastern, and Greater Accra Regions are large compared to the other regions.

Ghana's strength lies in agriculture with a 52% labour force and 54% Gross Domestic Product (Food and Agriculture Organization (FAO), 2020). The total agricultural land area occupies 238842.45 square kilometres, representing 56.94% (MoFA, 2015). The agricultural population of Ghana for 2015 was 4,275,986 (Country STAT Ghana, 2021). Smallholder farming with less than two hectares is common, although large farms and plantations exist. Intercropping is predominant on most food crop farms (MoFA, 2015).

The study area of the study covered all the ten regions in Ghana that existed before the creation of the additional six new regions in January 2019. However, the then Western and Eastern Regions, being the first and second in terms of cocoa production in Ghana (Yahaya et al., 2015) were selected for further interrogation. Also, both regions are noted for high production of maize (MoFA, 2013). In 2015, the Eastern Region was the region with the highest average yield performance of maize (Votomobile, 2015). The severity of depression in the Eastern and Western Regions are 12.1% and 4.5% respectively (Aryeetey et al., 2011). Besides the depression rates, the two regions are in different agro-ecological zones which provide an added advantage for comparison.

3.3.1 Profile of the then Eastern Region

The Eastern Region is one of the two regions selected for further interrogation in the study. This is based on the fact that the region is among the leading producers of maize in the country. The Eastern Region was the second producer of maize production in Ghana (MoFA, 2011).

Cocoa is also cultivated in the Eastern part of Ghana, as it houses Tetteh Quarshie's first cocoa farm. The region produced 60,000 metric tonnes of cocoa in the 2009/2010 cocoa production season. The average yield of maize in some selected districts such as Birim South, West Akim, and Suhum Kraboa Coaltar in 2011 was 2.50 metric tonnes (MoFA, 2011). The major cocoa and maize producing districts include Fanteakwa, East Akim, Suhum-Kraboa Coaltar, Afram plains, West Akim, Yilo Krobo, New Juaben, East Akim, Upper Manya-Krobo, and Suhum. Figure 3.1 indicates the leading producers of maize production by region in Ghana.

Table 3.1: Leading Producers of Maize Production by Region in 2011

Region	Metric tonnes
Brong Ahafo	510,000
Eastern	390,000
Ashanti	260,000

Source: MoFA, 2011

The region has Volta Lake, Akosombo, and Kpong dams that serve irrigation and farming purposes. The region also houses five agricultural research institutions, including the Cocoa Research Institute of Ghana (CRIG) and the University of Ghana Research Institutes at Kpong and Okumanin.

Agriculture and other related work constitute the main occupation of the population in the Eastern region. The region is known for the production of other major crops such as industrial crops (cocoa, oil palm, pineapples, citrus, and cola nut), staple food crops (maize, rice, cassava, cocoyam, yam, plantain, and groundnuts), and other exotic crops (ginger, cashew nuts, and sweet pepper).

3.3.2 Profile of the then Western Region

The then Western Region was the second region selected for further interrogation in this study. The western region occupies a land area of 239,211^2 kilometres of Ghana's land surface, with a population size of 2,755,096 (GSS, 2016). It shares boundary to then then Central, Ashanti, And Brong Ahafo regions, La Cote d'Ivoire, and the Atlantic Ocean. The region accounts for 40% of forest reserves in the country and the coastal wetlands of Ghana. It has moderate temperatures from 22^0 C - 34^0 C (GSS, 2010). Farming, fishing, and husbandry are the main livelihoods of the population.

The region is well known for cocoa, rubber, oil palm production, and other starchy crops such as maize, cassava, plantain, cocoyam, and yam. It is the first leading producer of cocoa in Ghana, and also noted for maize production in the country. The estimated area of maize production as of 2010 was 56,094 hectares. The cropped area and average yield for maize production in some districts in the Western Region include Amenfi West district 4,340 hectares (1.41 metric tonnes), Amenfi East 4,670 hectares (1.40 metric tonnes), and East Nzema district 1,560 hectares (1.39 metric tonnes) respectively.

3.4 Sources of Data

The study utilized both primary and secondary sources of data. The Ghana Socio-Economic Panel Survey (GSPS) conducted in over 5009 households served as the quantitative data. The survey data collection covered a period of 6 months (November 2009 to April 2010) and (November 2013 to April 2014) in 334 enumeration areas in the then ten regions of Ghana. It covered the same households for the two panel periods 2008/2009 and 2013/2014. The Economic Growth Center at Yale University and the Institute of Statistical Social and Economic Research (ISSER) at the University of Ghana jointly collected the survey data.

The quantitative study for the thesis utilized the GSPS data on psychology, agricultural production, social networking, and basic household information. The advantage of using this dataset was that the data captured the depression of individuals at the national level. Thus, the section on psychology documents the psychological distress (depression) of individual cocoa and maize farmers in households with the Kessler 10 depression scale. Secondly, the data provided detailed long-term scientific data on significant aspects of the lives of individual cocoa and maize farmers. More importantly, the data captured individual

farmers who, for one reason or the other, move from one place to another. Individuals from 18 years and above were chosen for this study.

Subsequently, narrative research, a qualitative method of inquiry where individuals within a particular context provide stories about their lives (Creswell, 2003), was employed to elaborate the research questions. This interpretative method of inquiry involved collecting detailed information about a small number of individuals' lived experiences (Creswell, 2013).

3.5 Population sampling and data description

The Ghana Socioeconomic Panel Survey (GSEPS) data utilized for the quantitative part of this study consisted of 18,889 household members representing 5009 households in 334 enumeration areas (EAs). A two-stage stratified sampling design based on the then ten regions of Ghana was employed to select participants for the study. The first stage involved selecting 334 enumeration areas from a master sampling frame constructed from the 2000 Ghana Population and Housing Census in the then ten regions. The variety of the enumeration areas was dependent on a simple random sampling technique.

A household listing was generated in all the selected EAs to serve as a sampling frame for the second sampling stage. The second stage involved the listing and random selection of 15 households from each EAs. However, oversampling was done in EAs for Upper East and Upper West regions with smaller population sizes to allow for a reasonable number of households to be interviewed in these regions. Appropriate sampling weights were calculated and applied during the analysis, although not provided in the work.

Data collected from all household members covered health, education, housing conditions, psychological distress, social networking, information seeking, and agricultural production. However, the administration of the section on psychological distress, social networking, and information-seeking was exclusively for the household head, the first spouse, and one additional household member selected at random who was no younger than 18 years.

3.5.1 Quantitative Sampling

3.5.1.1 Sub-sampling of cocoa and maize households in the panel data

Out of the entire national data set of the Ghana Socioeconomic Panel Survey (GSEPS) data, which covered different households (individuals), the study focused on only cocoa and maize farmers. The more significant part of the data was at the household level, so cocoa and maize farmers were sub-sampled from the households of both datasets. The number of cocoa and maize farmers depended on the number of cocoa and maize plots distributed across two seasons, major and minor seasons in the year in the first wave. The farmers were classified into maize farmers, cocoa farmers, and mixed-crop (cocoa and maize) farmers.

The main unit of analysis of the study was the individual comprising of the head of the household, the first spouse, and any family member over 17 years of age. If there is no spouse, the household head and two other household members over 17 years were chosen. Individuals in household units were selected because depression affects individuals in households and not the household unit as a whole. Therefore, the study sample comprised individuals over 17 years in households. However, some households might not have a maximum of three persons if the household size was less than three or there were no other members over 17 years except the head or the head and spouse.

Besides the household and individual level analysis, a further examination was done at the plot level to determine the sample size for the study. A plot-level analysis determined the number of cocoa and maize farmers in the data sets because the activities or livelihoods of maize and cocoa farmers involved farming on plots. Finally, the individual and household level analysis was combined with the plot level analysis for systematic and comprehensive secondary data analysis. Household-level analysis is mainly common in most African agricultural systems (Doss & Morris, 2001). Finally, the main unit of analysis became a plot, but the household and individual complimented it.

The final sample comprising cocoa and maize farms drawn from the data were 8,553 farm plots. These farm plots included 5,816 maize farms, 2,572 cocoa farms, and 165 mixed cocoa and maize farms. However, individuals excluded from the total sample were those below 18 years and those who did not grow cocoa or maize crops. Multiple imputations handled missing data for some key variables to avoid losing observations from the sample size of plots and households.

3.5.2 Qualitative Sampling

3.5.2.1 Selection of regions, districts, communities, and farmers

The qualitative results showed a purposive selection of the then Western and Eastern Regions for the narrative study. This was done based on the following reasons; (1) the Western Region being the number one producer of cocoa in Ghana (2) the Eastern Region being the second leading producer of maize in Ghana after then Brong Ahafo Region with 390,000 metric tonnes (Mutungi & Affognon, 2015) (3) both regions being cocoa and maize producing areas in Ghana respectively (MoFA, 2015; Cocobod, 2019) (4) based on the

quantitative data used for the study, the Eastern Region had a high prevalence rate of depression, which was a worst-case scenario compared to the Western Region.

Thus, the population of the then Eastern Region had relatively higher rates of moderate and severe depression (15% and 12.1%) compared to the Western Region (12% and 4.5%) (Aryeetey et al., 2011). These two regions with variations in depression rates, differences in cocoa and maize production yields, and ecological zones helped to compare.

Subsequently, two districts each were purposively selected from each region. This selection was in connection with the cardinal points of the districts in the region and, most importantly, high producing districts of cocoa and maize compared to the others (Ministry of Food and Agriculture (MoFA), 2015). With some consultations with one of the agricultural field operation officers in MoFA, Accra, four districts were selected for the qualitative study. The districts chosen from the Eastern region were the East Akim and Suhum municipal areas. The East Akim district is one of the leading producing districts of cocoa and maize located in the central part of the region. The Suhum municipal also has a long history of cocoa production in Ghana (Dormon et al., 2004). It is currently one of the high-producing districts of cocoa and maize located in the south-central part of the region (Dormon et al., 2004).

On the other hand, the two selected districts in the Western Region comprised Nzema East and Mpohor Wassa East. Both districts are high cocoa producers in the eastern and western parts of the region (MoFA, 2020). Also, the Mpohor district has a predominantly rural population, unlike the Nzema East, which is urban.

The purposive sampling technique was used to select two known cocoa and two known maize growing communities within the four districts in both the Eastern and Western Regions chosen for this study. The four communities selected in the Eastern Region included Abomosu, Jejeti, Kumasi-Asuansi, and Atiwa. The other four communities selected in the Western region included Adumbanso, Edwinase, Gwira Banso, Kutukrom. Afterward, a list of cocoa and maize farmers was obtained from the agricultural extension officers in the four selected districts. Thus, a convenience sampling technique was employed to select two (2) participants from each of the eight (8) communities who agreed to be available and participate in the study.

On average, sixteen (16) cocoa and maize farmers from eight (8) communities within four (4) districts in Ghana were selected for the qualitative study. In addition, six (6) key informants were selected. These key informants were agricultural extension officers and representatives of cooperative farmer unions, considered experts with enough knowledge within the farming communities. In all, the total sample size for the qualitative study was twenty-two (22) participants. Refer to table 3.2.

Ordinarily, twenty-two (22) respondents may be considered relatively small in number; however, it is appropriate (Brigance et al., 2018), as the qualitative data in the study supports the quantitative results. However, at the beginning stage of the selection of participants for the qualitative study, a list of registered cocoa and maize farmers in the Western and Eastern Regions was obtained from the regional offices of the COCOBOD and the MoFA through the agricultural extension officers to assist in the purposive sampling of respondents, and for easy access to the contacts of cocoa and maize farmers.

Table 3.2: Distribution of Sample in Selected Districts in the Two Regions of Ghana for the Qualitative Study

Region	Districts	No. of selected communities	No. of selected farmers	No. of selected key informants	
Eastern	East Akim	**2**	**4**	**2**	
	Suhum municipal	**2**	**4**	**1**	
Western	Nzema East	**2**	**4**	**2**	
	Mpohor	**2**	**4**	**1**	
TOTAL	**4**	**8**	**16**	**6**	**Grand Total = 22**

Source: Author's estimates from the field, 2020

3.6 Data Collection Methods- Instruments

3.6.1 Questionnaire

The questionnaire was used in collecting the quantitative data from the respondents. The questionnaire collected information on education, health, employment, agricultural production and inputs, housing, financial assets, psychological distress (depression), etc among the respondents. Nonetheless, an investigation of the data was done to obtain information on the mental health of cocoa and maize farmers. The focus of this study was the demographic characteristics of respondents and sections on household assets, agricultural production, psychological distress (depression), and social networking. The psychological section of the questionnaire comprised information on depression, social networking, interaction with organizations, and agricultural extension services.

The demographic characteristics obtained from the data included age, gender, marital status, educational level, household size, happiness in life, urban/rural, ecological zone, etc. The educational level was classified based on no education, primary, junior high school (JSS), senior high school (SHS), and above. The marital status of respondents was categorized into never married, married, separated/divorced, widowed, and consensual/betrothed. The age

of the respondents was also classified as young (18-30), middle-aged (31-45), mature (46-60), and (61-120) aged. Lastly, ecological zones were categorized into savannah, forest, and coastal zones.

The Kessler Psychological Distress scale (K10) was used to assess the mental health wellbeing and the level of happiness of respondents in the panel survey. This K10 instrument is widely adopted to screen anxiety and depressive disorders among western and non-western populations (Fassaert et al., 2009). It is also most importantly proven to be better compared to other mental health screening instruments (Furukwa, Kessler, Slade & Andrews, 2003), non-ethnic bias (Fassaert et al., 2009), and primarily used among older adults (Anderson et al. 2013). The K10 constitutes ten questions about the emotional states of respondents over the past two weeks. The K10 comprises a 5-level response scale ranging from "None of the time" (scored as 1) to "All of the time" (scored as 5). A sample of the K10 questions include ("About how often did you feel tired out for no good reason?") ("About how often did you feel nervous?") ("About how often did you feel restless or fidgety?"). The scoring of each of the questions was from 1 to 5. Afterwards, the responses for all the ten questions were summed for a total possible range of 10 to 50, categorized as likely to be well or low (10-19), mild (20-24), moderate (25-29), and severe (30-50) levels of depression. Besides the Kessler 10 questions, questions relating to how mental health affects respondents' daily activities, including employment, progress, future economic outcomes, etc., were assessed. The computations of the depression data based on the Kessler 10 depression scale were influenced by the Australian Mental Health and Classification Network's Training Manual on Kessler 10.

Another crucial section of the questionnaire; social networking, assessed respondents' time spent with others outside of the household, the kind of relationship with people they spend time with, and whether they receive or give agricultural advice to any members of the households they network with. Similarly, the section on information-seeking assessed interaction with organizations (contacts with an organization, type of information received, or assistance sought on crops in the last 12 months). The details of the questions included "How many contacts have a household head had with an organization in the last 12 months?", "What type(s) of information did you request?" "Did you request information about crops?" "What were the concerns of farmers regarding the crops they grow?". Extension services (services provided by agricultural agents) were another section of information-seeking. The questions included "Did you receive an extension service through any mass media in the past year?" and "How often do you speak to your agricultural agent?" etc.

3.6.2 Interview Guide

The study adopted the qualitative approach to understanding the risk factors (institutional and ecological), gender, and social support of cocoa and maize farmers. An in-depth interview guide was developed to collect information from participants (cocoa and maize farmers and key informants) and help gain insight into participants' experiences and meanings on gender and social support on farmer mental health within their context.

The interviews focused on some thematic areas, including the challenges in cocoa and maize farming, the resources available to cocoa and maize farmers, the effect of the distribution of farming resources on farmers, and the social support systems available for cocoa and maize farmers. The interview guide consisted of open-ended questions. In this study, there were

three (3) interview guides for the three categories of respondents, explicitly cocoa and maize farmers, agricultural extension officers, and the representatives of farmer unions. The three interview guides were designed to cover all three objectives of the study. Furthermore, an audio recording of the interviews was done for later access to the data, and the researcher took detailed field notes.

3.7 Data Analysis

The study is a mixed research method that adopts the sequential explanatory research design; hence both the quantitative and qualitative analyzes methods would be used to analyze the data.

3.7.1 Analysis of Quantitative Data

The quantitative analysis involved cleaning and managing the Ghana Socioeconomic Panel Survey (GSEPS) data with STATA version 15.0. The data cleaning involved editing and post coding to check for consistency, completeness, and definition of new response categories for open-ended questions. Also, the management of data involved the creation of new variables in both waves for the panel analysis. Missing values in the data were also given the needed attention by cleaning and managing the values.

The data analysis involved panel data analysis because of the longitudinal nature of the data used for the study. To determine the role of institutional and environmental risk factors, social support, and the gendered differences in the effects of the risk factors on the mental health of cocoa and maize farmers, the main approach to the panel analysis was applied on three different main levels. Consequently, the household-level analysis included household head, household size, and household dependents. The farm or plot-level analysis had

characteristics of the farm such as the size of the farm, number of farms, type of soil, type of crop grown, irrigation, farm yield, and harvest value. The individual-level analysis involved respondents' demographic characteristics and information on depression.

Furthermore, the quantitative data analysis involved the use of chi-square, t-tests, and dependent t-test to describe the associations between the dependent variable 'mental health of farmers' and selected independent variables. Also, descriptive statistics, including percentages and frequency distributions, and correlation analyzes, were used to calculate and identify patterns in the data.

Finally, some panel data regression models, including the pooled regression model, random and fixed effects regression models, were employed to examine the associations between farmers' mental health and farming risk factors, gender, and social support. The models used the nominal nature of the dependent variable (depression), that is the mental health scores, unlike mental health outcomes based on levels.

Regarding the pooled regression model, all observations for each individual are pooled together and analysed with the ordinary least squares (OLS) (Gayle & Lambert, 2018a). However, the pooled model considers that each observation of an individual is independent of the multiple contributions from the same individual affecting estimations of standard errors and variances.

The fixed effects panel model, on the other hand, considers the respondent's pattern of change over time, especially explanatory variables that are not time constant but change over time (e.g. age, farm yield, and quantity of crop loss). The main aim of the fixed effects

model is based on analysing the differences between individual respondents (Gayle & Lambert, 2018a). According to Gayle and Lambert (2018), the fixed effects panel model has the feature of estimating robust errors when observed independent variables are correlated with unobserved effects. In contrast, the random-effects model considers both respondent's changes over time and differences between the outcomes of the respondent's changes over time. The random panel model includes both independent variables that are time constant and those that change over time.

The panel data regression models mentioned above have been used in several mental health studies. A study utilized the OLS (Pooled model) to examine the social determinants of food on the mental health of households in the northern parts of Ghana (Atuoye & Luginaah, 2017). Within the study context, a strong relationship was established between food insecurity and mental health, where the sociocultural implications of food insecurity, such as poverty, were the initiators of the mental distress of households. In another study, the random effects panel regression model was used to investigate the impact of water scarcity and other climatic conditions on farmers' mental health in the Murray Darling Basin, Australia (Yazd et al., 2020). The researchers discovered worse mental health among farmers in areas with less rainfall and less than 30% water allocations than in other areas. A similar study conducted in Eastern North Carolina, USA, examined the associations between depressive symptoms and sleepiness among farmworkers in a panel data collected at monthly intervals in 2008, with a linear mixed effect model (LMM) (Grzywacz et al., 2011).

Subsequently, a Hausman test was conducted to choose between the fixed and random effect panel models, which indicated a chi-square of 105.06 at 18 degrees of freedom, a highly

significant value ($p<0.000$). Therefore, the null hypothesis showing 'the difference in coefficient not systematic' was rejected, favouring the fixed-effect panel model.

3.7.2 Analysis of Qualitative Data

For the qualitative data, audiotapes were transcribed verbatim and edited for accuracy. With a critical review of the transcripts, thematic codes were developed and used to support the study's relevant subjects of interest. The thematic analysis approach involves identifying, summarising, and reporting themes in a given set of data (Patton & Cochran, 2007).

Interviews were conducted with cocoa and maize farmers on the experiences of farming risk factors, gender, and social support on their mental health. With agricultural extension officers and representatives of cocoa and maize farmer unions, discussions were based on the influence of gendered differences and social support on the mental health of cocoa and maize farmers. Data collected from the field through interviews were transcribed verbatim and translated into English. The qualitative data collected from the field for the study were manually analysed.

Firstly, few transcripts were observed to get an idea of the data (Patton & Cochran, 2007). Then the data were reviewed to identify themes relevant to achieving the purpose of the study. A list of codes and categories was generated from the data through repeated reading of transcripts. Later, the responses provided by cocoa and maize farmers and key informants comprising of agricultural extension officers and representatives of cocoa and maize farmer unions were assessed to identify similarities and differences regarding the type of crop grown and region. The responses were categorized to reflect themes and sub-themes. Finally, all the responses from the cocoa and maize farmers were arranged in categories of

community, district, and region to reflect the themes. The responses from key informants in the study were also categorized into district and region.

The findings were discussed with the themes and sub-themes generated from the data. A more significant parts of the findings was presented verbatim by simply cutting and pasting the responses from respondents. Finally, the results were verified by scrutinizing the transcripts, codes, and themes again.

Table 3.3 is a summary of the methods of data analysis for the objectives of this study. Likewise, estimations of the panel models are explicitly explained according to each of the study's objectives.

Table 3.3: Summary of the Data Analysis Methods for the Study's Objectives.

No.	Objective	Main methods of assessment	Data Source
1	Explore the environmental and institutional risk factors influencing the mental health of cocoa and maize farmers in Ghana.	• Descriptive statistics, Chi-square, Fixed effects regression model • Thematic analysis	• Ghana Socioeconomic Panel Survey (GSEPS) data • Qualitative data
2	Investigate existing social support systems and their role in the mental health of cocoa and maize farmers in Ghana.	• Descriptive statistics, Chi-square, Fixed effects regression model • Thematic analysis	• GSEPS data • Qualitative data
3	Assess the gendered differences in the factors influencing the mental health of cocoa and maize farmers in Ghana.	• Descriptive statistics, Chi-square, Fixed effects regression model • Thematic analysis	• GSEPS data • Qualitative data

Source: Author's construct, 2019

3.8 Objective 1: Risk Factors Influencing the Mental Health of the Cocoa and Maize Farmers

With the study of the risk factors (ecological/environmental and institutional) that could show significant variability on the mental health of cocoa and maize farmers, chi-square, t-tests, and ANOVA were first used to describe the associations between mental health and risk factors of farmers. The Chi-squared (x^2) statistic examined and compared the frequency of mental health expressed in four levels among cocoa and maize farmers. As initially, chi-square tests assess the significant difference between two categorical and mutually exclusive variables at some level of measurement (Acock, 2012; Franke, Ho, & Christie, 2012).

Following the theoretical model of the person-environment fit theory, the association between the mental health and the risk factors in the farming environment (crop loss quantity, farm asset score, farm size, number of farms and plot security, gender, education, marital status, religion, and age) of the cocoa and maize farmers were examined. The chi-square test for independence assisted in analysing the differences in the mental health of cocoa and maize farmers due to the environmental and institutional risk factors. Possible variations in how the cocoa and maize farming groups differed with mental health were examined with cross-tabulation.

Another descriptive-analytical method, population-dependent t-test analysis, was used in testing whether there exists a significant increase in mental health due to exposure to farming risk factors. The t-test for the two related samples depended on the fact that the data was a panel, and the study's sample size was significant. In the study, the ANOVA was used to test the extent of variance in the depression scores between cocoa and maize farmers, male and female cocoa and maize farmers, and other subcategories of both groups of

farmers. The Kruskal-Wallis test for independent samples was performed to evaluate how the variances differed between the mean depression scores for the groups.

Subsequently, the Rasch model was used, to sum up, each respondent's total mental health score on a linear scale (Uddin, Bhar, & Islam, 2019). The depression computations used in the study are consistent with a study conducted in Ghana that investigated psychological distress and unemployment (Canavan et al., 2013) using the following categories: mild depression 10-24, moderate depression 25-29, and severe depression 30-50.

Alternatively, the main panel estimation techniques applied to the environmental and institutional risk factors influencing the mental health of cocoa and maize farmers were the OLS, fixed, and random effects panel regression models. These models were adopted because of the nature of the data (panel) and the dependent variable (scores of mental health outcomes), unlike the ordered logistic regression model, popularly known as the proportional odds regression model, used for estimating categorical dependent variables, such as mental health in ordered outcomes (low, mild, moderate, and severe) (Murad et al., 2012). The multicollinearity and normality tests were conducted to check normalcy in the panel data.

Models Specification

One of the key assumptions of the pooled or proportional odds regression model is that m does not depend on the association between x and y. Another assumption is that all logit equations have equal βs for the different cut points (Gayle & Lambert, 2018). Where γ is the dependent variable, χ is the independent variable and m contains the constant terms.

Following Kivyiro (2015), the pooled regression model expresses an outcome in the following equation:

$$Y_{it} = \alpha + X_{it}\beta_i + \mathcal{E}_{it} \quad (1)$$

Where y is a continuous dependent variable representing mental health, X_{it} is a vector of independent variables, α contains both a time and an individual or group-invariant variables that are constant terms observed as sex, race, and religion, and unobserved variables such as individual skills and preferences and family characteristics, etc. $_t$ is constant change over time and β is a vector of regression coefficients to be estimated by using maximum likelihood, and represents the log ratios of y. The $\mathcal{E}_{it}$ is the error terms considered independent, and with a mean of zero and constant variance in distribution.

