GENDER DIFFERENCES IN DEPRESSIVE SYMPTOMS
IN KUMASI, GHANA

by
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in conformity with the requirements for the degree of Doctor of Philosophy

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DISSEMINATION ABSTRACT

Background

Depression is an important public health issue globally, and accounts for an increasingly large proportion of disease burden in low-income countries. Depression is twice as common in women as men. Despite the public health importance, very little research has been done on depression in low-income countries, especially outside the post-partum period. This dissertation uses a mixed methods approach to assess gender differences in depressive symptoms in a peri-urban area near Kumasi, Ghana.

Methods

This research was embedded within the Family Health and Wealth Study, an ongoing cohort study. Results and analyses are presented in three manuscripts. The first manuscript addresses the results of focus group discussions with FHWS participants and in-depth interviews with community care providers. Qualitative data analysis included reading, coding, displaying data, and data reduction. The second manuscript contains the results of mixed methods analyses to assess the internal consistency reliability, face validity, content validity, and construct validity of a ten-item version of the Center for Epidemiologic Studies Depression (CES-D) Scale. In the third manuscript, we present the results of a series of Tobit regression models identifying factors associated with depressive symptoms for men and women, and statistical differences between groups.

Results

Our qualitative data analyses reveal a possible conceptual model for depression in the study community, including description of potential causes, consequences, and treatments for
depression. Common causes described for men and women differ, but both are rooted in a combination of family/relationship and economic factors. Our quantitative results indicate adequate reliability and validity of the ten-item CES-D Scale in the study community. The addition of locally-relevant symptom groups would improve the scale’s validity. The following characteristics were associated with more depressive symptoms in combined regression models for men and women: having a larger education difference with one’s partner, higher commitment, lower communication, and partner’s higher CES-D score. There were significant interaction effects between sex and relative SES and self-rated health.

Conclusions

The results of this dissertation provide information on the experiences of depressive symptoms in peri-urban Ghana. The findings can be used to inform future research and interventions to address depression in sub-Saharan Africa.
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CHAPTER ONE: INTRODUCTION
Background and Significance

The 2004 Global Burden of Disease Study estimated that unipolar depressive disorder was the leading cause of disease burden (morbidity and mortality combined) for women globally, including in low-income countries. (1) This condition was estimated as the third most important cause of disease burden for men and women combined globally, and the eighth most important in low-income countries. (1) The 2010 GBD estimates indicate the growing importance of mental health worldwide: the number of DALYs attributed to mental and behavioral disorders increased by 38% between 1990 and 2010. (2) Beyond the changing global impact of mental illness, research in diverse populations indicates that incidence and prevalence of depression is approximately twice as common for women than men. (3,4) However, gender differences in mental illness in low-income countries have been largely unexplored by public health researchers. In reporting on the GBD Study findings, Ustun and Chisolm (4) emphasize the need for more research in developing countries on the epidemiology of mental health disorders in order to “mainstream” these issues into public health interventions. Despite some progress in building an evidence base for mental health promotion in low-income settings, there remains a persistent need to identify risk and protective factors and develop effective interventions. (5)

The purpose of this dissertation is to explore gender differences in depression in a peri-urban area near Kumasi, Ghana. This study adopts a mixed-methods approach to understanding local attitudes and perceptions of mental health, as well as to identifying factors associated with depressive symptoms in men and women in the study setting. The data also provide an opportunity to explore the reliability and validity of a commonly used self-report measure of depressive symptoms in the study setting. The results can be used to
inform future research and interventions on gender and depression in similar settings.

**Depression as a Public Health Problem**

The results of the Global Burden of Disease study show clearly that, in terms of disease burden, mental illness is of public health significance for men and women in low-income countries. (1) With a median one-year prevalence of 5.3% (IQR: 3.6-6.5), major depressive disorder is one of the most common psychopathologies worldwide. (6) Mental illness is also linked to numerous other health and development outcomes, including child growth faltering, poverty, and chronic and infectious disease. (7-9) Through a systematic review, Eaton and colleagues found that the risk of all-cause mortality among those with major depressive disorder is 70% higher than in the general population (median RR: 1.7, IQR: 1.3-2.2). (6) Evidence also indicates that infants of depressed mothers experience more growth faltering and more diarrheal episodes than infants of non-depressed mothers. (10)

Both poverty and education have a bidirectional relationship with depression. Social causation theory argues that people living in poverty are at an increased risk of developing mental disorders due to factors such as stress and malnutrition, while social drift theory contends that people living with mental disorders are more likely to fall into poverty due to exclusion and stigma. (11) A systematic review of the relationship between depression and poverty in middle and low-income countries revealed a consistently positive relationship overall, although certain manifestations of poverty, such as food insecurity and inadequate housing, appear most strongly related to depression. (12) Similarly, while education is potentially protective against development of mental health disorders, the existence of disorder also makes educational attainment more difficult. (11) In a cross-national study of
depression, Van de Velde and colleagues found that, while higher socioeconomic status was associated with lower risk of depression overall, this relationship differed for men and women. For example, they found that education was more strongly protective against depression for women than men. (3)

Depression and Gender

Incidence and prevalence of major depressive disorder (MDD) is higher among women than men. (13,14) This finding has been replicated across numerous settings and studies. For example, Tomita and colleagues found that depressive symptoms, measured by a 10-item version of the CES-D, were significantly higher for women than men in a nationally representative survey in South Africa. (15) Chipimo and colleagues also found mental distress, measured by the SRQ-10, to be significantly higher among females than males in Zambia. (16) Gender stratification theories argue that gender inequalities in health outcomes are a result of disparities in power and opportunity in societies. (17) Reflecting this idea, in a review of the evidence on gender differences in depression, Parker and Brotchie note that differences are less pronounced in homogeneous community samples (e.g. by education, culture). They weigh arguments in favor of both an artifactual explanation (e.g. women are more likely to seek help) as well as real differences in risk (e.g. women are biologically more predisposed to developing depression; women are exposed to more risk factors for depression). They conclude that women are both more predisposed (i.e. due to biological or genetic factors) and are also exposed to greater social stressors, increasing their risk further. (13)
Study Setting

Ghana is located on the West African Coast, and is bordered by Togo, Burkina Faso, and Cote d’Ivoire. It has ten administrative regions divided into 170 governing districts. (18) The World Bank considers Ghana to be a lower middle-income country, with a gross national income (GNI) per capita of US $1,230. (19) According to the United Nations Development Programme, Ghana has recently transitioned from being a “low human development” country to a “medium human development” country, and is now ranked 135 out of 187 countries based on its human development index. (20) Ghana has seen important improvements in major health indicators over the last two decades, such as a drop in the under-five mortality rate from 155 in 1988 to 80 in 2008. Although the gender gap in education is small at the primary and secondary levels, the majority of children of both sexes do not complete secondary school. (18) 78% of adult women and 81% of adult men are literate. Ghana has seen indications of downward trends in HIV prevalence over the last decade, with a 2009 population prevalence of 1.9%. Sentinel surveillance data indicate that HIV prevalence varies by region, however, and prevalence in Kumasi is closer to 4% of the population. (21)

Population Structure and Fertility in Ghana

Ghana has been experiencing steady population growth since the first post-independence census in 1960, increasing from 14.8 million in 1990 to 19.2 million in 2000, and again to 24.4 million in 2010. (18) Despite continued population growth, Ghana has made progress in achieving the government’s target total fertility rate (TFR) of 4.0, one of the lowest in sub-Saharan Africa. The TFR is higher for women with less education and women living in poorer households. The median age at first birth in Ghana is 20.7 years. (18) 58% of
Ghanaian women of reproductive age are in long-term unions compared to 48% of men of reproductive age. Polygyny, a cultural practice in which men have multiple wives, is common in Ghana, with 18% of currently married women and 9% of currently married men in polygynous unions. As of 2008, 36% of married women had an unmet need for family planning. There was little change in levels of unmet need for family planning among married women between the 2003 and 2008 DHS. (18) Fertility is highly valued in Ghana, and recent qualitative research in northern Ghana found that both men and women believed that contraceptive use and abortion cause infertility. (22) Evidence also indicates that women suffer disproportionately, including in terms of mental health, when couples struggle with infertility. (23)

**Depression in Ghana**

Although nationally representative data on mental health in Ghana do not exist, several smaller studies have addressed this issue. Through the Women’s Health Study, following 2814 adult women from the Accra area, de Menil and colleagues found that low levels of education, poverty, and unemployment were associated with poor mental health. In addition, women who reported either taking prescription medication, or having headaches in the last month, or women who had ever been pregnant, reported more mental illness symptoms. (24) A recent study on bullying and mental health with senior high school students in Ghana found that 16.5% of students reported suicidal ideation in the previous year, although a more complete measure of depressive symptoms was not included. (25) Also, in a hospital sample of pregnant women in Kumasi, 27% of women met criteria for major depression, and depression accounted for a substantial proportion of self-reported disability. (26)
Through the Mental Health and Poverty Project (MHaPP), Ofori-Atta and colleagues conducted a qualitative study with healthcare providers from five regions in Ghana to explore local understandings of mental illness. (27) They found that respondents attributed mental illness in women to three main causes: inherent vulnerability (e.g. women cannot handle stress as well as men), witchcraft, and gender disadvantage (polygyny, physical abuse, and poverty). Another recent study on mental health in Ghana examined official police records to assess reasons for suicidal behavior. Although social stigma and the threat of prosecution for survivors likely produced biased data, the authors found that 95% of people undertaking reported suicidal behavior between 2006 and 2008 were men, and the most common reason attributed to the behavior was to avoid public dishonor (34%), while an additional 10% were attributed to sexual impotence or suspecting a wife/partner of having an affair. (28)

Work on mental health in Ghana also indicates some opportunities for future interventions. For example, the government of Ghana revised its mental health policy in 2000 to emphasize decentralization and community-based interventions. However, following the 2000 revision, Bhana and colleagues found that many healthcare providers were unaware of the current mental health policy, and the government continued to allocate inadequate resources to its implementation. (29) The Parliament of Ghana passed a new Mental Health Act (Act 846) in March 2012 that, among other stipulations, creates a Mental Health Service, including establishment of regional and district oversight committees to ensure that the law is being implemented as designed. Despite the government’s support for more widespread mental health services, Human Rights Watch has raised concerns about the new law’s
endorsement of involuntary admission and treatment of individuals judged to be mentally ill, without legal recourse. (30)

**Theory and Conceptual Framework**

The conceptual framework for this research draws on several related theories and bodies of literature, including work to identify the events and situations that cause stress across populations and by gender, and work to understand the impact of stress on mental health.

*What causes stress?*

Stress is defined as events or conditions that objectively threaten the physical and/or psychological health or well being of individuals of a particular age in a particular society. (14) There is a growing body of literature, mostly from high-income countries, exploring the causes of stress and its impacts on physical and mental health. Exposure to stress has often been assessed through straightforward life events scales. (14) One widely used example is the Social Readjustment Rating Scale (SRRS), which ranks positive and negative life events in terms of the readjustment required to adapt to each event. The SRSS ranks events on a scale of 1 to 100, such as death of a spouse (100) or close family member (63), pregnancy (40), and change in the number of arguments with a spouse (35). (31) Rather than capturing chronic exposures, this scale focuses on recent events or changes in conditions, such as changes in financial circumstances rather than chronic poverty. Some researchers have argued that stress measures based on life events might not be appropriate for all populations, in part because they fail to capture chronic stressors. For example, Watts-Jones developed the African American Women’s Stress Scale (AWSS), focused on chronic and acute situations, such as inadequate resources, relationship dissatisfaction (e.g. partner is
possessive), role functioning (e.g. being a single parent), and racism. (32)

The concept of embodiment can be used as a broad theoretical framing for the ways that stress impacts health across the life course. Krieger defines embodiment as “how we literally incorporate, biologically, the material and social world in which we live, from in utero to death.” (33) For example, in a recent cross-sectional study, Krieger and colleagues found that both U.S. born and foreign born working class Black Americans had nearly seven times the odds of reporting severe psychological distress if they had experienced high (vs. no) racial discrimination. (34) Continuing the causal chain, the Whitehall II study found that women who reported psychosocial stress at work were nearly twice as likely to develop Type II Diabetes over a fifteen year follow-up period, compared to women who did not report psychosocial stress; there was no effect for men. (35) In terms of gender, mental health researchers have argued that gender norms and their effects, such as lower self-esteem and tendency toward internalizing behaviors for women, result in both increased exposure to stress and decreased ability to cope with stress for women compared to men. (13,36) For example, in a recent Australian study of gender differences in coping with workplace stress, Watson and colleagues (2011) found that women experience stress in response to primary appraisal (is this situation a threat?), while men experience stress in response to secondary appraisal (do I have the resources to deal with this threat?) (37) Embodiment captures the idea that mental and physical health are not only influenced by immediate events (e.g. loss of a family member, exposure to pathogens) but also by situations and exposures that occur over the life course and across multiple domains of an individual’s life, including discrimination, access to resources, and empowerment. (33) Health outcomes, such as depression, can be seen as the sum total of those exposures.
How does stress impact mental health?

Hankin and Abela describe a series of vulnerability-stress models of psychopathology as useful theoretical frameworks for understanding the factors contributing to the development of mental health disorders, including depression. (14) Vulnerability-stress models broadly capture the idea that mental illness results from combined exposure to stress and vulnerability (see Figure 1.1). Vulnerabilities are endogenous stable traits (e.g. genes, sex, personality) that make the development of a disorder possible. (14) A threshold version of these models posits that vulnerability factors establish different stress thresholds for individuals, after which point they develop disorders. For example, neuroticism is a stable trait (vulnerability) that tends to be more common in women than men, (13) while caretaking for dependents is a gender role assumed by many women that potentially increases exposure to stress. (17)

While vulnerability stress models capture the general role of stress in increasing risk of mental disorders, stress process models focus on the pathways for specific mental health outcomes. These models have guided much of the research seeking to identify social risk factors for depression. For example, Pearlin describes a stress process model of the pathways from disruptive job events to depression, including changes in economic pressures, mastery, and self-esteem. (38) A key feature of stress process models

Figure 1.1: Vulnerability Stress Model of Depression
is an emphasis on the ways in which social disparities determine differential exposure to acute stressors. (36) Stress process models are also useful in examining moderators and mediators of the relationships between exposures, stress, and depression. In the context of these models, mediators are caused or activated by the stressful exposure, and help to explain (conceptually and statistically) the relationship between the stressor and the mental health outcome. In contrast, moderators are characteristics of the person (or her environment) that existed prior to the stressful exposure, (14) and affect the direction or strength of the relationship between a stressor and a mental health outcome. (39) While the designation of a variable as a mediator or moderator should be made on theoretical grounds, in some cases, the same characteristic can act as either a mediator, or a moderator, or both. (39)

Turner and Lloyd sought to operationalize a stress process model of the relationship between stress and depression by testing a series of stress process components (social stress, emotional resilience, self-esteem, mastery, assertion of autonomy, and social support) as mediators of the relationships between social risk factors (gender, age, and marital status) and depression. They found all hypothesized stress process components, with the exception of social support, to be significant predictors of depression, explaining 23% of the gender gap in depression. (36) More recently, Thoits identified social support as one of the most important moderators of the relationship between stress and depression that has emerged from the cumulative research on this topic. (40) In measuring social support, mental health research has tended to focus on parenting influences for children, peer influences for adolescents, and romantic/sexual partner influences for adults. (14)
Conceptual Framework

The conceptual framework for this study seeks to capture potentially relevant components of embodiment theory, vulnerability stress models, and stress process models, as well as previous research on the roles of acute and chronic stressors in increasing the risk of depression (see Figure 1.2). Embodiment theory and the role of chronic stressors is captured through factors such as infrastructure, cultural norms, and gender power dynamics in relationships. Potential acute stressors are also listed, including loss of a child and loss of employment. While measures of exposure to stress have been validated in different populations, it is likely that the events and situations that cause stress vary across individuals, time, and location. Therefore, one goal of this research is to further elaborate the conditions and events that cause stress in the study population. Gender and marital status are presented as both potential stressors and moderators of the relationship between stress and depressive symptoms. The framework also presents several factors (e.g. social support, personality) that could potentially act as mediators or moderators in the relationship between stressors and depressive symptoms. An analytical framework, or simplified version of the conceptual framework that will guide the quantitative analyses, is presented in Chapter Two.
Figure 1.2. Conceptual Framework

Study Aims and Hypotheses

The study aims and hypotheses are listed below. The analyses for all aims include data on married and cohabiting couples in Kumasi, Ghana. The qualitative data (used in Aims 1 and 2) also include male and female community mental healthcare providers.

**Aim 1:** Explore local understandings of depressive symptoms, their risk and protective factors, and common treatments and outcomes.

<table>
<thead>
<tr>
<th>Sub-Aim</th>
<th>Hypothesis</th>
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<tbody>
<tr>
<td><strong>1.a</strong> Through focus groups with women and men from the study community, explore local understandings of depressive symptoms, their causes and consequences, and common treatments.</td>
<td>No hypothesis.</td>
</tr>
<tr>
<td><strong>1.b</strong> Through in-depth interviews with community mental healthcare providers, explore local understandings of depressive symptoms, their causes and consequences, and common treatments.</td>
<td>No hypothesis.</td>
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</table>
**Aim 2**: Assess the reliability and validity of a 10-item version of the Center for Epidemiologic Studies Depression (CES-D) Scale for women and men in the study community.

<table>
<thead>
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<th>Sub-Aim</th>
<th>Hypothesis</th>
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<tbody>
<tr>
<td>2.a</td>
<td>Assess internal consistency reliability of a 10-item version of the CES-D scale.</td>
</tr>
<tr>
<td>2.b</td>
<td>Assess validity of a 10-item version of the CES-D scale using qualitative and quantitative data.</td>
</tr>
<tr>
<td>2.c</td>
<td>Compare reliability and validity of a 10-item version of the CES-D scale between men and women.</td>
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**Aim 3**: Examine associations between stressors and depressive symptoms for women and men in the study community.

<table>
<thead>
<tr>
<th>Sub-Aim</th>
<th>Hypothesis</th>
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<tr>
<td>3.a</td>
<td>Examine associations between stressors and depressive symptoms separately for men and women in the study community.</td>
</tr>
<tr>
<td>3.b</td>
<td>Examine whether sex moderates the associations between stressors and depressive symptoms in the study community.</td>
</tr>
</tbody>
</table>

**Dissertation Overview**

This dissertation is organized around three analytic papers examining aspects of gender differences in depressive symptoms in Kumasi, Ghana.

Chapter Two describes the methods used to collect and analyze the data for this dissertation. The quantitative data were collected through the Family Health and Wealth Study. A measure of depressive symptoms was added after the most recent round of data collection was completed. Chapter Two also describes the collection and analysis of qualitative data.
through focus groups with FHWS participants and in-depth interviews with community mental healthcare providers.

Chapter Three is the first of three manuscripts, titled, *A Conceptual Model of Depression among Men and Women in Kumasi, Ghana: A Qualitative Study*. This chapter presents a conceptual model of depression in the study community, capturing local understandings of depressive symptoms, risk and protective factors, and common treatments and outcomes. Important themes emerging from the qualitative research are presented and compared through a gender lens.