The fixed-effects model works on individual differences, acknowledges individuals' characteristics or specific individual effects that constantly change over time (Kivyiro, 2015). It is specified in Equation (2)

$$Y_{it} = \alpha_i + \beta_i X_{it} + \mathcal{E}_{it} \quad (2)$$

Where Y_{it} is the continuous dependent variable, i represents a specific cross-section; t represents time, β stands for the slope coefficient which is constant for all cross-section units; X_{it} is a vector of independent variables; α_i is the individual-specific unobserved effects or constants, and $\mathcal{E}$ is the error term. The model could also include unobserved time-specific effects. Some assumptions of the fixed effects model are that there is a correlation between individual-specific effects and the independent variables, but no correlation between $\mathcal{E}_{it}$ and X_{it} (Kivyiro, 2015).

The final model, the random-effects model, calculates the differences within and between individual respondents in the data. According to Gayle and Lambert (2018), this model estimates outcomes for 'between- respondents' and 'within -respondents' measures. Here the individual-specific effects are random variables (Kivyiro, 2015). This model could also be modelled as

$$Y_{it} = \alpha + \beta X_{it} + \upsilon_{it} + \mathcal{E}_{it} \quad (3)$$

Where α represent specific individual random errors; υ_{it} represents the remaining random error or idiosyncratic error. This implies that the individual-specific effects are independent with identical random variables, zero mean, and constant variance in a distribution not far from a normal distribution. α also represents the general mean.

The empirical model is expressed as

$$MH_{it} = \beta_0 + \beta_1 sex_i + \beta_2 age_{it} + \beta_3 education_{it} + \beta_4 marital_{it} + \beta_5 religion_{it} + \beta_6 household\ size_{it} + \varepsilon_{it} \quad (4)$$

$$MH_{it} = \beta_0 + \beta_1 cocoa_{it} + \beta_2 maize_{it} + \beta_3 plot\ security_{it} + \beta_4 number\ of\ farms_{it} + \beta_5 asset\ score_{it} + \beta_6 cost\ of\ mechanization_{it} + \beta_7 lnfarm\ yield_{it} + \beta_8 size\ of\ farm_{it} + \beta_9 clossqty_{it} + \beta_{10} ecological\ zones_{it} + \beta_{11} timetplot_{it} + \beta_{12} seed\ value_{it} + \beta_{13} irrigation_{it} + \beta_{14} total\ labour\ hours_{it} + \varepsilon_{it} \quad (5)$$

Table 3. 4: Description of Variables for Risk Factors Influencing the Mental Health of the Crop Farmers studied

Description of variables	Indicators/ Measurement	Min. value	Max. value	A prior expectation	Supporting Literature	Wave
Socio-demographic characteristics						
Age of respondent	Number of years	18	120	+/-	Scarth et al., (2008), Park et al., (2015), Hawes et al., (2019)	Wave 1 & 2
Age categories of the respondent	18-30 31-45 46-60 61-120	1	4	+/-	Stallones, Leff, Garrett, Criswell, & Gillan (1995), Hounsome, Edwards, Hounsome & Edwards-Jones (2012), Park et al., (2015), Torske et al., (2016)	Wave 1 & 2
Marital status of the Respondent	Never married, Married, separated/divorced, Widowed, Consensual/Betrothed.	1	5	+/-	Stallones, Leff, Garrett, Criswell, & Gillan (1995), Scarth et al., (2008), Pulgar et al., (2016), Hanklang et al., (2016)	Wave 1 & 2
Sex of the respondent	Female, Male	0	1	-/+	Jafarzadeh, Mohan, & Velu (2012), Hounsome, Edwards, Hounsome & Edwards-Jones (2012), Torske et al. (2016), Lee et al., (2019)	Wave 1
Person ever attended school	No, Yes	0	1	-/+	Stallones, Leff, Garrett, Criswell, & Gillan (1995), Hanklang et al., (2016)	Wave 1 & 2
Level of education of the respondent	None BECE SSCE Post-Secondary	1	4	-/+		
Religion	Christianity Islam Traditional Others	1	4	-		
Household size	Size of household	1	20	+		
Ecological Risk-related Factors						
Rural Area	No, Yes	0	1	+	Hounsome, Edwards, Hounsome & Edwards-Jones (2012), Brew, Inder, Allen, Thomas, & Kelly (2016).	Wave 1
Ecological zone	Savannah, Forest, Coastal	1	3	-	Adjaye-gbewonyo et al., (2019)	Wave 1

Region	Western, Central, Greater Accra, Eastern, Brong Ahafo, Volta, Ashanti, Northern Upper East, Upper West	1	10		Stallones, Leff, Garrett, Criswell, & Gillan (1995)	
Quantity of crop loss	Percentage of cocoa or maize loss	0	100	+	Raine, 1999; Parry et al. 2005), Freeman, Schwab & Jiang (2008)	Wave 1 &2
Use of Pesticides	No, Yes	0	1	+	Sang-Baek et al. (2017)	Wave 1 & 2
Institutional Risk-related Factors						
Cost of mechanization	Ghana cedis	0	1750	+		
Number of farms	Number of farms cultivated	1	10	+		
Size of farm	hectare	0.2	320	+	Seligman & Hovey (2006)	
Seed value	Ghana cedis	0	33024	+	(Das, 2017)	
Log of yields	*Tonnes/hectare of cocoa and maize*	0	1000	+		
Household asset score	*Number of household assets*	1	49	-		
Household farm asset score	*Number of Agric assets*	1	42	-		
Plot security	*No, Yes*	0	1	-		
Right to farm	*No, Yes*	0	1	-		
Type of cropping system	Mono, Mixed	0	1	-	Parry et al. (2005) Das (2017)	
Irrigation of land	No, Yes	0	1	+	Yazd et al. (2020)	
Mental health						
Depression	*Depression score*	10	50	+	Kelly et al., (2011), Brew et al., (2016) Leonard et al. (2013)	Wave 1 & 2

Source: Author's computation using ISSER-EGC Ghana Socioeconomic Survey, 2009/2010, 2013/2014. Number of observations; 8553

3.9 Objective 2: Existing Social Support and Its Role in the Mental Health of Cocoa and Maize Farmers

Following Atuoye and Luginaah (2017) and Johnson et al. (1990), the panel regression model assisted in assessing the associations between social support and the risk factors of mental health among cocoa and maize farmers. Social support in this study involved social networking (time spent with others outside of their household, agricultural advice received and given to other households) and social services (interaction with agricultural organizations, and agricultural extension services). The social networking and services accessible to the crop farmers act as a buffer against the mental health of the crop (cocoa and maize) farmers.

The empirical model is expressed as

$$MH_{it} = \beta_0 + \beta_1 socialnetworking_{it} + \beta_2 access\ to\ social\ services_{it} + \varepsilon_{it} \quad (6)$$

Specifically, the model is as follows.

$$MH_{it} = \beta_0 + \beta_{1k} household\ spent\ time\ with\ others_{it} + \beta_{2k} relationship\ to\ household_{it} + \beta_{3k} period\ spent\ with\ other\ household_{it} + \beta_{4k} household\ provide\ support_{it} + \beta_{5k} household\ receive\ support_{it} + \beta_{6k} household\ provide\ advice_{it} + \beta_{7k} household\ receive\ advice_{it} + \beta_{8m} access\ to\ govt\ agricultural\ extension_{it} + \beta_{9m} access\ to\ agricultural\ media\ extension_{it} + \varepsilon_{it} \quad (7)$$

Where

k represents different variables as proxies for social networking
m represents other variables as proxies for access to social services
t represents time
MH_{it} represents mental health as an ordered variable ranging from 10 – 50 (depression scores)
ε= Error term

Table 3.5: Description of Variables for Social Support Influencing the Mental Health of the Crop Farmers Studied

Description of variables	Indicators/ Measurement	Min. value	Max. value	A prior expectation	Supporting Literature	Wave
Social Support *(Agricultural Extension Service/ Media agricultural Extension /Time spent with other households)*						
Access to agricultural extension services	No, Yes	**0**	1	+	Plasier et al. (2006)	
Access to agricultural government extension	No, Yes	0	1			
Access to agricultural media extension	No, Yes	0	1			
Household spent time with other households	No, Yes	0	1			
Relationship with the households	*None, Family/relative, Friend, Neighbour, Others*	0	4		Brigance, Mas, Sanchez & Handel (2018), McPhedran and De Leo(2015)	
Length of time spent with other households	*No acquaintance, Some years, Entire life*	0	2			
Households provide support/advice	No, Yes	0	1			
Households receive support/advice	No, Yes	0	1			

3.10 Objective 3: The Gendered Differences in the Risk Factors Influencing the Mental Health of Cocoa and Maize Farmers in Ghana

Empirical evidence shows differential effects of gender in farmers' mental health in some specific countries. Several studies have established severe or poor mental health in female and male farmers as a result of the predisposing risk factors, which includes farm-related

(size of farm, right to farm, access to mechanization, and farm yield) environmental or ecological risk factors (ecological zones and quantity of crop loss).

The empirical model is expressed as

$$MH_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 marital_{it} + \beta_3 education_{it} + \beta_4 marry_{it} + \beta_5 household\ size_{it} + \beta_6 crop_{it} + \beta_7 (ecological)_{it} + \beta_8 (institutional)_{it} + \beta_9 Male_i + \varepsilon_{it} \quad (8)$$

Where

t represents time
MH_{it} represents mental health as an ordered variable ranging from 10 – 50 (depression scores)
ε= Error term

3.11 Ethical Considerations

Ethical approval was sought from the Ethics Committee for Humanities (ECH) in the University of Ghana, which approves all sampling, recruitment, and data collection procedures. The approval certificate number ECH 135/18-19 was assigned for the study. There was adherence to informed consent, confidentiality, and anonymity for all participants. The Agriculture Department of the selected districts and the leadership of the cocoa and maize farmers in the respective communities were consulted before the commencement of the data collection exercise. Individuals selected for the study were provided with the needed information to determine their willingness to participate or not.

3.12 Pretesting of the Data Collection Instrument

There was a need to conduct a pretest to check for the validity and reliability of the qualitative instrument. Two in-depth interviews were conducted in the Nzema district in the Western region of Ghana on the 23rd of January 2019 among cocoa farmers randomly selected from the Gwirabanso community in the district. The choice of the district and

community depended on the reports of a high number of cocoa farmers in the district (MoFA, 2020). The pretest was conducted with only cocoa farmers selected from the Gwirabanso community in the Western region. At the end of the pretesting exercise, some sections of the interview guide were reviewed. Two additional questions on the influence of the social division of labour and socialization patterns on farmer mental health were included.

3.13 Limitations of the Study

The main limitation of the study was the study areas for the qualitative research. The Northern Region would have been better compared with the Western Region regarding the crops grown and ecological zone. The Northern Region was not chosen because of the distance. Despite this limitation, data from the Eastern and Western Regions were adequate for the comparative analysis between maize and cocoa farmers.

There was another challenge in obtaining data on mental health problems from the population of farmers. Obtaining reliable qualitative data from the farmers and key stakeholders was a challenge. The farmers were reluctant to discuss their mental health issues. In dealing with this, the researcher had to apply therapeutic skills to get reliable data for the study. Also, the issue of organizational support would have been adequately addressed if the panel data had captured important information about the interactions with organizations such as contacts with organizations, the information sought from the organization, and the difficulties faced with working with agricultural organizations. Most of the variables for the organizational support were largely missing in the data. These omissions were however accounted for with the qualitative data to explain the effect of organizational support issues on mental health confronting farm households.

CHAPTER FOUR

FARMING RISK FACTORS INFLUENCING THE MENTAL HEALTH OF CROP FARMERS IN GHANA

4.1 Introduction

In the work of farmers, internal and external forces or demands and structures in farming often predispose farmers to mental health disorders (Logstein, 2016). Anxiety, depression, and suicide are common mental health disorders significant among farmers worldwide. However, few interventions have been designed to deal with these psychological health issues prevalent among farming populations. A few essential strategies, including creating fair loan facilities and other income avenues, farmer and crop insurance, modern farming education, and irrigation management, have been offered but not widely implemented (Das, 2017). Farm or environmental-related challenges otherwise represented as institutional and ecological risk factors of farmer mental health are rarely investigated. This chapter highlights the institutional and ecological risk factors influencing the mental health of crop (cocoa and maize) farmers. The factors affecting the mental health of cocoa and maize farmers in Ghana are interpreted with the fixed effect panel regression model and thematic analysis. Still, they are preceded by a bivariate analysis of the correlates of farmer mental health. It is important to note that the panel was unbalanced as a result of the listwise deletion of cases arising from the difference in the number of variables (which have different sample sizes) in the panel data. This unbalanced dataset was taken into account in the estimation of the fixed effect models. Three separate models comprising the individual characteristics of the farmers, ecological and farm-related (institutional) factors were run. The aggregated models provide a more theoretical foundation to understand the relative contribution of the factors in explaining farmer mental health.

4.2 Results and Discussion of Farming Risk Factors on Farmer Mental Health

The results of the farming risks factors are discussed under three different themes. The first is the summary results of the crop farmers' socio-demographic characteristics and the crop farmer's mental health. The fixed effect panel regression analysis provides a context for understanding the second theme, ecological risk factors on farmer mental health. The third theme is the effect of institutional risk factors on farmers' mental health.

The variables constituting these main risk factors are described in Table 4.2. Before that, the descriptive statistics of the socio-demographic characteristics of the sampled population (cocoa and maize farmers) are presented in Table 4.1.

4.3 Descriptive Statistics of the Socio-demographic Characteristics of Cocoa and Maize Farmers

The results from the panel survey across the rounds (as shown in Table 4.1) indicate that more than 50% of the sampled population were females, and males constituted 47.15%. This particular study shows female dominance in cocoa and maize production in Ghana. However, other studies indicate male dominance in cocoa and maize farming in other parts of the country, especially in the Eastern Region and Mion district in the north of Ghana (Kyei et al., 2011; Abu-Nashiru, 2018). In addition, majority cocoa and maize farmers were between 31 to 45 years, the second majority of the farmers were between 18 to 30 years, and the least age group was between 61 to 120 years.

More than 50% of the farmers had at least ever attended school; whiles 41.96% had not. The survey further shows that majority of the cocoa and maize farmers (60.94%) were Christians, and the minority were in the other religious groups, either Islam or Traditional

religion. In this survey, 61.76% of the farmers were married, and 16.78% were never married. The majority of the farmers were located in the rural areas (85.54%) compared to the urban areas (14.46%). Most farmers (50.78%) were found in the forest ecological zones; the rest were in the savannah (39.24) and coastal zones (9.98%). Lastly, maize farmers constituted 68% of the sampled compared to cocoa farmers (32%).

Table 4.1: Percentage Distribution of Socio-demographic Characteristics of Cocoa and Maize Farmers.

Variables	Category	Frequency	Percent
Sex of respondent	Female	4,520	52.85
	Male	4,033	47.15
	Total	**8,553**	**100.00**
Age of respondent	18-30	2,534	29.66
	31-45	2,733	31.99
	46-60	1,922	22.50
	61-120	1,355	15.85
	Total	**8,554**	**100.00**
Education of respondent	No	3,586	41.96
	Yes	4961	58.04
	Total	**8,547**	**100.00**
Religion of respondent	Christianity	5,200	60.94
	Islam	1,934	22.66
	Traditional	868	10.17
	Others	531	6.23
	Total	**8,533**	**100.00**
Marital status of the respondent	Never married	1,425	16.78
	Married	5,245	61.76
	Separated/Divorced	510	6.00
	Widowed	636	7.49
	Consensual/Betrothed	677	7.97
	Total	**8,493**	**100.00**
Locality of residence	Urban	1,143	14.46
	Rural	6,763	85.54
	Total	**7,906**	**100.00**
Ecological zone	Savannah	3,102	39.24
	Forest	4,015	50.78
	Coastal	789	9.98
	Total	**7,906**	**100.00**
Crop grown	Maize	5,816	68.00
	Cocoa	2,737	32.00
	Total	**8,553**	**100.00**

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014
Note: N=8553

4.4 Farming Risks Factors Influencing the Mental Health of Crop Farmers

According to WHO (2021), mental health is defined as a state of wellbeing in which an individual realizes his or her abilities, can cope with the normal stresses of life, can work productively, and can make a contribution to his or her community. Mental health is one of the integral components of health, driven by biological, socioeconomic, and environmental factors. A common mental health disorder, depression, is characterized by tiredness, sadness, nervousness, hopelessness, restlessness and worthlessness in K10. Depending on the level of depression, whether mild, moderate, or severe, one's ability to work or cope with daily life activities can be affected.

4.4.1 Descriptive Analysis of Risks Factors Influencing the Mental Health of Crop Farmers

To explain the mental health (depression) of farmers, it is essential to begin with the descriptive statistics and frequency distribution of the analytical factors comprising demographic, institutional, and ecological risk factors. The main farmer mental health model is interpreted with the summary statistics of the risk factors presented in Table 4.2. The table shows that the average age of respondents (household head, spouse, and any other household member) is 42 years, with a standard deviation of 17 years and an age range of 18 to 120 years. This indicates a young population of farmers within crop farming in Ghana, which is preferable. Brigance et al. (2018) also found similar results among the population of organic farmers in the US, but not the situation in Asia where farming is mainly an occupation for the elderly (Park et al., 2015). Furthermore, the results indicate that the average farm size is almost 2 hectares, ranging from 0.20 to 320 hectares, and the average number of cocoa or maize farms or plots cultivated is 2, within a range of 1 to 10 (Table

4.2). The maximum land size of 320 hectares is because cocoa is a cash crop often grown commercially or on large farm plots.

The average farm yield is 0.72 tons per hectare, ranging from 0.1 to 1500, whilst the quantity of crops lost to pests and diseases, and climate change is 12.93%. This confirms the low productivity (0.72) experienced by farming populations in Ghana, which emanates from a quite high percentage of crop loss.

Table 4.2: Descriptive statistics of risks factors influencing farmer mental health

Variable	Obs.	Mean	Std. Dev.	Min	Max
Age of respondent	8,544	42	16.9	18	120
Size of household	8,553	4.9	2.8	1	20
Size of farm (ha)	8,477	1.99	5.53	.020	320
Number of cocoa/maize plots	8,553	2.18	1.19	1	10
Farm yields (ha/t)	8,477	0.72	16.89	0.1	1500
Cost of mechanization (GH¢)	8,547	28.07	89.43	0	1750
Quantity of crop loss	8,553	12.93	21.99	0	100

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014
Notes: N=8553

The reference category for mental health in the study is depression and is examined in a frequency distribution as shown in Table 4.3. The percentage distribution of the depression variable indicates that severe, moderate, and mild depression is 6.98%, 12.61%, and 24.65%, respectively, whereas low/none depression accounted for 55.76%. Although more than half of the farmers had no depression, farmers with severe depression were 511 (6.98%), which might be considered insignificant, but is a cause for concern. This 6.98% of severe depression is high compared to 2.9% and 3% severe depression among farmers in South Dakota, the USA, and Canada (Roh et al., 2015; Jones-Bitton et al., 2019). However, the 6.98% severe depression is small compared to 12.1% severe depression among farm producers in Iowa, the USA (Scarth et al., 2008). The differences could be attributed to the psychological scales used in measuring depression, the sample size, and most probably the

context of the studies. Additionally, the severity of depression among professionals (an occupational group who are mainly paid employees) captured in the dataset tend to be low (5.5%) compared to the crop farmers in this study.

Table 4.3: Percentage Distribution of the Levels of Depression of Farmers

Levels of depression	Frequency	Percent
Low/None depression	4,081	55.76
Mild depression	1,804	24.65
Moderate depression	923	12.61
Severe depression	511	6.98
Total	7,319	100

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

4.4.2 Bivariate Analysis of the Factors Influencing the Mental Health of Crop Farmers

A series of bivariate analyses were conducted with the three main factors of interest of the study. It begins with the specific demographics of crop farmers influencing the mental health of crop farmers. The other predictor factors, including ecological and institutional factors, were also examined. Furthermore, the quoted words and phrases from respondents in the qualitative research were represented to support the quantitative results. The shared experiences from the respondents in the qualitative research were numbered and represented with pseudo names in their respective districts and regions to safeguard the confidentiality.

4.4.2.1 Demographic Characteristics Influencing the Mental Health of Crop Farmers

The demographic characteristics influencing the mental health of crop (maize and cocoa) farmers are presented in Table 4.4, while Table 4.5 and 4.6 present the ecological and institutional risk factors respectively. Table 4.4 indicates that all the farmers' demographic characteristics, including sex, age, education, marital status, religion are statistically significant correlates of the farmers' mental health. Majority of female crop farmers experience mild, moderate, and severe depression compared to male crop farmers. Table 4.4

indicates that 26.17% and 14.62% of female crop farmers are mildly and moderately depressed, respectively, compared with 22.98% and 10.40% for male crop farmers.

Also relative to male crop farmers (6.37%), female crop farmers (7.53%) were more severely depressed. For low or no depression, the female crop farmers accounted for 51.68% compared to 60.25% for the male crop farmers. Additionally, the relationship between the gender of the crop farmers and their mental health is statistically significant, indicating that a correlation exists between the gender of the crop farmer and the mental health of the crop farmer.

Table 4. 4: Bivariate analysis of specific demographic factors of crop farmers' mental health

Variable	Categories		Kessler scale of depression				Measures of association	
		Low/None	Mild	Moderate	Severe	Total	Chi 2	P-value
Sex of respondent	Female	51.68	26.17	14.62	7.53	100	60.92	0.000
	Male	60.25	22.98	10.40	6.37	100		
	Total	**55.76**	**24.65**	**12.61**	**6.98**	**100**		
Education of respondent	No	41.65	30.28	17.03	11.04	100	449.89	0.000
	Yes	65.66	20.69	9.51	4.14	100		
	Total	**55.76**	**24.65**	**12.61**	**6.98**	**100**		
Age of respondent	18-30	61.98	21.46	11.24	5.32	100	82.62	0.000
	31-45	55.57	25.13	12.75	6.55	100		
	46-60	54.65	26.18	12.84	6.33	100		
	61-120	48.38	26.22	14.02	11.38	100		
	Total	**55.77**	**24.64**	**12.61**	**6.98**	**100**		
Marital status of respondent	Never married	72.66	17.07	6.00	4.27	100	189.35	0.000
	Married	53.70	25.48	13.69	7.13	100		
	Separated	51.95	28.54	11.50	8.01	100		
	Widowed	43.08	26.15	18.08	12.69	100		
	Consensual	61.88	24.69	9.69	3.74	100		
	Total	**55.80**	**24.66**	**12.59**	**6.95**	**100**		
Religion of respondent	Christianity	61.77	22.19	10.87	5.17	**100**	243.77	0.000
	Islam	47.76	27.36	15.20	9.68	**100**		
	Traditional	35.66	35.52	17.20	11.62	**100**		
	Others	53.78	23.32	14.08	8.82	**100**		
	Total	**55.75**	**24.65**	**12.61**	**6.99**	**100**		

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014
Notes: N=8553

The age of the farmers is also one of the key risk factors in farmers' mental health. Age and sex are critical biological determinants of health outcomes (Brigance et al., 2018). Table 4.4

indicates a strong relationship between the age of crop farmers and their mental health. The crop farmers between the ages of 61 to 120 years accounted for the most significant mild (26.22%), moderate (14.02%), and severe depression (11.37%) as compared to the other age groups. This shows that the aged crop (cocoa and maize farmers) are likely to be more susceptible to depression (mental disorders) compared to younger farmers. A similar finding is reported among farmers between the ages of 50 to 59 years in Norway (Logstein, 2016a). Older farmers with many years of farming might be financially unstable to manage their farms and other developing needs as a result of the many challenges they encounter in their work.

On the contrary, this study contradicts another study which revealed that young farmers between the age range of 20 to 40 years have a greater probability of getting depressed in Norway (Logstein, 2016b). The researcher revealed that young farmers are concerned about the economy, and this usually causes depression among them. Many young farmers enter the farming business with exuberance, but with little farming experience (Allen et al. 2012) and insufficient financial resources to support their farming activities. Romans et al. (2011) also confirms high depression rates among younger farmers in Canada, because younger farmers may have little farming experience (Allen et al., 2012). Highlights from the qualitative interview indicated that many of the young farmers were psychologically or mentally distrurbed.

Some young male cocoa farmers described their situations in an interview:

> "It's tough for young farmers who are starting cocoa cultivation. We find it difficult to get help in any form to manage the affairs of our farm. Some of us ought to work as contract labourers on other farms to get about Gh¢300 to invest in our farms and families...All these issues result in thinking which causes stress, tiredness, body pains, and other body-related diseases". (Bonwire, *27 years*, married, District 1-Eastern Region, 19/07/2021)

Another farmer said:

> "The number of cocoa farmers has reduced because there is a lot of difficulty in it, especially for those of us who are young farmers. Yes, beginners face a lot of difficulties. You will suffer if you don't get anyone's farm to weed. The suffering is greatly reduced for those already in the business compared to the beginners with no capital. Do you understand? Beginners suffer". (Ansah, *29 years*, married, cocoa and plantain farmer, District 1- Western Region, 9/08/2021)

The results from the field data supported the risk of depression among young farmers. Younger farmers should maximize support from older farmers and seek agricultural advice when needed.

Another key determinant of farmer mental health in this study is education. Here, there was a negative correlation between the education of crop farmers and their mental health. The results in the panel study indicated that crop farmers who had ever been to school are unlikely to be depressed (65.66%). In other words, crop farmers who have received some form of education are less likely to be mildly, moderately, and severely depressed (20.69%, 9.51%, and 4.14%, respectively), compared to crop farmers who have never been to school (30.28%, 17.03%, and 11.04%). Further interrogation of the education and gender variables showed that female crop farmers who are uneducated are more likely to be depressed compared to uneducated male crop farmers. This confirms Hanklang et al.'s (2016) study among rice farmers in a province in Thailand, who found the beneficial effect of education on the mental health of rice farmers. But then, the study further shows that male farmers with low level of education were severely depressed compared to female crop farmers with low level of education. It is also observed that educated female crop farmers are likely to have mild and moderate depression, while educated male crop farmers are likely to have severe depression. This may be because female farmers who have ever been to school seek support to enhance their farming business when they encounter challenges beyond their

control. On the other hand, male farmers who have ever been to school are still reluctant to seek help or support. This could also be attributed to masculinity, socialization, and societal expectations. Therefore, the problems faced by educated male farmers may escalate and lead to severe depression.

Marital status also plays a crucial role in the mental health of farmers. It has the potential to influence farmers' mental health. Table 4.4 indicates that the never-married/single is unlikely to be depressed compared to the married, separated, widowed, and consensual. The married are more likely to be severely depressed (8.01%) compared to the single or never married (4.27%). Ideally, the reverse is expected because marriage is supposed to serve as a support base for partners. Even though half of the crop farmers studied believed that marriage provides a platform for partners to enjoy support from each other, many of the farmers believed that some farmers neglect or refuse to provide for their partners' needs which causes them to suffer depression. Others believed that poverty, misunderstandings, and mistrusts in marriage cause depression in farmers. A farmer stated:

> "For marriage, it affects us. It affects us in the sense that, currently, if you are not financially sound in marriage, there will be a misunderstanding, no matter the level of understanding. When there's not enough money to support your partner to undertake a project or cater for the needs of your children, happiness in marriage will cease" (*Prince, representative of Farmer Association, 62 years, married, cocoa and maize farmer, District 2- 19/07/2021 Eastern Region).*

The finding from the study implies that for the crop farmers studied, it is safer to stay single than married and be bothered by the needs of a partner when the means to achieve your needs are non-existent, although marriage is more about partners supporting each other. Hence, the farmers studied in this study believe that the never-married or single farmers are better off when it comes to depression. The results further show that married crop farmers are less likely to be severely depressed compared to the separated and widowed. Based on

the results, the widowed and separated farmers are severely depressed compared to the married or those in consensual relationships. This could be attributed to the loss of their partners or separation. Nonetheless, the marital status of crop farmers correlates more strongly with their mental health. Leonard et al. (2013), however, found the opposite. Thus, there was no association between marital status and the mental health of palm plantation farmers in southern Malaysia (Leonard et al., 2013).

Beyond these demographic characteristics, religion also played a significant role in the mental health of the crop farmers studied. Generally, crop farmers who were traditionalists were at high risk of depression (11.62) compared to the Muslim (9.68) and Christian farmers (5.17). The results in table 4.4 indicates that Christian crop farmers were at lower risk of depression. The Christian farmers might be the majority in crop farming in Ghana, and may be providing support and agricultural advice to each other, which reflects the caring role in the religion. On the contrary, a high prevalence of mental health problems was found among Catholic Christian farmers in Brazil (Poletto & Gontijo, 2012).

4.4.2.2 Ecological Risk Factors Influencing the Mental Health of Crop Farmers

Table 4.5 indicates that the locality of residence of crop farmers in rural or urban areas may matter for their mental health. A higher percentage of crop farmers living in the rural areas were generally more depressed (47.39%) compared those living in the urban areas (36.88%). Rural crop farmers are more likely to be isolated and have less access to medical and psychological care (Brew et al., 2016). Crop farmers in the urban areas are more likely to be farm owners and not farmers because they can afford labour for the farms. They are also likely to have access to other livelihood sources. This result of a high prevalence of depression among the farmers studied in the rural areas is consistent with Hounsome et al.

(2012) and Brew et al. (2016), who documented worse mental health disorders characterizing farmers who live in remote or rural areas. The person environment fir theory is supported by the finding on rural-urban farmers and mental health.

Table 4.5: Bivariate Analysis of the Ecological Risk Factors of Crop Farmers' Mental Health

Variable	Categories	Kessler scale of depression					Measures of association	
		Low/None	Mild	Moderate	Severe	Total	Chi 2	P-value
Locality of residence	Urban	63.12	22.13	9.59	5.16	**100**	38.73	0.000
	Rural	52.61	26.16	13.76	7.47	**100**		
	Total	**54.07**	**25.60**	**13.18**	**7.15**	**100**		
Ecological zone	Savannah	41.75	31.90	16.05	10.30	**100**	261.36	0.000
	Forest	62.25	21.18	11.44	5.13	**100**		
	Coastal	55.36	26.10	12.08	6.46	**100**		
	Total	**54.07**	**25.60**	**13.18**	**7.15**	**100**		
Region of respondent	Western	63.71	22.39	10.68	3.22	**100**	517.13	0.000
	Central	65.57	21.86	8.20	4.37	**100**		
	Greater Accra	75.00	20.59	4.41	0.00	**100**		
	Volta	67.83	19.81	8.40	3.96	**100**		
	Eastern	58.66	20.49	12.36	8.48	**100**		
	Ashanti	61.51	20.36	12.66	5.47	**100**		
	Brong Ahafo	58.48	27.64	9.39	4.49	**100**		
	Northern	34.07	31.70	19.22	15.01	**100**		
	Upper East	42.86	30.20	21.22	5.72	**100**		
	Upper West	43.99	36.61	13.93	5.47	**100**		
	Total	**55.37**	**24.86**	**12.73**	**7.04**	100		

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014
Notes: N=8,553

Furthermore, the ecological zone is linked to the environmental conditions of a specific land unit that is part of an integrated agricultural system. The results in Table 4.5 indicate that crop farmers in the savannah ecological zone are more depressed compared to crop farmers in the forest and coastal zones of Ghana. The savannah ecological zone is predominantly in the northern parts of the country and is characterized mainly by dry (unfavourable) climatic conditions that do not support the growth of crops. Additionally, farmers in the savannah zones may have problems with security of plot and this may return negative results in the north of Ghana.

The next ecological risk factor is the region of crop farmers. The results reveal that crop farmers living and working in the then three northern parts of the country are more depressed compared to crop farmers in the other regions. Table 4.5 indicates a significant correlation among each of these ecological risk factors (locality of residence, ecological zone, region) and the depression of crop farmers. Also, there is a direct link between the ecological zone, the region of the crop farmer and depression. This finding supports the person-environment fit theory of stress, which points out that psychological distress occurs due to an interaction between the difficulties individuals encounter in the environment and their personal characteristics.

4.4.2.3 Institutional Risk Factors Influencing the Mental Health of Crop Farmers

Apart from the ecological risk factors discussed above, institutional risk factors are farm-related stressors predisposing crop farmers to mental health disorders. The institutional risk factors involved in crop farmers' work reveal some correlations of depression, as indicated in Table 5.6. The right to sell land, type of crop grown, and access to mechanization or the use of mechanization equipment were the factors that significantly correlated with the depression of crop farmers.

Table 4.6: Bivariate Analysis of the Institutional Risk Factors of Crop Farmers' Mental Health

Variable	Categories	Kessler scale of depression					Measures of association	
		Low/None	Mild	Moderate	Severe	Total	Chi 2	P-value
Type of crop grown	Maize	50.64	26.71	13.89	8.76	**100**	176.36	0.000
	Cocoa	65.83	20.59	10.09	3.49	**100**		
	Total	**55.76**	**24.65**	**12.61**	**6.98**	**100**		
Cropping System	Mono	55.74	24.75	12.55	6.96	**100**	2.92	0.404
	Mixed	56.52	19.57	15.94	7.97	**100**		
	Total	**55.76**	**24.65**	**12.61**	**6.98**	**100**		
Right to a sell plot	No	53.73	25.41	12.96	7.89	**100**	36.46	0.000
	Yes	60.22	22.97	11.83	4.98	**100**		
	Total	**55.76**	**24.65**	**12.61**	**6.98**	**100**		
Security of plot	No	55.26	25.06	12.77	6.91	**100**	0.49	0.922
	Yes	56.00	24.46	12.55	6.99	**100**		
	Total	**55.75**	**24.66**	**12.62**	**6.96**	**100**		
Irrigation of land	No	55.60	24.91	12.51	6.98	**100**	4.70	0.195
	Yes	58.37	20.47	14.19	6.98	**100**		
	Total	**55.76**	**24.65**	**12.61**	**6.98**	100		
Access to mechanization	No	60.26	23.18	10.99	5.57	**100**	153.27	0.000
	Yes	45.78	27.90	16.21	10.11	**100**		
	Total	**55.76**	**24.65**	**12.61**	**6.98**	100		
Household share dwelling with other households	No	56.14	23.88	12.86	7.12	**100**	6.35	0.096
	Yes	54.81	26.53	11.98	6.69	**100**		
	Total	**55.72**	**24.72**	**12.58**	**6.98**	100		

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014
Notes: N=8553

The type of crop grown is among the factors discussed in the literature as associated with the mental health of farmers (Hanklang et al., 2016). Here, farmers involved in maize production were generally more depressed with a lesser percentage of 50.64% for low/none depression compared to farmers involved in cocoa production (65.83%). For severe depression, more than 4% of maize farmers were severely depressed compared to cocoa farmers (9%). For mild and moderate depression, farmers involved in maize production accounted for 26.71% and 13.89% compared to 20.59% and 10.09% for farmers involved in cocoa production. The chi-square test shows a statistically significant relationship ($p< 0.005$). This correlation between the type of crop grown and depression is expected because cocoa is a perennial crop that takes years to bear fruit. It is also a cash crop with high market

value, compared to maize, a cereal crop with low market value. Furthermore, farmers involved in the production of cocoa may have more access to technical support from agricultural organizations compared to maize farmers, who generally may have less support from such organizations. The crops of maize farmers are attacked by armyworms and other diseases that often render their farms empty of any harvest.

The right of a crop farmer to use or sell land is often linked to land ownership rights and security of plot. These are equally important in farmer mental health literature. The results from the study indicate that crop farmers who have farm rights are generally less depressed compared to those who do not have farm rights. For low/none depression, 60.22% of crop farmers with farm rights had no or low depression compared to 53.73% without farm rights. For crop farmers with farm rights, 4.98% were more likely to be severely depressed compared to 7.89% of crop farmers without farm rights, implying the psychological effect of the lack of ability to sell the land or serve a collateral purpose. Additionally, crop farmers with farm rights may be doing abunu abusa ie having to share farm proceeds with an owner of the land or having to use some farm proceeds to pay for a borrowed land and thus the higher challenge of the risk of severe depression. However, farmers with farm rights also accounted for a lesser proportion of mild and moderate depression (22.97% and 11.83%), respectively, compared to crop farmers without farm rights (25.41% and 12.96%). The right to sell land is related to the security of plot and both may return more positive results in the North than in the South of Ghana.

The use of mechanization was examined in terms of the use of devices or tools in farming such as tractors, combined harvesters, cultivators, and agricultural sprayers. In this study, crop farmers' use of or access to mechanization is correlated and statistically significant with mental health. Table 4.6 shows that crop farmers who had access to agricultural

mechanization are more depressed. For severe depression, crop farmers who had access to agricultural mechanization accounted for 10.11% compared to 5.57% of crop farmers who had no access to agricultural mechanization. This is counterintuitive but can be explained that the use of mechanization cannot safeguard crop farmers from getting depressed. In other words, farmers might encounter physical and mental difficulties in the acquisition and management of the mechanized tools. A farmer and an agricultural extension officer described this in an in-depth interview:

> "They give out machines for weeding and pruning, but it is inadequate. The farming group I belong to received just three machines, although we are a total of 33 farmers. These same machines are used for pruning and weeding by all of us."
> (Amoah, *cocoa farmer, District 1 Western Region*, 9/08/2021).

> "Farmers do not have access to the spraying machines in the communities under my jurisdiction, and it's because it is costly. Currently, there are just two spraying machines to be used by all the farmers in this district".
> (Annan, *Agricultural Extension Officer, District 2, Western Region*, 9/08/21)

Cropping system, whether mono or mixed cropping (growing single or more than a single crop), security of plot (land disputes), irrigation of land (source of water other than rainwater), the farming season (major or minor season), and whether households share dwelling with other households is not correlated with depression. This suggests that depression is not significantly correlated with farming single or many crops, the experience of disputes on the farm, and the source of water for farming.

4.4.3 Factors Affecting the Mental Health of Crop Farmers

To quantify the effects of the demographic, ecological, and institutional factors on the mental health of crop farmers, this study estimated three-panel regression models: the pooled cross-sectional or ordinary least squares model, the fixed-effects, and random-effects models. The random and fixed panel regression models are primarily used in panel analysis (Gayle & Lambert, 2018b) because they have peculiar characteristics. Fixed effects models

analyze change differences within individuals by considering only explanatory variables that change over time against time constant variables. On the other hand, the random-effect model analyzes change differences within and between individuals or respondents. It also considers both explanatory variables that change over time and are constant in the analysis. Gayle and Lambert (2018) further explain that, unlike the fixed effects model, the parameters for each respondent are not estimated by the random-effects model. Instead, the overall distribution of differences in individual respondents is calculated as a parameter. Also, the pooled model only pools the data distribution and impacts the estimates of variances and standard errors by estimating small standard errors (Gayle & Lambert, 2018). This section of the study presents the regression results of depression among crop (cocoa and maize) farmers in Ghana. The panel data generated for the study was unbalanced. The OLS panel model (which focuses on a pooled analysis of the data), the fixed effects panel model (which focuses on the within-individual effects), and the random effects panel (which focuses on both the within and between-individual effects) were presented in Tables 5.7, 5.8 and 5.9. There was the need to choose a panel approach to guide the interpretation of the coefficients and standard errors in the estimated model, as reported in Tables 4.7 and 4.8. Hence, a Hausman test was performed to select from the fixed and random panel models.

Gayle and Lambert (2018) states that the Hausman test compares an estimator (β_{fe}), which is consistent with another estimator (β_{re}) known to be efficient. The Hausman test indicated a highly significant chi-square of 105.06 at 18 degrees of freedom. Therefore, the null hypothesis showing 'the difference in coefficient not systematic' was rejected, favouring the fixed effect panel model. Finally, the fixed effects regression model was used to examine the farming risk factors influencing the mental health of crop farmers. After that, the thematic analysis described and further explained the related-risk factors of farmer mental health identified by the crop farmers in the quantitative data. With the findings from both

study designs, a point of convergence was estimated to identify the similarities and differences between the quantitative and qualitative data.

4.4.3.1 Demographic Characteristics Influencing the Mental Health of Crop Farmers

Table 4.7 shows that sex, age, education, marital status, and religion are significant in all the models. However, in the fixed-effects model, the significant demographic determinants of farmer mental health include age, education, marital status, religion, share dwelling, and asset score. The level of education of the farmers is a time-variant characteristic that emphasizes within-person change. The results indicated that education was statistically significant but not all the levels of education. More specifically, the fixed-effect model shows that having basic education exerts a negative statistically significant effect on the mental health of cocoa and maize farmers. Basic education has a coefficient of -0.651, which is significant at 1%. This indicates that farmers with at least a Basic Education Certificate Examination (BECE) or basic level of education are less likely to be depressed compared to those with no basic level of education. This result is consistent with the finding that lower-educated females are more depressed among rice farmers in Thailand (Hanklang et al., 2016). But the work of Stallones et al. (1995) reveals that educational achievement was not associated with mental health of the farmers they studied. This contradiction might be due to the Center for Epidemiologic Studies Depression Scale (CES) and the cut-off point for depression used in their studies.

Table 4. 7: Panel Regression Models of the Demographic Characteristics of Crop Farmers' Mental Health

	OLS Estimator	Fixed effects Estimator	Random Effects Estimator
Variables	**Depression**	**depression**	**Depression**
Male	-1.020**	-0.970***	-0.916***
	(0.397)	(0.279)	(0.277)
Age	-0.133**	-0.067**	-0.087***
	(0.054)	(0.033)	(0.033)
Age^2	0.002***	0.001***	0.001***
	(0.001)	(0.000)	(0.000)
BECE	-1.794***	-0.651***	-0.980***
	(0.295)	(0.229)	(0.225)
SSCE	-1.336*	0.127	-0.089
	(0.771)	(0.542)	(0.542)
Post-secondary	-2.765***	-0.427	-1.074*
	(0.712)	(0.591)	(0.578)
Married	1.973***	1.873***	2.127***
	(0.622)	(0.399)	(0.394)
Separated	2.572**	2.049***	2.351***
	(1.001)	(0.602)	(0.599)
Widowed	3.091***	2.678***	2.997***
	(0.979)	(0.606)	(0.603)
Consensual/Betrothed	2.323***	2.567***	2.591***
	(0.699)	(0.480)	(0.476)
Islam	2.229***	-0.400	0.382
	(0.574)	(0.347)	(0.310)
Traditional	2.204***	-0.431	0.305
	(0.604)	(0.372)	(0.354)
Others	1.458*	1.012**	1.009**
	(0.785)	(0.398)	(0.394)
Household size	0.150**	-0.029	0.036
	(0.069)	(0.043)	(0.042)
Share dwelling	-0.592	-0.966***	-0.793***
	(0.464)	(0.215)	(0.207)
Asset score	-0.106	-0.243***	-0.215***
	(0.075)	(0.031)	(0.027)
Constant	19.930***	22.210***	21.121***
	(1.160)	(0.708)	(0.723)
Observations	4,055	4,141	4,141
R-squared	0.130	0.093	0.089
F	11.71	20.96	.
Number of EA	247	247	247
sigma_u		4.019	2.778
sigma_e		5.133	5.133
rho		0.380	0.227

Robust p-values: ***p<0.01, **<0.05, *p<0.1. Standard errors in parentheses
Standard Error adjusted for 8,553 cocoa and maize farmers.
Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

In general, being a member of the conventional religious groups in Ghana - Christian, Islam, or Traditional religion has no significant effect on the mental health of farmers. However, the results showed that the 'other' religious group had a coefficient of 1.012, which was significant at a 5% level. This implies that belonging to other religions significantly increases depression of the respondents (crop farmers), holding all other factors constant. This study also found out that an increase of a farmer's household asset score decreases the depression of the farmer. In other words, a positive change or unit increase in household asset score is significantly associated with a 0.243 decline in depression. This indicates the critical role of farm assets in the work of farmers.

Furthermore, the sharing of dwellings has a coefficient of 0.966 and is statistically significant at 1%. This implies that sharing dwellings with other households decreases the chances of depression among crop farmers. This could be attributed to the support members possibly provide to each other. This result supports the evidence from a study that showed that male rice farmers who are sick and live with less than four family members were more likely to be depressed than other rice male farmers living with more than four family members (Hanklang et al., 2016). However, the rice farmer study contradicts Fraser et al.'s (2005) finding that farmers who live close to the extended family or in contact with the family are challenged by higher demands and responsibilities for dependent relatives and conflict over roles between family members, which predisposes them to increased rates of depression.

With respect to the gender of the cocoa and maize farmers, the male indicator variable had a coefficient of -0.970, which was statistically significant at 1%. This implies that male farmers were less likely to be depressed. Women, of course, are mostly engaged in taking

care of the home and children and helping husbands in farm work. The stress of taking up such multiple roles may be impacting negatively on the mental health of female farmers. This finding is consistent with other studies (Romans et al., 2011; Scarth et al., 2008).

Additionally, the results reveal that an increase in the age of farmers decreases the depression of the farmers, indicating that older farmers are less likely to be depressed. This may imply that younger farmers might not be receiving the needed support from agricultural organizations. Additionally, the younger farmers are more likely to be financially unstable, have lower earnings and savings, with greater economic demands (Schulman & Armstrong, 1990). The young farmers are also more concerned with accumulating wealth and decreasing debt (Henning-Smith et al., 2021). On the other hand, Henning-Smith et al. (2021) established in their study that older farmers were more susceptible to mental health issues compared to younger farmers. The researchers explained that the older farmers are more often concerned with the stress of retirement planning and the future of their farms.

Furthermore, the results from this study reveal a strong positive association between the married, widowed, separated, betrothed, or consensual and an increased risk of depression among the crop farmers studied. The unmarried farmers have low/no depression or have a lower risk of depression compared to the married, separated, and widowed. On the flip side, widowed, separated, and betrothed farmers have an increased risk of depression compared to the married. Patel et al. (2006) explained that married females were depressed because they have to cope with multiple roles that were challenging. Similarly, the high risk of depression among the widowed and separated could be linked to social isolation and stigma. Marriage in Ghana is expected to serve as a support base for partners, where there is

companionship and fulfilment. However, marriage has become an institution where many partners especially women, face domestic abuse; hence there is a lack of contentment.

4.4.3.2 Ecological Factors Influencing the Mental Health of Crop Farmers

The ecological risk factors are linked to the geographical, environmental, and ecosystem related aspects of the agriculture sector in Ghana. The results from this study show that the region, locality of residence, and ecological zone significantly affect the mental health of crop farmers. Generally, the fixed-effect model had lots of its values missing in the model because it controls for invariant variables. Nonetheless, the Eastern Region remained statistically significant but negative on the mental health of crop farmers. The Eastern Region is noted for maize and cocoa growing in Ghana because of the forest and vegetation covers which support the growth of food and cash crops. The Eastern Region is also the second producer of maize in the country (Kuwornu & Amoah, 2013).

Table 4.8: Panel Regression Model on the Ecological Risk Factors of Farmer Mental Health

Variables	OLS Estimator	Fixed Effect Estimator	Random Effect Estimator
Ecological risk factors			
Quantity of crop loss	0.010	0.004	0.005
	(0.009)	(0.005)	(0.005)
Central	-2.753***		-3.253***
	(0.920)		(1.208)
Accra	-5.075***		-5.090***
	(0.988)		(1.728)
Volta	-2.920***		-2.709***
	(0.795)		(1.040)
Eastern	-0.809	-12.044**	-0.955
	(0.833)	(5.615)	(1.078)
Ashanti	-1.443*		-2.249**
	(0.829)		(1.088)
Brong-Ahafo	-1.489***		-1.416
	(0.558)		(0.941)
Northern	2.372***		1.911**
	(0.514)		(0.855)
Upper east	0.295		0.586
	(0.638)		(1.067)
Rural	1.041**		1.111***
	(0.474)		(0.404)
forest	-0.721		-0.134
	(0.628)		(0.687)
Coastal	1.076		1.667*
	(0.787)		(0.866)
Constant	19.683***	21.402***	19.583***
	(0.534)	(0.872)	(0.831)
Observations	6,843	6,843	6,843
R-squared	0.079	0.001	
F	13.66	4.601	.
Number of EA		276	276
sigma_u		5.417	2.337
sigma_e		5.554	5.554
rho		0.487	0.150

Robust p-values in parentheses ***p<0.01, **<0.05, *p<0.1.
Standard Error adjusted for 8,553 cocoa and maize farmers.
Standard errors in parentheses

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

The result indicates that crop (maize and cocoa) farmers in the Eastern Region were less depressed compared to crop farmers in any other region. The reason may be that the Eastern

Region is within the forest ecological zone, which mainly supports the growth of food crops such as cocoa, oil palm, cassava and maize (Kuwornu & Amoah, 2013).

Conversely, the then Northern Region was the only statistically significant and positive variable on the mental health of the farmers. This means that individual crop farmers in the then Northern Region are more depressed compared to farmers in other regions. The vulnerability of the farmers in the Northern Region to depression may be caused by the lack of access to agricultural inputs and resources as a result of the geographical location of the region (Anang & Asante, 2020). Additionally, the region's location in the savannah ecological zone is characterized by dry soil and low humidity, hardly supporting the growth of food crops.

The results of this study also are of a positive statistical significance for the locality of residence (rural and urban areas) of crop farmers in the two other models. Crop farmers in rural areas are more likely to be depressed than crop farmers in urban areas. This result confirms studies conducted in Australia and the UK, which indicated worse mental health disorders among farmers located in rural areas (Brew et al., 2016; Hounsome et al., 2012). Often farmers in the rural areas of Ghana utilize traditional methods of farming, characterized by the use of hoes and cutlasses. These farm tools are less efficient and labour intensive for a day's work and may likely cause farmers to experience depression.