Chapter Four, the second manuscript, is titled, *Reliability and Validity of the CES-D in Men and Women in Kumasi, Ghana: A Mixed Methods Study*. This chapter addresses the reliability and validity of a ten-item version of the Center for Epidemiologic Studies Depression Scale. Quantitative analyses include internal consistency reliability, confirmatory factor analysis, and exploratory factor analysis. These results are supplemented with qualitative data identifying local perceptions of depressive symptoms. Recommendations for future measurement of depressive symptoms in the study community are presented.

Chapter Five, the third and final manuscript, is titled, *Gender Differences in Factors Associated with Depressive Symptoms among Couples in Kumasi, Ghana*. Results from a series of Tobit regression models for men and women are presented to identify factors associated with depressive symptoms in each group. Based on these results, a Tobit regression model combining men and women is presented, identifying interactions by sex.
The final chapter, Chapter 6, includes a summary of conclusions related to gender differences in depression in Kumasi, Ghana. This chapter also outlines future opportunities to apply and integrate these findings in research and practice.
Chapter One References


(18) Ghana Demographic and Health Survey. September 2009.


CHAPTER TWO: METHODS
The current study utilizes a mixed methods approach to exploring gender differences in depressive symptoms in Kumasi, Ghana. The specific methods used for each manuscript are described in detail below.

**Quantitative Data Collection Methods**

*Study Sample*

The Family Health and Wealth Study (FHWS) is a multi-country longitudinal open cohort study that aims to examine individual and household level health and economic consequences of family size. Operating in six study sites across five African countries (Ghana, Ethiopia, Malawi, Nigeria, and Uganda), FHWS enrolled cohorts ranging in size from 500 to 799 families in each site. FHWS is located in peri-urban areas of each country based on the assumption that contraceptive use in these areas is likely to be moderate, so variations in outcomes due to family size should be observable. The FHWS survey, administered individually to husband-wife pairs (or cohabiting pairs), includes questions on the following areas, among others: contraceptive use, fertility history, fertility preferences, health status, socio-economic status, and relationship quality. Prior to recruitment for the FHWS, a household enumeration was undertaken in the target communities to inform a sampling frame. Exclusion/inclusion criteria were also established, which included age (15-44 for women, 18-59 for men), relationship status (married or cohabiting), and residence within the study area. These criteria, along with the sampling frame, were used to randomly select households for participation. In polygynous households or households with multiple families, one wife/couple was selected randomly for participation. All participants provided informed consent, obtained through culturally appropriate procedures, before participation.
The Ghana FHWS study communities are located near Kumasi, the second largest city in the country, in the Ashanti administrative region. Participants were recruited from the Asokwa sub-metropolitan area outside of Kumasi. The Asokwa area has an estimated 500,000 inhabitants living in 56 communities. (1) The study site is divided into four areas within Asokwa: Oforikrom (site A), Asawase (site B), Adukrom (site C), and Asokore Mampong (site D). The FHWS is implemented in collaboration with the Kwame Nkrumah University of Science and Technology (KNUST), whose researchers have experience conducting similar research. KNUST has a close partnership with the Bill & Melinda Gates Institute of Population and Reproductive Health at the Johns Hopkins Bloomberg School of Public Health.

In the Ghana FHWS site, the 2010 baseline study included 799 married or cohabiting couples. The response rate was 96.7% (27 couples declined participation). Both members of all couples provided informed consent before participation began. The second round FHWS data were collected over a period of eight months between September 2011 and May 2012, and included a similar survey to the one used at baseline. The study team was able to locate 644 out of the original 799 couples (81%). The primary reason for loss to follow-up was migration due to work. The average lag time between baseline and follow-up survey administration within households was nineteen months. An additional 168 couples were recruited at follow-up and provided responses to the baseline FHWS survey. Out of the follow-up sample, 44 men and 21 women refused or were unavailable to respond (see Figure 2.1).
Center for Epidemiologic Studies Depression (CES-D) Scale

The CES-D was originally developed in the early 1970s by the Center for Epidemiologic Studies at the U.S. National Institute of Mental Health (NIMH) to assess the epidemiology of depressive symptoms in the general population, including relationships between depressive symptoms and other variables. (2) It is designed as a self-reporting tool that can be administered by lay interviewers. In contrast to diagnostic tools used during clinical intake, the CES-D was developed to measure depressive symptoms – with a focus on depressed mood – that might accompany different clinical diagnoses, including normal. (2)

At the time when the original CES-D scale was designed, the second version of the Diagnostic and Statistical Manual (DSM) identified six major components of depression symptomatology: depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. The twenty items included in the original scale were identified from existing self-reporting tools (e.g. Beck Depression Inventory), clinical literature, and factor analysis. (2) The CES-D included a few items to assess each of the DSM symptom groups, and several were worded in the positive direction to assess positive affect and prevent acquiescence bias. In the twenty-item version of the CES-D, respondents are asked to tell the interviewer how often they have felt a certain way over the preceding week, with four response options: rarely or none of the time (less than 1 day), some or a little of the time (1-2 days), occasionally or a moderate amount of time (3-4 days), most or all of the time (5-7 days). (2)

Validity and reliability of the original scale was assessed in U.S. psychiatric clinic and population samples. In the original validation study in the US, Radloff found that the 20-
item CES-D had a four-factor structure: depressed affect, positive affect, somatic and retarded activity, and interpersonal symptoms. (2) This factor structure was consistent across age groups, sex, racial groups (black and white), levels of education, and “help groups” (individuals who reported they needed help with an emotional problem in the previous week). Although the CES-D is not diagnostic, it was designed to discriminate between patient and general population groups, be sensitive to levels of depressive symptomology severity, and be sensitive to certain life events. The CES-D can be used to identify high-risk population groups in need of intervention, and to identify correlates of depressive symptoms. (2)

Numerous shortened versions of the CES-D scale have also been validated. (3-5) A ten-item version of the CES-D, with two response options (yes/no), was validated by Irwin and colleagues in an elderly U.S. population. (3) It includes questions intended to capture each of the four factors from original validation studies. (2) Table 2.1 displays the CES-10 version used in this dissertation, as well as the hypothesized factor associated with each scale item.

<table>
<thead>
<tr>
<th>Item</th>
<th>Question (in the past week…)</th>
<th>Hypothesized Factor (Radloff 1977)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I felt depressed</td>
<td>Depressed Affect</td>
</tr>
<tr>
<td>2</td>
<td>I felt everything I did was an effort</td>
<td>Somatic and retarded activity</td>
</tr>
<tr>
<td>3</td>
<td>My sleep was restless</td>
<td>Somatic and retarded activity</td>
</tr>
<tr>
<td>4</td>
<td>I was happy</td>
<td>Positive Affect</td>
</tr>
<tr>
<td>5</td>
<td>I felt lonely</td>
<td>Depressed Affect</td>
</tr>
<tr>
<td>6</td>
<td>People were unfriendly</td>
<td>Interpersonal Symptoms</td>
</tr>
<tr>
<td>7</td>
<td>I enjoyed life</td>
<td>Positive Affect</td>
</tr>
<tr>
<td>8</td>
<td>I felt sad</td>
<td>Depressed Affect</td>
</tr>
<tr>
<td>9</td>
<td>I felt that people disliked me</td>
<td>Interpersonal Symptoms</td>
</tr>
<tr>
<td>10</td>
<td>I could not get going</td>
<td>Somatic and retarded activity</td>
</tr>
</tbody>
</table>
To our knowledge, the CES-D scale has not been previously validated in a sub-Saharan African population.

Collection of depressive symptom data

The FHWS study team agreed to include a depressive symptom questionnaire for the second round of data collection. Five potential measures of depressive symptoms were identified, based on previous research validating them in low-income settings. The local study team reviewed these measures, and selected the ten-item CES-D scale based on a belief that these questions would be most appropriate in the study setting, and the simplicity of the measure would be most feasible.

Data on depressive symptoms were initially collected during the FHWS follow-up data collection process in 2011 and 2012 described previously. However, during data entry the survey pages including the CES-D responses were detached from the rest of the survey, and they did not include household IDs or sex of respondents. As a result, the study team re-collected the depressive symptom data in September and October 2012. During the second attempt at depressive symptom data collection, the study team identified 657 men (86% of follow-up respondents) and 716 women (91% of follow-up respondents) in the study population. The average lag time between the follow-up survey administration and depressive symptom data collection was ten months. In Chapter Four, we analyze the reliability and validity of the 10-item CES-D scale. For those analyses we dropped 22 men and 11 women with incomplete data on key covariates (age, education, religion), for a final analytic sample of 635 men and 705 women. In Chapter Five, we conduct a series of regression models for men and women including their partner’s covariates. Because these
analyses required complete couple data, we dropped 93 men and 163 women for whom partner data were not available. The final analytic sample for Chapter 5, therefore, was 542 men and women in couples (see Figure 2.1). Table 2.2 compares means/proportions on key variables in the final analytic sample for Chapter Five with the dropped observations. For both men and women, the mean CES-D score was significantly higher in the dropped observations than in the analytic sample. For men, the mean values for age and biological children were higher in the analytic sample, while the mean value for trust was lower. For women, the mean commitment, trust, and communication scores were significantly different between the two samples – in all cases higher in the analytic sample.

Our assumption is that data are missing at random, meaning that the probability that CES-D scores are missing depends on values of the independent variables, but not on the values of the missing CES-D scores. (6) Since CES-D score is our key dependent variable, we chose not to impute missing values. However, in order to assess the impact of missing values on independent variables, we created a complete dataset using hotdeck multiple imputation methods to replace missing data on independent variables. (6) To assess the impact of missing data on the analyses in Chapter Four, we compared the means and proportions on key independent variables between the analytic dataset (n = 635 for men, n = 705 for women) and the complete imputed dataset (n = 657 for men, n = 716 for women), as shown in Table 2.3. The approximate means/proportions and statistical significance of tests for differences between men and women remained the same across three rounds of imputations. To assess the effect of missing data on the analyses in Chapter Five, we compared the results of bivariate Tobit regression models between the complete imputed dataset (n = 657 men and n = 705 women) and the analytic dataset (n = 542 men and n = 542 women). As shown
in Tables 2.4 and 2.5 the directions and approximate magnitude of all estimates remained the same, although several estimates changed statistical significance (satisfaction for men; education, education difference, and parity for women).

We then examined the distributions of CES-D scores by sex and study site. Figures 2.2 and 2.3 show histograms of CES-D scores by site for men and women, respectively. Table 2.6 presents the response patterns to each scale item by sex and study site. For men and women in all sites, a large proportion of respondents did not report any depressive symptoms (score of 0), as is expected with this scale. However, this proportion varied by site. Comparing the men’s responses across the four study sites, more than 80% of men in both sites C and D reported no depressive symptoms, while approximately 20% of men in sites A and B reported no depressive symptoms. We saw a similar pattern in the women’s data, where 56% and 23% of women in sites A and B, respectively, reported no depressive symptoms, compared to 71% and 82% of women in sites C and D, respectively. Even more striking, in site C there were only two response patterns for women: all depressive symptoms (29%) or no depressive symptoms (71%). The women in site D displayed a similar, but less extreme, pattern. While we expected a floor effect at 0, the extreme patterns in the women’s data in sites C and D were not expected. We therefore took several steps to check the accuracy of these data. We first re-entered all CES-D data by hand, then met with the research assistants from each site to ensure that they had collected the data in accordance with the study protocols. We also compared the data response patterns from the second round of CES-D data collection to the first round (which did not include household IDs or sex), and found similar patterns. As a final step, we examined the differences in key variables across sites, to assess whether differences between study sites should be expected. Table 2.7 presents the
key study variables by sex and site. The most striking difference between study sites was in religion. In sites A and B, approximately 67% of respondents were Christian, compared to approximately 22% in site C and 51% in site D. In discussing the different CES-D results by site, the research assistants reported their belief that Muslim respondents were less likely to report depressive symptoms. While the mean CES-D scores were lower for men in sites C and D, this difference was not as pronounced for women in those sites. Because research assistants were assigned to sites, it is impossible to tease out potential interview effects from site effects. However, the variables in our regression models do not fully account for the differences in responses across sites. To address this concern, all regression models were adjusted for clustering by site, which has the effect of producing more conservative standard errors (and t-tests), but does not change mean estimates. (7)

Quantitative Data Analysis

Reliability and validity of the CES-D 10 scale

The appropriateness of a scale in measuring a latent variable can be assessed in several ways. One attribute of a well-performing scale, reliability, is defined as the proportion of variance attributable to the true score of the latent variable. (8) We assessed internal consistency reliability of the CES-D scale using Cronbach’s alpha. (9) This measure quantifies inter-item correlations, which demonstrate the extent to which scale items measure the same underlying construct in a study sample. An alpha value between 0.70 and 0.80 provides evidence of an internally consistent scale. Low internal consistency most often indicates one of two issues: 1) the items do not effectively measure the underlying construct, or 2) the items measure more than one underlying dimension. (8) In the original validation study,
Radloff and colleagues reported Cronbach’s alpha values ranging from 0.84-0.90 in four samples. (2)

We used both confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) methods to examine the construct validity of the CES-D scale in this population. (10) Confirmatory factor analysis is a type of structural equation modeling that deals with the measurement model, or relationships between observed indicators and latent variables. CFA is hypothesis driven, meaning that the researcher must have a priori knowledge of the number of factors in the model, and which indicators are related to which factors. (10) In contrast, EFA is a data-driven descriptive technique that is used to determine the appropriate number of common factors and provide evidence of which measured variables are useful indicators of those factors. In scale development, EFA can be used when insufficient theory or evidence of a scale’s structure exist, or when the hypothesized structure does not fit the data. (10, 11)

We initially used CFA to determine whether the four-factor model shown in Table 2.1 fit the data for men and women in the study population. We conducted these analyses separately for men and women, and then compared the results across groups. Since all indicators in the scale are dichotomous, we used robust weighted least squares (WLSMV) estimation for our CFA models. (10) Although dichotomous data require a larger sample size than continuous data to conduct CFA, samples of 150 to 200 observations are sufficient for medium-sized models (10 to 15 indicators) when using WLSMV estimation. (8,10) For both men and women, we were unable to generate valid coefficient estimates for the four-factor model because the residual covariance matrix (psi) was not positive definite. After examining the
model results, we combined highly correlated factors to address this issue. (12) The final CFA models for both men and women (described in detail in Chapter Four) were one-factor models including seven of the ten scale items (excluding sad, dislike, and happy due to high correlations between these indicators). Analyses were conducted using STATA/SE version 13.0 and Mplus version 7.

To supplement the CFA results, and provide further insight into the selection of final models, we conducted EFA for men and women using principal factor estimation. For both men and women, the EFA results provided further support for a one-factor model (presented in Chapter Four). We chose not to include the results from the final CFA models in Chapter Four because they reinforce the results of the EFA models. Table 2.8, which presents those CFA results, compares the completely standardized parameter estimates and item communalities from the one-factor CFA models for men and women. All parameter estimates were statistically significant (p < 0.0001) and had small standard errors. For example, the parameter estimates for lonely indicated that a one-unit increase in the depressive symptom factor was associated with a 0.75 unit increase in the lonely item for men, but a 0.98 unit increase in the lonely item for women. Similarly, the communality estimate for this item indicated that the underlying depressive symptom factor explained 56% of variance in the lonely item for men, but 89% of variance in the lonely item for women. (10,11) Overall these results revealed relatively higher communalities, and higher magnitude coefficients, for women compared to men on all items. While all coefficients were statistically significant, for men the relatively lower communalities for the lonely (56%) and unfriendly (47%) items compared to women (89% on lonely and 80% on unfriendly) indicated that those two items
were more closely associated with the underlying factor (depressive symptoms) for women than they were for men.

**Identifying factors associated with depressive symptoms**

Chapter Five of this dissertation presents the results of a series of regression models identifying factors associated with depressive symptoms. The analytic framework used to inform the analyses in Chapter Five is presented in Figure 2.4. It is a modified version of the conceptual framework presented in Chapter One based on available data and the results of the qualitative data analyses.

![Figure 2.4 Analytic Framework for Chapter Five](image)
Key independent variables

The FHWS includes four relationship quality scales, each focused on a different dimension of relationship quality: communication, trust, satisfaction, and commitment. Respondents were asked to indicate how much they agree with a series of statements about their relationship, e.g. *my partner treats me fairly and justly*, or how often a certain behavior occurs, e.g. *how often do you confide in your partner?* Each of the original scales includes five to eight questions, and women and men responded separately to each question. Previous research on the psychometric properties of the relationship quality scales in this population suggested a series of modifications, which we adopted in our analyses. These modifications include the use of shortened versions of the commitment and trust scales, one question on relationship satisfaction, and two separate communication scales – one on destructive communication and one on constructive communication. (1)

Self-rated health was measured in the FHWS through one question: *Tell me, please, how would you evaluate your health? Is it very good, good, average (not good, but not bad), bad, very bad.* Previous research indicates that self-rated health, adjusted for age, is a reliable predictor of mortality in diverse populations. (13-15) Numerous studies have also found significant associations between poor self-rated health and mental illness. (16,17)

Relative SES was measured in the FHWS using the following question: *Imagine a 9-step ladder where on the bottom, the first step, stand the poorest people, and on the highest step, the 9th, stand the rich. On which step is your family located today?* In addition to the question on relative SES, the FHWS survey contained questions on household wealth, income, and expenditures, including questions on whether the household owns a series of assets, land ownership, and recent
medical expenditures. The wealth portion of the FHWS survey was administered to men only, and their responses were applied to the entire household, including their wives/partners. Responses to these questions were used to create a measure of absolute socio-economic status, based on the methodology developed for the Demographic and Health Surveys (DHS). (18) We ultimately chose to use relative SES in our analyses because it is a subjective measure, and has previously been shown to be more strongly associated with mental illness than absolute measures of SES. (19)

Based on a review of the literature, and previous qualitative research in the study community, we selected the following individual and household characteristics to include in our analyses: religion, marriage type, education, age, parity, and pregnancy/post-partum status for women. We also included age and education differences within couples as a measure of power within relationships. The key questions used from the FHWS are included in Appendix A.

*Tobit regression models*

Approximately 56% of respondents in the analytic sample for Chapter Five reported no depressive symptoms (54% of men and 58% of women) (see Figure 2.5). As a result, the distribution of the dependent variable violates the assumptions of ordinary least squares (OLS) regression, meaning that this method would produce biased estimates. (20) Tobit models have been used increasingly in social science literature to account for data censoring at the lower and/or upper level of the outcome variable. (20-22) This method has been used for predicting CES-D scores given the common clustering of observations at the lower and upper levels. (23) In contrast to interpretation of OLS coefficient estimates, Tobit coefficients can be interpreted as representing the association between each independent
variable and an underlying latent unobserved outcome. (20,21) The estimates produced by Tobit models can be decomposed and interpreted in two parts: 1) the effect of each independent variable on the value of the dependent variable (CES-D score) among those with a CES-D score greater than zero (non-limit value); and 2) the effect of each independent variable on the probability of having a non-limit value (i.e. CES-D score > 0) among respondents with a CES-D score of zero. These two components reflect the structure of the Tobit model, which has two different formulas for respondents at the limit value (i.e. zero) and respondents above the limit value. (21) We conducted the same analyses described below using OLS regression and the results were similar.