Additionally, although the quantity of crop loss remained statistically insignificant, there was some evidence from the qualitative study that the farmer's loss of crops negatively affects their mental health. Almost all farmers maintained that pests, diseases, and heavy rains affect the maize crops and cocoa pods by piercing and sucking, leaving the farms

without yield, although huge investments have been made. The cocoa and maize farmers and agricultural extension officers explained that the psychological wellbeing of the farmers is considerably affected by the loss of crops in the field, because they develop stress-related issues and sleeping problems. Some of the farmers (maize) described their frustrations:

> "Of course, when the pests spoil too many of my crops, it bothers and hurts me. The pests, like the grass cutter, do harm our crops. Sometimes you go to the farm and think someone came to pluck the pods off, but that is not the case; it's the pests. And sometimes the pests directly drain the sap of the cocoa pod, which withers the plants". (Obeng, 52 years, 16 acres of land, cocoa, plantain and cassava, District 2-Eastern Region 19/07/2021)

Another cocoa farmer said:

> "Some pests come around during rainy seasons, and if you don't have anything to protect your maize and cocoa pods, then all the work you've done would be in vain. You'll have to pluck all and dispose of them off. It hurts! It hurts us a lot! It's a loss! It makes me think. And everything that affects your thoughts also affects your health. Sometimes, you can't even sleep at night. Because it is very disturbing to see your source of livelihood being destroyed". (Otchere, 42 years, 7 acres of land, maize and cocoa, District 2- Eastern Region, 09/08/2021)

An agricultural extension officer, a key informant in the study, also reiterated this point by saying that:

> "So, for the farmers losing farmlands that they have dedicated a large part of their energy and life, and even, so much money, as well as the strength exerted in the farms, affect them greatly. The sight of a tree attacked by crop insects explains how hopeless some farmers look when I meet them. When you see how damaged the crops are, you will be emotionally affected yourself, how much more the owners of the farms. These insects destroy the crops. They chew the maize, making it look powdery. So, imagine a whole farm". *(Ahiabor, Agricultural Extension Officer, Gyebi Odumase 10/08/2021)*

4.4.3.3 Institutional Factors Influencing the Mental Health of Crop Farmers

The number of farms, size of the farm/plot, total labour on the plot in hours, security on plot, and the right to farmland were all statistically negative on the mental health of crop farmers, except for irrigation of farmland and agricultural asset score. This means that the depression of crop farmers is negatively associated with the number of farmlands,

ownership, and right to sell farmlands, the size of farms (whether large or small scale), the total number of hours (short or long) spent working on the farms, and lastly, the security of the farmland.

In farming, farm resources such as land and labour are essential farming inputs required to promote agricultural productivity and the livelihoods of farmers. Landholding size and the number of farms operated on are important determinants of farmers' access to agricultural resources such as credit and agricultural extension services. It is also presumed that bigger farms and a higher number of farms are likely to increase the workload of the farmer, which can stress up a farmer.

Sanne et al. (2004), reports a lack of data on farm size and the mental health of farmers. However, the results from the study show that the size of the farm and number of farms, the right to sell the land, and the security of the land are crucial as far as the mental health of the crop farmers is concerned. The results of this study indicate that increased plots cultivated reduce depression among crop farmers (Table 4.9). In this study, an increase in the size of farms and the number of farms reduces depression and increases happiness and self-fulfilment among farmers, especially younger farmers in the qualitative study. This means that any additional plots obtained by younger crop farmers reduce their depression. This supports the assertion by Gregoire (2002) that farmers with smaller farms might probably have lower income and increased levels of economic hardships that increases their rates of mental disorders.

In this study many of the younger farmers, especially migrant farmers, believe that the size of the land or number of farms owned provides a sense of satisfaction. But, Henning-Smith

et al. (2021) argue that farmers with bigger farms may be predisposed to the stress of dealing with different weather events that may negatively influence their mental health. Logstein (2016), on the other hand, found no statistically significant relationship between the number of hectares/farms operated on by crop farmers and their mental health. However, an important issue that came up about the size of the farm in this study is that the size of the farm does not matter, but how well they are managed is of considerable interest to them.

A male farmer at Beposo- Mpohor shared:

> "When you look at most of the people coming from the northern part of the country, a large number of them are young farmers. So, regardless of the size of land you give them, they can manage it. These young farmers can work on any acre of land they acquire. This is mainly because they have travelled down to this place". (Quaidoo, *maize farmer, District 1, Western Region*, 21/07/2021)

Another farmer explained that:

> "No, it's not about how big the farm is. It's about how well you can take care of your farm. It would be far easier if I had better resources and equipment, as it is not an issue of the size of land". (Antwi, *cocoa farmer- District 2, Eastern Region*, 21/08/2021).

Table 4.9: Panel Regression Model on the Institutional Risk Factors of Farmer Mental Health

Variables	OLS Estimator	Fixed Effect Estimator	Random Effect Estimator
Number of farms	-0.184	-0.533***	-0.410***
	(0.170)	(0.106)	(0.101)
Size of farm/plot	-0.032	-0.145***	-0.133**
	(0.065)	(0.056)	(0.054)
Improved Seed	0.789*	-0.063	0.079
	(0.429)	(0.264)	(0.254)
Access to mechanization	1.290**	-0.511	-0.009
	(0.581)	(0.341)	(0.318)
Seed value	-0.000**	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Total labour	0.000	0.000**	0.000**
	(0.000)	(0.000)	(0.000)
Agricultural asset score	0.223***	0.233***	0.226***
	(0.059)	(0.030)	(0.029)
Farm yield	-0.615*	-0.507	-0.649**
	(0.350)	(0.316)	(0.307)
Time to plot	-0.000	0.001	0.001
	(0.004)	(0.003)	(0.003)
Irrigation of Land	0.790	0.666*	0.501
	(0.588)	(0.350)	(0.343)
Plot security	-0.005	-0.595***	-0.461**
	(0.389)	(0.185)	(0.182)
Right to farmland	-0.847**	-0.652***	-0.735***
	(0.350)	(0.190)	(0.186)
Constant	18.607***	19.052***	19.322***
	(1.305)	(0.540)	(0.826)
Observations	2,879	2,879	2,879
R-squared	0.082	0.050	
F	5.887	10.69	.
Number of EA		231	231
sigma_u		4.347	2.947
sigma_e		5.332	5.332
rho		0.399	0.234

Robust p-values in parentheses ***p<0.01, **<0.05, *p<0.1.
Standard Error adjusted for 8,553 cocoa and maize farmers.
Standard errors in parentheses

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

In addition, the land of crop farmers watered at a source other than rainwater, revealed a statistically positive relationship with the mental health of farmers. This implies that farmers who largely depend on other sources of water other than rainfall are more depressed. Usually, farmers rely on rainfall for farming. However, changes in rainfall patterns adversely affect the crop yields of farmers and their livelihoods. Rainfall, however, remains the most important source of water in the agrarian sector that determines agricultural output in Ghana (Denkyi et al., 2016). In this regard, crop farmers who live and work in farming areas that experience irregular rainfall timing, short duration, and low intensity of rainfall may have their food crops withering and dying. The thoughts of losing some quantity of crops due to changing rainfall patterns might affect the mental health of the farmers.

The household agricultural asset score (HAAS) constitutes the total score of the number of agricultural assets owned by households other than cutlass and hoe. Agricultural assets include the plough, spraying machine, tractor, sickle, irrigation pipe, power tiller, harrow, and water pump. Modern agriculture and technology rely on modern agricultural tools and practices for efficient use of resources. The access to or ownership of agricultural assets enhances the work of farmers to enable increased levels of productivity. The coefficient of the household agricultural asset score, which is an aggregate of all the agricultural assets, is statistically significant in influencing the mental health of crop farmers. Contrary to apriori expectations, the results from the fixed-effects model show that household agricultural asset increases depression by a factor of 0.030, which is statistically and positively significant at the 1% level ($p<0.0001$). In other words, the mental health of crop farmers is positively influenced by the ownership of farm household assets, with an increase in the agricultural asset score worsening the mental health of crop farmers. This finding rejects the arguments of the conceptual framework for the study, where the lack of access to agricultural assets,

which is an agricultural demand or stressor is supposed to positively influence the mental health of the farmers. Whilst the access to agricultural assets is to reduce or negatively influence their mental health states.

Theoretically, the access to agricultural assets or a high agricultural asset score should have had a negative effect or reduced the effect of mental health of crop farmers in this study. Similarly, crop farmers with access to farm assets or high household farm asset scores should be less depressed than crop farmers with low assets scores because one of the major problems facing farmers in Ghana is access to farm tools and protective clothing. In the qualitative data, most of the crop farmers reported discrimination and corruption in the distribution of the farm tools and resources. Secondly, the crop farmers lamented that the farm tools come in late and are often inadequate to meet their needs in the districts. This often makes the farmers feel discouraged. Therefore, one can infer that farmers' struggle to secure their farm tools and resources often causes depression or negatively affect their mental health. Two agricultural extension officers shared the challenge of crop farmers regarding access to farm tools and resources in an in-depth interview:

> "The lack of boots and cutlasses from the government is a challenge faced by cocoa farmers. After renting land for cocoa cultivation, farmers run out of money to purchase farm tools. This makes farming a bit difficult. Sometimes, farmers without boots end up with injuries, and those without farm machines delay in clearing a piece of land for planting" *(Annan, Agricultural Extension Officer, District 1, 9/08/21).*

> "Some cocoa farmers are likely not to get access to the spraying machines as a result of corruption. Those in charge of distributing the farm tools or machines to farmers always sell them to the farmers instead of giving them out for free" *(Ahiabor, Agricultural Extension Officer, District 2, 10/07/2021).*

From the discussions on the findings related to the farming risk-related factors, financial difficulties (access to credit facilities, lack of income to purchase pesticides, fertilizer, land and chemicals), and weather conditions (rainfall and sunshine) came up strongly in the qualitative data analysis, but not in quantitative data. This suggests differences in the farmer

mental health risk factors in the two research designs. Nonetheless, some similarities were also identifiable between the quantitative and qualitative methods of analysis concerning the loss of crops, access to farm machines, attack of pests and low yields, marital status, education, and age.

4.5 Comparison of the Risk Factors of Mental Health Between Cocoa and Maize Farmers

In comparing the maize and cocoa farmers, gender, education, and marital status of the farmers, size of the farm, the value of the seed, right to farm, and the log of farm yields were all statistically significant (Table 4.10). Nonetheless, some of the risk factors mentioned were negatively correlated with their mental health. They include gender and education of farmers, size of the farm, the value of the seed, right to farm, and the log of farm yields. In other words, risk factors, particularly institutional risk factors, often negatively affect the mental health of both maize and cocoa farming groups.

The results from the study show that the sex of the farmer is significantly associated with their mental health. However, the female cocoa and maize farmers are more depressed compared to the male cocoa and maize farmers. Additionally, when the male cocoa and maize farmers are compared, the male cocoa farmers are less depressed compared to the male maize farmers. The reason could be that maize farmers might face serious challenges that adversely affect health. For instance, the frequent invasion of fall armyworms on the farms of maize farmers could be an event that disturbs the mental health of these farmers. The statistical significance effect of gender on mental health was 10% and 5% for cocoa and maize farmer groups, respectively.

The effect of age on mental health was statistically significant for only cocoa farmers. In this study, an increase in the age of cocoa farmers by a year reduces their mental health by 0.183 at a 1% statistical significant level. The reduction of mental health (depression) by age for cocoa farmers is 0.002 units compared to 0.001units for maize farmers. An increase in age favours the mental health of cocoa farmers compared to maize farmers. Alternatively, being older as a cocoa farmer could be better off in terms of mental health issues compared to being older as a maize farmer. The finding suggests that cocoa farming could be suitable for older farmers compared to maize farmers in their old age. Income from cocoa farming could serve as investment for the cocoa farmers in the future.

Consequently, older farmers could be supported with adequate resources to continue in the work of cocoa farming. Younger farmers could also be encouraged and supported with resources to venture into cocoa farming as a good wellbeing is possibly assured in their oldage. Further interrogation of the results indicates that younger farmers are more likely to be affected by mental health issues than older farmers. Hence, if the older farmers share their experience with the younger farmers, the risk of depression or mental health problems among the younger farmer may be reduced. The person and environment theory of psychological distress underpinning the study is supported in this regard. The theory argues the influence of individual's abilities or characteristics on psychological distress. The age of the crop farmers is a personal characteristic that is involved in increasing the mental health of younger farmers compared to older farmers.

On the other hand, the quantity of crop loss and the marital status of cocoa and maize farmers negatively impacted their mental health. This implies that the quantity of crop loss and marital status of a crop farmer worsened the risk of depression of both farmer groups. In the

study, it can be explained that maize farmers are more likely to be depressed by the quantity of crop loss compared to cocoa farmers. Also, married cocoa farmers are likely to be depressed compared to married maize farmers. However, a difference exists between widowed cocoa and maize farmers. The widowed maize farmers are more likely to be depressed compared to the widowed cocoa farmers. The widowed cocoa farmers had a 5% statistically significant level compared to 1% statistically significant level for maize farmers.

Another risk factor, the total labour hours of crop farmers, indicated a positive effect on the mental health of the general (mixed) sample of crop farmers but showed no direction or level of significance in the cocoa and maize sample groups. This shows there is no relationship between labour hours on farm and mental of the farmers. However, in the field data, about the same number of cocoa and maize farmers each explained there is labour shortages and financial difficulties to even engage individuals available for labour. This is likely to negatively affect the mental health of the crop farmers. A female cocoa farmer explained that:

> "Labour is difficult to come by because of galamsey. Those who work on our farm demand Ghc80 cedis for work done in a day ……. Labour is a problem here. Because of the galamsey, labourers are not available. Engaging someone to clear your land is a huge task to accomplish during the period, as all the young people in this village are engaged in galamsey". (Akrong, female, cocoa farmer, District, Eastern Region).

Education is another critical determinant of mental health. It is an important human capital that improves farm productivity and income (Afari, 2001). It is expected that the education of a farmer will likely reduce the mental health of a farmer. The results show that education has a negative effect on the mental health of both maize and cocoa farming groups (Table 4.10).

Basic and secondary education is likely to reduce depression among cocoa farmers compared to maize farmers. Also, post-secondary or high-level education is helpful for the mental health of maize farmers compared to cocoa farmers. However, education is negatively correlated with the mental health of both cocoa and maize farmers in Ghana. The effect of education on mental health reduces as farmers progress in education.

Similarly, plot size has a negative effect on the mental health of both farming groups (Table 4.10). The results show that the increase in the hectares of plots for maize farmers decreases their depression by 0.142 compared to cocoa farmers (0.109). This implies that the effect of the size of the plot (hectares) in reducing mental health tends to be high or better for cocoa farmers compared to maize farmers.

The log of yields and right to farmland were only statistically significant for maize farmers. The results from the study showed that the log of yields and right to farmland have a negative effect on the mental health of maize farmers. This suggests that maize farmers might experience lower risk of depression compared to cocoa farmers on these particular farming risk factors. Some studies conducted among rice farmers in the north-eastern region of Thailand and palm plantation farmers in Johor Malaysia revealed high prevalence rates of depression symptoms resulting from crop loss (Hanklang et al., 2016; Leonard et al., 2013).

In contrast, when the two farmer groups (cocoa and maize) were compared with the general sample of crop farmers, the results indicate a different reality. Within the general sample of crop farmers, irrigation of the farm, total labour hours, marital status, quantity of crop loss, and agricultural asset score indicated a positive effect on the mental health of the crop farmers but there was a variation in the different samples of the maize and cocoa farmer groups (marital status and quantity of crop loss). This indicates a mental health gap in the farming risk factors for particular farmer groups.

Table 4. 10: Comparisons of Risk Factors of Mental Health Among Cocoa and Maize Farmers

Variables	MAIZE SAMPLE			COCOA SAMPLE		
	OLS Estimator	Fixed Effects	Random Effects	OLS Estimator	Fixed Effects	Random Effects
Male	-0.281	-0.440**	-0.374*	-1.173***	-0.672*	-0.662*
	(0.220)	(0.199)	(0.197)	(0.399)	(0.345)	(0.338)
Age	-0.114**	-0.038	-0.047	-0.256***	-0.183***	-0.241***
	(0.056)	(0.037)	(0.036)	(0.070)	(0.060)	(0.058)
Age^2	0.002***	0.001**	0.001***	0.003***	0.002***	0.003***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
BECE	-2.233***	-1.026***	-1.414***	-1.175***	-1.245***	-1.260***
	(0.342)	(0.265)	(0.255)	(0.430)	(0.352)	(0.338)
SSSCE	-1.771**	-0.839	-1.181**	-1.399	-0.910	-1.023
	(0.692)	(0.597)	(0.585)	(1.405)	(0.957)	(0.931)
Post-Secondary	-3.684***	-2.437***	-2.984***	-2.991***	-2.143**	-2.711***
	(0.683)	(0.571)	(0.549)	(0.674)	(0.935)	(0.861)
Married	2.072***	1.202***	1.401***	1.761**	1.895***	1.959***
	(0.568)	(0.383)	(0.375)	(0.771)	(0.710)	(0.689)
Separated	2.924***	1.928***	2.095***	2.358**	2.654***	2.677***
	(0.835)	(0.549)	(0.539)	(0.991)	(0.911)	(0.875)
Widowed	3.179***	2.893***	2.909***	3.237***	2.513**	3.299***
	(0.866)	(0.584)	(0.575)	(1.159)	(1.032)	(0.997)
Consensual/Betrothed	1.861***	1.822***	1.617***	2.383***	2.381***	2.513***
	(0.704)	(0.514)	(0.500)	(0.756)	(0.739)	(0.719)
Forest	-1.579***		-2.383***	-0.706		-0.744
	(0.571)		(0.433)	(0.779)		(0.949)
Coastal	-1.404**		-2.059***	-1.567*		-1.412
	(0.651)		(0.550)	(0.852)		(1.168)
Plot size	-0.098	-0.142***	-0.152***	-0.074*	-0.109**	-0.114**
	(0.060)	(0.046)	(0.044)	(0.043)	(0.051)	(0.044)
Seed value	-0.000**	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Quantity of crop loss	0.021***	0.014***	0.015***	-0.006	0.009	0.005
	(0.007)	(0.004)	(0.004)	(0.015)	(0.011)	(0.011)
Log of yields	-0.470*	-0.621**	-0.649**	0.791	1.026	1.202*
	(0.275)	(0.265)	(0.252)	(1.027)	(0.740)	(0.708)
Right to land/farm	-0.841**	-0.731***	-0.725***	-0.306	-0.014	-0.006
	(0.356)	(0.254)	(0.243)	(0.449)	(0.345)	(0.319)
Constant	20.649***	20.254***	20.938***	25.157***	21.739***	23.683***
	(1.028)	(0.725)	(0.772)	(1.847)	(1.300)	(1.544)
Observations	3,801	3,801	3,801	1,247	1,247	1,247
R-squared	0.155	0.076		0.128	0.087	
F	20.14	17.03	.	4.748	6.124	.
Number of EA		257	257		132	132
sigma_u		3.695	2.235		3.191	1.304
sigma_e		5.433	5.433		5.049	5.049
Rho		0.316	0.145		0.285	0.0626

Robust p-values in parentheses ***p<0.01, **<0.05, *p<0.1.
Standard Error adjusted for 8,553 cocoa and maize farmers.
Standard errors in parentheses

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

4.6 Conclusion

This chapter discussed the risk factors influencing the mental health of crop farmers in Ghana. It highlighted the sociodemographic characteristics of farmers, the farm-related or institutional, and ecological risk factors that contribute to increasing the mental health of crop farmers. Crop farmers are at risk of mental health disorders in Ghana. The sex, age, education, marital status, and religion of a crop farmer were associated with the mental health of crop farmers, and this supports the tenets of the person-environment theory of stress. Nonetheless, ecological risk-related factors remained not quite associated with the mental health of crop farmers, except for the quantity of crops lost on the farm. Institutional risk factors, on the other hand, significantly related to farmer mental health include the number of farms, size of the plot, security of plot, and the right to the farmland. Beyond these variables, the household agricultural asset score (HAAS), irrigation of farm and total labour hours had significant positive effects on the mental health of the crop farmers. Additionally, the type of crop grown came out positive and strongly on the mental health of crop farmers. There were varying differences in the risk factors affecting cocoa and maize farmers. Compared to cocoa farmers, maize farmers were generally at risk of mental health problems. The risk-related mental health factors among cocoa and maize farmers are quite similar, except for farm yields, right to farmland, and quantity of crop loss, peculiar to maize farmers. There were direct effects of the personal characteristics of the farmers on their mental health, as well as an interaction between the personal characteristics and the ecological and institutional risk factors on the mental health of the crop farmers.

CHAPTER FIVE

GENDER DIFFERENCES IN THE FACTORS INFLUENCING THE MENTAL HEALTH OF CROP FARMERS IN GHANA

5.1 Introduction

This chapter examines the gender differences in the risk factors influencing the mental health of crop farmers in Ghana. It draws on the expectations in the world of farmers, societal discrimination, and beliefs. Since there are unique impacts of mental health among farming populations, the ecological and institutional factors that affect the mental health of crop farmers are examined differently according to gender. All analyzes are stratified by gender and from a gender role perspective to highlight the gender inequalities in access to and control over resources and the constraints they work. Gender plays a vital role in the mental health of farmers relative to some social determinants of mental health such as age, education, marital status, and employment.

Gender refers to the social roles assigned to males and females in society. It is also viewed as socially constructed distinguishing features for males and females (World Health Organization (WHO), 2004). However, the gender gap in mental health has become a critical concern in mental health literature. Since 2004, the WHO has placed greater emphasis on gender issues in mental health research because of the limited resources in almost every part of the world (WHO, 2004). Others suggest we embark on gender analysis of health data to ascertain the specific mental health burden over a lifetime in men and women and monitor their roles, responsibilities, positions in society, and access to health resources (Afifi, 2007).

The findings from the previous chapter show that gender plays a vital role in the mental health of crop farmers in Ghana. The evidence from the chapter shows a high prevalence rate of 48% depression amongst female crop farmers compared to 40% depression for males. Previous literature identified adverse reproductive outcomes and other possible underlying factors related to the psychological and social transitions, not necessarily hormonal changes as factors influencing the differences in gender and mental health (Das, Kumas Das & Das, 2012; Madden, 2010). Nonetheless, several studies have examined gender and farmer mental health but failed to adequately examine the gender differences in the ecological and institutional risk factors influencing the mental health of farmers.

5.2 Results and Discussion of Gender Differences in the Risk Factors Influencing Crop Farmer's Mental Health

This section discusses the gender characteristics of the sampled crop farmers and the bivariate relationship between gender and depression of farmers. It also provides an in-depth discussion of the estimated regression models on the socio-demographic and farming risk factors (institutional and ecological) by gender.

In the entire sample, a total of 8,553 crop farmers comprising 5,816 maize farmers, 2,572 cocoa farmers, and 165 farmers who grow both cocoa and maize were involved in the quantitative study. For the qualitative study, sixteen (16) cocoa and maize farmers, and six (6) key informants were purposively selected from two regions (Eastern and Western Regions). Based upon the conduct of a Hausman test, the fixed-effect model was chosen to interpret the quantitative (econometrics) results. However, two other models (Pooled and Random effect models) were estimated for robustness checks.

5.2.1 Descriptive Statistics of Gender and Depression Sample Characteristics

The proportion of females (53%) in the sample was greater than that of males (47%) (Table 5.1). More than half of the respondents were between 18 to 45 years. Sixty-four percent of females were between 18 to 45 years compared to 59% for the males. More than 40% of the males were within the older population compared to 36% of females.

Most of the respondents (62%) were married, but about 22% of the sample had never married. Few male farmers (2%) were widowed compared to 13% females. More females than males have no education. That is, 46% of male farmers had gained some level of education compared to 23% females. Only 3% of females had secondary (SSCE) and post-secondary education compared to the males (11%), implying that female farmers tended to be less educated than male farmers. More than half (63%) of male and female farmers were in smaller households, with 1 to 5 members. Similarly, one-third of male and female farmers belonged to medium households, sized 6 to 10 members.

Table 5.1: Percentage Distribution of Socio-demographic Characteristics by Gender

Demographic Data	Male (n=4,031)	Female (n=4,513)
Age (years)		
18-30	1,166 (28.93)	1,368 (30.31)
31-45	1,228 (30.46)	1,505 (33.35)
46-60	943 (23.39)	979 (21.69)
61-120	694 (17.22)	661 (14.65)
Marital status		
Never married	914 (22.79)	511 (11.40)
Married	2,457 (61.26)	2,788 (62.20)
Separated	232 (5.78)	278 (6.20)
Widowed	72 (1.80)	564 (12.58)
Consensual	336 (8.37)	341 (7.61)
Educational qualification		
None	1,980 (53.89)	2,937 (76.11)
BECE[2]	1,293 (35.19)	806 (20.89)
SSCE[3]	211 (5.74)	80 (2.07)
Post-Secondary	190 (5.18)	36 (0.93)
Household size		
Small (1-5)	2,625 (61.29)	2,764 (61.15)
Medium (6-10)	1,308 (35.73)	1,601 (35.42)
Large (11-20)	100 (2.98)	155 (3.43)

2 BECE -Basic Education Certificate Examination
3SSCE -Senior School Certificate Examination
Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

As shown in Table 5.2, more than half of both male (60%) and female (52%) farmers experienced no or low depression based on the mean score of Kessler 10 scale of depression. Comparatively, female farmers scored high on all other levels of depression (mild, moderate, and severe) than male farmers.

More female farmers (26%) reported mild depression than male farmers (23%). Similarly, higher proportions of female farmers (15%) had moderate depression compared with 10% of male farmers. The prevalence of mild to moderate depression was 33% for males and 41% for female crop farmers, which are comparable to the levels of mild to moderate depression among males (39%) and female (48%) rice farmers in North-Eastern Thailand (Hanklang et al., 2016). Albeit, the scores obtained in this study are relatively low for both male and female farmers. This may partly be due to the depression scale used in measuring the depression symptoms and probably the location of the study because the farmers in Thailand might have recently experienced adverse events.

Table 5.2: Bivariate Analysis of the Gender Differences in the Mental Health of Crop Farmers

Variable	**Categories**	**Kessler scale of depression**					**Measures of association**	
		Low/None	Mild	Moderate	Severe	Total	Chi 2	P-value
Sex of respondent	Female	51.68[1]	26.17	14.62	7.53	100	60.92	0.000
	Male	60.25	22.97	10.40	6.38	100		
	Total	**55.76**	**24.65**	**12.61**	**6.98**	**100**		

1 Note: Data are presented as percentages

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

Severe levels of depression prevail among 6.98% of crop farmers, with the prevalence rate being higher for females (7.53%) than males (6.38%). All in all, the bivariate analysis of the gender differences in mental health suggests that a higher percentage of female farmers (48.32%) suffer from mild to severe levels of depression than their male counterparts (39.75%).

A chi-square test on the gender differences and depression of crop farmers presented a chi-square value of 60.92, which is statistically significant at 1%. This suggests differences in the depression (mental health) between men and women involved in maize and cocoa farming in Ghana. Thus, depression is significantly related to gender among crop farmers. This underscores the importance of a gender-sensitive approach in addressing mental health problems among the respondents.

Furthermore, following previous studies in the mental health literature (Brew et al., 2016; Hanklang et al., 2016; Scarth et al., 2008), the average cut-off point of 16 was used to estimate low and high depression. In particular, depression scores above 16 are classified as high depression, while those below 16 are categorized as low depression (Hanklang et al., 2016; Scarth et al., 2008). Based on this cut-off point, 62% of crop farmers in Ghana had high depression, whereas 38% had low depression (Table 5.3). For the low depression, there was only a slight difference between the females (46%) and males (51%) farmers. However, 54% of the female farmers tended to be more highly depressed compared to the 49% of male farmers. Overall, this goes to reiterate that gender-focused measures must be put in place to offer clinical counselling, educate and increase access to mental health care for depressed farmers, and improve their psychological functioning.

Table 5.3: Distribution of Sex by Levels of Depression Among Crop Farmers

Variable	**Categories**	**Levels of depression**		
		Low	**High**	**Total**
Sex of respondent	Female	45.65[1]	54.35	100
	Male	50.76	49.24	100
	Male&Female	**37.63**	**62.37**	**100**

1 Note: Data are presented as percentages

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

The reported gendered differences in the prevalence of depression among crop farmers can be explained as follows. Firstly, in farming, female farmers often encounter problems that put them in disadvantaged positions compared to their male counterparts. Female farmers have limited access to land, markets, mechanization, labour, chemicals, fertilizer, and even cash crops production (Anaglo, Boateng & Boateng, 2014; Morgado & Salvucci, 2016). Secondly, the physical strength required for farm work activities, such as weeding and spraying pesticides on farms with spraying machines puts women at disadvantaged positions. Female farmers tend to engage labourers to work on their farms and pay a lot of money for their services. The financial stress that the women farmers experience could lead to depression. A key informant explained that:

> "Women lose more money in farming than men because men use their strength to work on their farms. Women can't do everything on their own. So, if a woman does not make enough profit from her farming, it affects her psychologically" *(Boateng, Agricultural Extension Officer. District 2- Western Region, 9/08/2021).*

Similarly, a male crop farmer also noted that:

> "There are certain things I can do as a man that a female farmer cannot do...: If we are to weed in three days, I will weed more than a female cocoa farmer. Also, a female farmer cannot carry the spraying machine at her back. They can work alright, but it won't be as good as a male farmer" *(Ansah, male, cocoa farmer, District 1, Eastern Region, 9/08/2021).*

5.3 Gender Differences in the Socio-demographic Factors Influencing the Mental Health of Crop Farmers

In this sub-section, the study goes beyond the qualitative analysis. It employs regression estimations to examine the gender-differentiated effects of socio-demographic factors on the mental health of crop farmers. The results of the fixed effect estimations (as well as those from random effects and pooled OLS models) are reported in Table 5.4. The coefficients of age and age squared of individual farmers are statistically significant, with negative and positive influences on depression. The results imply that growing older reduces

depression for male farmers by 8.8% compared to 14.7% for female farmers. Thus, an increase in age by one year reduces the depression of female farmers by 14.7% and 8.8% for male farmers. This indicates that the reduction of depression among older female farmers is high compared to older male farmers. This observation could be attributed to the low help-seeking behaviours among male farmers because of masculinities (Roy et al., 2014). This finding is in line with the gender role theory because there is an influence of the gender characteristics and societal expectations of the farmer on mental health.

Furthermore, the results indicate that in both male and female farmers, as age increases, depression decreases to a certain point. However, the magnitude and significant effect of age squared on the mental health of crop farmers is high among females than among male crop farmers. This suggests that older female farmers could be less stressed with family roles and farm responsibilities, as they might have outsourced their responsibilities to the younger females in the family. This is consistent with Haugen and Brandth (1994), Stallones et al.'s (1995), and Hanklang et al.'s (2016) findings that younger farmers (males) are more likely to have depressive symptoms than older farmers. Moreover, most of the young male farmers in the qualitative study were of the view that they struggled on their own to make ends meet because there wasn't enough support from government and private organizations for farmers in cocoa farming. A young male farmer in the Eastern Region emphasized that:

> "It's very tough for young farmers who are starting cocoa cultivation. There is difficulty in getting help in any form to manage the affairs of the farm. We ought to weed as labourers on other farms to get some money to purchase chemical fertilizers and pesticides... All these issues result in overthinking, worry, sleeping problems, stress, tiredness, body pains, and other body-related diseases" *(Bonwire, male, Gyebi Odumase 10/07/2021)*

Nonetheless, a non-significant association between age and depressive symptoms was observed in a study conducted in Iowa (Scarth et al., 2008).

The education of a farmer is another primary determinant of a farmer's mental health. The study found that education was statistically significant, and associated with higher levels of depression. More importantly, higher levels of education tend to reduce the effect of depression on both male and female farmers. However, the effect of education on the mental health of the respondents (crop farmers) was gender-specific. This supports the study's conceptual framework which argues that the sociodemographic characteristics of farmers such as farmers' education and gender influence farmer mental health. On the contrary, the educational achievement of Colorado farmers in the USA was found to have no relationship with depression (Stallones et al., 1995). The conflict in the research findings might partly be due to the personal characteristics of the respondents and the research settings of both studies. For example, farmers in Colorado are more likely to have the basic educational qualification of Senior High School, unlike most of the respondents in this study.

A closer interrogation of the results indicates that females with basic education (BECE) have lower depression when compared with females with no education. This suggests that basic education (BECE) has a more beneficial effect for female crop farmers. Alternatively, the results imply that having a basic education reduces the depression of female farmers by 1.545 units compared to 0.917 units for male farmers. Hence, basic education is more beneficial to female farmers than males when reducing depression. Similar findings are reported in a study conducted in Korea on gender and socioeconomic differences and depressive symptoms among the ageing population. The significant effect of education on depression among women was observed (Hwan & Lee, 2011). But higher levels of education, especially secondary education (Senior Secondary Certificate Examination - SSCE) and Post-Secondary Education (PSE), tend to benefit male farmers more than females in this study. This suggests that male farmers with secondary and post-secondary

education have lower depression than those without education. However, compared with females, the results show that higher levels of education, including secondary and post-secondary education, tend to have a more substantial reduction effect on depression among males than female crop farmers.

Table 5.4: Panel Regression Model on Gender Differences in Crop Farmer Socio-Demographic Characteristics and Mental Health

	Female Sample			Male Sample		
Variables	**Pooled**	**FE**	**RE**	**Pooled**	**FE**	**RE**
age	-0.112*	-0.147***	-0.138***	-0.234***	-0.088*	-0.127***
	(0.059)	(0.044)	(0.043)	(0.059)	(0.047)	(0.046)
age^2	0.002**	0.002***	0.002***	0.003***	0.001***	0.002***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
BECE	-2.096***	-1.545***	-1.763***	-1.626***	-0.917***	-1.320***
	(0.432)	(0.332)	(0.313)	(0.323)	(0.298)	(0.280)
SSCE	0.120	-0.266	-0.446	-2.209***	-1.509**	-1.693***
	(1.283)	(1.134)	(1.043)	(0.712)	(0.598)	(0.576)
Post-secondary	-2.647*	-2.265*	-2.811**	-3.517***	-2.344***	-2.947***
	(1.401)	(1.323)	(1.201)	(0.533)	(0.555)	(0.518)
Married	2.018***	2.077***	2.083***	2.545***	1.305***	1.811***
	(0.630)	(0.535)	(0.513)	(0.609)	(0.464)	(0.453)
Separated	3.371***	3.226***	3.304***	2.695***	1.286**	1.781***
	(0.894)	(0.721)	(0.698)	(0.879)	(0.646)	(0.630)
Widowed	3.463***	3.511***	3.450***	2.604**	2.087*	2.626**
	(0.820)	(0.686)	(0.664)	(1.267)	(1.067)	(1.034)
Consensual/Betrothed	2.351***	2.882***	2.545***	2.456***	1.509***	1.700***
	(0.774)	(0.629)	(0.606)	(0.600)	(0.568)	(0.553)
Household size	0.176**	0.069	0.109**	0.046	-0.052	0.009
	(0.069)	(0.054)	(0.052)	(0.060)	(0.051)	(0.049)
Constant	20.549***	20.807***	21.684***	23.162***	20.560***	21.982***
	(1.080)	(0.908)	(0.939)	(1.233)	(0.952)	(0.969)
Observations	2,557	2,557	2,557	2,491	2,491	2,491
R-squared	0.140	0.089		0.163	0.062	
F	14.99	13.09	.	12.01	8.555	.
Number of EA1		263	263		270	270

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

1 EA- Enumeration Area

The size of the household, although not statistically significant, tends to have a mixed effect on depression (Table 5.4). Its effect is positive for female crop farmers but negative for male farmers. This implies that female farmers in large household sizes tend to be more depressed than those in small-sized households. However, belonging to large households tends to be beneficial for the mental health of male farmers. Thus, an increase in the number of persons in the household increases the depression of females compared to the low depression for male crop farmers. In Ghana, household sizes are often large in rural farming settings. Farming requires labour, which is quite expensive and difficult to access and maintain. So large households tend to engage household members in farming to reduce hiring labourers for household farms. Female farmers in large household sizes might be overwhelmed with home management responsibilities, caring for older and younger household members, and taking up jobs outside the home to support the family. These responsibilities are likely to affect the mental health of female farmers. On the other hand, due to cultural and socialization values, male farmers in large household sizes might be restricted from engaging in household chores. In addition, large household sizes will provide the opportunity for male farmers to use family labour on farms, which will, in turn, reduce the labour stress. In Ghana, female farmers in households that contain averagely fewer males tend to have average labour, unlike male farmers who may have claim over women's labour despite the size of females in the households (Morris & Doss, 2004).

Furthermore, irrespective of gender, the results indicate that married farmers are more depressed than unmarried or never married farmers. Being married significantly increases depression by 2.017 for females and 1.035 for males. The effect sizes suggest that married female farmers are more depressed than male farmers. This is consistent with a Korean longitudinal study of the ageing population that examined the association between marital status, gender and depression symptoms (Jang et al., 2009). The authors argue that gender

differences in the social support that marriage provides for partners contribute to the differential associations of depressive symptoms in both married men and women. Furthermore, as expected, widowed female farmers are more depressed by 3.511 than widowed male farmers (2.087). This suggests that the effect of widowhood on depression is higher for female farmers than for male farmers in Ghana. The married, separated, divorced, widowed, and betrothed/consensual female farmers tend to be more depressed compared to male crop farmers. However, the impact of marriage on depression is lower for the married compared to the other marital groups (separated, divorced, widowed, and consensual) among both male and female farmers. This finding is in line with Jang et al.'s (2009) study but in conflict with the high depressive symptoms found among unmarried Latino women in North Carolina (Pulgar et al., 2016).

Nonetheless, the result from the qualitative study supports increased levels of depression among the unmarried (Pulgar et al., 2016). Participant farmers indicated that unmarried male and female farmers are most likely to be psychologically disturbed. They explained that unmarried male farmers might lack off-farm support in eating good food after a hard day's work, and unmarried female farmers may also lack on-farm support in terms of access to labour and farm inputs and resources. Participants in the qualitative study revealed that the lack of support from a partner is likely to affect the work of farmers. However, support from a partner will improve the work of farmers, therefore reducing the positive effect of mental health. This married female farmer expatiated on the issue of marriage:

> "My husband works with a company outside this town. He often acquires the land we use for farming. When he comes home on weekends, he helps me on the farm. He supports me in acquiring farm inputs such as land, labour, pest chemicals, and insecticides. He also communicates and settles issues with the agricultural extension officer on my behalf. So, I do not have many problems to deal with in the farming of cocoa" (Antwi, - *Gyebi Odumase, Eastern region, cocoa farmer,* 21/08/2021).

Similarly, a male married farmer noted:

> "Some unmarried female farmers with children are the affected group. Taking care of the farm in periodic weeding and spraying insecticides would be different from a married female farmer with support from a husband. The unmarried female farmers suffer from worries and fears. They are greatly overburdened with the challenges in maize farming. This is not good for the females without partners in farming" (Emma, cocoa farmer, Beposu-Mpohor Western Region).

5.4 Gender Differences in the Ecological Risk Factors Influencing the Mental Health of Crop Farmers

A higher proportion of female crop farmers were in the savannah (1,689, 41%), forest (2,046, 49%), and coastal (429, 10%) ecological zones compared to male crop farmers (Table 5.5). More females than males were in the savannah zones primarily because of the crops produced in those areas. The Northern, Savannah, and Upper East and West Regions are mainly the savannah ecological zones of the country. They are noted for cereal crop production such as maize, rice, and millet. Women in those areas largely cultivate these crops. The forest ecological zones are mainly tuber and cash crop production areas; however, there is not much difference between the male and female crop farmers in those areas, as is observed in the sample (Table 5.5). However, the coastal ecological zone had few crop farmers in the sample because it is primarily fishing. So, many inhabitants are mainly involved in fishing compared to crop farming. More males are generally engaged in fishing in those areas than females.

More female crop farmers (54%) lost maize crops compared to 46% of males. On the other hand, men had relatively considerable cocoa lost on the field. This observation is probably due to the number of women involved in maize production and men in cocoa production in the country, which is also quite evident in the sample of the study.

Table 5.5: Percentage Distribution of Ecological and Institutional Risk Factors by Gender

Demographic Data	Male (n=4,033)	Female (n=4,520)
Ecological zone		
Savannah	1,413 (37.76)	1,689 (40.56)
Forest	1,969 (52.62)	2,046 (49.14)
Coastal	360 (9.62)	429 (10.30)
Crop lost in the field		
Yes	2,177 (53.92)	2,437 (53.98)
No	1856 (46.02)	2,083 (46.08)
Type of crop grown		
Maize	2,690 (46.25)	3,126 (53.75)
Cocoa	1,343 (49.07)	1,394 (50.93)
Access to mechanization		
No	2,720 (47.71)	2,981 (52.29)
Yes	1,313 (46.04)	1,539 (53.96)
Right to sell farm		
No	2,773 (47.30)	3,089 (52.70)
Yes	1,260 (46.82)	1,431 (53.18)

*Note- Data are presented as numbers with percentages in brackets
Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

The ecological risk factors estimated for the gender model were the ecological zones and the loss of crops on the field. The ecological zones are non-time variant variables in that they do not change over time. This accounts for their elimination from the fixed effect model. Hence, the random-effect and pooled regression models are used to examine the effects of ecological factors on depression among female and male crop farmers in Ghana. In both models, farmers in coastal and forest zones have lower depression compared to the savannah ecological zone (Table 5.6). But compared to farmers in forest ecological zones, farmers in coastal ecological zones are more likely to be depressed. This is likely expected because farmers in the savannah ecological zone experience harsher climatic conditions (dry conditions) compared to the farmers in forest ecological zones, who might have forest reserves that support good climatic conditions.

Table 5.6: Panel Regression Model on Gender Differences in the Ecological Risk Factors Influencing the Mental Health of Crop Farmers

	Female Sample			Male Sample		
Depression	**Pooled**	**FE**	**RE**	**Pooled**	**FE**	**RE**
Forest ecological zone	-1.995***		-2.457***	-1.393**		-1.950***
	(0.586)		(0.488)	(0.566)		(0.430)
Coastal ecological zone	-1.519**		-1.852***	-2.064***		-2.348***
	(0.660)		(0.632)	(0.626)		(0.552)
Quantity of crop loss	0.024***	0.017***	0.018***	0.013*	0.012**	0.012**
	(0.008)	(0.006)	(0.005)	(0.007)	(0.006)	(0.005)
Constant	20.549***	20.807***	21.684***	23.162***	20.560***	21.982***
	(1.080)	(0.908)	(0.939)	(1.233)	(0.952)	(0.969)
Observations	2,557	2,557	2,557	2,491	2,491	2,491
R-squared	0.140	0.089		0.163	0.062	
F	14.99	13.09	.	12.01	8.555	.
Number of EA		263	263		270	270
sigma_u		3.800	2.434		3.542	1.838
sigma_e		5.390	5.390		5.318	5.318
rho		0.332	0.169		0.307	0.107

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

Comparing females and males, female farmers in forest ecological zones tend to be less depressed compared to male farmers (Table 5.6). On the other hand, male farmers in the coastal ecological zones tend to be less depressed compared to female farmers. This finding probably suggests that female farmers cannot thrive well in coastal and savannah zones. Again, the finding from this study could be attributed to the influence of the total sample of females and males in each ecological zone. The reason is that the number of female farmers in the forest ecological zone are more than male farmers, and that might influence the result of the study. This then does not support the conceptual framework which argues about the association between ecological zone of the farmer and mental health. However, the result on ecological zone and the mental health of the farmer is in line with a finding observed in

Ghana, where there was no association between depression and rural-urban residence among older adults (Adjaye-gbewonyo et al., 2019).

The loss of crops has been linked to the attack of pests and diseases, weather conditions, crop rotting, and other pests such as monkeys and birds, who feed on maize yields. The study results indicate that the percentage of the crop (cocoa and maize) loss in the field significantly increases depression by 1% among females compared to the males, holding all other independent variables constant (Table 5.6). Alternatively, the larger the quantity of crop loss, the higher the depression among both male and female farmers. This is likely an expected occurrence among farmers because the loss of crops generally affects the emotions of farmers and causes farmers to experience stress, anxiety, depression, and thoughts of suicide. But the female farmers tend to be more affected in terms of magnitude and significance compared to the males.

Compared to male farmers, larger quantities of maize loss might increase the depression of females, and larger quantities of cocoa loss also increase the depression of male farmers than females. This is dependent on literature, and the sample of the study, which indicate that more women are involved in maize production, and more men are engaged in cocoa production. Hence, the reduction in the quantity of maize yields 1.2-1.8 metric tons (mt) per hectare (ha) in Ghana in 2012 (Ragasa, Chapoto, & Kolavelli, 2014) could partly be due to mental health issues among the maize farmers in Ghana. Similarly, the loss of crops to weather, pests, and diseases identified as stressful to Iowa farmers (Freeman & Schwab, 2008) could be related to mental health issues.

Additionally, there was a common concern among the female farmers during the qualitative study about how the experience of the loss of crop often leaves them at a disadvantage, and

with the idea to quit farming. Some female farmers indicated that they are often at a disadvantage, although both males and females lose large quantities of crops to flooding, pest, and diseases. For example, one such female farmer said:

> "This year hasn't been good for me, just like the previous years in the sense that I have not been able to maintain my crops properly because of the lack of income to purchase enough pesticides and fertilizer for my farm. However, this can cause me to lose greater quantities of the crops to pests and diseases like in previous years. Most of the time, I get angry and promise not to farm the following year because of my experience. Even some of my colleague farmers who lost more crops have died because the pain was unbearable. Sometimes, if you don't take care, you can get shock and die" *(Asante, female, unmarried, cocoa farmer, District 2, Eastern Region).*

Another female farmer expatiated on the gender inequalities regarding the effects of crop loss that:

> "I invested money in labour while Brother Ernest put in physical effort so I lose more than he does, and will be more affected although we all lost almost the same quantities of crops" *(Armah, female, 47 years, married, District 2, Eastern Region, 19/07/2021).*

This supports Seligman and Hovey's (2006) finding that the perception of crop loss among farmers is their main worry, and has more significant effects on their mental health than the actual amount of loss.

5.5 Gender Differences in the Institutional Risk Factors Influencing the Mental Health of Crop Farmers

Institutional or farm-related risk factors such as the size of the plot/farm, the type of crop grown, and the right to sell land or ownership of the farm can affect the mental health of crop farmers and farm productivity (Table 5.7). The results indicate that a unit increase in plot size leads to a 0.147-unit decrease in depression for females and 0.105 units for male farmers. Alternatively, a unit increase in farm size is statistically significant and associated with a 0.147 (0.105) reduction in the level of depression for females (males). The result

shows a negative relationship between plot size and depression for female and male farmers. A possible explanation might be that farmers place more value on land so that any additional land acquisition may decrease any psychological distress, especially among female farmers. This is in discord with the apriori expectations of the study. However, in terms of magnitude and statistical significance, the effect is higher for females than males (Table 5.7). This suggests that female farmers could be more satisfied with large farm sizes compared to male farmers. Female farmers might be more enthusiastic about working on bigger farms to generate income to support family's needs because the farm lands have economic and intrinsic value and provide social status, respect, and fulfilment. It is also associated with wealth in society. Also, the larger your farm size, the more income, yield, or wealth you will enjoy.

In a review study of the mental health of agricultural workers, Seligman and Hovey (2006) list the size of the farm among external stressors that influence the mental health of agricultural populations. Similarly, it is well established in this study that an increase in land size is more influential in the mental health of the crop farmers studied. However, the increase in the size of farmland should come along with the access to farm resources to enhance the work of farmers. In other words, farmers with bigger land sizes might have better mental health if they access farm tools, machines, and materials. Thus, these farmers would not be overburdened with problems accessing farm equipment and resources.

> "Regarding the size of my farm, when I think about my cocoa, I'm able to harvest 20 bags at the moment, but I would be happy If I could harvest 30 bags, but the strength required to do so is beyond me. It would be far easier if I had better resources and equipment, as the issue is not about the size of the land" *(Asante, female, unmarried, cocoa farmer, District 2, Eastern Region).*

Another institutional risk factor that predisposes farmers to mental health is the type of crop grown. Growing cocoa has a positive effect on depression, especially among female farmers. Compared to maize farmers, growing cocoa is associated with higher levels of

depression among female farmers compared to male farmers. While cocoa farming increases the levels of depression by 1.009 among female farmers, it only increases that of males by 0.625 (Table 5.7). The results show that the cultivation of certain crops, like cocoa, is less suitable for female farmers. Cocoa is a high-value, export-oriented cash crop, which is highly susceptible to external market shocks or volatilities. The resulting uncertainty associated with the economic returns on investment in the cocoa sector can significantly affect farmers' mental health and overall well-being, especially women. Existing literature that advocates cash crop production among women, with the idea of promoting equality in agriculture, requires deeper investigation. The finding from this study implies that certain crops farmed by female farmers are likely to expose them to poorer mental health. The problems associated with producing those crops might be unbearable for women compared to men. So, they should be supported to overcome the challenges in cocoa production. This supports the work of Raine (1999), who found stress differences in different farm types of farmers, and gender differences in depressive symptoms among rice farmers (Hanklang et al., 2016). So, the advocates of women to engage in cash crop farming, especially cocoa farming, should reassess their proposals, to include more supportive programmes and resources for women in cocoa production. Similarly, in the qualitative study, almost all the female farmers admitted to being affected by the symptoms of depression. They reported a varied range of effects such as tiredness, anxiety, hopelessness, and worthlessness. The female cocoa farmers reported the experience of specific cultural beliefs and stereotypes, which expose them to stress and other mental health issues.