Before beginning data analyses we examined the distribution of CES-D score, the dependent variable, and each independent variable of interest. As a next step, we examined bivariate relationships between CES-D score and each independent variable of interest. As a final analytic step, we conducted a nested series of Tobit regression models to assess associations between independent variables of interest and CES-D scores. We first ran these models stratified by sex, and then ran a full model including both men and women, adjusting for sex to test for statistical interaction. In each model we controlled for clustering by study site. (7) Tobit regression in STATA/SE version 13.0 produces estimates of the marginal effects of each independent variable on the latent dependent variable, in this case latent CES-D score. The user-generated dtobit2 package then calculates estimated mean effects of independent variables unconditional on censoring, conditional on censoring, and the change in probability of censoring associated with each independent variable. (24) We present and interpret the results of our analyses in the context of the analytic model and previous
research on gender differences in depression. All analyses were conducted using STATA/SE version 13.0.

**Qualitative Data Collection Methods**

*Recruiting and training research assistants*

In September 2012, FHWS staff recruited male and female research assistants (RAs), who were students at KNUST and/or had previously worked on FHWS or other studies, to work on the qualitative component of this study. Eighteen RAs (10 men, 8 women) attended a four-day training at KNUST in September 2012 covering the following topics: overview of the planned qualitative research study, background on depression globally and in Ghana, overview of qualitative research, how to conduct focus groups and IDIs, and research ethics. The training schedule included one day to practice conducting focus groups and IDIs. At the end of the training, RAs were selected to fill each role based on interest, level of participation in the training, demonstrated capacity to perform each role, past experience, and fluency in English (for transcribers) and Twi. Research assistants were selected for the following roles: focus group facilitators/interviewers (2 men, 2 women), note-takers for focus groups (2 men, 2 women), transcribers (2 men, 2 women), and recruiters (4 men, 4 women). The recruiters had been in that role previously for the FHWS and were familiar with their assigned study areas. Some RAs played multiple roles (e.g. focus group note-taker and transcriber). RAs were matched by sex to respondents for both focus groups and interviews.
Focus group discussions

Focus groups have several benefits as a qualitative research method: they are useful in exploratory research when a clear body of literature does not yet exist on a topic; they provide the opportunity to observe group interactions on a topic, including differences in opinion; and they are efficient. However, they are not as controlled and directed as in-depth interviews, and they are more subject to researcher influence than participant observation. (25) In this study, focus groups were chosen to provide insight into community norms and attitudes around mental illness and depression in general, as well as more specific thoughts on the circumstances that protect or put people at risk of experiencing depression. (25) The focus groups were also used to elicit suggestions of relevant respondent groups for the subsequent in-depth interviews.

The qualitative component of this study adopted a purposeful stratified sampling approach, designating the sample’s characteristics and structure in advance based on the research questions. Focus group participants were drawn from the FHWS population, which was stratified by sex and level of depressive symptoms. Prior to beginning recruitment for the focus groups, the study team had collected data on depressive symptoms from approximately 80% of the study population (data collection was still in progress). Based on the available data, study participants were placed into one of three groups: “high” depressive symptoms, “low” depressive symptoms, and “moderate” depressive symptoms. The cutoffs for each group were chosen based on the distribution within the population of respondents, rather than using a priori cut points. Since previous research has shown consistently higher levels of depressive symptoms among women than men, and the available data displayed the same pattern, men reporting five or more depressive symptoms (out of eight) were assigned
to the “high” group, while the cutoff was seven or more depressive symptoms for women. This is more conservative than the “high” cutoff established by Irwin and colleagues of four or more depressive symptoms. (3) In the full depressive symptom data set, this cutoff reflects approximately 16% of men and 14% of women. For both women and men, the “low” depressive symptom group included respondents who reported no depressive symptoms (53% of men and 58% of women). Based on these groupings, the sex-matched recruiters identified focus group participants in each community and selected a convenient time to meet. Participants were not told that level of depressive symptoms was a criterion for selection to protect their privacy. All focus group participants provided oral informed consent immediately before the focus group began, and received soap and a soda in exchange for their participation.

Twelve focus groups, with a total of 95 participants (42 men and 53 women) were conducted in October 2012. Focus groups were distributed as follows:

<table>
<thead>
<tr>
<th>Study Site</th>
<th>A (3 focus groups)</th>
<th>B (3 focus groups)</th>
<th>C (3 focus groups)</th>
<th>D (3 focus groups)</th>
<th>Total # participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>(8)</td>
<td>(8)</td>
<td>(9)</td>
<td>(11)*</td>
<td>53</td>
</tr>
<tr>
<td>High</td>
<td>(8)</td>
<td>--</td>
<td>(9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>--</td>
<td>(6)</td>
<td>(8)</td>
<td>(7)</td>
<td>42</td>
</tr>
<tr>
<td>High</td>
<td>(6)</td>
<td>(6)</td>
<td>--</td>
<td>(9)</td>
<td></td>
</tr>
<tr>
<td>Total # participants</td>
<td>22</td>
<td>20</td>
<td>26</td>
<td>27</td>
<td>95</td>
</tr>
</tbody>
</table>

Note: Numbers in parentheses represent participants in each focus group discussion. *Although site D was originally scheduled to conduct a “high” female focus group, the research assistants chose to conduct a mixed (high and low together) focus group because of overwhelming interest in the community and hesitation to turn away women who were eager to participate.
Centering focus group and interview discussions on an image or task can help respondents to articulate their thoughts on a subject. (26) Vignettes, or brief fictitious stories related to the research question, are a useful structured data collection technique for focus groups. Issues for discussion are embedded in a culturally familiar context to allow respondents to share their views through discussion of the situation in the vignette. Vignettes have been used effectively in mental health research with low-income populations, providing an entrée into psychopathologies of interest without directly introducing normative terms and definitions. (27,28) In this study, vignettes were used in focus groups to depict a man or woman from the community experiencing depressive symptoms. The focus group guide was initially drafted based on a review of the literature on depression in low-income communities. It contained an adapted version of the vignette used by Karasz, followed by a series of questions based on the illness representation model from the health psychology literature. (27) During the training of Ghanaian research assistants, the focus group guide was adapted with locally appropriate examples and terms. For example, the research assistants suggested the women’s vignette should refer to attending a wedding, while the men’s vignette should refer to watching a football match. The final vignettes are included below, and the full focus group guides are included in Appendix B.

**Final Men’s Vignette**

For the past two weeks, Kwabena had felt that something was wrong with him. When he listened to sports and politics on the radio in the mornings, he realized he could not concentrate on the discussions. Often during the day his eyes filled with tears, and he felt very sad. His friends and family tried to cheer him up, but they had no success. When his brother asked Kwabena if he wanted to go watch a football match at a bar, like they used to do, he had no interest. Kwabena was not enjoying anything he used to enjoy.
Following the training, each focus group facilitator was paired with a note-taker and transcriber, and received a digital recorder. The selected RAs pilot tested the focus group guide in each of the four study areas (two male groups, two female groups). Pilot focus groups were fully transcribed, and RAs suggested small changes to the process and/or focus group guide. After reviewing the pilot transcripts, I provided detailed feedback to the facilitators, note-takers and transcribers. Feedback focused on how to respond to questions from focus group participants, and how to use open-ended questions to enrich the data collected from respondents. Facilitators collected the following basic demographic information from participants before beginning: age, number of children, employment status/area of work, and marital status. Focus groups lasted approximately 45 minutes to one hour, and most were conducted in the late afternoon/early evening to accommodate participants’ work schedules. Focus group discussions were conducted predominantly in Twi, the unwritten language in Kumasi, although focus group guides were in English. After each focus group, the facilitator and note-taker completed a debrief form, listing the three main themes that emerged from the discussion, as well as any challenges s/he faced in leading the discussion. I compiled the responses on the debrief forms to adjust the data collection approach and inform the qualitative data analyses as appropriate.
In-Depth Interviews

After the focus groups had been completed, the research team conducted semi-structured in-depth interviews (IDIs) between one interviewer and one respondent. The IDIs also explored local understandings and symptoms of depression. Compared to focus groups, IDIs provide the researcher with an opportunity to structure the discussion more clearly, as well as to collect detailed information on one individual’s perspectives and experiences. (25,26) Rather than the survey goal of collecting responses to direct questions, in-depth interviews are structured as a “conversation with a purpose”, where the respondent and interviewer work together to understand the research topic. (26)

One approach to purposeful sampling in qualitative research is to select respondents who are uniquely able to give information about the research question because of their role as privileged witnesses in the study community. (29) Participants for IDIs were community members who provide care – formally or informally – to people experiencing depressive symptoms. The focus groups, which were all completed prior to the IDIs, included a question about who might provide care to someone experiencing depressive symptoms. Based on this information, as well as previous research on care-seeking for mental illness in similar contexts, we identified the following groups of community care providers: religious leaders (pastors, imams, malams, religious counselors, herbalists), community elders and leaders, and healthcare providers (nurses, midwives). Recruiters were given guidance on identifying respondents from these groups, with a focus on recruiting both men and women, keeping in mind that most religious leaders are men.
Before beginning the main IDIs, the draft IDI guide was pilot tested in three of the four study sites by all interviewers and translated and transcribed. Interviewers gave feedback on questions and received feedback on the pilot transcripts (e.g. how to encourage a respondent to expand on short answers). The final IDI guide is included in Appendix C. IDIs lasted between 30 minutes and one hour. All IDI respondents gave written informed consent and kept a copy of the consent form with contact information for the study team. They received a soda and soap in exchange for their time. IDI respondents were selected as shown below. Following the same process as the focus groups, IDIs were fully translated and transcribed, and checked for accuracy and completeness.

<table>
<thead>
<tr>
<th>Study Site</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
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<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Translation and Transcription

Prior to beginning qualitative data collection, the RAs, with support from the local study administrator, discussed and agreed on the proper translation of the field guides and consent form. Using the digital recordings, all focus groups and IDIs were fully transcribed. Because Twi is not a written language, transcribers translated the recordings into English. While listening to the recording, the RA who had facilitated each focus group or IDI reviewed its
transcription to ensure accuracy and completeness. The supervisor also conducted spot checks of the transcription/translation quality.

**Qualitative Data Analysis**

Qualitative data analysis followed Ulin and colleagues’ four suggested stages: 1) reading, 2) coding, 3) displaying data, and 4) data reduction. (26) I reviewed the RA debrief forms at the end of each day of data collection, and sought further detail or clarification from the RAs as needed. As the focus groups and interviews were translated and transcribed in English, I read each transcript several times for content and began the process of identifying patterns and themes. (26) After reviewing each transcript, I created a draft codebook and coded each transcript (see Appendix D). Major codes were identified in advance in collaboration with the co-authors based on the illness representation model and the study’s research questions. Sub-themes within each major code emerged from the data. Codes evolved as necessary during the coding process, but the final codes and definitions were recorded in a codebook. (26) Using that codebook, a second reader coded one-third of the transcripts, and codes were compared and adjusted as necessary to ensure accuracy and consistency in application. The reader provided input throughout the remaining data analysis steps. Coding sorts were then used to group the text under themes and examine responses from multiple participants on the same issue. I then explored the information emerging under each theme, including quantitative information (e.g. how many focus groups named each stressor?) and qualitative information (how did respondents talk about depression in their community?) (26) As a final step in data analysis, I distilled the most important themes emerging from the data. This process was guided by Morgan’s proposed group to group validation approach, which entails assessing three factors for each topic of interest: how many groups mentioned the topic,
how many people within each of these groups mentioned the topic, and how much energy the topic generated within each group. (25) This final step also involved interpretation of key themes beyond description, e.g. how do they relate to each other and to the conceptual framework. The results of the qualitative data analyses related to causes of depressive symptoms, outcomes, and treatment in the study community are presented in detail in Chapter Three. The results of these analyses related to identification of depressive symptoms are included in Chapter Four to supplement the quantitative analyses on the validity of the 10-item CES-D scale in the study population. Analyses were conducted using ATLAS.ti version 7.
Chapter Two References


(11) Byrne B. Structural equation modeling with Mplus: Basic concepts, applications, and programming. New York: Taylor & Francis Group, LLC; 2012.


Chapter Two Tables and Figures

Figure 2.1 Flow Diagram of Sample Size, by Data Collection Round

- **Round 1 (2010)**: 799 men, 799 women enrolled
  - 166 men, 168 women enrolled at follow-up
  - 155 men, 155 women lost to follow-up (19%)
    - Remaining: 644 men and 644 women

- **Round 2 (2011-2012)**: 810 men, 812 women visited
  - 44 men refused/unavailable, 21 women refused/unavailable
    - Remaining: 766 men and 791 women

- **CES-D (09-10/2012)**: 657 men, 716 women visited
  - 86% of men and 91% of women from Round 2
  - 22 men and 11 women with incomplete data on key covariates
    - Remaining: 635 men and 705 women (used in Chapter 4)

- Remaining: 93 men and 163 women without partner data
  - Remaining: Complete data from 542 couple pairs (used in Chapter 5)
Table 2.2 Selectivity of the Sample by Sex

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dropped Observations</td>
<td>Analysis Sample (n = 542)</td>
</tr>
<tr>
<td>n</td>
<td>Mean/Proportion</td>
<td>Mean/Proportion</td>
</tr>
<tr>
<td>CES-D score (mean)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>115</td>
<td>2.82</td>
</tr>
<tr>
<td>Religion (% Christian)</td>
<td></td>
<td>51.6</td>
</tr>
<tr>
<td>Marriage type (% polygynous)</td>
<td>199</td>
<td>6.0</td>
</tr>
<tr>
<td>Relative SES</td>
<td></td>
<td>4.47</td>
</tr>
<tr>
<td>Education (years)</td>
<td></td>
<td>7.1</td>
</tr>
<tr>
<td>Age (mean)</td>
<td></td>
<td>41.0</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td>3.2</td>
</tr>
<tr>
<td>Pregnant/post-partum (%) yes</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Commitment (mean)</td>
<td></td>
<td>32.7</td>
</tr>
<tr>
<td>Trust (mean)</td>
<td></td>
<td>28.5</td>
</tr>
<tr>
<td>Communication (mean)</td>
<td></td>
<td>19.7</td>
</tr>
<tr>
<td>Satisfaction (mean)</td>
<td></td>
<td>4.9</td>
</tr>
<tr>
<td>Self-rated health (mean)</td>
<td></td>
<td>1.4</td>
</tr>
</tbody>
</table>
Figure 2.2 Distributions of Men’s CES-D Scores by Study Site (n = 542)
Figure 2.3 Distributions of Women's CES-D Scores by Study Site (n = 542)
Table 2.3 Comparison of Sample Characteristics by Sex between Analytic Dataset and Imputed Complete Dataset for Chapter Four

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean/Proportion</td>
</tr>
<tr>
<td>% Christian (Muslim)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Data</td>
<td>635</td>
<td>53.3</td>
</tr>
<tr>
<td>Imputation 1</td>
<td></td>
<td>51.5</td>
</tr>
<tr>
<td>Imputation 2</td>
<td>657</td>
<td>51.8</td>
</tr>
<tr>
<td>Imputation 3</td>
<td></td>
<td>51.6</td>
</tr>
<tr>
<td>Education (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Data</td>
<td>635</td>
<td>7.1</td>
</tr>
<tr>
<td>Imputation 1</td>
<td></td>
<td>7.1</td>
</tr>
<tr>
<td>Imputation 2</td>
<td>657</td>
<td>7.1</td>
</tr>
<tr>
<td>Imputation 3</td>
<td></td>
<td>7.1</td>
</tr>
<tr>
<td>Age (mean)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Data</td>
<td>635</td>
<td>41.8</td>
</tr>
<tr>
<td>Imputation 1</td>
<td></td>
<td>41.9</td>
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<tr>
<td>Imputation 2</td>
<td>657</td>
<td>41.9</td>
</tr>
<tr>
<td>Imputation 3</td>
<td></td>
<td>41.9</td>
</tr>
</tbody>
</table>

Note: T-tests were conducted to assess differences in means for continuous variables; one-way anova tests were conducted to assess differences in proportions for categorical variables.
Table 2.4 Comparison of Bivariate Tobit Regression Models between Analytic Sample and Complete Imputed Samples for Men

<table>
<thead>
<tr>
<th></th>
<th>Analytic Sample</th>
<th>Imputed Sample 1</th>
<th>Imputed Sample 2</th>
<th>Imputed Sample 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 542)</td>
<td>(n = 657)</td>
<td>(n = 657)</td>
<td>(n = 657)</td>
</tr>
<tr>
<td>Christian (Muslim)**</td>
<td>-3.33 (0.01)</td>
<td>-2.80 (0.04)</td>
<td>-2.91 (0.04)</td>
<td>-2.87 (0.04)</td>
</tr>
<tr>
<td>Monogamous (polygynous)</td>
<td>2.06 (&lt;0.0001)</td>
<td>2.60 (&lt;0.0001)</td>
<td>2.41 (&lt;0.0001)</td>
<td>2.41 (&lt;0.0001)</td>
</tr>
<tr>
<td>Relative SES</td>
<td>-1.31 (0.007)</td>
<td>-1.28 (0.01)</td>
<td>-1.28 (0.01)</td>
<td>-1.29 (0.01)</td>
</tr>
<tr>
<td>Education</td>
<td>0.008 (0.91)</td>
<td>0.06 (0.22)</td>
<td>0.06 (0.22)</td>
<td>0.06 (0.22)</td>
</tr>
<tr>
<td>Education difference</td>
<td>0.02 (0.70)</td>
<td>0.03 (0.48)</td>
<td>0.03 (0.47)</td>
<td>0.03 (0.51)</td>
</tr>
<tr>
<td>Age</td>
<td>0.04 (0.32)</td>
<td>0.03 (0.24)</td>
<td>0.03 (0.24)</td>
<td>0.03 (0.24)</td>
</tr>
<tr>
<td>Age difference</td>
<td>-0.03 (0.59)</td>
<td>-0.014 (0.69)</td>
<td>-0.011 (0.75)</td>
<td>-0.014 (0.69)</td>
</tr>
<tr>
<td>Parity</td>
<td>-0.01 (0.79)</td>
<td>-0.04 (0.43)</td>
<td>-0.05 (0.49)</td>
<td>-0.06 (0.51)</td>
</tr>
<tr>
<td>Commitment</td>
<td>0.03 (0.92)</td>
<td>0.07 (0.79)</td>
<td>0.07 (0.78)</td>
<td>0.07 (0.79)</td>
</tr>
<tr>
<td>Trust</td>
<td>0.13 (0.51)</td>
<td>0.16 (0.43)</td>
<td>0.17 (0.40)</td>
<td>0.16 (0.43)</td>
</tr>
<tr>
<td>Communication</td>
<td>-0.39 (0.005)</td>
<td>-0.33 (0.02)</td>
<td>-0.31 (0.02)</td>
<td>-0.32 (0.02)</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>-1.11 (0.03)</td>
<td>-0.79 (0.06)</td>
<td>-0.90 (0.03)</td>
<td>-0.78 (0.08)</td>
</tr>
<tr>
<td>Self-rated Health</td>
<td>-1.30 (0.44)</td>
<td>-1.23 (0.45)</td>
<td>-1.31 (0.42)</td>
<td>-1.18 (0.48)</td>
</tr>
</tbody>
</table>

Note: All estimates are controlling for clustering by site.

**3 women and 15 men reported their religion as “other”; regression includes only those couples who reported their religion as Christian or Muslim.
<table>
<thead>
<tr>
<th></th>
<th>Analytic Sample</th>
<th>Imputed Sample 1</th>
<th>Imputed Sample 2</th>
<th>Imputed Sample 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 542)</td>
<td>(n = 657)</td>
<td>(n = 542)</td>
<td>(n = 716)</td>
</tr>
<tr>
<td>Christian (Muslim)**</td>
<td>-3.04 (0.01)</td>
<td>-2.78 (0.02)</td>
<td>-2.54 (0.01)</td>
<td>-2.75 (0.01)</td>
</tr>
<tr>
<td>Monogamous (polygynous)</td>
<td>0.27 (0.84)</td>
<td>-0.73 (0.55)</td>
<td>-0.84 (0.51)</td>
<td>-0.73 (0.55)</td>
</tr>
<tr>
<td>Relative SES</td>
<td>-0.57 (0.09)</td>
<td>-0.44 (0.10)</td>
<td>-0.45 (0.11)</td>
<td>-0.44 (0.11)</td>
</tr>
<tr>
<td>Education</td>
<td>-0.12 (0.19)</td>
<td>-0.18 (0.04)</td>
<td>-0.18 (0.05)*</td>
<td>-0.18 (0.04)</td>
</tr>
<tr>
<td>Education difference</td>
<td>0.04 (0.07)</td>
<td>0.11 (0.001)</td>
<td>0.10 (&lt;0.0001)</td>
<td>0.10 (&lt;0.0001)</td>
</tr>
<tr>
<td>Age</td>
<td>0.10 (0.04)</td>
<td>0.12 (&lt;0.0001)</td>
<td>0.12 (&lt;0.0001)</td>
<td>0.12 (&lt;0.0001)</td>
</tr>
<tr>
<td>Age difference</td>
<td>-0.07 (0.46)</td>
<td>-0.12 (0.12)</td>
<td>-0.12 (0.12)</td>
<td>-0.12 (0.12)</td>
</tr>
<tr>
<td>Parity</td>
<td>0.08 (0.56)</td>
<td>0.11 (0.30)</td>
<td>0.11 (0.07)</td>
<td>0.08 (0.02)</td>
</tr>
<tr>
<td>Not pregnant/post-partum</td>
<td>0.86 (0.43)</td>
<td>0.05 (0.95)</td>
<td>0.36 (0.65)</td>
<td>0.20 (0.82)</td>
</tr>
<tr>
<td>Commitment</td>
<td>-0.26 (0.13)</td>
<td>-0.24 (0.14)</td>
<td>-0.25 (0.14)</td>
<td>-0.24 (0.12)</td>
</tr>
<tr>
<td>Trust</td>
<td>-0.37 (0.04)</td>
<td>-0.33 (0.03)</td>
<td>-0.32 (0.03)</td>
<td>-0.33 (0.03)</td>
</tr>
<tr>
<td>Communication</td>
<td>-0.16 (&lt;0.0001)</td>
<td>-0.15 (&lt;0.0001)</td>
<td>-0.15 (&lt;0.0001)</td>
<td>-0.14 (&lt;0.0001)</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>-2.05 (0.02)</td>
<td>-1.91 (0.02)</td>
<td>-1.93 (0.02)</td>
<td>-1.95 (0.02)</td>
</tr>
<tr>
<td>Self-rated Health</td>
<td>2.26 (0.045)</td>
<td>2.08 (0.06)</td>
<td>2.07 (0.06)</td>
<td>2.14 (0.04)</td>
</tr>
</tbody>
</table>

Note: All estimates are controlling for clustering by site.

**3 women and 15 men reported their religion as “other”, regression includes only those couples who reported their religion as Christian or Muslim.
Table 2.6 Percentage Responding Affirmatively to Each Item in the CES-D Scale, by site and sex (n = 1084)

<table>
<thead>
<tr>
<th>CES-D Item</th>
<th>Site A</th>
<th>Site B</th>
<th>Site C</th>
<th>Site D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>Depress</td>
<td>26.4</td>
<td>34.6</td>
<td>53.0</td>
<td>48.3</td>
</tr>
<tr>
<td>Effort</td>
<td>78.2</td>
<td>35.5</td>
<td>55.0</td>
<td>52.4</td>
</tr>
<tr>
<td>Restless</td>
<td>34.6</td>
<td>33.6</td>
<td>28.2</td>
<td>41.6</td>
</tr>
<tr>
<td>Happy</td>
<td>70.0</td>
<td>67.3</td>
<td>52.4</td>
<td>61.7</td>
</tr>
<tr>
<td>Lonely</td>
<td>15.5</td>
<td>24.6</td>
<td>26.9</td>
<td>26.2</td>
</tr>
<tr>
<td>Unfriendly</td>
<td>15.5</td>
<td>2.7</td>
<td>8.7</td>
<td>22.8</td>
</tr>
<tr>
<td>Enjoy</td>
<td>70.9</td>
<td>64.6</td>
<td>35.6</td>
<td>61.7</td>
</tr>
<tr>
<td>Sad</td>
<td>26.4</td>
<td>37.3</td>
<td>47.0</td>
<td>37.6</td>
</tr>
<tr>
<td>Dislike</td>
<td>12.7</td>
<td>1.0</td>
<td>16.8</td>
<td>24.2</td>
</tr>
<tr>
<td>Going</td>
<td>19.1</td>
<td>20.0</td>
<td>30.9</td>
<td>6.7</td>
</tr>
<tr>
<td>No symptoms</td>
<td>19.1</td>
<td>56.4</td>
<td>22.8</td>
<td>22.8</td>
</tr>
<tr>
<td>Mean Score</td>
<td>2.9</td>
<td>2.6</td>
<td>3.8</td>
<td>3.4</td>
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</table>
Table 2.7 Key Variable Means/Proportions by Sex and Study Site (n = 1084)

<table>
<thead>
<tr>
<th></th>
<th>Site A</th>
<th>Site B</th>
<th>Site C</th>
<th>Site D</th>
<th>All Sites</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Men (n = 110)</td>
<td>Women (n = 110)</td>
<td>p-value</td>
<td>Men (n = 149)</td>
<td>Women (n = 149)</td>
</tr>
<tr>
<td>CES-D score Mean (range)</td>
<td>2.6 (0-10)</td>
<td>2.9 (0-9)</td>
<td>0.49</td>
<td>3.8 (0-9)</td>
<td>3.4 (0-9)</td>
</tr>
<tr>
<td>% Christian</td>
<td>66.4 (0-25)</td>
<td>68.2 (0-25)</td>
<td>0.78</td>
<td>66.4 (0-25)</td>
<td>68.5 (0-25)</td>
</tr>
<tr>
<td>% Polygynous</td>
<td>4.6 (0-25)</td>
<td>5.5 (0-25)</td>
<td>0.76</td>
<td>4.7 (0-25)</td>
<td>8.1 (0-25)</td>
</tr>
<tr>
<td>Commitment Mean (range)</td>
<td>4.3 (2-7)</td>
<td>--</td>
<td>--</td>
<td>3.4 (1-8)</td>
<td>--</td>
</tr>
<tr>
<td>Relative SES, Mean (range)</td>
<td>6.8 (0-21)</td>
<td>7.0 (0-16)</td>
<td>0.80</td>
<td>6.3 (0-22)</td>
<td>6.6 (0-16)</td>
</tr>
<tr>
<td>Age, years Mean (range)</td>
<td>41.2 (25-56)</td>
<td>34.1 (21-46)</td>
<td>&lt;0.0001</td>
<td>41.9 (28-56)</td>
<td>35.1 (22-46)</td>
</tr>
<tr>
<td>Parity Mean (range)</td>
<td>3.6 (0-30)</td>
<td>3.5 (0-8)</td>
<td>0.79</td>
<td>3.4 (0-11)</td>
<td>3.3 (1-8)</td>
</tr>
<tr>
<td>% Pregnant/ post-partum</td>
<td>--</td>
<td>11.8 (5-27)</td>
<td>--</td>
<td>--</td>
<td>7.4 (2-25)</td>
</tr>
<tr>
<td>Commitment, Mean (range)</td>
<td>35.5 (14-36)</td>
<td>25.5 (11-36)</td>
<td>&lt;0.0001</td>
<td>31.6 (8-36)</td>
<td>29.8 (7-36)</td>
</tr>
<tr>
<td>Trust Mean (range)</td>
<td>33.1 (10-35)</td>
<td>23.2 (8-35)</td>
<td>&lt;0.0001</td>
<td>26.5 (10-35)</td>
<td>25.4 (10-33)</td>
</tr>
<tr>
<td>Communication Mean (range)</td>
<td>20.7 (4-27)</td>
<td>15.6 (-12-27)</td>
<td>&lt;0.0001</td>
<td>14.7 (0-22)</td>
<td>14.2 (-16-25)</td>
</tr>
<tr>
<td>Satisfaction Mean (range)</td>
<td>5.2 (2-6)</td>
<td>4.2 (1-6)</td>
<td>&lt;0.0001</td>
<td>4.8 (1-6)</td>
<td>4.0 (1-6)</td>
</tr>
<tr>
<td>Self-rated health Mean (range)</td>
<td>1.2 (1-3)</td>
<td>1.2 (1-3)</td>
<td>0.13</td>
<td>1.3 (1-3)</td>
<td>2.1 (1-4)</td>
</tr>
<tr>
<td>Item</td>
<td>Estimates (S.E.)</td>
<td>p-value</td>
<td>Communality</td>
<td>Estimates (S.E.)</td>
<td>p-value</td>
</tr>
<tr>
<td>------------</td>
<td>------------------</td>
<td>---------</td>
<td>-------------</td>
<td>------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Depress</td>
<td>1.00 (0.01)</td>
<td>--</td>
<td>0.99</td>
<td>1.00 (0.00)</td>
<td>--</td>
</tr>
<tr>
<td>Lonely</td>
<td>0.75 (0.04)</td>
<td>&lt;0.0001</td>
<td>0.56</td>
<td>0.98 (0.006)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Effort</td>
<td>0.91 (0.02)</td>
<td>&lt;0.0001</td>
<td>0.84</td>
<td>0.98 (0.006)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Restless</td>
<td>0.86 (0.02)</td>
<td>&lt;0.0001</td>
<td>0.73</td>
<td>0.94 (0.01)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Going</td>
<td>0.92 (0.02)</td>
<td>&lt;0.0001</td>
<td>0.85</td>
<td>0.95 (0.01)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Enjoy</td>
<td>-0.93 (0.02)</td>
<td>&lt;0.0001</td>
<td>0.86</td>
<td>-0.99 (0.004)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Unfriendly</td>
<td>0.69 (0.05)</td>
<td>&lt;0.0001</td>
<td>0.47</td>
<td>0.89 (0.02)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
Figure 2.5: Histogram of CES-D Score Responses for Men and Women, with Overlayed Normal Distribution Line (n = 1084)
CHAPTER THREE: MANUSCRIPT ONE

A Conceptual Model of Depression among Men and Women in Kumasi, Ghana: A Qualitative Study
Introduction

Globally, unipolar depressive disorder is the leading cause of disease burden for women, according to the World Health Organization’s (WHO) 2004 Global Burden of Disease (GBD) Study. (1) In reporting on the GBD Study findings, Ustun and Chisolm emphasize the need for more research in developing countries on the epidemiology of mental health disorders in order to “mainstream” these issues into public health interventions. (2) Despite some progress in building an evidence base for mental health promotion in low-income settings, there remains a persistent need to identify risk and protective factors and effective interventions. (3)

Gender and depression

Incidence and prevalence of major depressive disorder (MDD) is higher among women than men worldwide and within diverse communities. (4-6) In a review of the evidence on sex differences in depression, Parker and Brotchie weigh arguments in favor of both an artifactual explanation (e.g. women are more likely to seek help) as well as real differences in risk (e.g. women are biologically more predisposed; women are exposed to more risk factors). The authors note evidence that gender differences are less pronounced in homogeneous study samples (e.g. by education, culture), indicating the potentially important role of social factors in driving this difference. They conclude that women are both more predisposed biologically and are also exposed to greater social stressors, increasing their risk further. (4)

Mental illness and depression in Ghana

Although nationally representative data on mental health in Ghana do not exist, several
studies have examined this issue. Through the Mental Health and Poverty Project (MHaPP), Ofori-Atta and colleagues conducted a qualitative study with healthcare providers from five regions in Ghana to explore local understandings of mental illness. They found that respondents attributed mental illness in women to three main causes: inherent vulnerability (e.g. women cannot handle stress as well as men), witchcraft, and gender disadvantage (polygyny, physical abuse, and poverty). (7) A recent study on bullying and mental health with senior high school students in Ghana found that 16.5% of students reported suicidal ideation in the previous year, although a more complete measure of depressive symptoms was not available. (8) The Women’s Health Study followed 2814 adult women from the Accra area, de Menil and colleagues found that low levels of education, poverty, and unemployment were associated with poor mental health. (9) In a hospital sample of pregnant women in Kumasi, Ghana, Bindt and colleagues found that 27% of women met criteria for major depression, and depression accounted for a substantial proportion of self-reported disability. (10) Another recent study examined official police records to assess reasons for suicide, which is illegal in Ghana. Although stigma and threat of prosecution likely produced biased data, the authors found that 95% of people undertaking reported suicidal behavior between 2006 and 2008 were men, and the most common reason attributed to the behavior was to avoid public dishonor (34%), while an additional 10% were attributed to sexual impotence or suspecting a wife/partner of having an affair. (11)

**Research Question**

We designed and conducted a qualitative research study, using focus groups and in-depth interviews, to explore conceptualizations of depression in men and women in two neighboring, sub-metropolitan areas of Kumasi, Ghana. We were interested in
understanding the extent to which depression exists in these communities, as well as causes, symptoms, approaches to treatment, and gender differences. Given the exploratory nature of this study, we did not have any hypotheses.

**Methods**

*Family Health and Wealth Study*

This qualitative study was embedded in the Family Health and Wealth Study (FHWS). FHWS is a multi-country longitudinal open cohort study that aims to examine individual and household level health and economic consequences of family size. The Ghana FHWS is implemented in collaboration with the Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi, Ghana’s second largest city.

*Data collection*

Focus group discussions (FGDs) were conducted with community members who were FHWS study respondents, and in-depth interviews (IDIs) were conducted with community care providers (non-FHWS respondents). FGDs were chosen to provide insight into community norms and attitudes around mental illness and depression in general, as well as more specific thoughts on the circumstances that protect or put people at risk of experiencing depression. The IDIs explored the same themes from the individual perspectives of community care providers. (12)

This qualitative study adopted a purposeful stratified sampling approach, designating the sample’s characteristics and structure in advance based on the research questions. Focus group participants were drawn from the FHWS population, which was stratified by sex and level of depressive symptoms. Prior to beginning recruitment for the focus groups, the study
team had collected data on depressive symptoms from approximately 80% of the FHWS follow-up study population. Study participants were placed into one of three groups: “high” depressive symptoms, “low” depressive symptoms, and “moderate” depressive symptoms. The cutoffs for each group were chosen based on the distribution within the population of respondents, rather than using a priori cut points. Men reporting five or more depressive symptoms (out of eight) were assigned to the “high” group, while the cutoff was seven or more depressive symptoms for women. For both women and men, the “low” group included respondents who reported no depressive symptoms. Twelve focus groups, with a total of 95 participants (42 men and 53 women) were conducted in October 2012. Focus groups were distributed as follows:

<table>
<thead>
<tr>
<th>Study Site</th>
<th>A (3 groups)</th>
<th>B (3 groups)</th>
<th>C (3 groups)</th>
<th>D (3 groups)</th>
<th>Total participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>53</td>
</tr>
<tr>
<td>Low</td>
<td>(8)</td>
<td>(8)</td>
<td>(9)</td>
<td>(11)*</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>(8)</td>
<td>--</td>
<td>(9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>Low</td>
<td>--</td>
<td>(6)</td>
<td>(8)</td>
<td>(7)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>(6)</td>
<td>(6)</td>
<td>--</td>
<td>(9)</td>
<td></td>
</tr>
<tr>
<td>Total participants</td>
<td>22</td>
<td>20</td>
<td>26</td>
<td>27</td>
<td>95</td>
</tr>
</tbody>
</table>

Note: Numbers in parentheses represent participants in each focus group discussion.
*Although site D was originally scheduled to conduct a “high” female focus group, the research assistants chose to conduct a mixed (high and low together) focus group because of overwhelming interest in the community and hesitation to turn away women who were eager to participate.

IDI respondents were community care providers, selected based on their role as privileged witnesses in the study community. Community care providers were defined as women and men who live or work in the study community and provide care – formally or informally – to people experiencing depressive symptoms. The focus groups, which were all completed prior to the IDIs, included a question about who might help someone experiencing depressive symptoms. Based on this information, as well as previous research on care-giving
for mental illness in similar contexts, we identified the following groups of community care
providers: religious leaders (pastors, imams, malams, religious counselors), community elders
and leaders, and healthcare providers (herbalists, nurses, midwives). Respondents were
selected as shown below. The higher proportion of male respondents reflects the fact that
most religious leaders in the study community are men.

Table 3.2: IDI Respondent Roles by Sex and Study Site

<table>
<thead>
<tr>
<th>Study Site</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>• Muslim Counselor</td>
<td>• Elder</td>
<td>• Elder</td>
<td>• Nurse</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>• Nurse</td>
<td>• Nurse</td>
<td></td>
<td>• Herbalist</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>• Pastor</td>
<td>• Elder</td>
<td>• Imam</td>
<td>• Herbalist</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>• Chief</td>
<td>• Catechist</td>
<td>• Herbalist</td>
<td>• Elder</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Herbalist</td>
<td></td>
<td>• Pastor</td>
<td>• Malam</td>
<td></td>
</tr>
</tbody>
</table>

Focus group participants provided oral informed consent, and IDI participants provided written informed
consent, in accordance with guidance from the KNUST IRB. All participants received a small gift and
refreshment in exchange for their time.

Vignettes, or brief fictitious stories related to the research question, are a useful structured
data collection technique. Issues for discussion are embedded in a culturally familiar context
to allow respondents to share their views through discussion of the situation in the vignette.
(14) Vignettes have been used effectively in mental health research with low-income
populations, providing an entrée into psychopathologies of interest without directly
introducing normative terms and definitions. (15,16) In this study, vignettes were used in
focus groups to depict a man or woman from the community experiencing common
depressive symptoms. The focus group guide contained an adapted version of a vignette
used by Karasz for a U.S. study of depression, and both the focus group and IDI guides
included a series of questions based on the illness representation model. (15) During the
training of Ghanaian research assistants, both guides were adapted with locally appropriate
examples and terms. The research team also discussed and agreed on the proper translation of the focus group guides, IDI guides, and consent forms. Before beginning formal data collection, the focus group and IDI guides were pilot tested in the study communities and revised as necessary. The final focus group vignettes are below, and the full focus group and IDI guides are included in Appendices B and C, respectively.