> "I am always in distress because of the problems on the cocoa farm; as a woman it is not easy to be involved in cocoa production. When we have our menses, we are not supposed to climb any crop tree. If we do, it is believed that the tree will die" (*Ayem, 42 years, married, cocoa and maize farmer, District 1, Eastern Region-19/07/2021).*

Furthermore, the result shows a negative effect of access to mechanization on the depression of farmers (Table 6.7). This implies that mechanization reduces depression considerably among females than male farmers. A couple of the female participants in the qualitative study indicated that both female and male farmers have access to farm inputs and machines

such as spraying machines. They further indicated that there is no discrimination or cheating in the district officer's management of the farm resources. Most of the farmers explained that:

> "In other farming areas, women will have less access than men, but within this farming community, every farmer has access to the spraying machines if they are available. No preferential treatment is given to anyone based on the grounds of gender" *(Mohammed, Male, 49 years, married, cocoa and plantain farmer, District 1, Eastern Region, 9/08/2021.)*

> "The government provides us with the machines or tools we use on our farms. We have about six spraying machines in storage used in rotations. However, one can be unlucky when it gets to your turn, and the machine has issues… but access to farm tools is accessible to all, regardless of gender" *(Ayem, female, representative of Farmer Association, 42 years, married, cocoa and maize farmer, District 2, Eastern Region, 19/07/2021).*

Table 5. 7: Panel Regression Model on Gender Differences in the Institutional Risk Factors Influencing the Mental Health of Crop Farmers

	Female Sample			Male Sample		
Depression	**Pooled**	**FE**	**RE**	**Pooled**	**FE**	**RE**
Plot size	-0.098**	-0.147***	-0.142***	-0.086*	-0.105**	-0.132***
	(0.049)	(0.048)	(0.044)	(0.050)	(0.050)	(0.046)
Cocoa	0.978*	1.009**	0.835**	0.369	0.615	0.400
	(0.524)	(0.467)	(0.409)	(0.447)	(0.438)	(0.387)
Access to mechanization	0.905**	-0.462	0.157	1.475***	-0.155	0.688**
	(0.452)	(0.362)	(0.324)	(0.418)	(0.351)	(0.310)
Seed value	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Farm yield	-0.712*	-0.480	-0.540	-0.138	-0.395	-0.334
	(0.424)	(0.383)	(0.363)	(0.295)	(0.312)	(0.299)
Right to sell farm/ownership of farm rights	-0.435	-0.386	-0.350	-0.814**	-0.760***	-0.758***
	(0.332)	(0.288)	(0.273)	(0.319)	(0.290)	(0.273)
Constant	20.549***	20.807***	21.684***	23.162***	20.560***	21.982***
	(1.080)	(0.908)	(0.939)	(1.233)	(0.952)	(0.969)
Observations	2,557	2,557	2,557	2,491	2,491	2,491
R-squared	0.140	0.089		0.163	0.062	
F	14.99	13.09	.	12.01	8.555	.
Number of EA		263	263		270	270
sigma_u		3.800	2.434		3.542	1.838
sigma_e		5.390	5.390		5.318	5.318
rho		0.332	0.169		0.307	0.107

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

For the crop yield, there is no statistically significant dependence on the depression of crop farmers. The result shows a negative effect of crop yield on the depression of farmers. This is expected because an increase in crop yields boosts farmers' motivation and increases income, and consequently reduces the depression of the crop farmers. Sometimes, the reduction in farmers' crop yields results from threats to their crops by diseases and pests, disasters, and community factors (Goffin & Accident Compensation Corporation, 2014).

In comparing female and male farmers on the association between ownership of farm rights and their mental health, farmers who have ownership rights are less likely to be depressed than those who do not have ownership rights (Table 5.7). The effect tends to be statistically significant and more vital for males than females. This suggests that since women are less likely to have ownership rights of lands in Ghana, their mental health would be easily affected. This is expected, and it is in line with the theories adopted for the study. The person-environment theory could explain that females' abilities interact with their ownership rights to influence their mental health. Also, the gender role theory supports that the subordinate roles of women, which emerge from the cultural and social structures in the society, influence their mental health through their ownership rights. So, the gender characteristics of the farmers interact with their ownership rights, which is a challenge in farming, to influence the mental health of the farmers. This finding supports the gender role theory and existing literature, where women have lesser farm rights or the right to use farms. It is also consistent with Haugen and Brandth (1994) and Mukasa and Salami (2016), which showed that women suffer from discriminatory land laws in certain parts of sub-Saharan Africa. The results suggest that farmers who do not have ownership rights tend to be more depressed compared to farmers who have ownership rights. However, female farmers with farm ownership rights are expected to have a lesser effect of depression compared to male farmers.

5.6 Conclusion

The chapter examined the gender differences in the risk factors influencing the mental health of crop farmers in Ghana. The previous chapter established that socio-demographic characteristics of farmers and some particular ecological and institutional risk factors in farming predispose crop farmers to mental health in Ghana. Most importantly, farming risks factors associated with mental health among crop farmers in Ghana mostly differ by gender in this study. This study has shown gender differences in the ecological and institutional risks factors related to the mental health of crop farmers in Ghana. In terms of the contribution of the sociodemographic characteristics of the crop farmers, age, education, and marital status were statistically significant factors that contributed to the account of the mental health of the farmers, but more significantly for female farmers. In particular, the loss of crops and the type of crop grown by farmers had a substantial positive effect on females than male crop farmers.

On the whole, female crop farmers were significantly more vulnerable to mental health issues caused by ecological and institutional risk factors. This conforms to evidence in Canada as reported by Jones-Bitton et al. (2019) on the effect of gender on farmer mental health. The qualitative results from this study also revealed that female crop farmers were more vulnerable to mental health issues due to the size of the farm and the ownership rights of the farm. This study recommends that issues affecting women in agriculture, especially crop production, should be prioritized in agriculture and mental health intervention projects. However, male farmers should not be excluded. The stakeholders in agriculture and health in Ghana must mainly work together at supporting farmers to prevent the risk factors that predispose them to mental health issues.

CHAPTER SIX

EXISTING SOCIAL SUPPORT AND ROLE IN THE MENTAL HEALTH OF CROP FARMERS IN GHANA

6.1 Introduction

The previous chapter discussed the risk factors influencing the mental health of crop farmers in Ghana with a critical look at the differential effect of gender. The findings revealed that female farmers were more at risk of depression due to the cultural and societal structures in farming. Nonetheless, female farmers were not ultimately worse off compared to the males. In as much as farming risk factors make both male and female farmers at risk of developing mental health problems, ensuring that the social support needs of farmers are addressed would protect the farming populations in Ghana and would prevent direct and indirect consequences on their families and people who interact with them (Raine, 1999; Hossain et al., 2008). This chapter sought to explore the existing social support systems available to crop farmers and their role in mitigating mental health problems among farmers.

As Bjornestad and Brown (2015) reported, there is limited knowledge regarding the protective factors of farmer mental health and the negative stigma concerning help-seeking and treatment among farming populations in agricultural communities. Survey and in-depth interviews were conducted to fill this knowledge gap in the literature on social support variables, including social networking and institutional services (information seeking, interaction with agricultural organizations, and agricultural extension services). The social support issues examined within the study included access to agricultural extension service, access to agricultural extension service through the media, crop farmers spending time with other households, relationship with the families they spend time with, the period of the acquaintance they have had with the households, and whether farm households provide or

receive support/advice from other households. The fixed effect regression model and thematic analysis were used to examine the influence of social support as a risk factor and its critical role in the mental health of crop farmers in Ghana.

6.2 Results and Discussion

6.2.1 Existing Social Support and Farmer Mental Health

This section discusses the existing social support and the role of social support in the mental health of crop farmers in Ghana. It begins with the descriptive statistics of the social support sample characteristics and concludes with the estimated regression models on social support.

A total of 8,553 crop farmers (comprising 5,816 maize farmers, 2,572 cocoa farmers, and 165 mixed cocoa and maize farmers) were involved in the general study. However, because the data on social support was collected at the household level, the sample size was about 6,700 crop farming in households. In addition, a narrative study was conducted with selected participants, who included sixteen (16) cocoa and maize farmers and six (6) key informants to understand and describe the social support and mental health issues.

6.2.1.1 Description of Social Support Systems

This section presents the social support systems (social networking and access to social services) available to crop farmers in Ghana. Social networking is conceptualized in the study as the persons' farmers interact with, spend time, and share resources with. On the other hand, institutional/social services refer to the contacts made with organizations for information and other agricultural services such as agricultural extension and financial

needs by crop farmers. The combination of social networking and social/institutional services is needed to enhance the psychological well-being of farmers.

The results of this study show that social networking is the most utilized social support system among crop farmers compared to access to social service. Generally, crop farmers spend time building relationships with other farm households by providing and receiving support or advice. Social networking among the farmers is a good incentive that could create opportunities for the farmers to share ideas about crop farming and support each other emotionally or instrumentally. The results further indicate that individual crop farmers in households receive support from their families, friends, work colleagues, neighbours, and organizations, including government agricultural extension offices, input supplier business entities, farmer-based organizations, and non-profit organizations providing agricultural extension services.

Table 6.1: Distribution of social support systems

Social Networking

Variable	Yes	No	Total
Household spent time with other households	3,157 (47)	3,520 (53)	6,677 (100)
Household received support	3,399 (52)	3,195 (48)	6,594 (100)
Household received agricultural advice	2,032 (31)	4,621 (69)	6653 (100)
Household provided support	3,612 (54)	3,045 (46)	6,657 (100)
Household provided agricultural advice	2,066 (31)	4,575 (69)	6,641 (100)

Relationship to person/household providing support	**Frequency/Percent**
Family/Relative	1,679 (20)
Friend	626 (7)
Neighbour	1,472 (17)
Other	176 (2)
None	4,600 (54)
Total	**8,553 (100)**

Period of acquaintance	
No acquaintance	3,512 (62)
Some years	455 (8)
Entire life	1,657 (30)
Total	**5,624 (100)**

Social Services

Variable	Yes	No	Total
Access to agricultural extension services	822 (13)[1]	5,741 (87)	6,563 (100)
Access to media agricultural extension	941 (16)	5,025 (84)	5,966 (100)

Type of extension service provider	**Frequency/Percent**
Government	741 (90)
Private	47 (6)
Faith-Based Organization	17 (2.07)
Other	3 (1.93)
Total	**822 (100)**

Contact with Organizations	
Government Extension Office	446 (24)
Farmer Based Organization (FBO)	398 (21.50)
Non-profit Organization (NGO)	538 (29.50)
Input Supplier Private Business	471 (25)
Total	**1,853 (100)**

1 Note: Data are presented as numbers with percentages in brackets

*gov't- Government

On the other hand, social service was the least utilized social support among crop farmers. Out of a total number of 8,553 of the study respondents, a small number of 1,853 crop farmers have had contacts with government agricultural extension offices, input suppliers of private businesses, faith-based organizations, and non-governmental organizations. The contacts are made to request information about their crops regarding irrigation, seed varieties, fertilizer, crop diseases, and access to credit. The results indicate that non-profit organizations (NGOs) are the most contacted organizations (29%) by crop farmers, followed by input suppliers of private businesses and government agricultural extension offices for support regarding their crops' concerns. The least contacted organizations by crop farmers is the farmer-based organization (21%). The qualitative study revealed that input supplier private entities supervise the work of the farmers and recommend some chemicals to the farmers for use on their farms for improved results. The chemicals are sold to the farmers or given credit to the farmers.

A young male cocoa farmer described his encounter with the organization in the key informant interview:

> "They come here to sell chemicals, so if they come, they check the state of the cocoa on the trees, and if any problem is identified, they would recommend chemicals to use on the farm and to help it grow well" (*Ayem, representative of Farmers Association, 62 years, married, cocoa farmer, District 1, Eastern Region - 19/07/2021).*

Similarly, the government agricultural extension office provides crop farmers with chemicals and fertilizers. They also support the farmers by applying chemicals on their farms. The farmers pointed out they receive immense support from non-profit organizations (NGOs) compared to the government and private agricultural entities. One of the crop farmers who grow both cocoa and maize indicated that:

> "At the moment, the agric department in this district has been of great support. This is because they provide us with chemicals, especially during the rainy season, and assist us with applying chemicals to prevent the pests from attacking and destroying our cocoa. Currently, there isn't any organization that assists us; the government is the only organization that assists us with fertilizers and spraying chemicals" *(Emma, 37 years, married, cocoa, maize and okro, District 2, Eastern Region -19/07/2021).*

Table 6.1 indicates that the proportion of crop farmers with access to agricultural extension service was far lesser than farmers with no access to the agricultural extension. Only the sampled crop farmers who had access to agricultural extension exposed the lapses in the extension service delivery in cocoa and maize production in Ghana. Indeed, there is evidence that poor provision of agricultural extension services for farmers leads to inefficiency in resource use (Awunyo-Vitor, Wongnaa, & Aidoo, 2016). For the source of agricultural extension service, the results further indicate considerable access to government agricultural extension services compared to private, faith-based, and other non-governmental organizations. Table 6.1 shows that 90% of crop farmers who had access to agricultural extension service obtained it through government agricultural extension officers, 6% had access to private agricultural extension, and faith-based and other non-governmental organizations are accessed by just 2% and 1.93% of crop farmers, respectively.

Agricultural media extension is conceptualized in the study as the access to agricultural extension by crop farmers through the mass media, including television, radio, mobile phones, and the internet. Similarly, the proportion of farmers with access to agricultural media extension (16%) was comparatively less than farmers who did not have agricultural media extension (84%). Yet, more crop farmers had access to agricultural media extension (16%) than farmers with access to general agricultural extension (13%). This suggests that some farmers utilize agricultural media extension to boost productivity. This, however,

contradicts the finding from previous researchers that farmers hardly receive agricultural information through the internet, television, and mobile phones because many do not have access to the machines and the knowledge to operate them (Anaglo, Boateng, & Boateng, 2014). Besides, technological advancement has allowed farmers to easily access mobile phones, radio, and television for agricultural and personal purposes.

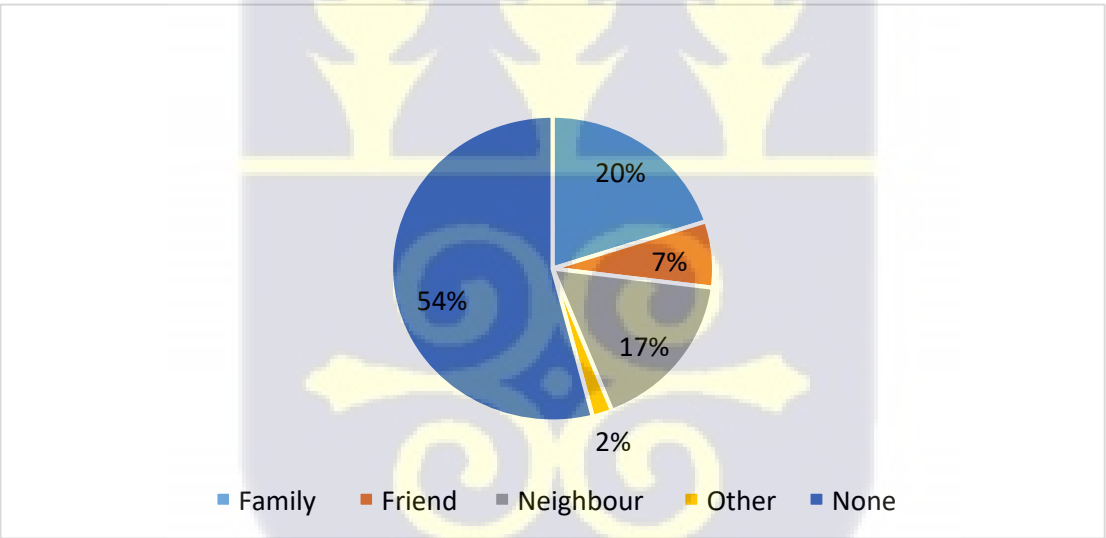
Furthermore, results from the study show that crop farmers spend time with other farm households. As illustrated in Figure 6.1, the farmers associate with other farm households who may be a family (relative), friend, neighbour, and other categories of people through interactions and socialization. Among these people, crop farmers considerably spend most of their time with their family and neighbours. Similarly, Bjornestad et al. (2019) found family and friends as critical social support networks in preventing depressive symptoms among farmers. The family, however, is a social institution that protects and provides care and security for its members. The family is also responsible for providing physical, social, and psychological safety.

Neighbours, including tenants, were the second majority of people farmers spent most of their time with. The results of the study reveal that the family and neighbours provide close social contacts with the farmers (Table 6.1). The friends of farmers are the third group of people farmers associate with and share issues with. It is evident in the result that farmers have close relationships with friends that enable them to share their problems. In addition, 'others', which could include the work colleagues of the farmers and so on, tended to be the least people farmers spend their time with (Table 6.1). This may probably be, especially for colleagues' farmers, due to the work schedules of the farmers or the proximity to farms. The work schedules and proximity to homes and location of farms could make it impossible for

farmers to interact frequently, as many of the farmers live in deep rural areas away from the town. This could further predispose farmers to social isolation and loneliness, poor mental health, and suicides (Brew et al., 2016; Ozbay et al., 2007).

Table 6.1 indicates crop farmers' relationship with persons or households within their network. It is important to emphasize that most crop farmers (54%) had no affinitive or familial relationship with the persons or households they associate with. This implies that there is not any close relationship with more than half of the persons or households that crop farmers associate themselves with. However, the family and neighbours are the most common social networks of crop farmers in households in Ghana (Figure 7.1).

Figure 6.1: The Categories of People that Crop Farmers Spend Time with (%)



Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

However, a large number of the farmers in households studied are reported to have partial or no acquaintance with the households they associate with. A considerable number of the farmers related to farm households they had known in an entire life compared to the households they had known in just some years. This suggests that crop farmers spend more time with farm households they had known in their entire lives than those they have known

for some years. Most definitely, these farm households could either be a family, neighbour or friend.

Furthermore, the results indicate that a little over half (52%) of the crop farmers receive basic needs such as food and shelter from other agricultural households (Table 6.1). Similarly, more than half (54%) provide support to other agricultural households, suggesting that crop farmers consider 'support to others' essential, although their work is occupied with many adverse challenges and setbacks. Also, the provision and receipt of agricultural advice are low and at similar rates, respectively (31%, 31%). This demonstrates that crop farmers of farm households are mostly reluctant in sharing agrarian information among themselves. They prefer that any other agricultural household directly contact agricultural organizations and request information to satisfy their needs.

Table 6. 2: Relationship Between Crop Farmers and the Person or Household they have networked with over the years

Year	Family/Relative	Friend	Neighbour	Other	None	**Total**
2010	2,869	372	709	77	2,869	**4,980**
2014	1,731	254	763	99	1,731	**3,573**
Total	4,600	626	1,472	176	4,600	**8,533**

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014
Notes: N=8553

To show how the social networks of crop farmers have evolved, Table 6.2 presents the period for 2009/2010 and 2013/2014. As illustrated in Table 6.2, there was a decrease from 2,869 to 1,731 in family or relative networks. Similarly, networking with friends decreased from 372 to 254. However, there was an increase in networking with neighbours and other people compared to family and friends. This indicates that the farming related networks of the farmers with neighbours and others tend to increase over time than with family and friends. The results indicates that farmers commune more with neighbours than with the family. The interaction with neighbours could be more about farming issues (sharing of agricultural advice and support). Also, the values, norms and customs determining

behaviour and general conduct of affairs contribute to the interaction with neighbours. For instance, the relations between the youth and the old, men and women and the rich and the poor in society have mental health implications to the extent that these also affect the access to land and other inputs as well as utilization of communal resources.

6.3 The Role of Social Support in the Mental Health of Crop Farmers

In this study, the effects of social support are examined in two dimensions, namely, social network (persons in farm households spending time with other farm households) and access to social service (access to agricultural extension and agricultural media extension). The social network and service are expected to either interactively or individually influence depression.

To measure social networks, a social network score was created by the researcher for the study. This constituted a sum of all the social network variables, including households/persons spending time with other households, households providing and receiving support, and households providing and receiving agricultural advice. From the panel regression results in Table 6.3, the coefficient of the total score of the social networks indicates a negative relationship with the mental health of crop farmers. The result shows that all else being equal, an increase in the social network score decreases the depression of the farmers in farm households by 0.085 (Table 6.3). Being statistically significant, this strongly demonstrates that access to social support (social network) reduces the risk of depression among crop farmers. The result suggests that social network is beneficial to crop farmers when it comes to depression. This is in line with Logstein (2016), who argues that social relations are an essential resource for farmers and predict farmer mental health outcomes.

Table 6.3 further indicates that social support variables, including access to agricultural extension services and agricultural media extension, the relationships with the households' farmers spend time with (relative, neighbour, friend, and others), and the period of association with other households was significantly associated with the depression of the crop farmers. The results from the study indicate that crop farmers in households with access to agricultural media extension services have positive correlates of mental health. Thus, the access to agricultural media extension increases the depression of crop farmers in households by 0.858. This is counter-intuitive, as the direction of the result is unexpected. However, there could be some problems associated with the use of agricultural media extension among crop farmers. Even though agricultural media extension could expose many farmers to information simultaneously, some farmers, for example, uneducated farmers, might find it difficult to operate the devices or even understand the language of communication on the media devices. Other issues such as accessibility, affordability, and complexity of the devices could stress the farmers and affect their mental health (depression).

Additionally, crop farmers might be overwhelmed with the stress in agricultural media extension, leading to depression. Hence, the intended purpose of agricultural media extension could not be realized, as it positively correlates with the mental health of crop farmers. This then is inconsistent with the Job Demand and Resources model since agricultural media extension (social service) could not buffer the effect of depression experienced by crop farmers due to some farming demands associated with their work. The Demand-Control-Support model (DCS), which considers the crop farmers' control or independent abilities, could be relevant in explaining the positive effect of agricultural media extension service on the depression of crop farmers or farm households.

Table 6.3: Regression Model for Social Support and Farmer Mental Health

Standard errors in parentheses

Depression	Pooled	FE	RE
Social support score	-0.125	-0.085**	-0.009
	(0.059)	(0.041)	(0.039)
Social service			
Access to agricultural extension	-0.515	-1.804***	-1.590***
	(0.566)	(0.316)	(0.307)
Access to agricultural media extension	1.490**	0.858***	1.050***
	(0.655)	(0.297)	(0.290)
Social networking			
Farm household spent time with other households	-0.753	-3.642	-1.076
	(3.957)	(2.828)	(2.366)
Relationship with households farmers spend time with			
Relative	-2.761***	-2.912***	-2.666***
	(0.976)	(0.567)	(0.554)
Neighbour	-3.041***	-2.042***	-2.096***
	(0.891)	(0.504)	(0.493)
Friend	-4.442***	-3.160***	-2.990***
	(1.620)	(0.642)	(0.629)
Others	-3.337**	-2.486***	-2.285***
	(1.401)	(0.886)	(0.874)
Period of relationship/acquaintance with other households			
Some years	4.612	7.183**	4.345*
	(4.103)	(2.866)	(2.400)
Entire life	6.701*	7.746***	5.444**
	(4.035)	(2.863)	(2.408)
Provision and receipt of advice and support			
Farm household provide support	-1.297	-0.460	-0.663
	(1.005)	(0.642)	(0.635)
Farm household receive support	1.904**	-0.531	-0.008
	(0.739)	(0.567)	(0.559)
Household provide advice	-1.522	0.099	0.045
	(1.892)	(0.989)	(0.986)
Household receive advice	1.156	0.070	0.112
	(1.878)	(1.002)	(0.996)
Constant	18.836***	20.261***	19.579***
	(0.340)	(0.146)	(0.254)
Observations	3,331	3,353	3,353
R-squared	0.093	0.038	
F	10.33	9.419	.
Number of EA		222	222
sigma_u		4.227	3.037
sigma_e		4.963	4.963
rho		0.420	0.272

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

Few farmers described the cumbersome nature of agricultural media extension in crop production.

According to a crop farmer in the qualitative interviews:

> "Agricultural media extension is challenging for us because we do not have electricity, and the media devices are expensive. Even when the devices are available, it is difficult to manipulate them, especially the complex ones. I always wait for my children to return from school to assist me if need be" (*Otchere, Best farmer recipient, 42 years, maize and cocoa, District 2, Eastern Region, 09/08/2021).*

Another farmer shared in the qualitative interviews:

> "At certain times, we are asked to watch agricultural extension programmes on the television about farming methods. But the problem is that not all of us have television. There is no electricity in this village and the surrounding villages. Many farmers in these villages listen to the radio, and just a few use car batteries to power their television sets. And so, when there's a programme on the television about cocoa farming, most of us do not have the opportunity to watch such programmes. There could be training on fertilizer application on television, but we often lose such opportunities because most of us do not have television. Sometimes if the information is not shared on the radio, we stand at a loss" *(Emma, 37 years, cocoa and maize, District 1, Western Region 09/07/2021).*

Furthermore, the results from this study indicate that crop farmers have had an entire lifetime and some years relationship with their networks. The results indicate that the period of association with other farm households in their entire life or some years increases the depression of crop farmers by 7.746 and 7.183, respectively (Table 6.3). Also, further analysis indicates that an entire life or a lifetime association with other farm households increases the depression of farmers better than some years of association with other farm households. The magnitude effect for the entire life of association on the depression of crop farmers or farm households (7.746) is more significant than some years of association (7.183). This suggests that knowing a farm household or persons in farm households for the entire life or some years does not necessarily reduce the risk of depression among crop

farmers. Therefore, the period of association with other farm households has no influential role in reducing the depression of crop farmers. Nonetheless, this result is counter-intuitive because having a/an entire lifetime relationship with others is expected to strengthen bonds of social networks. Farm households that crop farmers might likely have a lifetime association with tend to demand a lot from crop farmers (in terms of support), causing crop farmers to bear part of their burdens/problems. In the face of resource constraints, this may lead to depression among crop farmers since they might be unable to help other farm households they have known in some years. Additionally, the economic situation in the country could affect the financial, social, and emotional support crop farmers receive from other households they have known in their lifetime or just some years.