**Final Women's Focus Group Vignette**
For the past two weeks, Abena had felt that something was wrong with her. When she watched her TV shows in the afternoon, she realized she could not concentrate on the stories. Often during the day her eyes filled with tears, and she felt very sad. Her friends and family tried to cheer her up, but they had no success. There was a wedding that she was supposed to go to with her friend, but she decided she had no interest in going. Abena was not enjoying anything she used to enjoy.

**Final Men's Focus Group Vignette**
For the past two weeks, Kwabena had felt that something was wrong with him. When he listened to sports and politics on the radio in the mornings, he realized he could not concentrate on the discussions. Often during the day his eyes filled with tears, and he felt very sad. His friends and family tried to cheer him up, but they had no success. When his brother asked Kwabena if he wanted to go watch a football match at a bar, like they used to do, he had no interest. Kwabena was not enjoying anything he used to enjoy.

Each focus group facilitator was paired with a note-taker and transcriber, and received a digital recorder. Facilitators collected basic demographic information from participants. Focus groups lasted approximately one hour, and most were conducted in the early evening to accommodate participants’ schedules. Focus groups were conducted predominantly in Twi, the unwritten language spoken in Kumasi, although focus group guides were in English. Using digital recordings, all focus groups and IDIs were translated into English and fully transcribed. The RA who had facilitated each focus group or IDI reviewed its transcription to ensure accuracy. The supervisor also conducted spot checks of the transcription/translation quality.
Data analysis

Data analysis followed Ulin and colleagues’ four suggested stages: 1) reading, 2) coding, 3) displaying data, and 4) data reduction. Facilitators/interviewers completed debrief forms after each focus group or IDI, in which they summarized the most important themes emerging from the discussion/interview. Since the transcripts were not available until after data collection was complete, these debrief forms were used to inform adjustments or additions to the data collection process as needed. As the focus groups and interviews were translated and transcribed in English, the first author read each transcript several times for content and began the process of identifying patterns and themes.

After reviewing each transcript, the first author created a draft codebook and coded each transcript. Major codes were identified in advance in collaboration with the co-authors based on the illness representation model and the study’s research questions. Sub-themes within each major code emerged from the data. Codes evolved as necessary during the coding process, but the final codes and definitions were recorded in a codebook (see Appendix D). Using that codebook, a second researcher coded one-third of the transcripts, and codes were compared and adjusted as necessary to ensure accuracy and consistency in application. The second researcher provided input throughout the remaining data analysis steps. Coding sorts were then used to group the text under themes and examine responses from multiple participants on the same issue. The first author then explored the information emerging under each theme, including quantitative information (e.g. how many focus groups named each stressor?) and qualitative information (how did respondents talk about depression in their community?) As a final step in data analysis, the first author distilled the most important themes emerging from the data. This process was guided by Morgan’s proposed
group to group validation approach, which entails assessing three factors for each topic of interest: how many groups mentioned the topic, how many people within each of these groups mentioned the topic, and how much energy the topic generated within each group. (12) This final step also involved interpretation of key themes beyond description, i.e. how they relate to each other and to the conceptual framework. (14) Analyses were conducted using ATLAS.ti version 7.

_Ethical approvals_

The Family Health and Wealth Study in Ghana received ethical approval from the Institutional Review Board (IRB) at KNUST. This qualitative research component received ethical approval from the IRBs at the Johns Hopkins Bloomberg School of Public Health and KNUST.

_Results_

Table 3.3 presents basic demographic characteristics of qualitative research respondents.

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (focus groups)</td>
<td>45</td>
<td>36</td>
</tr>
<tr>
<td>Mean age (IDIs)</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>Mean number of children</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Employment types (focus groups)</td>
<td>Market trader, Driver, Carpenter, Mason, Tailor, Farmer</td>
<td>Market trader, seamstress, hairdresser</td>
</tr>
</tbody>
</table>

The most commonly reported sources of income for women were trading in the market (food, small goods), and working as a seamstress or hairdresser. Men reported more diverse sources of income, including trading in the market, and working as drivers, carpenters, masons, tailors and farmers. Only three of the respondents (all men) reported that they had no source of income, and one man reported that he was retired.
Figure 3.1 shows a conceptual model of depression emerging from the focus groups and IDIs.

Previous research on mental illness has found that, while white Western populations tend to see depression as a medical problem requiring treatment, other populations often conceptualize depressive symptoms and depression as emotional reactions to stressful situations. (15,17) The latter conceptualization was evident in the study population. In discussing potential causes of depressive symptoms and depression, respondents proposed types of situations, and responses to those situations, that cause these outcomes in their community. According to participants, in response to a negative situation, men and women sometimes worry or think excessively about the situation, which can lead to depression.
Depression can then lead to “madness”, suicide, or other negative outcomes. Conversely, when faced with a problem, people who seek help from God or talk to someone they trust, even after developing “excessive worry” and/or depressive symptoms, are more likely to find a resolution to the problem and to avoid the severe consequences of depression.

In the focus group discussions, the word depression was not used unless the respondents raised it spontaneously. In response to the vignettes provided, the most common term used to describe the behaviors associated with depression was advendw en, meaning excessive thinking or worry. Advendwen was used both to describe the behaviors preceding depression (or a more serious mental health problem), and as a symptom of depression.

[Respondent A:] A friend of mine is married to a certain man and this man always humiliates her...some marriages can overwhelm someone with advendwen.

[Respondent B:] If her job or her husband's work is not moving on as it is supposed to be, it becomes difficult for him to get enough finances to take care of the family. This can cause her to have sadness and advendwen, such that she cannot concentrate on what she's doing.

[Females, high depressive symptoms focus group]

Some complain of their problems, but if initially they fail to get help, their issue becomes worse and turns them into advendwen. Advendwen results in depression.

[Male catechist, IDI]

Causes of depression

Respondents described four categories of stressors that potentially cause depression: financial, relationship, fertility, and illness. There was considerable overlap between men and women in their reported causes of stress and depression, but overall financial issues were most salient for men, while relationship and fertility issues were most salient for women. For example, men described how financial stress sometimes causes depressive symptoms and depression:
For the men, our only worry is: What will our kids eat? What will my wife eat? Will the children go to school? And finally you yourself, what work will you do? That is the kind of thing that bothers our minds.

[Male herbalist,IDI]

If you face job challenges it can result in a situation in which others may say your brain is affected. He easily becomes quickly tempered when you talk to him because…it is the job that makes him who he is.

[Male, high depressive symptoms focus group]

Women also noted that concerns about a partner’s financial situation and his ability to provide for his family are important sources of stress for women. In particular, both men and women highlighted financial pressure related to paying their children’s school fees.

Personally what depresses me, and I think it is so for those my age too, is when I don’t know whether my husband will get money for the children tomorrow...even if I don’t have anything to eat and my husband gets money for them to go to school it is ok.

[Female counselor,IDI]

Both groups of respondents discussed connections between financial and relationship issues.

It may be that [Kwabena] is having some marital problems. Some women, when your finances begin to go down, then it brings issues in the house.

[Male, high depressive symptoms focus group]

Maybe her husband is worrying her, or money problems. It could be that the money her husband gives her is not enough...that’s what can make her sad. Maybe he used to give her lots of money, and now he doesn’t.

[Female, low depressive symptom focus group]

For women, in addition to financial concerns, causes of depression were related to important transitions, including marriage, fertility, and finding ways to support a family. A female counselor summarized the major causes of depressive symptoms for women as follows:

When [women] are not married they get so depressed, nothing you do to help works. If by grace she manages to get a husband and then after a while she doesn’t give birth, that one too becomes a major cause of depression in her life. If she however by grace again gives birth and there is no money to look after the children she can stay up all night ‘til the following morning thinking and worrying about how to get help.

[Female counselor,IDI]
As described, the causes of stress for women were dependent on their stage of life. For young women, being unmarried at an age when women felt they should be married was one of the most commonly cited stressors.

If [Abena] is not married, it could be that she has reached the age of marriage and any men are not proposing to her. This can cause [symptoms described in the vignette].

[Female, high depressive symptom focus group]

Once married, both women and men reported that concerns about infertility were a major source of stress. Responses indicated that both men and women feel pressure to have children from their partners, as well as their parents and in-laws.

It could be that Abena is married and living with the husband but because she hasn’t gotten her own children it gets her thinking and disturbed every time. Her in-laws might be worrying her because of that. The husband too might say that because children are not coming I’m going to marry someone else who can give me children.

[Female, high depressive symptom focus group]

It may happen that [Kwabena] is infertile and the wife needs children, so any time he comes to the house to see the wife he becomes sad…there is nothing that will make him happy because if you marry a woman and there are issues of infertility, no matter what you do for her she will never be happy. Women really want children.

[Male, high depressive symptom focus group]

On the other hand, unplanned pregnancies for unmarried women were also mentioned as important causes of stress. However, these situations were only presented as problematic when the man involved does not take responsibility for the pregnancy.

The last person [who came to me with depression] was this pregnant lady whose boyfriend rejected the pregnancy…She was affected greatly. The depression she had to go through wasn’t easy.

[Female counselor, IDI]

Maybe [Abena] has given birth without a father, and has had other children also without fathers. You [the woman] have become the man taking care of the children, so it brings about a great burden so much that if you don’t take care you will commit suicide.

[Female, mixed depressive symptoms focus group]
Once married, the most common relationship problem experienced by women that respondents discussed was fear or knowledge that your partner is cheating:

> When I started this marriage it was nice, but after two years he started cheating. Even when he is eating, he will be looking at the time because he is in a hurry to go out and meet someone...so we women we are always faced with this problem.

[Female, low depressive symptom focus group]

> Most of these problems [depression] are given to the women by the men. Unfaithfulness on the part of a man in marriage can render the woman mad, she can get sick and she can even get heart-related problems.

[Male pastor, IDI]

Finally, both male and female respondents mentioned illness – specifically stigmatizing illness such as HIV/AIDS – as a possible cause of depressive symptoms. Respondents also appeared to distinguish between physical illness, mental illness, and spiritual sickness, although the lines were sometimes blurred between these areas.

[Kwabena] should be sent to the hospital for a check up on his mental health…it could be that he is not mentally ill. In that case he could be sent for a spiritual consultation.

[Male, low depressive symptom focus group]

> I think the sickness [depression], it is not a physical thing but a spiritual attack on his life. So if it is spiritual, God works on him while the doctors work on the physical aspect.

[Male pastor, IDI]

**Treatment for depression**

The most commonly mentioned source of help for people experiencing depression was prayer or God, followed by talking to someone you trust. The intersection between these areas was demonstrated by the common suggestion that someone experiencing depression should seek help from a religious leader.

> The God [Abena] serves, if she puts her trust in him he will definitely help her. He can also help her through someone.

[Female, high depressive symptom focus group]
The Qu'ran says that if someone comes to tell you his problem, know that the person didn't acquire the problem himself. Anything that happens, it is God that does it...whatever you need in this world, if you ask [God], he would do it for you.

[Male imam, IDI]

Although respondents emphasized the importance of religion and religious healers as sources of care for those experiencing depressive symptoms, several respondents also raised concerns about the role of religious leaders who ask for money but are unable to help them. More broadly, respondents emphasized the importance of sharing your problem with someone you trust. They often noted that if people are unwilling to talk to someone about their problem they will be unable to recover from depression.

Those who commit suicide, many of them don't want to disclose their problems to others. Those who write notes before committing suicide...we find out that it is not any serious problem to have resulted in this. Maybe the solution he needs is close to him.

[Male, low depressive symptom focus group]

If [a depressed person] does not get help on time, he is confused and he doesn't get anyone to tell him that, this thing you are going through, it has happened to someone before. And the person did this and that and became well.

[Male herbalist, IDI]

In some cases respondents mentioned that someone experiencing depression should see a doctor. However, this suggestion appeared to be based on an assumption that the person might be experiencing either a physical health problem that requires medicine, or that the person has become mad and is therefore beyond help from people in his or her community.

Effects of depression

The most commonly mentioned effect of depression, if a person does not get help, was death or suicide. Respondents mentioned suicide explicitly, as well as death more generally.
Depression can bring about death, for instance if the person is sick and doesn’t have money to go to the hospital and anybody to help financially... be can die. Even if it is not the sickness, worrying about it can kill him or her at any time. People commit suicide sometimes because they are depressed as a result of not getting help.

Male pastor, IDI

If she is not able to take that thing [depression] out of her, she may one day decide to take a drug and die so that all will be over.

Female, low depressive symptom focus group

People who go through these depression states don’t usually speak out to other people to be counseled. I am even surprised that this year a lot of people have committed suicide.

Male elder, IDI

Another commonly mentioned effect of depression was high blood pressure.

Male, high depressive symptom focus group

There was one woman who came here complaining of headaches and a heart condition. As the condition was getting better there was a sudden relapse with the blood pressure. Upon further probing I got to know that her husband was seeing another woman.

Female nurse, IDI

Respondents also explained that if someone has depression and does not get help, s/he might become ‘mad’ or develop ‘hysteria’. However, descriptions of these conditions seemed to align with symptoms of depression, rather than psychosis.

Male herbalist, IDI

Most of them [depressed people] go mad, its called madness by force... be is not like the ones we see on the streets, with tattered clothes and carrying rubbish all around, but his mind is damaged. If it hurts him for a long time, it can damage his brain.

Male herbalist, IDI

The more [Abena] keeps on thinking, it can result in hypertension or pressure. It can break her mind... she can be mad, such that as she walks, she will keep talking.

Female, high depressive symptoms focus group

Beyond the effects on the individual of death and depression, respondents were asked about effects on the family and community. Most responses centered around the role that the person plays in the family or community (e.g. financial support, caretaking), or bringing shame to the family. Overall, the suggested effects of men’s depression were focused on his
financial contributions to the family and his broader role in the community, while the suggested effects of women’s depression were focused on her role as a caregiver in the family. Concerns about community gossip were also an important theme, both in terms of one of the effects of depression, but also as a reason why people decide not to seek help.

Let’s say Kwabena is from my family and, based on what he is going through, becomes mad. Others start [asking] which household or family is he from? This will tag the family with a bad name from outsiders.

[Male, low depressive symptom focus group]

We always say that when something bothers you, you have to share it with someone for advice...[but] you’d later go out and find that what you thought was between the two of you is all over the place. This can also [cause] someone who is worried not to want to share [her] problems with anyone.

[Female, low depressive symptoms focus group]

Discussion

This qualitative study explored the risk and protective factors for depressive symptoms and depression from the perspectives of male and female community members and care providers. Responses were consistent across data collection methods, although men and women emphasized different – but overlapping – causes. The data provide a potential conceptual model for depression, represented in Figure 3.1. Depression begins with an initial problem or stressor, with the potential to cause excessive thinking or worry, leading to depression, and ultimately leading to more severe outcomes without intervention. However, the respondents believed that talking to someone can be a highly effective intervention to prevent the initial problem from developing into excessive thinking, depression, and/or other negative outcomes.

The most common initial problems or stressors described fell into four categories: financial, relationship, fertility, and illness. For men, concerns about being able to provide for one’s
family due to job or other financial problems were most salient, although relationship problems were also important. For women, relationship and fertility problems were most salient. Relationship problems focused on being unmarried at an age when a woman feels she should be married, and having a partner who is cheating. Fertility problems included both unplanned pregnancies when unmarried – but only if the male partner refused to take responsibility – and perceived or real infertility in marriage. Both men and women also mentioned the possibility of stigmatizing illness as a reason someone might be depressed.

Men and women gave consistent responses regarding the possible effects of depressive symptoms and depression. Without help, both groups reported the following likely outcomes: suicide/death, high blood pressure, and family problems. Suicide was commonly mentioned as a possible outcome; the most common method described was consumption of DDT or other drugs. Respondents also described possible death from health problems, especially high blood pressure, resulting from excessive worry. Suggestions emerging from focus groups and IDIs regarding the potential impact of depression focused on a financial or leadership impact for men, and a care-taking impact for women.

This study also explored effective treatments for depressive symptoms and depression in the study community. The two most commonly reported sources of help for men and women were God or prayer, and talking to someone you trust. There was often an intersection between these two areas, with respondents suggesting that someone with depression talk to a community religious leader. Respondents appeared to believe that speaking to someone – whether a religious leader or other trusted community member – would help most people recover from depressive symptoms or depression.
Although previous research on depression in similar populations is limited, these findings are consistent with other studies. Skeen and colleagues describe social causation theory, which argues that people living in poverty are at an increased risk of developing mental disorders due to factors such as stress and malnutrition, while social drift theory argues that people living with mental disorders are also more likely to fall into poverty due to exclusion and stigma. (18) A systematic review of the relationship between depression and poverty in middle and low-income countries revealed a consistently positive relationship overall. (19) Research on associations between relationship and fertility-related problems and depression is more limited. A recent systematic review of research on non-psychotic common perinatal mental disorders (CPMD) in low-income income countries found the following factors to be consistently associated with increased risk of CPMD, among others: unintended pregnancy, being unmarried, lacking intimate partner support, and experiencing intimate partner violence. (20) A study in Uganda found that women with unplanned pregnancies were three times more likely to be diagnosed with major depressive disorder compared to women with planned pregnancies. (21) Other studies have found that the association between unplanned pregnancy and depression is no longer significant after adjusting for positive paternal support. (22)

Extensive research has been conducted in high-income countries on the psychological effects of infertility, although research on this topic in sub-Saharan Africa has been more limited. A study of male infertility in Zimbabwe found that one third of men presenting at a male infertility clinic reported symptoms consistent with mild depression, such as insomnia. A similar proportion reported that infertility was causing problems in their marriage, and/or
with other family members who were putting pressure on them to have a child. (23) A study with Nigerian couples seeking infertility treatment found that 43% of women and 16% of men reported clinically relevant depressive symptoms, a statistically significant difference. They also found that “couple friction,” and pressure on the husband from his family, were associated with lower emotional health of couples in the sample. (24) A recent qualitative study with women in obstetric clinics in Accra, Ghana, found that women experiencing both primary and secondary infertility reported symptoms consistent with depression, such as sadness, crying, and insomnia. All respondents, including women who were not seeking care for infertility, reported that women in their culture bear a disproportionate amount of blame and stigma when couples are seen as infertile. (25)

Credibility and transferability of findings

There are two potential threats to credibility in qualitative research: researcher subjectivity, or the ways the researcher’s values and beliefs influence the research; and reflexivity, or the impact of the researcher’s presence on the data. (13) While it is unrealistic to eliminate these threats altogether, we took several steps to mitigate them. Data were collected by sex-matched trained Ghanaian researchers. The process of keeping a field journal and collecting regular reflections from research assistants during data collection provided insight into the potential influence of the researchers’ perspectives on the findings. (26) We fully transcribed all focus groups and interviews, and drew comparisons between the data from different groups (men, women, care providers), to lend credibility to the analytical conclusions. (13) In addition, while we were unable to present preliminary results to the study community due to the timing of data collection, we did conduct a formal debrief meeting with the team of local researchers to discuss and identify a preliminary set of important themes. (13,26) Despite
these efforts, however, it is likely that the presence of researchers influenced the data that were collected. For example, the ethical approval process required that focus groups participants be told that the study was about mental health. This description might have led participants to highlight the importance of mental health in their responses more than they would have otherwise. In addition, the researchers are interested in the role of gender and relationship quality, and these items are represented in the FHWS questionnaire. It is possible that this interest influenced the responses given, and the interpretation of the data.