In contrast, the negative correlates of social support on the mental health of crop farmers include the access to agricultural extension and the relationships with households or persons in households (relatives, friends, neighbours, and others) farmers spend time with (Table 6.2). The result points out the beneficial role of social support, thus, social networking (family, friends, neighbours, and others), and access to social service (agricultural extension service) on the mental health of crop farmers in Ghana. The theory of Job Demands and Resources (JD-R) is also supported in this regard as the supportive roles of social support; access to social service (agricultural extension service), and social networking (support from social networks) act as protective factors against the risk of depression. In this study, the supportive roles of social support (agricultural extension service and social networks) affirm the JD-R model to some extent. The conceptual framework for this study argues that crop farmers' negative mental health outcome results from the protective roles of social support (agricultural extension service and social networking) against the demands and adverse events in farming.

It is also mainly observed that the access to agricultural media extension positively influences the mental health of crop farmers compared to the general agricultural extension. There could be other factors that may be increasing the risk of depression among crop farmers who access agricultural media extension. Financial stress involved in acquiring the media devices and accompanying accessories could be a factor. This does not mean that agricultural media extension is unimportant; however, compared to the general extension in farming, it has a significant positive risk on the mental health of crop farmers. Since there are reports of a limited number of agricultural extension officials in Ghana (Baloch & Thapa, 2018), agricultural media extension could have complimented it. However, there are psychological issues associated with its usage.

Access to farm extension services could enable farmers to obtain agricultural information on farm inputs and suppliers that could be used efficiently on their farms. The majority of the farmers believed that extension services offered by the agricultural field officers were beneficial. A young farmer shared in the qualitative interviews:

> As for our extension officer, he is very supportive. His guidance and teachings are helpful. He notes our needs and often responds to our requests to see him. Our extension officer for this farming area visits our farms frequently. His frequent visits to the farms and teachings motivate us to continue farming *(Patrick, 29 years, married, native, 6 acres, cocoa, plantain, District 1, Eastern Region, 09/08/21).*

Moreover, the results indicate that crop farmers in farm households who spend time with other households are negative but insignificant on the depression of the crop farmers. This implies that when crop farmers in farm households spend time with other farm households, it does not necessarily reduce the risk of the depression of crop farmers. Although there could be the possibility of a reduction in the risk of depression, it is not statistically significant in the result (Table 6.3). On the other hand, the qualitative data revealed the

benefits of association/social support to crop farmers. Several crop farmers meet for discussions about issues on their farms, share ideas, and provide material and financial support to each other (nnoboa). One of the male maize farmers shared:

> "There are times we meet to discuss and put heads together to find solutions to our problems, and that is why I said initially that there are situations where someone loses hope in farming and probably wants to stop farming, but we discuss with the person and get him to know that it isn't in one day that he will see the fruits of his work, and that farming requires patience. We also practice 'nnobua', to support each other on the farms" (Quaidoo, maize farmer, *District 1, Western region*, 21/07/2021).

Additionally, the relationship with the persons in households or households crop farmers associate with was another significant determinant of depression among crop farmers. The results indicate that spending time with friends decreases the depression of farmers far more than with the family, neighbours, and significant others (Table 6.3). The results show a negative relationship between the social network of friends and the depression of crop farmers. The importance of the social network of friends at the workplace is established as reducing the effects of high strain jobs on work performance and satisfaction (Sargent & Terry, 2010).

Besides, the friends of farmers, the family, and some 'significant others' play an important role in reducing the risk of the depression of crop farmers. The results of this study show that the family significantly reduces the depression of crop farmers (Table 6.2). This result contradicts the duration or period of the relationship, which was reported earlier. Families relate over a lifetime, but this was found to increase depression in this study. The family network of crop farmers includes the husband, wife, children, and other close relatives who support farmers on their farms. Yet, several farmers explained that most families do not participate in the farm work because they are often unavailable. A female farmer shared in the qualitative interviews:

> "The elderly children have travelled to other parts of the country, and the rest here are young school-going children who are unable to offer the needed support on farms. For my wife, she sells things, and before the sun goes up, she is out of home but returns early" (Antwi, *cocoa farmer, District 2, Eastern region,* 21/08/2021).

On the contrary, Table 6.2 indicates that crop farmers tend to minimize family networking across time. However, the role of the family tends to be beneficial in the mental health of crop farmers. The crop farmers indicated that they confide in their families when issues overwhelm them.

Furthermore, the significant 'others', which may include religious and community leaders and representatives of farm associations, negatively impacted the depression of the farmers. Lastly, the results show that social support from the neighbours of crop farmers was significant and negative on the mental health outcome of crop farmers. However, compared to the family, friends, and 'significant others, the neighbours of crop farmers are the least in reducing the risk of mental health disorders among crop farmers. There was a small marginal effect of 2.042 depression compared to friends, family, and significant others (3.160, 2.912, and 2.486).

Lastly, variables including crop farmers of farm households providing and receiving support and crop farmers of farm households providing and receiving agricultural advice were insignificant on the depression of crop farmers in Ghana. This implies that the receipt of support from other farm households and the provision of support to other farm households has no association with the depression of crop farmers. In the same way, there is no significant relationship between the receipt and provision of agricultural advice from other farm households and the depression of crop farmers. The support farm households provide

and receive includes shelter, water, money, and agricultural advice. These instrumental support items might probably be less important than emotional support.

There might also be other important factors that might have affected the outcome of the result (depression), which were not considered. The theory adapted for the study Jobs-Demand and Resources model (JD-R) examines demands and support on psychological outcomes. However, the theory fails to consider the control or independence and self-efficacies that persons should have. Other theories such as Job-Demand Control and Support models (Karasek, 1979) and Job-Demand Control-Support and Self-efficacy models (Brouwers & Tomic, 2016) incorporate such personal abilities in the examination of psychological outcomes. So, when there are high levels of job control and self-efficacy and the support or agricultural advice received by crop farmers, the depression of the farmers would be negative. Nonetheless, increased levels of social support increase the plans of farmers to remain in agriculture and continue farming (Schulman & Armstrong, 1990), and different levels of social support impact depressive symptoms differently (Lin et al., 1979). This is evident in the weak mediating role of social support between stressors and psychiatric illness (Lin et al., 1979).

Based on theoretical reasoning, some of the social support variables interacted with other statistically significant socio-demographic characteristics of the farmers and farming risk factors. This was to test the moderating role of social support in mitigating the effect of the socio-demographic characteristics of farmers and farming risk factors on the mental health of crop farmers. In addition, the interaction effect provides further explanations needed about those farming risk factors in their state and how social support from other farm households and agricultural extension services might be differently associated with their

mental health. This particular aim of the job demands and resources theory underpins the study. The theory emphasizes the moderating role of social support between job demands and mental health outcomes. It was expected that the social support would act as a buffer against depression for some particular socio-demographic characteristics of farmers and farming risk factors, including marital status and irrigation of the land.

The coefficient for marital status measures the change in the depression of crop farmers about a change in marital status, and the coefficient for farm households spent time with other households measures the difference in the depression of crop farmers about a change in the households that farm households spent time with. It is observed that the interaction term has a significant positive effect on the mental health of crop farmers (Table 6.4). If a crop farmer belongs to a household that does not associate with other members outside the household and the person is married, divorced/separated, widowed, in a consensual/betrothed relationship, the farmer's risk of depression is high. However, if a crop farmer is unmarried, married, or divorced/separated and associates with other members outside the household, the risk of depression are low. This implies that despite the marital status if a crop farmer associates or belongs to a household that associate with other members of a farm household, there would be a reduced risk of depression for the crop farmer; however, if the crop farmer does not associate with other members in households, there would be an increased risk of depression for the crop farmer. When a crop farmer is married/unmarried and the crop farmer associates more, he/she expands his/her network. Still, if the crop farmer does not associate with other members of farm households, and it is just the farmer and the spouse, others might not keep them in check. The risk of depression could be increased.

Table 6.4: Interaction Effects of Social Support and Socio-Demographic Characteristics of Crop Farmers

Depression	Fixed Effects
Marital status	-2.188***
	(0.671)
Household spent time with other farm households	10.642***
	(2.424)
Household spent time with other farm households # Marital status	
Household does not spend time with other farm households # Married	4.130***
	(0.748)
Household does not spend time with other farm households # Separated/Divorced	7.210***
	(1.425)
Household does not spend time with other farm households # Widowed	11.101***
	(2.069)
Household does not spend time with other farm households # Consensual/Betrothed	11.543***
	(2.719)
Household spent time with other farm households # Never married	-10.497***
	(2.420)
Household spent time with other farm households # Married	-5.890***
	(1.739)
Household spent time with other farm households # Separated/Divorced	-2.315**
	(1.19)
Constant	19.393
	(0.747)***
Observations	5,647
R^2	0.0332
Rho	0.1657
F (9,379)	18.83
Pr>F	0.0000

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Author's estimations using Ghana Socioeconomic Survey,2009/2010,2013/2014

Furthermore, at a 1% statistical significant level, the depression of the unmarried farmers who spend time with other farm households is reduced by -10.497, more than the married (-5.890) and divorced/separated (-2.315) farmers spend time with other farm households. This demonstrates the protective role of social support in the mental health of crop farmers in this study. In essence, social networks are equally beneficial in farmers' mental health, particularly among crop farmers in this study. Hendryx et al. (2009) suggest that farmers increase their social network and engage in more mental health recovery.

Table 6.5: Interaction effects of social support and farming risk factors

Depression	**Fixed effect**
Farmland watered from a source other than rainwater	0.697 (0.372)
Access to agricultural extension service	-0.790*** (0.261)
Farmland watered from a source other than rainwater # Access to agricultural extension	
Farmland watered from a source other than rainwater # access to agricultural extension	-0.646 (1.069)
Constant	19.665*** (0.099)
Observations	5,582
R^2	0.038
Rho	0.309
Rho	0.1657
F (9,379)	18.83
Pr>F	0.0000

Note: Farmland watered from a source other than rainwater - irrigate
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Author's estimations using Ghana Socioeconomic Survey, 2009/2010, 2013/2014

Table 6.5 indicates that the farming risk factor (farmland watered from a source other than rainwater) increases the depression of farmers, though it is insignificant. On the other hand, access to social service, which includes agricultural extension, plays a more beneficial role

in reducing the depression of the farmers. As illustrated in Table 6.5, the interaction term indicates a negative effect on the depression of the farmers, but it is insignificant. The results suggest that irrigation of the farmland supported by the access to agricultural extension does not affect depression. Some other factors might have more effect on depression, and so other risk factors could be explored.

Probably, the farmers might depend on the natural system of irrigation and other sources that have not failed them much and do not have a problem with agricultural extension service. So, they do not see irrigation as a significant risk factor of depression. The mental health risk factors of the farmers may be centred on other things. This irrigation issue might be a minor issue. There might be other relevant existing problems such as financial problems and exposure to pesticides contributing to the mental health of the crop farmers studied.

6.4 Conclusion

The protective effects of social support on the psychological well-being of farmers have been well explored. This study has revealed the existing social support systems for crop farmers and the moderating role of social support (social networking and access to social service) on the depression of crop farmers. The role of social service, which includes access to agricultural extension and agricultural media extension, and social networking (households that spent time with other farm households) on farmers' mental health were examined. Friends, family, neighbours, and some significant others were available social support systems to crop farmers. Family and friends tend to be more beneficial in the mental health of crop farmers. Additionally, the government extension office, private business entities, non-governmental organizations (NGOs), and farmer-based organizations (FBOs) serve as social support bases for farmers. Access to agricultural extension service

significantly reduces the risk of depression compared to agricultural media extension. Agricultural media extension was noted to increase the risk of depression among crop farmers. This was attributed to the difficulty with access and usage of media devices. Furthermore, the association between crop farmers and support received from other farm households showed negative and was statistically insignificant. Some possible explanations were attributed to other significant socio-demographic characteristics such as marital status. Marriage with support from other farm households reduces the risk of depression among the crop farmers studied. But the period of relationship with farm households or persons, which could be a lifetime or some years, increases the depression of the crop farmers. The relationship between crop farmers and their families could be a lifetime relationship that might increase their risk of depression. But the family serves as the most effective social support system for farmers at risk of depression for the farmers studied.

CHAPTER SEVEN

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

7.1 Introduction

This final chapter of the thesis provides a summary of the results of the study and the major conclusions drawn from the findings. It also discusses relevant recommendations for policy considerations and suggests areas for further research. Additionally, the chapter indicates the study's contribution to knowledge.

Mental health problems are associated with the work of farmers as a result of the difficulties farmers encounter in their work. Some risk factors involved in the work of farmers predispose farmers to mental health problems, which consequently affect the productivity of the farmers. Maize and cocoa farmers have continuously been challenged with the loss of crops to pests and diseases and the lack of market in Ghana. But sustainable strategies that directly link these farming risk factors to the mental health of the farmers and thus effectively deal with the mental health outcomes of farmers have been under-examined.

Existing research has focused on environmental challenges such as climate change (drought), with farming-related or institutional and ecological factors almost missing in the literature. Besides, gender differences within the effect of the farming risk factors on the farmers' mental health have not been broadly considered. Furthermore, existing literature on the support of the family, communities, and organizations for the mental health outcomes of farmers has been conflicting. Lastly, the methodological approach used in studies on farmer mental health had been predominantly quantitative, with mixed research designs almost non-existing.

Based on the gaps identified, the study examined how institutional and ecological risk factors in farming influence the mental health of crop farmers in Ghana. The analysis considered how the differences in the type of crop grown (cocoa and maize) increase farmers' vulnerability to mental health problems. Additionally, it investigated the differential effect of gender (gendered differences) in the farming risk factors influencing the mental health of crop farmers. This was followed by examining the existing social support systems available to crop farmers and the role of social support in the farmers' mental health.

The study was designed using the sequential explanatory mixed research method, which contributed to the achievement of the objectives of the study. The Ghana Socioeconomic Panel Survey data for 2009/2010 and 2013/2014 was utilized for the study. The qualitative data included data from sixteen (16) crop farmers and six key informants of farmers' associations and district agricultural extension officers. The quantitative data were analyzed using the fixed effect panel, and ordinary least squares. The qualitative data were analyzed using thematic analysis for the transcribed narrative interviews. The study applied the Person and Environment Theory of psychological stress, Job Demands and Resources Theory and the Gender Role Theory.

7.2 Summary of Key findings

The key findings of the study are summarised in the sub-sections that follow.

7.2.1 Institutional and Ecological Farming Risk Factors Influencing the Mental Health of Crop Farmers

Some conclusions were drawn on the first objective that sought to analyze the institutional and ecological factors affecting the mental health of crop farmers. The depression levels of

the crop farmers were as follows; severe (6.98%), moderate (12.61%), mild (24.65%), and low/none (55.76%). More than half of the crop farmers had no/low depression. The analysis shows that the 6.98% severe depression among crop farmers in Ghana is high compared to farmers in Canada but low compared to the farmers in the USA.

Concerning the sociodemographic characteristics of the crop farmers, a correlation exists between the gender of the crop farmer and mental health. Male farmers are less affected by depression compared to female farmers. This is attributed to women's social and cultural roles in society. Women are overwhelmed with substantial household activities that stress them. Similarly, a strong relationship existed between the age and the mental health of the farmer. Furthermore, being unmarried makes crop farmers less likely to be depressed. Also, being a widowed or separated crop farmer increases the likelihood of severe depression. In addition, education came out strongly on the farmers' mental health. A farmer's basic education makes him/her less likely to be depressed than those without education. Nonetheless, a closer interrogation of the results indicated that female respondents who were educated were mostly susceptible to mild and moderate depression, and educated males were more exposed to severe depression in this study. The findings from this study mostly agree with the Person and Environment Theory of psychological stress's core proposition; the respondents' personal abilities or characteristics such as age, education, marital status and sex makes them susceptible to depression that translates into negative consequences in their work settings.

Concerning the ecological factors, locality of residence, ecological zone, and region of the crop farmer were essential in the mental health of the farmer. This supports the person and environment fit approach to psychological stress. Being in the savannah ecological zone and

not the forest ecological zone makes a farmer more depressed. Also, being in regions such as Upper East, Upper West, and Northern Regions increases the likelihood of the depression of a crop farmer.

The results of examining the institutional factors on the mental health of crop farmers reveal that the type of crop grown and the use of mechanization correlates to worse mental health among the crop farmers studied. This exposes the inefficiencies and inadequacies in acquiring and managing farming equipment, especially mechanization. Also, there was a statistically significant and positive relationship between irrigation of the farmland and the mental health of the crop farmers. Farmers who depend on other water sources than rainfall were more depressed than farmers with rainwater as the primary water source.

However, household assets and sharing of dwellings correlate with improved mental health on farmers. A positive change or unit increase in household asset score is significantly associated with a decline in the depression of crop farmers. Also, at 0.01 statistical significance level, farmers having a low household agricultural asset score correlate to worsen the mental health of crop farmers. Financial difficulties and lack of income to purchase fertilizer and pesticides strongly influenced mental health in the qualitative data analysis. Sharing a dwelling with other households decreases the chances of getting depressed as a crop farmer at a 0.001 significance level. The number of farms, farm size, total labour on the plot in hours, security on the plot, and the right to farmland are less crucial as far as farmer mental health is concerned. Any additional plot obtained by a crop farmer reduces their depression. It is believed that an increase in farmlands provides a sense of satisfaction.

In comparing cocoa to maize farmers, growing older as a cocoa farmer correlates with better mental health than maize farmer. Consequently, older maize farmers could be supported to have better mental health which is likely to increase their farm productivity. The loss of crops also had similar consequences on the mental health of both cocoa and maize farmers. Other factors, including the log of farm yields, right to farmland, and quantity of crop loss, were only statistically significant for maize farmers. This implies that maize farmers are more predisposed to depression by some farming risk factors, unlike cocoa farmers. This indicates a mental health gap in the farming risks factors for particular farmer groups compared to the general population of farmers.

7.2.2 Gender Differences in the Risk Factors Influencing the Mental Health of Crop Farmers

The gender differences in the depression of the farmers were examined to understand the sources, levels, and variations in the farming risk factors that affect males and females differently. The conclusion drawn from the objective is that depression is significantly more gender-related and gender-specific among crop farmers. A higher percentage of females (48.32 %) suffer from mild to severe levels of depression compared to their male counterparts (39.75%). Also, severe depression prevails more among females (7.53%) than male crop farmers (6.38%). More than half of the female crop farmers (56%) had high depression compared to (46%) male crop farmers. Physical strength required for farm work activities and limited access to land, labour, and markets could increase the likelihood of female farmers getting depressed. Gender differences in depression were also evident in cocoa and maize farmers studied.

The findings on the gender differences in the sociodemographic characteristics of the farmers indicate that as age increases, depression decreases for both male and female farmers. But the reduction is more effective in females than male farmers. Also, basic education is more beneficial for female farmers than males regarding depression. But higher levels of education, including SSCE and PSE, tend to benefit more males than female farmers. In addition, female farmers in large-sized households tend to be more depressed than other females in small-sized households. Consequently, small-sized households tended to be more beneficial to the mental health of female farmers than males. This is because large households in this study tended to engage female members in farming to reduce the expenses of farming activities. Female members were often overwhelmed with home and farm responsibilities combined, whereas the males concentrate on-farm activities because of societal roles and expectations. When it comes to marriage, the married, widowed, separated, divorced, consensual, and betrothed females were more likely to be depressed than male crop farmers.

In situations of crop loss on the fields, female farmers were at a disadvantage compared to their male counterparts in this study. In other words, there are gender inequalities regarding the effects of crop loss. More female farmers lost maize crops on the field than male farmers in this study. Male farmers also had large quantities of cocoa lost on the field. In effect, maize loss mainly affects the depression of female farmers, whilst cocoa loss affects the depression of males. Female farmers in the forest ecological zone had reduced depression compared to male farmers. Alternatively, male farmers in the coastal zone have reduced depression compared to female farmers. This is probably because female farmers find it more difficult coping with the unfavourable weather conditions in the coastal and savannah zones. Furthermore, the increase in the unit of plot decreases depression better for females

than males. This is because female farmers are probably satisfied with large farm sizes compared to male farmers.

Also, growing cocoa is associated with higher levels of depression among females compared to male farmers. Crop production like cocoa may be challenging for female farmers, and so female farmers may need more social support with their cocoa farming, compared to male farmers. Advocates for gender equality in agriculture should seriously consider this evidence in their proposals. Furthermore, mechanization reduces depression more drastically among females than male farmers. Farm yield primarily reduces depression more among females than male farmers. For farmland ownership, male farmers with ownership rights tend to have decreased depression compared to female farmers. As much as women are less likely to have land ownership rights compared to men in African society, it may affect them physically and psychologically. The person and environment fit theory is confirmed in this study, as the personal abilities of female farmers (gender) interact with the right to land ownership to influence their mental health. The gender role theory also supports the subordinate position of female farmers in ownership of land rights in society.

7.2.3 Existing Social Support Systems Available to Crop Farmers and Their Role in Mitigating Mental Health Problems Among Farmers

The social support for farmers was examined under two categories: social networking and access to social services. Social networking included farmers' relationship with farm other households, period of relationship with other farm households, and provision and receipt of support from other farm households. The access to social services also included interaction with agricultural organizations and agricultural extension services. Only a small number of the farmers had contacts with government agricultural extension officers, businesses, and

organizations. Organizations most contacted for support services by the farmers include non-governmental organizations (NGOs). This may be because there are few government agricultural extension officers that are to work with large numbers of farmers in their jurisdiction, so there is a possibility that they might not satisfy the agricultural extension needs of all the farmers.

Nevertheless, government agricultural extension service was handier compared to private agricultural extension service. The government agricultural extension office supports farmers with applying the chemicals on their farms. However, the proportion of farmers with access to agricultural extension service was less than farmers with no access to agricultural extension service. The majority of crop farmers who used agricultural media extension were found to have increased levels of depression. Common problems associated with agricultural media extensions, such as accessibility and complexity, could stress and overwhelm the farmers. Hence, the intended purpose of agricultural media extension where farmers are provided with handy agricultural information on farm inputs and suppliers for efficient use was not achieved in this study.

The results also showed that social networking is the most utilized social support system among crop farmers compared to access to social service in this study. The two most common social networks of crop farmers include the family and neighbours. Networking with family and neighbours has increasingly evolved in the Ghanaian society. This study also showed that farmers spend time with the networks in the following order; family, neighbours, friends, and others. They also associate more with farm households or persons they have known in an entire life than in just some years. In addition, many crop farmers

receive and provide support to others. But provision and receipt of agricultural advice are relatively less among the farmers.

The effect of social support on the mental health of the farmers was analyzed with the total network score that comprised social networking and access to social service. The total network score was negatively associated with farmers' mental health, indicating the benefit of social networking on the farmers' mental health. On the contrary, the period of relationship with other farm households, whether in an entire life or some years, had no influential role in reducing the risk of depression among crop farmers. Although, having an entire life relationship could strengthen the bonds of social networks.

Furthermore, in this study spending time with the family did not necessarily reduce the risk of depression among crop farmers. But spending time with friends reduced the risk of depression for farmers more than with the family, neighbours, and significant others. Although families relate over an entire lifetime, it might increase the risk of depression in certain circumstances for farmers. Conflicts and unhealthy relationships could exist in families, affecting family members psychologically. Similarly, neighbours tend to put farmers at risk of depression. Although, the study found out that the family and neighbours are the most common social networks of the farmers. The provision and receipt of support and agricultural advice were of no benefit for the depression of the farmers in this study. Provision of support and agricultural advice might be less critical to the crop farmers in this study, as other factors might contribute to the depression of the farmers.

7.3 Conclusion

It can be concluded that cocoa and maize farmers are at high risk of depression compared to craftsmen and related trade workers, service or sales workers, and professionals in Ghana. The institutional and ecological risk factors in cocoa and maize farming are major determinants in the depression of the farmers studied. Institutional factors including asset score, sharing of dwelling, number of farms, farm size, labour hours, security on plots, and the right to the farm negatively affected the depression of crop farmers. In other words, the risk factors mentioned above did not necessarily put the farmers in this study at risk of depression. However, irrigation of farmland, mechanization, and type of crop grown put the farmers in this study at risk of high levels of depression.

The type of crop production had varied depression outcomes on the farmers. Crops such as cocoa and maize differently affect the mental health of farmers in this study. The mental health of the maize farmers studied was primarily influenced by farm yields, loss of crops, and the right to farmland. Most female farmers in this study were at risk of depression due to maize loss on the field, while the male farmers studied were significantly at risk of depression due to cocoa loss. These gender inequalities in the loss of crops significantly resulted in variations in the depression outcomes of the farmers in this study. The farmers in cocoa farming were better off regarding depression than farmers in maize farming. Furthermore, the location of farmers, including locality of residence, region, and ecological zone, came out as essential determinants of farmer mental health. Farmers living in the rural areas, savannah ecological zones, and the northern parts of the country were more at risk of depression.