Generalizability in qualitative research, also referred to as transferability, (14) can be conceptualized in two ways: internal generalizability (do the conclusions apply to the study community as a whole?) and external generalizability (are these findings generalizable to Ghana or sub-Saharan Africa as a whole?) (13) To address internal generalizability, we ensured that we conducted a sufficient number of focus groups and IDIs to reach saturation of data. (13) The main themes identified were even more consistent across focus groups and IDIs than we expected they would be, and analysis revealed that the sample was more than sufficient to reach saturation. In terms of external generalizability, although the findings may not be directly applicable to a broader population, they are useful in informing future research or interventions in similar populations, as well as to adapt theory that may have been developed in Western or higher-income populations. (13, 14)

Despite limitations, the results of this study indicate several possible areas for intervention. A strong network – especially of religious leaders – is in place in the study community to provide support to people experiencing depressive symptoms. Respondents mentioned that many churches have hours set aside in the evenings for counseling services provided by
pastors or other church staff and volunteers. However, it does not appear that religious leaders have received training or other information on mental illness and depression, including when referrals for medical or psychiatric care might be necessary.

Respondents also discussed the stigma associated with depressive symptoms, explaining that if someone develops madness or hysteria (described in terms of depressive symptoms), the result is often community gossip, suicide, or other serious health outcomes. Community awareness raising campaigns could be an effective approach to normalizing depressive symptoms, emphasizing that healthy people sometimes experience stress, sadness, and other symptoms, and can benefit from seeking help. Transforming norms around mental illness and care seeking could result in a higher proportion of people with depressive symptoms seeking help, ideally from trained counselors. This could lead to quicker and more effective resolution of symptoms, and referral for further treatment when necessary.

Work on mental health in Ghana also indicates some opportunities for future interventions. For example, the government of Ghana revised its mental health policy in 2000 to emphasize decentralization and community-based interventions. However, following the 2000 revision, Bhana and colleagues found that many healthcare providers were unaware of the current mental health policy, and the government continued to allocate inadequate resources to its implementation. (27) The Parliament of Ghana passed a new Mental Health Act (Act 846) in March 2012 that, among other stipulations, creates a Mental Health Service, including establishment of regional and district oversight committees to ensure that the law is being implemented as designed. Despite its support for more widespread mental health services, Human Rights Watch has raised concerns about the new law’s endorsement of
involuntary admission and treatment in some cases, without legal recourse. (28) Despite growing political attention to mental health, the lack of quality services for people experiencing severe mental illness in Ghana presents another barrier to de-stigmatization and increased care-seeking behavior. (28)

More broadly, the causes of depressive symptoms proposed by focus group and IDI respondents all related closely to gender norms and expectations in the study community. For example, respondents voiced concern that infertility in marriage (or perceived infertility) leads to both partners being unhappy, and potentially seeking new partners. Beyond pressure from a partner, respondents noted strong pressure from in-laws to have children within a year of marriage. Respondents also emphasized the pressures on men to provide financially for their families, and on women to get married at an appropriate age. Transforming gender norms is potentially a longer-term process, but interventions addressing gender-related expectations can support communities in examining the utility and risks associated with these expectations. For example, respondents noted that increasingly women are working outside the household to supplement their partners’ income, which can potentially relieve pressure on men. Similarly, encouraging community members to value advanced education and more stable employment opportunities for women can lead to relaxation of the expectation that women marry by a certain age. Improved education about causes and signs of infertility, and treatment for common causes of infertility can relieve pressure on women and men, and also potentially reduce the pressure to conceive within a year of marriage.
Chapter Three References


CHAPTER FOUR: MANUSCRIPT TWO

Reliability and Validity of the CES-D 10 Scale

in Men and Women in Kumasi, Ghana
Introduction

Unipolar depressive disorder is the leading cause of disease burden (morbidity and mortality combined) for women of reproductive age globally, including in low-income countries, according to the World Health Organization’s (WHO) 2004 Global Burden of Disease (GBD) Study. (1) This condition is the third most important cause of disease burden globally for men and women combined, and the eighth most important in low-income countries. (1) The 2010 GBD estimates indicate that the number of DALYs attributed to mental and behavioral disorders increased by 38% between 1990 and 2010. (2) In reporting on the GBD Study findings, Ustun and Chisolm emphasize the need for more research in developing countries on the epidemiology of mental health disorders in order to “mainstream” these issues into public health interventions. (3) Beyond the high burden of disease overall, depression is twice as common among women compared to men, (4) indicating possible differences in risk factors, causes, and measurement. (5) This study aims to explore the reliability and validity of a ten-item version of the Center for Epidemiologic Studies Depression Scale among men and women in peri-urban Kumasi, Ghana.

Measurement of depression in Ghana

Although nationally representative data on depressive symptoms in Ghana do not exist, several smaller studies have assessed aspects of mental health in Ghana. Through the Women’s Health Study, following 2814 adult women from the Accra area, de Menil and colleagues found that low levels of education, poverty, and unemployment were associated with poor mental health. Only 0.3% of women reported symptoms consistent with the U.S. cutoff for a mental health disorder on the Kessler-6 instrument, a measure of non-specific psychological distress, indicating that a different cutoff might be more appropriate in this
setting. (6) In contrast, in a study of risk factors for postpartum depression among mothers of sick infants in Kumasi, Ghana, Gold and colleagues found that 69.9% of respondents had levels of depressive symptoms (assessed using the PHQ-9) consistent with mild, moderate, or severe depression. (7) In a hospital sample of pregnant women in Kumasi, Ghana, Bindt and colleagues found that 27% of women met criteria for major depression using the PHQ-9, and depression accounted for a substantial proportion of self-reported disability. (8) A recent study on bullying and mental health with senior high school students in Ghana found that 16.5% of students reported suicidal ideation in the previous year, although a more complete measure of depressive symptoms was not included. (9) While research on the validity and reliability of depressive symptom assessments in Ghana is limited, Weobong and colleagues compared the validity of three scales (SRQ-20, PHQ-9, and EPDS) to assess common postnatal mental disorders in Kintampo, Ghana. They found that, although internal consistency was comparable among the three scales, the PHQ-9 performed better in the post-partum sample in terms of test-retest reliability and criterion validity. In addition, they found that, for all three scales, a combination of cognitive (e.g. crying because unhappy) and somatic (e.g. difficulty sleeping) items discriminated well between cases and non-cases, while positively worded items (e.g. look forward with enjoyment) were less effective at discriminating between these groups. (10)

Center for Epidemiologic Studies Depression (CES-D) Scale

This study examines the reliability and validity of a ten-item version of the CES-D scale in Kumasi, Ghana. The CES-D was designed as a self-reporting tool that can be administered by lay interviewers. Although it is not diagnostic, the CES-D was designed to discriminate between patient and general population groups, be sensitive to levels of depressive
symptomology severity, and be sensitive to certain life events. (11) In the original validation study, Radloff found that the 20-item CES-D had a four-factor structure: depressed affect, positive affect, somatic and retarded activity, and interpersonal symptoms. This factor structure was consistent across age groups, sex, racial groups (black and white), levels of education, and “help groups” (individuals who reported they needed help with an emotional problem in the previous week). (11) Numerous shortened versions of the CES-D scale have also been validated. (12-14) After reviewing previous research on the use of depressive symptom scales in different cultures, we selected the 10-item CES-D scale with two response options (yes/no) based on a belief that these questions would be most appropriate in the study setting, and the simplicity of the measure would be most feasible. This version was previously validated by Irwin and colleagues in an elderly U.S. population, (12) and includes questions intended to capture each of the four factors from original validation studies: depressed affect, positive affect, somatic symptoms, and interpersonal problems. (11) To our knowledge, no shortened version of the CES-D scale has previously been validated in a sub-Saharan African population.

Methods

Using quantitative and qualitative data, this study aims to examine several aspects of the reliability and validity of the 10-item CES-D in the study population: internal consistency reliability, face validity, content validity, and construct validity.

Study site

The data for this study were collected through the Family Health and Wealth Study (FHWS), a multi-country longitudinal open cohort study that aims to examine individual and
household level health and economic consequences of family size. Detailed background on the FHWS is provided in Chapter Two. In Ghana, the FHWS communities are located near Kumasi, the second largest city in the country, in the Ashanti administrative region. Participants were recruited from the Asokwa sub-metropolitan area outside of Kumasi. The Ghana FHWS is implemented in collaboration with the Kwame Nkrumah University of Science and Technology (KNUST), whose researchers have extensive experience conducting similar research.

Quantitative data collection

The 2010 baseline FHWS in Ghana included 799 cohabiting or married couples in two neighboring peri-urban communities outside of Kumasi. The FHWS survey, administered individually to husband-wife pairs (or cohabiting pairs), included questions on the following areas, among others: contraceptive use, fertility history, fertility preferences, health status, socio-economic status, and relationship quality. The second round FHWS data were collected over a period of eight months between September 2011 and May 2012, and included a similar survey to the one used at baseline. After follow-up data collection had been completed, we returned to FHWS households to administer the 10-item CES-D scale to FHWS respondents in order to assess the presence of depressive symptoms. Both members of all couples provided informed consent before participation began in each round of quantitative data collection, including the assessment of depressive symptoms.

Quantitative data analysis

The appropriateness of a scale in measuring a latent variable can be assessed in several ways. One attribute of a well-performing scale, reliability, is defined as the proportion of variance
attributable to the true score of the latent variable. (15) We assessed internal consistency reliability of the ten-item CES-D using Cronbach’s alpha. (16) This measure quantifies inter-item correlations, which demonstrate the extent to which scale items measure the same underlying construct in a study sample. (15) An alpha value between 0.70 and 0.80 provides evidence of an internally consistent scale. Low internal consistency most often indicates one of two issues: 1) the items do not effectively measure the underlying construct, or 2) the items measure more than one underlying dimension. (15) In the original validation study, Radloff and colleagues reported Cronbach’s alpha values ranging from 0.84-0.90 in four population samples. (11)

We used both confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) methods to examine the construct validity of the CES-D scale in this population. Confirmatory factor analysis is a type of structural equation modeling that deals with the measurement model, or relationships between observed indicators and latent variables. (17) CFA is hypothesis driven, meaning that the researcher must have a priori knowledge of the number of factors in the model, and which indicators are related to which factors. In contrast, EFA is a data-driven descriptive technique that is used to determine the appropriate number of common factors and provide evidence of which measured variables are useful indicators of those factors. (17) In scale development, EFA can be used when insufficient theory or evidence of a scale’s structure exist, or when the hypothesized structure does not fit the data. (17,18)

Table 4.2 shows the 10-item version of the CES-D scale used in the current study (12) based on Radloff’s original four-factor structure. (11)

We initially used CFA to determine whether the four-factor model fit the data for men and
women in the study population. Since the hypothesized model did not fit the data well for either group, we then conducted EFA to identify a more appropriate factor structure. We conducted these analyses separately for men and women, and then compared the results across groups. Since all indicators in the scale are dichotomous, we used robust weighted least squares (WLSMV) estimation for our CFA models. (17) Although dichotomous data require a larger sample size than continuous data to conduct CFA, samples of 150 to 200 are sufficient for medium-sized models (10 to 15 indicators) when using WLSMV estimation. (15,17) Analyses were conducted using STATA/SE version 13.0 and Mplus version 7.

Qualitative data collection

We conducted focus group discussions (FGDs) with community members who were FHWS study respondents, and in-depth interviews (IDIs) with community care providers (non-FHWS respondents). FGDs were chosen to provide insight into community norms and attitudes around mental illness and depression in general, as well as more specific thoughts on the circumstances that protect or put people at risk of experiencing depression. (19) Focus group participants were drawn from the FHWS population, stratified by sex and level of depressive symptoms. Study participants were identified as “high” depressive symptoms, “low” depressive symptoms, and “moderate” depressive symptoms. The cutoffs for each group were chosen based on the distribution within the population of respondents, rather than using a priori cut points. Twelve focus groups, with a total of 95 participants (42 men and 53 women) were conducted in October 2012. IDIs explored the same issues as the focus groups from the perspectives of community care providers, selected based on their role as privileged witnesses in the study community. (20) Community care providers were defined as women and men who live or work in the study community and provide care – formally or
informally – to people experiencing depressive symptoms. The focus groups, which were all completed prior to the IDIs, included a question about who might help someone experiencing depressive symptoms. Based on this information, as well as previous research on care-giving for mental illness in similar contexts, we identified the following groups of community care providers: religious leaders (pastors, imams, malams, counselors), community elders and leaders, and healthcare providers (herbalists, nurses, midwives). We conducted IDIs with 19 respondents (11 male, 8 female) drawn from these groups. Focus group participants provided oral informed consent, and IDI participants provided written informed consent.

Qualitative data analysis

Data analysis followed Ulin and colleagues’ four suggested stages: 1) reading, 2) coding, 3) displaying data, and 4) data reduction. (21) Since the translated transcripts were not available until after data collection was complete, debrief forms were used to inform adjustments or additions to the data collection process. After reviewing each transcript, the first author created a draft codebook and coded each transcript. Major codes were identified in advance in collaboration with the co-authors based on the illness representation model and the study’s research questions. Sub-themes within each major code emerged from the data. Codes evolved as necessary during the coding process, but the final codes and definitions were recorded in a codebook. (21) Using that codebook, a second researcher coded one-third of the transcripts, and codes were compared and adjusted as necessary to ensure accuracy and consistency in application. The second researcher provided input throughout the remaining data analysis steps. The first author then explored the information emerging under each theme, including quantitative information (e.g. how many focus groups named
each stressor?) and qualitative information (how did respondents talk about depression in their community?) (21) As a final step, the first author distilled the most important themes emerging from the data. Analyses were conducted using ATLAS.ti version 7. The qualitative data collection and analysis processes are described in more detail in Chapter 3. This paper presents the findings related to symptoms of depression identified by respondents.

**Ethical Approvals**

The Family Health and Wealth Study in Ghana received ethical approval from the Institutional Review Board (IRB) at KNUST. The qualitative component of this study received ethical approval from the IRBs at the Johns Hopkins Bloomberg School of Public Health and KNUST.

**Results**

**Quantitative Results**

We identified a total of 810 men and 812 women during the follow-up round of FHWS. This represents 644 couples from the baseline sample (81% of original 799 couples), as well as 168 additional couples who were recruited to replace the men and women lost to follow up. Out of the follow-up sample, 44 men and 21 women refused or were unavailable to respond. Out of the remaining follow-up FHWS sample, CES-D data were collected from 657 men (86%) and 716 women (91%). These data were collected separately from the follow-up survey, with an average lag time of ten months. The most common reason for non-response was that data collectors were unable to locate respondents at their homes despite repeated visits during the data collection period. The higher proportion of missing CES-D data for men reflects the fact that many men in the study community migrate for
work. Our analyses use a final sample of 705 women (87% of sample) and 635 men (78% of sample), for whom complete data on basic demographic information were available.

Table 4.1 provides descriptive statistics on the men and women included in the study sample. The mean level of depressive symptoms was 2.3 for men and 2.8 for women (p = 0.003). Table 4.2 shows the ten-item version of the CES-D used in this study, item responses for men and women (and results of tests for difference), and the hypothesized factor structure. (11) Women endorsed the following items significantly more often than men: lonely, sad, restless, unfriendly, and dislike. There were no items that men endorsed more often than women. Responses varied by item, with 40.0% of men and 35.2% of women responding affirmatively to I felt everything I did was an effort, compared to 7.6% of men and 19.9% of women responding affirmatively to People were unfriendly. Using a cutoff of four or more symptoms, (12) 28.7% of men and 33.5% of women were categorized as having high levels of depressive symptoms (p = 0.06).

Table 4.3 presents the tetrachoric correlation matrices for item responses by men and women in the study population. Overall, items were highly correlated for both men and women. Some items appear to be potentially collinear given their high positive or negative correlations, such as depress and sad for women (rho = 0.98) and depress and happy for both men and women (rho = -0.98). Reflecting the high correlations, the overall Cronbach’s alpha for the ten scale items was 0.94 (0.91 for men, 0.96 for women). For both men and women, all items exhibited high item-rest correlations (i.e. correlation with the rest of the scale, not including the item), but for men the dislike, unfriendly, and lonely items had lower item-rest correlations than the other items.
We conducted CFA for men and women separately to test whether the hypothesized four-factor model fit the sample data. For both men and women, we were unable to generate valid coefficient estimates for the four-factor model because the residual covariance matrices (psi) were not positive definite. After examining the model results, we combined highly correlated factors to address this issue. (22) For women, Model 1 (see Table 4.4.a) is a two-factor model, with interpersonal symptoms as one factor, and the other three (depressed affect, positive affect, and somatic/retarded activity) combined into one factor. Although this model fit well in terms of RMSEA, CFI, and TLI, the chi-squared test revealed that the model fit was significantly worse than the baseline/full model (p = 0.002). Due to high correlations between the two factors, we then chose to test a one factor model (Model 2), dropping sad, dislike, and happy due to high correlations between these items, which again caused problems with the psi matrix. This model showed improvement in fit based on the chi-squared value, but deterioration in fit based on the RMSEA value. In Model 3, we tested a higher order model, with depressive symptoms as a second-order factor, negative affect and somatic symptoms as two first-order factors, and unfriendly and enjoy regressed on the second-order factor. Using unfriendly and enjoy as covariates in this model addressed the high correlations between these items and dislike and happy, respectively. This model resulted in a slight deterioration in model fit based on the chi-squared test, but a slight improvement based on the RMSEA value. We were unable to compare the fit of these models statistically because they were not nested. (18) We tested the same three models for men (see Table 4.4.b), given similar problems with the psi matrices. For men, the one-factor (Model 2) was clearly the best fit for the data, as demonstrated by the chi-squared (p = 0.10), RMSEA, CFI and TLI values.
To supplement the CFA results, and provide further insight into the selection of final models, we conducted EFA for men and women using principal factor estimation (see Table 4.5). For both groups, a clear one-factor structure emerged, which explained 92.3% of the variance for women and 79.0% of the variance for men. For women, all ten items had loadings greater than 0.90 on the one underlying factor. For men, while all loadings were high (greater than 0.75), the loadings for the dislike, unfriendly, and lonely items were lower than the loadings for the remaining items. Based on this information, as well as research and theory on depressive symptoms, we chose the one-factor model as the final model for women as well as men.

**Qualitative Results**

This section presents the qualitative research results related to the measurement of depressive symptoms. A more complete presentation of the qualitative findings, including information on causes, outcomes, and treatment for depression in the study community, is included in Chapter Three. Respondents in both the focus groups and the IDIs described symptoms commonly associated with depression in their communities. The most common symptoms emerging from our analyses were loss of concentration, crying, loss of appetite, and becoming quiet or withdrawn. Respondents gave several examples of how loss of concentration as a symptom of depression was manifested in their daily lives by themselves or others in their communities:

*Excessive worrying can even make you lose consciousness of things around you...it could even make you search for something you have in your palms...it could halt your mental processes in such a fashion such that you’d not be able to articulate intelligibly.*

[Male low depressive symptoms focus group]

*When you gather your clothing to wash it, sister, it will get to nighttime yet you’d not have done anything to it.*

[Female nurse, IDI]
Sometimes when I'm strolling, a car horn is blown at me before I become aware that I'm straying into the road. Because I lose consciousness of my surroundings, I don't even hear what is happening in the background.