Gender also played a significant role in the mental health of the farmers studied. Most female farmers were at risk of depression because of the social position of women in the Ghanaian society. Female farmers participate excessively in farm activities but are challenged with land, labour, and market limitations, as this study showed. Although depression was higher among female farmers in this study, depression was significantly reduced for females more than male farmers, as the males usually continue to refuse to seek support for their mental health problems (Roy et al., 2014). Marriage was presumed to act as a support base for farmers. However, the unmarried was found to be more protective of depression than the married in this study. Education also served as a check against depression, especially among female farmers.

Additionally, social support (social networking and access to social service) served as a buffer for the mental health of the crop farmers due to the institutional and ecological risk factors in farming. Family and neighbours were the common social networks of cocoa and maize farmers in this study. But friends and the family of cocoa and maize farmers served as a buffer against their risk of depression in this study. Spending time with friends, more specifically, reduced the risk of depression of cocoa and maize farmers than with their family in this study. The family system could put farmers at risk of depression if family members are challenged with conflicts or unhealthy relationships.

Furthermore, the cocoa and maize farmers in this study preferred to associate with persons or households they have known in their entire life compared to persons or households they have known in just some years. However, the results from the study showed that the period of association, whether in an entire life or just some years, increasingly put the farmers at

risk of depression. This indicates the unimportance of the relationship period with persons or households for depression among the farmers.

On the other hand, access to social service has been quite beneficial for the mental health of the crop farmers studied. A small number of the farmers had had contacts with agricultural extension offices, agricultural businesses, and organizations. In this study, the proportion of farmers with access to agricultural extension service was less than farmers without access to the agricultural extension service. As a result, many crop farmers might usually lose information about crop diseases, irrigation, use of seed varieties, and fertilizer application. In addition, the crop farmers in this study had had more contact with NGOs than government agricultural extension offices. However, the majority of the farmers in this study preferred government agricultural extension officers. Besides, in its general form, agricultural extension service serves as a buffer against depression among crop farmers in Ghana.

Agricultural media extension, on the other hand, did not seem to achieve its intended purpose of supporting the crop farmers in this study with their ecological and institutional farming needs. Agricultural media extension in this study increasingly puts farmers at risk of depression. The stress in agricultural media extension, including accessibility and complexity of the media devices, may have overwhelmed the farmers.

7.4 Contribution to Knowledge

Farmers constitute the backbone of Ghana because of agriculture's contribution to employment and livelihoods in the country. By this, issues concerning this population should be prioritised. This makes the mental health of farmers more relevant in development. This thesis studied the farming risk factors (ecological and institutional) and

social support influencing the mental health of crop farmers in Ghana and the gender differences in the farming risk factors.

In terms of the study's methodological contribution to knowledge in farmer mental health, farming risk factors have generally been studied quantitatively in most studies (Hagen et al., 2019). This study has used the qualitative and quantitative (mixed research design) approaches to study farming risk factors that contribute to farmer mental health and indicated the gender differences in the risk factors. This has provided unique evidence for the gender dynamics in farmers' mental health.

This study has further contributed to theoretical knowledge by confirming the Person and Environment Fit theory of psychological stress and the Job Demands and Resources (JD-R) model for farmer mental health in Ghana, based on the unique settings of the environment. Despite the confirmation, the study found that agricultural media extension, a resource to buffer against poor mental health, does not serve its purpose among crop farmers. The JD-R theory suggests two fundamental categories: job demands and job resources that emerge in the work environment. It fails to consider the control individuals exert in their environment of work, which could be relevant in navigating agricultural media extension. The study further developed a conceptual framework from the major theories underpinning this study by drawing a link with the personal characteristics of the farmer (including gender), farming risk factors (ecological and institutional), and social support for mental health. This link is important because it provides a better understanding of addressing the mental health of farmers in agricultural programmes, particularly with the Planting for Food and Jobs (PFJ) and the structuring of the cocoa sector in Ghana.

Existing studies on farmer mental health predominantly employ cross-sectional designs that limit the researchers' abilities to make causal inferences (Hagen et al., 2019). However, this study has covered a broader scope of farmers in Ghana with longitudinal data that allowed the assessment of many cocoa and maize farmers at different time points in a cause-and-effect relationship.

The study also contributes to the literature on the state of farmer mental health in Ghana in terms of the levels of depression (low/none, mild, moderate, and severe). The percentage distribution of depression in this study was as follows: severe (6.98%), mild (12.61%), moderate (24.65%), and low/none (55.76%). This study indicated that 62.37% of cocoa and maize farmers were at high risk of depression. However, a similar study in Canada with a sample of 385 farmers discovered a 61.9% risk of depression among the farmers (Jones-Bitton et al., 2019). The results on cocoa and maize farmers' depression in this study emphasise the critical need for farmer mental health education, improvement in mental health service delivery in Ghana and research.

This study further highlighted a comparative description of depression among cocoa and maize farmers. The literature limits examining farmer mental health to one farmer group or a generalized farmer group. The mixed research approach has been used to indicate which crop farmer group is likely to be at risk of depression and the support required of the farmers to safeguard their wellbeing. This study has established that maize farmers are increasingly susceptible to depression compared to cocoa farmers. This is because of the quantity of maize crops lost in the field and problems associated with the irrigation of farmlands compared to others.

Finally, social support is studied in farmer mental health studies, but there is limited information on the role of social services on the mental health of farmers. For example, access to agricultural information, credit facilities, farm inputs, and agricultural extension from government and private agricultural organizations. Nonetheless, agricultural media extension in this study increased crop farmers' risk of depression because of accessibility and availability problems associated with media devices. This is contrary to the Job Demand and Resources Model on work stress, which emphasizes the buffering role of resources on mental health. Presumably, the positive effect of agricultural media extension on the mental health of the farmers could be resolved if the challenges associated with its use are managed. This underscores the need to promote agricultural extension in cocoa and maize farming areas by increasing farmers' access to adequate resources to enhance farmer productivity and psychological wellbeing.

Regarding agricultural media extension, agricultural extension officers should be equipped to offer training to farmers to adapt to farming innovations and technology that comes with the use of the media devices for agricultural extension.

7.5 Recommendations

Based on the conclusions drawn from this study, the following recommendations on policy and development are considered.

1. *Promotion of mental health education- Mental Health Authority Ghana (MHA)*

First, with the significant number of cocoa and maize farmers in Ghana with depression in this study, the Mental Health Authority Ghana (MHA) with support from MOFA should promote mental health education among the farming population. Advocacy messages on agriculture participation being promoted by the Planting for Food and Jobs (PFJ) policy

should also aim at educating farmers on the stress in crop production and the need to seek psychological support from professionals when the need arises. Additionally, clinical counselling programmes should be designed together with the Department of Agriculture (DOA) in the districts to serve farmers' psychological needs better.

2. *Strengthening Rural Mental Health Care- Ministry of Health (MOH) and the Ghana Health Service (GHS)*

The Ministry of Health (MOH) should prioritize strengthening mental health care inclusion in mainstream health systems at the regional, district, and, most importantly, community levels. This is because community mental health care is likely to reduce stigma and discrimination, and provide continuous care and services for rehabilitation and recovery. Beyond the inclusion of mental health care, the mental health centres should be well-resourced to address the needs of farming populations, especially in the country's rural and savannah ecological areas, the married, young adults, and women. In this study, these target groups were the most affected with depression; hence efforts should be made to secure their psychological safety.

Furthermore, the Ghana Health Service (GHS) should increase the employment of counsellors, social workers, and psychologists as there are few professionals in mental health care (World Health Organization, 2017). Most importantly, they should also equip psychologists and social work professionals with adequate resources, and ensure that the professionals offer clinical counselling to clients who might require their services in the districts and regional health centres. In addition, cocoa and maize farmers should be educated to seek care for poor mental health.

3. *Promotion of innovative farming techniques for sustainable agriculture- Department of Agriculture (DOA)*

The Department of Agriculture (DOA) in District Government Offices should continually promote innovative farming techniques for sustainable agriculture. Modern farming, including irrigational techniques, mechanization, and technology practices, should be enforced. The DOA should support farmers with the resources for irrigation and mechanization practices.

4. *Strengthening Extension Service Delivery- Ministry of Food and Agriculture (MoFA)*

The District Extension Officers should frequently contact and provide farmers with information on fertilizer, seed varieties and other essential information. More efforts should be channelled to make agricultural extension services available to farmers in remote farming areas. With support from the agricultural organizations, the Ministry of Food and Agriculture (MoFA) should recruit more agricultural extension officers to serve the needs of farmers. Agricultural mass media extension should be particularly encouraged in farming areas with adequate access to media devices and connectivity. However, the form and structure of the mass media extension requires some attention.

5. *Development of an Agricultural Mental Health Policy- MOH, MOFA and MHA*

One key recommendation of this study is that a comprehensive agricultural mental health policy should be developed by the Ministry of Health with support from MOFA and MHA. This policy will adequately address the mental health issues of farming populations. The policy should consider addressing the factors that predispose farmers to mental health problems and address the care and recovery needs.

7.6 Areas for Further Research

Some suggestions for further studies are therefore made, based on the findings of this study. From the findings of the study, research into the coping strategies farmers to adopt to deal with mental health disorders is more relevant. Different coping mechanisms are essential for farmers' mental health policy decisions.

Secondly, the need to explore the help-seeking behaviours of farmers, specifically the people farmers seek help from, the number of times help is sought, and the factors that influence help-seeking among farming populations, especially with male farmers, to identify masculinity issues, could better inform policymakers' decisions in mental health management.

More evidence is required from research on irrigation management or water scarcity on farmer mental health. We need to broadly understand the irrigational factors that predispose farmers to mental health disorders. A qualitative analysis of the effects of irrigation on farmers' mental health must be conducted to know the extent of the relation.

Finally, a study on the role of organizational social support in farmer mental health and its implications should be conducted. This is essential due to the need to know the influence of information seeking and contacts with agricultural organizations on farmer mental health to inform policy decisions better. It is recommended that these studies are conducted in the north and south of Ghana for better comparison.

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APPENDICES

Appendix 1- Interview Guide for Crop farmers

University of Ghana, Legon

Institute of Statistical, Social and Economic Research (ISSER)

PhD in Development Studies

Farmers Interview Guide

This interview is meant to be administered to only cocoa and maize farmers. The interview guide examines the influence of risk factors, gender, and social support on the mental health of cocoa and maize farmers in Ghana. The interview is aimed at obtaining data for a Ph.D. in Development Studies at the Institute of Statistical Social and Economic Research, University of Ghana, Legon. This study is entirely for academic purposes thus; all information gathered would be confidentially treated. You are encouraged to share your experiences on the questions. You are permitted to withdraw from this research if, at any point, you feel uncomfortable or desire to discontinue participating in the study, because penalty is not involved. Thank you.

FARMING RISK FACTORS, GENDER, SOCIAL SUPPORT, AND MENTAL HEALTH OF CROP FARMERS IN GHANA

Objective 1: Explore the institutional and ecological risk factors influencing the mental health of cocoa and maize farmers in Ghana.

Objective 2: Assess the differential effect of gender on the factors influencing the mental health of cocoa and maize farmers in Ghana.

Objective 3: Investigate existing social support systems and their role in the mental health of cocoa and maize farmers in Ghana.

Background Information of participants:

Community/District Name……

Age: ……

Sex: ……

Educational background: ……

Marital status: ……

Status in this community? Native /Migrant

The number of years involved in farming ……

Primary/current occupation ……

Information on farms and crops farmed:

Farm Information	
Major crops farmed	
Farm size (in acres)	
Average farm yield/acre	
Source of labour	

I. Risks factors within cocoa and maize farming influencing the mental health of the farmers

1. Please tell me about your activities as a farmer.
2. What would you say are the challenges you encounter within the cocoa or maize production sector?
3. How do the challenges you have mentioned above affect you?
4. Do you sometimes feel hopeless, worthless, sad, tired, and nervous?
   Probe: If yes, why? If no, why not?
5. What exactly makes you feel sad, hopeless, tired, worthless, and nervous sometimes?
6. Would you say the size of your farm contributes to the way you feel in any way?
   Probe: If yes, How? If no, Why Not?
7. Would you say your crop yield affects the way you feel in any way?
   Probe: If yes, How? If no, why not?
8. Would you say the quantity of crops you may have lost in the field affects how you feel in any way?
   Probe: If so, how? If no, why not?
9. Do you feel your age contributes to the way you feel, as you have mentioned?
   Probe: If yes, How? If No, Why Not?
10. Does your marital status affect the way you feel currently?
    Probe: If Yes, How? If no, Why Not?

II. Differential effects of gender on the mental health of crop farmers

11. Do you think that being a male/female farmer affects your farming/farm work in any way?
    Probe: If yes, how does being a male or female affect your work? If no, why do you say so?

12. Tell me how your farm size affects your feeling as a male/female farmer. If no, why do you say so?
13. Do you feel being a male/female plays any role in how you think your age affects your feelings about your farming/farm work? Please explain how this works? If no, why do you say so?
14. Do you feel being a male/female plays any role in how you think your marital status affects your feelings about your farming/farm work? Please explain how this works? If no, why do you say so?
15. Would you say that access to mechanization affects your feelings in any way?
    Probe: If yes, how does mechanization affect you as a male or female farmer? If no, why do you say so?
16. Would you say the lawful access to the farm/land affects your feelings about your farming in any way?
    Probe: If it does, how does lawful access to a farm affects your feelings as a male/female farmer? If no, why do you say so?
17. If the quantity of your crop loss affects your feelings about your farm in any way, do you think being male/female plays any role in the way you feel about your farm?
    Probe: If yes, how does being a male/female farmer affect your feeling (differently) about your crop losses on this farm?
    If the crop losses do not affect your feelings about your farming, why are your feelings not affected by crop losses? Will you say being a woman/man plays any role in this?
18. Do you have access to all the resources you require for this farm? If no, what resources do you require for this farm but which are not available to you?
19. **Probe:** If there is any such need/lack of the necessary resources for farming, do you think being a male/ female farmer, plays any role in not having the resources you need for your farming?
    Probe: If no, why do you not lack any of the resources you need for your farming? Does being a male/female play any role in this?

III. Forms and the role of social support

20. Have you consulted any organization for support or advice in dealing with the challenges you encounter in your farming?
    Probe: If yes, what are these organizations? Anymore?
    If no, why not?

21. Do you think being a male/female cocoa/maize farmer influences the support you receive from organizations?
    Probe: If yes, tell me about it. If no, why do you say so?

22. Have you sought support for your farming from government extension officers?

Probe: If yes, what support have you received from government extension officers in dealing with the challenges you encounter in farming. Please, tell me more about this support.

23. Have you benefited from agricultural extension through the mass media?
    Probe: If yes, what are the types of mass media? Anymore?
    If no, why not?

24. Have you consulted your family/friends for support or advice in dealing with the challenges you encounter in farming?
    Probe: If yes, who are these relatives/ friends? Anymore? If no, why not?
25. Do you think being a male/female cocoa/maize farmer influences the support you receive from family/friends? **Probe:** If yes, tell me about it. If no, why do you say so?
26. What forms of resource(s)/support from government organizations can help your farming work and reduce psychological distress?

Thank you so much for your time. Do you have any questions for me?

Appendix 2- Interview Guide for Agricultural Extension Officers and Representatives of Cocoa Farmers Association

University of Ghana, Legon

Institute of Statistical, Social and Economic Research (ISSER)

PhD in Development Studies

KEY INFORMANT INTERVIEW GUIDE

This interview is meant to be administered to only key informants. The interview guide examines the influence of risk factors, gender, and social support on the mental health of cocoa and maize farmers in Ghana. The interview exercise is aimed at obtaining data for a Ph.D. at the Institute of Statistical Social and Economic Research, University of Ghana, Legon. This study is entirely for academic purposes, thus, all information gathered would be confidentially treated. You are encouraged to share your experiences on the questions. You are permitted to withdraw from this research if, at any point, you feel uncomfortable or desire to discontinue participating in the study. There will be no penalty if you withdraw from the study. Thank you.

Background Information

Area of jurisdiction ……

Age: ……

Sex: ……

Educational background: ……

Number of years working in the community ……

Primary responsibilities

……...

I. Risks factors influencing the mental health of cocoa and maize farmers

1. Please highlight the activities of cocoa or maize farmers?

2. What would you say are the obstacles the farmers encounter within the cocoa or maize production sector?

3. Would you say the obstacles you have mentioned above affect the way they feel in any way?

Probe: If yes, how do these obstacles affect farmers? If no, why not?

4. Do you think that farmers sometimes feel hopeless, worthless, sad, tired, and nervous?
   Probe: If yes, why do you think so? If no, why not?

5. What exactly makes them feel sad, hopeless, tired, worthless, and nervous sometimes?

6. Would you say the size of their farm contributes to the way they feel in any way?

Probe: If yes, How? If no, Why Not?

7. Would you say the quantity of crops they might have lost in the field affects the way farmers feel?

Probe: If so, how? If no, why not?

8. Would you say the crop yield of farmers contributes to the way they feel in any way?
   Probe: If yes, How? If no, why not?

9. Would you say the lawful access to farm/land contributes to the way farmers feel in any way?

Probe: If yes, How? If no, why Not?

10. Would you say the age of the farmers contributes to the way they feel, as you have mentioned?
    Probe: If yes, How? If No, Why Not?

11. Would you say their marital status affects the way they feel?

Probe: If yes, why do you say so? If no, why do you say so?

II. Differential effect of gender on the risk factors of crop farmers' mental health

12. Do you think that being a male/female farmer affects the farm work of farmers in any way?
    Probe: If yes, how does being a male or female affect their work? If no, why do you say so?
13. Do you think being a male/female plays any role in how their age affects their feelings about their farm work?
    Probe: Please explain how this works? If no, why do you say so?

14. Do you think being a male/female plays any role in how their marital status affects their feelings about their farm work?
15. Tell me how the size of their farm affects their feelings as a male/female farmer.
    Probe: If no, why do you say so?
16. Would you say the lawful access to the farm affects the feelings of the farmers in any way?

    Probe: If it does, how does the lawful access to a farm affects their feelings as a male/female? If no, why do you say so?
17. If the quantity of their crop loses affects their feelings in any way, do you think being male/female plays any role in the way they feel about their farm?

    Probe: If yes, how does being a male/female farmer affect their feeling (differently) about their crop losses on the farm?
    Please explain how this works? If no, why do you say so?
18. Do you think the farmers have access to all the resources they require for their farms? If no, what resources do they require for these farms but which are not available to them?

    Probe: If there is any such need/lack of the necessary resources for farming, do you think being a male/ female farmer, plays any role in not having the resources they need for farming?

    If no, why do they not lack any of the resources they need for farming? Does being a male/female play any role in this?

III. Existing social support systems and the role of social support on the mental health of crop farmers

19. Do you think the farmers consult organizations for support or advice in dealing with the challenges they encounter in your farming?

    Probe: If yes, what are these organizations? Anymore?

    If no, why not?
20. Do you think being a male/female cocoa/maize farmer influence the support they receive from organizations?

    Probe: If yes, tell me about it. If no, why do you say so?
21. Do the farmers seek support for farming from government extension officers?

Probe: If yes, what support do they receive from government extension officers in dealing with the challenges they encounter in farming. Please, tell me more about this support.

22. Do the farmers benefit from agricultural extension through the mass media in dealing with the challenges they encounter in farming?
    Probe: If yes, what are the types of mass media? Anymore?
    If no, why not?

23. Do the farmers consult their family/friends for support or advice in dealing with the challenges they encounter in farming?
    Probe: If yes, who are these relatives/ friends? Anymore?
    If no, why not?
24. Do you think being a male/female cocoa/maize farmer influences the support they receive from family/friends?
    Probe: If yes, tell me about it. If no, why do you say so?

Thank you very much for your time. Do you have any questions for me?

Appendix 3- Ethical Clearance Form

UNIVERSITY OF GHANA
ETHICS COMMITTEE FOR THE HUMANITIES (ECH)

Ref. No.: ECH 135/18-19

26th July, 2019

Ms. Bernice Agyeiwaa Boateng
Institute of Statistical Social and Economic Research
University of Ghana
Legon

Dear Ms. Boateng,

ECH 135/18-19: GENDER, MENTAL HEALTH AND SOCIAL SUPPORT AMONG SMALL-HOLDER COCOA FARMERS IN GHANA.

This is to advise you that the above reference study has been presented to the Ethics Committee for the Humanities for a full board review and the following actions taken subject to the conditions and explanation provided below:

Expiry Date:	26/07/2020
On Agenda for:	Initial submission
Date of Submission:	13/05/2019
ECH Action:	Approved
Reporting:	Annually

Please accept my congratulations.

Ethics Committee for Humanities
26 JUL 2020
Valid Until
University of Ghana

Yours Sincerely,

Prof. C. Charles Mate-Kole.
ECH Vice Chair

Cc: Prof Adobea Yaa Owusu, Institute of Statistical Social and Economic Research, UG.
Dr. Emmanuel Asampong, Department of Social and Behavioural Sciences, UG.
Dr. Charles Ackah, Institute of Statistical Social and Economic Research, UG.

INTEGRI PROCEDAMUS

Appendix 4- Protocol Consent Form

UNIVERSITY OF GHANA

Official Use only Protocol number

Ethics Committee for Humanities (ECH)

PROTOCOL CONSENT FORM

Section A- BACKGROUND INFORMATION

Title of Study:	Gender, Mental Health and Social Support among small-holder cocoa farmers in Ghana.
Principal Investigator:	Bernice Agyeiwaa Boateng
Certified Protocol Number	ECH 135/18/19

Section B– CONSENT TO PARTICIPATE IN RESEARCH

General Information about Research

The broad study is trying to find out how institutional and ecological risk factors, as well as social support and gender in cocoa production, influence the mental health conditions of cocoa farmers. This part of the study specifically aims at understanding how institutional and ecological risk factors in cocoa production influence the mental health conditions of cocoa farmers in Ghana. Also, it seeks to examine how gendered differences in access and control over resources and existing social support systems contribute to the mental health conditions of cocoa farmers and consequently how they impact productivity.

The study is using face-to-face interviews and key informant interviews to obtain responses to the research question. A total sample size of the study is 20, comprising of 16 small-holder cocoa farmers and 4 key informants (extension officers and representatives of cocoa farmers' association). Thus, in all a total of 20 individual interviews will be conducted. The interview is not expected to exceed 1 hour. Depression will serve as the indicator of mental health condition in the study.

Benefits/Risks of the study

There are no direct monetary benefits of this study, but there may be a likely risk of recalling past events which may be disturbing or harmful to participants. The researcher will take responsibility for the situation, or may refer the participant to a health facility if need be. However, participation in the study will help produce knowledge on risk factors involved in

farming and social support issues that puts farmers at risk of mental health conditions. The study will clearly show the differences in access and control of resources and social support systems between male and female cocoa farmers that influences their mental health conditions. In so doing, issues which affect access and control of resources among cocoa farmers can be refined to help safeguard their livelihoods to improve growth in the agricultural sector.

Confidentiality

Information will be anonymously collected from participants and will be kept as confidential as possible. This will help to protect the identity of participants from anyone who may handle the data at any point. To ensure that the data is secured, transcriptions and analysis will be carried out on computers provided for by the investigator. The findings will, however, be accessible to other students and research for reference.

Compensation

No form of compensation will be given for participation in this study. Participation is entirely voluntary.

Withdrawal from Study

Participation in this study is voluntary. You are therefore free to withdraw or discontinue your participation in the study if at any point you feel uncomfortable. The researcher will not hold any grudge against you for choosing to withdraw from this study. You may choose to answer or not answer a question depending on how you are comfortable with it. The interview may also be rescheduled if you like to meet at a different date to continue. But if there is further help needed in dealing with some psychological issues, the participant will be referred for counseling in a health facility.

Contact for Additional Information

If you wish to raise any concerns relating to this study or any harm or injury brought to you due to this study, you may please contact: Email: benny.essien@gmail.com; Phone: + 233 243 219736. Or Rev. Prof. Adobea Yaa Owusu . Email: ayowusu@ug.edu.gh Address: Institute of Statistical Social and Economic Research (ISSER), University of Ghana, Legon, P.O. BOX LG 74, Legon, Ghana.

If you have any questions about your rights as a research participant in this study you may contact the Administrator of the Ethics Committee for Humanities, ISSER, the University of Ghana at ech@isser.edu.gh / ech@ug.edu.gh or 00233- 303-933-866.

Section C- PARTICIPANT AGREEMENT

"I have read or have had someone read all of the above, asked questions, received answers regarding participation in this study, and am willing to give consent for me, my child/ward to participate in this study. I will not have waived any of my rights by signing this consent form. Upon signing this consent form, I will receive a copy for my personal records."

_____

Name of Participant

_____ _____

Signature or mark of Participant Date

If participants cannot read and or understand the form themselves, a witness must sign here:
I was present while the benefits, risks and procedures were read to the volunteer. All questions were answered and the volunteer has agreed to take part in the research.

_____
Name of witness

_____ _____
Signature of witness / Mark Date

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

_____
Name of Person who Obtained Consent

_____ _____
Signature of Person Who Obtained Consent Date