[Female, low depressive symptom focus group]

Respondents also mentioned crying and loss of appetite as common symptoms of depression:

She becomes so sad that whenever she is talking you will see her crying.

[Female elder, IDI]

Because of the situation he was always crying...he felt his life has come to an end. He was always crying...when you give him food be wouldn't eat...I kept on advising him to eat and live for God will heal him.

[Male pastor, IDI]

The depression she had to go through wasn't easy...when she woke up she would not eat. I would cook and send it to her but she wouldn’t eat, I could sit by her for long hours just persuading her to eat something but to no avail.

[Female religious counselor, IDI]

In addition, respondents mentioned becoming quiet or withdrawing socially as symptoms of depression:

At one point my husband, who is an extrovert, suddenly turned into an introvert. If you talked to him, he wouldn’t answer you. If you pinched him, he didn’t notice it.

[Female, low depressive symptom FG]

People going through hardship at times refuse to get closer to people.

[Male, high depressive symptom focus group]

The social life of the person changes and he or she even chooses not to get involved in the social events or activities as he or she used to partake. As I've observed, people who are sociable at times will withdraw from others when depressed.

[Male catechist, IDI]

Respondents also mentioned suicide as a common outcome of depression, indicating the potential utility of screening for suicidal ideation:
If she is not able to take that thing [depression] out of her, she may one day decide to take a drug and die so that all will be over.  

[Female, low depressive symptom focus group]

Sometimes people can be depressed to the extent of wanting to commit suicide.  

[Female counselor, IDI]

A lot of people commit suicide because of frustration from home due to economic hardship.  

[Male elder, IDI]

While the above symptoms were the most frequently mentioned in the qualitative data, other symptoms, such as feeling sad and losing sleep, were also mentioned. Interpersonal problems, especially with one’s spouse or partner, were noted as potential causes of depressive symptoms rather than symptoms themselves.

Discussion

By compiling the results from the qualitative and quantitative analyses, we were able to assess several aspects of reliability and validity of the 10-item CES-D as a measure of depressive symptoms in the study population: internal consistency reliability, face validity, content validity, and construct validity. We did not collect a gold-standard measure of depressive symptoms, such as clinical assessment, which would be needed to assess criterion validity. (15)

Internal consistency reliability

A Cronbach’s alpha level of 0.94 is consistent with guidance that an alpha value of 0.70 or higher is evidence of an internally consistent scale, (15) as well as the results of the original CES-D validation study. (11) The tetrachoric correlation matrices reveal very high correlations – and potential collinearity – between some of the scale items for both men and women. This is not problematic in terms of scale development – in fact it leads to high
internal consistency. However, these high (positive and negative) correlations indicate an opportunity to prioritize a subset of indicators if using a shortened scale, or to add additional indicators, as necessary.

Face and content validity

While reliability relates to the precision of a scale, validity focuses on a scale’s accuracy, or whether the underlying construct is actually the construct of interest (i.e. depressive symptomatology). (15) Face validity refers to whether the items in a scale appear related to the construct of interest. Based on our understanding of depressive symptoms in the study population, the CES-D 10 has adequate face validity. The scale items were understandable by male and female respondents during survey administration, and the Ghanaian study team felt that the items represented depressive symptoms in their culture. However, face validity does not, in itself, indicate that this selection of scale items represents the most effective way of assessing depressive symptoms. (15)

Content validity is the extent to which a scale’s items capture the full domain of interest. (15) Common approaches to assessing content validity include conducting a literature review of the construct of interest, and consulting with experts in the field on the different dimensions of the concept. (15) The Diagnostic and Statistical Manual represents expert opinion on common symptoms of depression, based on research and clinical practice, albeit with a focus on U.S. populations. (23) At the time that the original CES-D scale was designed, the second version of the Diagnostic and Statistical Manual (DSM) identified six major components of depression symptomatology: depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep
disturbance. A few items representing each symptom group were included in the CES-D, and several were worded in the positive direction to assess positive affect and prevent acquiescence bias. (11) The recently revised version of the CES-D scale (CES-D-R) was updated based on symptom groups from the fourth revision of the DSM, with an increased focus on anhedonia, psychomotor retardation, suicidal ideation, and loss of concentration. (23,24) The additional depressive symptom groups were maintained in the recent DSM-5 revision. (25) Table 4.6 compares the items and symptom groups represented in both the original 20-item CES-D, the 10-item version used in this study, and the CES-D-R. While the DSM provides one useful expert source on depressive symptomology, it is also important to anchor depressive symptom measurement in research and evidence from the study community. (26,27) The qualitative research results highlighted the following important symptom groups in the study community that were not captured by the CES-D 10: loss of concentration, loss of appetite, suicidal ideation, and withdrawal/becoming quiet. The CES-D-R contains questions representing three of these missing symptom groups, and the original 20-item CES-D contains an item, I talked less than usual, that could reflect the withdrawal/becoming quiet symptom group. Items capturing these key areas are shaded in Table 4.6, representing possible additions to scales measuring depressive symptoms in the study community that would improve content validity.

Construct validity

We used confirmatory factor analysis to assess construct validity of the CES-10 for men and women in the study population. The results of our CFA and EFA models indicated that a one-factor model was the most appropriate fit for the data for both men and women. In order to fit the CFA models we were forced to drop three items (sad, dislike, happy) due to
very high correlations. However, the high correlations also contributed to the high internal consistency of the scale. (15) The CFA results indicated that all items were significantly associated with the underlying factor depressive symptoms, and all items had high communalities. (18) However, all items were also more strongly associated with the depressive symptom factor for women than for men, providing evidence of different factor structures in these groups. The EFA results similarly showed a strong one-factor model with high factor loadings on all items, but relatively lower loadings for men than women.

Conclusions

Our quantitative and qualitative results indicate that, while the CES-D 10 is an internally consistent and valid measure of depressive symptoms for men and women in the study population, it is likely that the addition of culturally relevant depressive symptom groups would further strengthen this measure. Kleinman argued that cultural beliefs and systems play a powerful role in determining which symptoms are expressed by patients, as well as which symptoms represent the most serious physical and mental ailments. (26) While references such as the DSM are invaluable in informing the development of mental health assessment tools in developing countries, they are just a starting point. Although many researchers have found support for Radloff’s four-factor model in CFA analyses, (28) our results are also consistent with previous cross-cultural validation work identifying differences in symptom groups based on culture and ethnicity. (29) In a recent meta-analysis of CES-D factor analytic studies in different cultural groups, Kim and colleagues found that, using EFA, the four-factor model was only replicated in Hispanic samples, while different factors emerged for African Americans (demoralization and distress), Asians (alienation), and Whites (preoccupation). (29)
Marsella promotes an emic approach to determining symptom groups of depression, explaining that symptoms that are central in some cultures, such as depressed affect, might not be relevant in others. (30) For example, in a study comparing European Americans and South Asian immigrants, Karasz found that European Americans conceptualized depression in terms of a biopsychiatric model, while South Asian immigrants saw depression as a reaction to social and interpersonal situations. (31) Similarly, we should expect that men and women, especially in cultures with more traditional gender norms, will experience and express depression differently. For example, in this study, questions related to loneliness and interpersonal problems appeared to be more salient for women than for men. It is possible that other items that were not included in the CES-D, related to symptoms such as becoming quiet, loss of concentration, or suicidal ideation, would be more strongly related to depressive symptoms for men than women (or vice versa).

This study has some important limitations. We did not collect a gold standard measure of depression, which would have provided evidence of the criterion validity of the CES-D 10 in this setting, as well as informing a locally-derived cutoff for high depressive symptoms. We also chose to use a shortened version of the CES-D scale to limit the burden on respondents. The high correlation between scale items meant that we were unable to formally test the validity of the four-factor model, although it also provided evidence of a stronger shared underlying factor. We also chose to drop 33 observations for whom data on key independent variables were not available. To assess the impact of dropping these observations, we created a second complete dataset by using hotdeck multiple imputation to impute the missing values on religion, age, and education. We compared the means and
proportions on those variables between the analytic dataset (n = 635 for men, n = 705 for women) and the complete imputed dataset (n = 657 for men, n = 716 for women). The approximate means/proportions and statistical significance of tests for differences between men and women remained the same across three rounds of imputations.

This study also has some important strengths. We were able to assess the reliability and validity of a common measure of depressive symptoms in a study site in Kumasi, Ghana. We are not aware of any other studies that have sought to validate a shortened version of the CES-D in a sub-Saharan African setting. We were also able to compare the reliability and validity for men and women. Finally, the use of qualitative data allowed us to supplement our quantitative results with the perspectives of male and female community members and community care providers, and facilitated the identification of additional potentially important symptom groups.

Based on our findings, we recommend that future research on depressive symptoms in the study population build on the CES-D scale (or items representing the same constructs) by adding items related to loss of concentration, loss of appetite, withdrawal/becoming quiet, and suicidal ideation. Further research is also needed on gender differences in the salience of interpersonal problems as a depressive symptom group in this population. In addition, future studies should integrate the input of formal and informal mental health care providers, both in assessment of the face and content validity of scale items, and to provide clinical diagnoses of depression against which to assess criterion validity. Programmatically, our results indicate that depressive symptoms are an important issue in the study community, and that men and women might experience and communicate depressive symptoms
differently. Development of assessment tools that are rooted in research on local symptoms of depression is an essential first step in integrating depression screening more systematically into clinical practice.
Chapter Four References


(18) Byrne B. Structural equation modeling with Mplus: Basic concepts, applications, and programming. New York: Taylor & Francis Group, LLC; 2012.


Chapter Four Tables and Figures

Table 4.1 Sample Characteristics by Sex (n = 1340)

<table>
<thead>
<tr>
<th></th>
<th>Men (n = 635)</th>
<th>Women (n = 705)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CES-D score (mean)</td>
<td>2.3</td>
<td>2.8</td>
<td>0.003</td>
</tr>
<tr>
<td>% Christian (Muslim)</td>
<td>53.3</td>
<td>50.6</td>
<td>0.50</td>
</tr>
<tr>
<td>Education (years)</td>
<td>7.1</td>
<td>6.2</td>
<td>0.0002</td>
</tr>
<tr>
<td>Age (mean)</td>
<td>41.8</td>
<td>34.7</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Note: T-tests were conducted to assess differences in means for continuous variables; one-way anova tests were conducted to assess differences in proportions for categorical variables.
* Men’s and women’s mean values/proportions are significantly different at the alpha = 0.01 level
**Men’s and women’s mean values/proportions are significantly different at the alpha = 0.05 level

Note: Respondents are classified as having a high level of depressive symptoms if they report four or more depressive symptoms.

Table 4.2 Hypothesized Factor Structure and CES-D Item Responses, by sex (n=1340)

<table>
<thead>
<tr>
<th>CES-D Item (Irwin 1999) (In the past week…)</th>
<th>Hypothesized Factor</th>
<th>Women (n = 705) (% yes)</th>
<th>Men (n = 635) (% yes)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I felt depressed</td>
<td>Negative Affect</td>
<td>34.2</td>
<td>29.3</td>
<td>0.06</td>
</tr>
<tr>
<td>I felt lonely</td>
<td></td>
<td>26.4</td>
<td>15.0</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>I felt sad</td>
<td>Somatic Symptoms</td>
<td>31.5</td>
<td>25.4</td>
<td>0.01</td>
</tr>
<tr>
<td>I felt everything I did was an effort</td>
<td></td>
<td>35.2</td>
<td>40.0</td>
<td>0.07</td>
</tr>
<tr>
<td>My sleep was restless</td>
<td>Positive Affect</td>
<td>31.9</td>
<td>23.9</td>
<td>0.001</td>
</tr>
<tr>
<td>I could not get going</td>
<td></td>
<td>20.3</td>
<td>18.3</td>
<td>0.35</td>
</tr>
<tr>
<td>I was happy</td>
<td>Interpersonal Problems</td>
<td>68.7</td>
<td>72.1</td>
<td>0.17</td>
</tr>
<tr>
<td>I enjoyed life</td>
<td></td>
<td>68.2</td>
<td>70.1</td>
<td>0.46</td>
</tr>
<tr>
<td>People were unfriendly</td>
<td></td>
<td>19.9</td>
<td>7.6</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>I felt that people disliked me</td>
<td></td>
<td>19.9</td>
<td>9.1</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>33.5</td>
<td>28.7</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Response options are yes or no for all questions; p-value represents results from t-tests for differences in response proportions between men and women. * p < 0.05, **p < 0.01

Note: Respondents are classified as having a high level of depressive symptoms if they report four or more depressive symptoms. (Irwin 1999)
Table 4.3 Tetrachoric Correlation Matrices for Men and Women (n=1340)

<table>
<thead>
<tr>
<th></th>
<th>depress (NA)*</th>
<th>effort (SOM)</th>
<th>restless (SOM)</th>
<th>happy (PA)</th>
<th>lonely (NA)</th>
<th>unfrien. (INT)</th>
<th>enjoy (PA)</th>
<th>sad (NA)</th>
<th>dislike (INT)</th>
<th>going (SOM)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>depress</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>effort</td>
<td>0.92</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>restless</td>
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<td>0.81</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>happy</td>
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<td>-0.91</td>
<td>-0.88</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lonely</td>
<td>0.75</td>
<td>0.66</td>
<td>0.66</td>
<td>-0.72</td>
<td>1.00</td>
<td></td>
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<tr>
<td>unfriendly</td>
<td>0.64</td>
<td>0.57</td>
<td>0.59</td>
<td>-0.66</td>
<td>0.62</td>
<td>1.00</td>
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<td></td>
</tr>
<tr>
<td>enjoy</td>
<td>-0.93</td>
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<td>-0.69</td>
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<td></td>
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<tr>
<td>sad</td>
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<td>0.83</td>
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<td>0.70</td>
<td>0.64</td>
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<td></td>
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<tr>
<td>dislike</td>
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<td>0.90</td>
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<td>going</td>
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<td>0.76</td>
<td>-0.92</td>
<td>0.62</td>
<td>0.60</td>
<td>-0.89</td>
<td>0.88</td>
<td>0.70</td>
<td>1.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>depress (NA)*</th>
<th>effort (SOM)</th>
<th>restless (SOM)</th>
<th>happy (PA)</th>
<th>lonely (NA)</th>
<th>unfrien. (INT)</th>
<th>enjoy (PA)</th>
<th>sad (NA)</th>
<th>dislike (INT)</th>
<th>going (SOM)</th>
</tr>
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<tbody>
<tr>
<td><strong>Women</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>depress</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>effort</td>
<td>0.93</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>restless</td>
<td>0.91</td>
<td>0.91</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>happy</td>
<td>-0.98</td>
<td>-0.92</td>
<td>-0.92</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lonely</td>
<td>0.95</td>
<td>0.90</td>
<td>0.91</td>
<td>-0.98</td>
<td>1.00</td>
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<tr>
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<td>0.85</td>
<td>0.87</td>
<td>-0.85</td>
<td>0.87</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>enjoy</td>
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<td>-0.91</td>
<td>1.00</td>
<td>-0.98</td>
<td>-0.85</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sad</td>
<td>0.98</td>
<td>0.92</td>
<td>0.92</td>
<td>-0.99</td>
<td>0.98</td>
<td>0.85</td>
<td>-0.99</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dislike</td>
<td>0.89</td>
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<td>0.86</td>
<td>-0.86</td>
<td>0.88</td>
<td>0.98</td>
<td>-0.86</td>
<td>0.88</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>going</td>
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<td>0.91</td>
<td>-0.93</td>
<td>0.91</td>
<td>0.86</td>
<td>-0.93</td>
<td>0.94</td>
<td>0.86</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*Letters in parentheses indicate the hypothesized factor that each indicator measures. NA = negative affect, SOM = somatic symptoms, PA = positive affect, INT = interpersonal problems. Tetrachoric correlations adjusted by STATA to be positive semidefinite.*
Table 4.4.a Global Fit Statistics for a Series of Confirmatory Factor Models for Women (n=705)

<table>
<thead>
<tr>
<th>Model</th>
<th>(2 factor)</th>
<th>(1 factor)</th>
<th>(2nd order)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\chi^2$</td>
<td>62.48</td>
<td>30.16</td>
<td>38.65</td>
</tr>
<tr>
<td>$p$-value</td>
<td>0.002</td>
<td>0.007</td>
<td>(0.005)</td>
</tr>
<tr>
<td>RMSEA (95% CI)</td>
<td>0.034 (0.021-0.048)</td>
<td>0.040 (0.020-0.060)</td>
<td>0.038 (0.021-0.056)</td>
</tr>
<tr>
<td>$p$-value</td>
<td>0.974</td>
<td>0.765</td>
<td>0.858</td>
</tr>
<tr>
<td>CFI</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>TLI</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td>Free parameters</td>
<td>21</td>
<td>14</td>
<td>17</td>
</tr>
</tbody>
</table>

$\chi^2$ value represents the discrepancy between the unrestricted sample covariance matrix and the restricted sample covariance matrix, the associated $p$-value indicates probability that the model fit is significantly different from the baseline/full model. RMSEA = root mean square error of approximation, cutoff is (less than) 0.05. $p$-value represents probability true RMSEA value is less than 0.05. The CFI and TLI measure improvement in model fit by comparing the hypothesized model with the less restricted nested baseline model.

Table 4.4.b Global Fit Statistics for a Series of Confirmatory Factor Models for Men (n=635)

<table>
<thead>
<tr>
<th>Model</th>
<th>(2 factor)</th>
<th>(1 factor)</th>
<th>(2nd order factor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\chi^2$</td>
<td>58.19</td>
<td>21.02</td>
<td>61.54</td>
</tr>
<tr>
<td>$p$-value</td>
<td>0.006</td>
<td>0.1012</td>
<td>0.000</td>
</tr>
<tr>
<td>RMSEA (95% CI)</td>
<td>0.033 (0.018-0.048)</td>
<td>0.028 (0.000-0.051)</td>
<td>0.050 (0.043-0.076)</td>
</tr>
<tr>
<td>$p$-value</td>
<td>0.973</td>
<td>0.937</td>
<td>0.161</td>
</tr>
<tr>
<td>CFI</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td>TLI</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td>Free parameters</td>
<td>21</td>
<td>14</td>
<td>17</td>
</tr>
</tbody>
</table>

$\chi^2$ value represents the discrepancy between the unrestricted sample covariance matrix and the restricted sample covariance matrix, the associated $p$-value indicates probability that the model fit is significantly different from the baseline/full model. RMSEA = root mean square error of approximation, cutoff is (less than) 0.05. $p$-value represents probability true RMSEA value is less than 0.05. The CFI and TLI measure improvement in model fit by comparing the hypothesized model with the less restricted nested baseline model.
Table 4.5 Exploratory Factor Analysis Results for Men and Women

<table>
<thead>
<tr>
<th>Factor Loadings on First Factor</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depress</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>Effort</td>
<td>0.91</td>
<td>0.95</td>
</tr>
<tr>
<td>Restless</td>
<td>0.85</td>
<td>0.95</td>
</tr>
<tr>
<td>Happy</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>Lonely</td>
<td>0.78</td>
<td>0.98</td>
</tr>
<tr>
<td>Unfriendly</td>
<td>0.76</td>
<td>0.92</td>
</tr>
<tr>
<td>Enjoy</td>
<td>0.94</td>
<td>0.98</td>
</tr>
<tr>
<td>Sad</td>
<td>0.95</td>
<td>0.99</td>
</tr>
<tr>
<td>Dislike</td>
<td>0.79</td>
<td>0.93</td>
</tr>
<tr>
<td>Going</td>
<td>0.92</td>
<td>0.96</td>
</tr>
</tbody>
</table>

The first factor accounts for 92% of total variation for women, and 79% of total variation for men.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I felt sad</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>I felt depressed</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>I had crying spells</td>
<td>Sadness/Dysphoria</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I could not shake off the blues</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>I felt lonely</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>I felt that I could not shake off the blues</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Nothing made me happy</td>
<td>Anhedonia/Loss of interest</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>1 lost interest in my usual activities</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I had trouble keeping my mind on what I was doing</td>
<td>Thinking/Concentration</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I could not focus on the important things</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I did not feel like eating; my appetite was poor</td>
<td>Appetite</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I lost a lot of weight without trying to</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I had a lot of trouble getting to sleep</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>My sleep was restless</td>
<td>Sleep</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>I slept much more than usual</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I felt like a bad person</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I thought my life had been a failure</td>
<td>Guilt/Worthlessness</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I did not like myself</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I felt like I was moving too slowly</td>
<td>Movement/Agitation</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I felt that everything I did was an effort</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I felt fidgety</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I could not get going</td>
<td>Tired/Fatigue</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>I was tired all the time</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I felt hopeful about the future</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I was happy</td>
<td>Positive Affect</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I enjoyed life</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I felt that I was just as good as other people</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I talked less than usual</td>
<td>Friends/Interpersonal</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>People were unfriendly</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I felt that people dislike me</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I wanted to hurt myself</td>
<td>Suicidal ideation</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>I wished I were dead</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I was bothered by things that usually don’t bother me</td>
<td>Unclear</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>I felt fearful</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Note: Shaded questions are suggested additions to a measure of depressive symptoms in the study population.
CHAPTER FIVE: MANUSCRIPT THREE

Factors associated with depressive symptoms

among couples in Kumasi, Ghana
Introduction

Depression is an important public health issue globally, including in low-income countries. (1) Research in diverse populations indicates that depression is approximately twice as common for women as it is for men. (2-4) These gender differences are commonly attributed to a combination of diathesis and stress factors. (4) Despite the public health importance of this issue, very little research has been done on depression in sub-Saharan Africa, and specifically on gender differences. This study aims to expand the evidence base on this issue by exploring factors associated with depressive symptoms among 542 couples in Kumasi, Ghana.

Gender and depressive symptoms

Unipolar depressive disorder is the leading cause of disease burden (morbidity and mortality combined) for women globally, including in low-income countries, according to the World Health Organization’s (WHO) 2004 Global Burden of Disease (GBD) Study. (1) The study also estimated that this condition is the third most important cause of disease burden globally for men and women combined, and the eighth most important in low-income countries. (1) Tomita and colleagues found that depressive symptoms were significantly higher for women than men in a nationally representative survey in South Africa. (5) Chipimo and colleagues also found mental distress to be significantly higher among females than males in Zambia. (6) In a review of the evidence on sex differences in depression, Parker and Brotchie weigh arguments in favor of both an artifactual explanation (e.g. women are more likely to seek help) as well as real differences in risk (e.g. women are biologically more predisposed to developing depression; women are exposed to more risk factors for depression). (3) The authors note evidence that gender differences are less pronounced in
homogeneous community samples (e.g. by education, culture), indicating the potentially important role of social factors in driving this difference. They conclude that women are both more predisposed to depression (i.e. due to biological or genetic factors) and are also exposed to greater social stressors, increasing their risk further. (3)

Mental health and depression in Ghana

Although nationally representative data on mental health in Ghana do not exist, several smaller studies have addressed this issue. Through the Women’s Health Study, following 2814 adult women from the Accra area, de Menil and colleagues found that low levels of education, poverty, and unemployment were associated with poor mental health. In addition, women who reported either taking prescription medication, or having headaches in the last month, or women who had ever been pregnant were significantly more likely to report higher mental illness symptoms. Only 0.3% of women reported symptoms consistent with the U.S. cutoff for a mental health disorder on the K6 instrument, indicating that a different cutoff might be more appropriate in this setting. (7) A recent study on bullying and mental health with senior high school students in Ghana found that 16.5% of students reported suicidal ideation in the previous year, although a more complete measure of depressive symptoms was not included. (8) Finally, in a hospital sample of pregnant women in Kumasi, Ghana, Bindt and colleagues found that 27% of women met criteria for major depression, and depression accounted for a substantial proportion of self-reported disability. (9)

Through the Mental Health and Poverty Project (MHaPP), Ofori-Atta and colleagues conducted a qualitative study with healthcare providers from five regions in Ghana to explore local understandings of mental illness. They found that respondents attributed
mental illness in women to three main causes: inherent vulnerability (e.g. women cannot handle stress as well as men), witchcraft, and gender disadvantage (polygyny, physical abuse, and poverty). (10) Another recent study on mental health in Ghana examined official police records to assess reasons for suicidal behavior. Although social stigma and the threat of prosecution for survivors likely produced biased data, the authors found that 95% of people undertaking reported suicidal behavior between 2006 and 2008 were men, and the most common reason attributed to the behavior was to avoid public dishonor (34%), while an additional 10% were attributed to sexual impotence or suspecting a wife/partner of having an affair. (11)

Methods

Study site

The data for these analyses come from the Family Health and Wealth Study (FHWS) in Ghana. FHWS is a multi-country longitudinal open cohort study that aims to examine individual and household level health and economic consequences of family size. The FHWS survey is administered individually to husband-wife (or cohabiting) pairs, and includes questions on the following areas, among others: contraceptive use, fertility history, fertility preferences, health status, socio-economic status, and relationship quality. The Ghana FHWS study communities are located near Kumasi, the second largest city in the country, in the Ashanti administrative region. Participants were recruited from four neighboring sites in the Asokwa sub-metropolitan area outside of Kumasi. Prior to recruitment for this study, a household enumeration was undertaken in the target communities to inform a sampling frame. Exclusion/inclusion criteria were also established, which included age (15-44 for women, 18-59 for men), relationship status (married or cohabiting), and residence within the
study area. These criteria, along with the sampling frame, were used to randomly select households for participation.

At baseline in 2010, the Ghana FHWS enrolled a cohort of 799 households. The response rate was 96.7% (27 couples declined participation). The FHWS follow-up survey, administered from 2011-2012, included similar questions to the baseline survey. The study team was able to locate 644 out of the original 799 couples (81%). The primary reason for loss to follow-up was migration due to work. The average lag time between baseline and follow-up survey administration within households was nineteen months. An additional 168 couples were recruited at follow-up and provided responses to the baseline FHWS survey. In 2012, the FHWS study team collected data on depressive symptoms from adult male and female study participants. They identified 704 men (87% of follow-up respondents) and 757 women (93% of follow-up respondents) in the study population. The average lag time between the follow-up survey administration and depressive symptom data collection was 10 months. All participants provided informed consent, obtained through culturally appropriate procedures, before participation.

The Ghana FHWS is implemented in collaboration with the Kwame Nkrumah University of Science and Technology (KNUST), whose researchers have extensive experience conducting similar research. KNUST has a close partnership with the Bill & Melinda Gates Institute for Population and Reproductive Health at the Johns Hopkins Bloomberg School of Public Health.
**Key variables**

Depressive symptoms were assessed using a 10-item version of the Center for Epidemiologic Studies Depression (CES-D) Scale. (12) The CES-D was designed as a self-reporting tool that can be administered by lay interviewers. In contrast to diagnostic tools used during clinical intake, the CES-D was developed to measure depressive symptoms – with a focus on depressed mood – that might accompany different clinical diagnoses, including normal. (13) The 20 items included in the original scale were identified from existing self-reporting tools (e.g. Beck Depression Inventory), clinical literature, and factor analysis. (13) Validity and reliability of the original scale was assessed in U.S. psychiatric clinic and population samples. These tests revealed acceptability, criterion validity, construct validity, and high internal consistency. Numerous shortened versions of the CES-D scale have been validated. (12,14) In order to limit the burden of an additional scale on study participants, we chose to use a 10-item version of the CES-D with two response options (yes/no), which was previously validated by Irwin and colleagues in an elderly U.S. population. (12) Using a sum score of responses to all ten items, and a cutoff of four depressive symptoms, Irwin and colleagues found that this 10-item version of the CES-D had a sensitivity of 97% and specificity of 84%. (12) The analyses presented in Chapter 4 indicate strong internal consistency reliability and validity of the CES-D 10 scale in the study population. A high proportion of variation in all ten scale items was explained by one underlying factor, depressive symptoms. Table 5.1 provides the 10-item version of the CES-D scale used in this study. The remaining variables used in this study were assessed during the FHWS follow-up data collection round. They include: relationship quality, self-rated health, socioeconomic status, and all other independent variables.
The FHWS includes four relationship quality scales, each focused on a different dimension of relationship quality: communication, trust, satisfaction, and commitment. Respondents were asked to indicate how much they agree with a series of statements about their relationship, e.g. *my partner treats me fairly and justly*, or how often a certain behavior occurs, e.g. *how often do you confide in your partner?* Each of the original scales includes five to eight questions, and women and men responded separately to each question. Previous research on the psychometric properties of the relationship quality scales in this population suggests a series of modifications, which we have integrated into our analyses. The modifications include the use of shortened versions of the commitment and trust scales, one question on relationship satisfaction, and two separate communication scales – one on destructive communication and one on constructive communication. (15)

Self-rated health was measured in the FHWS survey through one question: *Tell me, please, how would you evaluate your health? Is it very good, good, average (not good, but not bad), bad, very bad?* Previous research indicates that self-rated health, adjusted for age, is a reliable predictor of mortality in diverse populations. (16-18) In addition, numerous studies have found significant associations between poor self-rated health and mental illness. (6,19)

Relative SES was measured in the FHWS using the following question: *Imagine a 9-step ladder where on the bottom, the first step, stand the poorest people, and on the highest step, the 9th, stand the rich. On which step is your family located today?* In addition to the question on relative SES, the FHWS included diverse questions on household wealth, income, and expenditures, including questions on whether the household owns a series of assets, land ownership, and recent medical expenditures. The wealth portion of the FHWS survey was administered to men
only, and their responses were applied to the entire household, including their wives/partners. A combination of responses to these questions were also used to create a measure of absolute socio-economic status, based on the methodology used by the Demographic and Health Surveys (DHS). (20) We ultimately chose to use relative SES in our analyses because it is a subjective measure, and has previously been shown to be more strongly associated with mental illness than absolute measures of SES. (21)

Based on a review of the literature, and previous qualitative research in the study community, we selected the following individual and household characteristics to include in our analyses: religion, marriage type, education, age, parity, and pregnancy/post-partum status for women. We also included age and education differences within couples as a measure of power within relationships.

**Data Analysis**

Since the goal of these analyses was to look at similarities and differences between men and women in couples, we selected the subset of 542 couple pairs (i.e. 542 men and 542 women) for whom complete data were available. This represents 71% of men and 69% of women who provided follow-up data for the FHWS. We chose not to impute missing values for the outcome or for our primary independent variables of interest. For other variables we noted that individuals tended to have missing data on multiple items, which informed the decision to only analyze data from couples with complete data available.

Approximately 56% of respondents in the analytic sample reported no depressive symptoms (54% of men and 58% of women) (see Figure 5.1). As a result, the distribution of the
dependent variable violates the assumptions of ordinary least squares (OLS) regression, meaning that OLS would produce biased estimates. (22) Tobit models have been used increasingly in social science literature to account for data censoring at the lower and/or upper level of the outcome variable. (22-24) This method has been used for regression models predicting CES-D scores given the common clustering of observations at the lower and upper levels. (25) In contrast to interpretation of OLS coefficient estimates, Tobit coefficients can be interpreted as representing the association between each independent variable and an underlying latent unobserved outcome. (22) The estimates produced by Tobit models can be decomposed and interpreted in two parts: 1) the effect of each independent variable on the value of the dependent variable (CES-D score) among those with a CES-D score greater than zero (non-limit value); and 2) the effect of each independent variable on the probability of having a non-limit value (i.e. CES-D score > 0) among respondents with a CES-D score of zero. (23) We conducted the same analyses described below using OLS regression and the results were similar (data not shown).

Before beginning data analyses we examined the distribution of CES-D score, the dependent variable, and each independent variable of interest. Given the research focus on gender differences, we then statistically compared mean values and proportions of each variable between men and women in the study population. We conducted t-tests for differences in mean values of continuous variables, and one-way anova tests for differences in proportions of categorical variables.

As a next step, we examined bivariate relationships between CES-D and each independent variable of interest. We ran simple Tobit regression models between each independent
variable and CES-D score for men and women separately. In each model we controlled for clustering by study site, which resulted in unchanged mean estimates, but adjusted the standard errors of each estimate to take into account the similarities between individuals living in the same study sites. (26)

As a final analytic step, we conducted a nested series of Tobit regression models to assess associations between independent variables of interest and CES-D scores. We first ran these models stratified by sex, and then ran a full model including both men and women, adjusting for sex to test for statistical interaction. In each set of models (men, women, combined) we added variables in three consecutive blocks: individual/household characteristics (religion, marriage type, relative SES, education, education difference between partners, age, age difference, parity/biological children, and pregnant/post-partum for women only); relationship quality and self-rated health (four relationship quality scales and self-rated health); and partner characteristics (partner’s CES-D score and partner’s four relationship scales). We chose to include partner characteristics in order to assess the extent to which a respondent’s partner’s depressive symptoms and perceptions of relationship quality were associated with his or her own level of depressive symptoms. In the final set of combined regression models for men and women we included interactions between sex and other independent variables that appeared relevant based on our a priori assumptions and the results of the sex-stratified models. All regression models adjusted for clustering by study site. (26)

Tobit regression in STATA/SE version 13.0 produces estimates of the marginal effects of each independent variable on the latent dependent variable, in this case latent CES-D score.
The user-generated dtobit2 package then calculates estimated mean effects of independent variables unconditional on censoring, conditional on censoring, and finally the change in probability of censoring associated with each independent variable. (27) For the purposes of these analyses, we have first focused on highlighting the risk and protective factors that are statistically significantly associated with the outcome; these variables remain the same regardless of the type of effect estimate. We then examine the conditional effects in each model more closely, which represent estimates of the effect that each independent variable has on increasing (or decreasing) CES-D score among those who have a CES-D score larger than zero. (22-24) Last, we present the effect of each independent variable on the probability that individuals with a CES-D score of 0 will develop any depressive symptoms. All analyses were conducted using STATA/SE version 13.0.

**Ethical approvals**

The FHWS was approved by the Committee on Human Research Publication and Ethics at the School of Medical Sciences, Kwame Nkrumah University of Science and Technology in Kumasi, Ghana. This secondary data analysis study was approved by the Institutional Review Board at the Johns Hopkins Bloomberg School of Public Health.

**Results**

**Sample characteristics**

Table 5.2 presents sample characteristics by sex. In the full sample, the mean CES-D score for women (2.6) was significantly higher than the mean score for men (2.1, p = 0.02). Using the cutoff of at least four symptoms identified by Irwin and colleagues, 27.3% of men and 31.2% of women were categorized as having high levels of depressive symptoms. (12) Mean
level of education (p = 0.003) and mean age (p < 0.0001) were both higher for men than women. Men reported a higher mean number of biological children than women (parity) (p = 0.03). Men also reported higher levels on all four relationship quality scales: commitment (p <0.0001), trust (0.09), communication (<0.0001), and satisfaction (<0.0001). Women reported significantly poorer self-rated health compared to men (p = 0.0001). There were no statistically significant differences between men and women on reported religion or marriage type. Approximately 9.4% of women were categorized as pregnant or post-partum based on their responses during the follow-up survey. The mean reported level of household relative SES was 4.4.

Unadjusted analyses

Table 5.3 presents the results of bivariate Tobit regression models between each independent variables and latent CES-D score, adjusted for clustering by site. For both men and women, being Muslim (vs. Christian) was significantly associated with a lower latent CES-D score (p = 0.01 for men and women). For men, being in a polygynous (vs. monogamous) relationship was associated with a lower latent CES-D score (p < 0.0001), but there was no significant difference for women (p = 0.84). For women, older age was associated with a higher latent CES-D score (0.04), but there was no difference for men (p = 0.32). In terms of relationship quality, better communication and higher satisfaction were associated with lower latent CES-D scores for both men (communication p-value = 0.005, satisfaction p-value = 0.03) and women (communication p-value < 0.0001, satisfaction p-value = 0.02). In addition, for women higher trust was associated with lower latent CES-D scores (p = 0.04). Finally, for women poorer self-rated health was associated with a higher latent CES-D score (p = 0.04).
Adjusted Analyses for Men and Women Separately

In the final men’s regression model (Table 5.4.a), the following characteristics were associated with more depressive symptoms: lower relative SES, higher education difference with his partner, more biological children, higher commitment, higher trust, lower communication, higher partner’s CES-D score and lower partner’s trust (column A). Among men who reported any depressive symptoms, a one point increase in relative SES was associated with 0.27 point lower mean CES-D score; and one additional biological child was associated with a 0.01 higher mean CES-D score. In the same group of men, a one-year increase in education difference with his partner was also associated with a 0.04 point increase in CES-D score. In terms of relationship quality, among men who reported any depressive symptoms: a one point increase in commitment was associated with a 0.11 point increase in CES-D score; a one point increase in trust with a 0.05 point increase in CES-D score; and a one point increase in communication with a 0.10 point decrease in CES-D score. Also, a one point increase in wife’s trust score was associated with a 0.06 point decrease in CES-D score for men who report any depressive symptoms and a one point increase in wife’s CES-D score was associated with a 0.13 point increase in men’s CES-D score, among men who report any depressive symptoms. Column 3 presents the effect of each independent variable on the probability that men with a CES-D score of 0 will develop any depressive symptoms. For example, among men reporting no depressive symptoms, a one-point decrease in relative SES was associated with a 7.3% increase in the probability of reporting any depressive symptoms. Also in this censored group of men, a one-point increase in wife’s CES-D score was associated with a 3.3% increased probability of reporting any depressive symptoms.
In the final women’s regression model (Table 5.4.b), the following characteristics were associated with more depressive symptoms: being Christian vs. Muslim (p = 0.02), poorer self-rated health (p < 0.0001), and higher partner’s CES-D score (p = 0.04). Among women who reported any depressive symptoms (column B), being Christian was associated with a 0.80 point lower mean CES-D score, and a one point increase in self-rated health (toward poorer health) was associated with a 0.48 point increase in CES-D score. Also in this group of uncensored women, a one point increase in partner’s CES-D score was associated with a 0.20 point increase in women’s CES-D score. The estimated changes in the probability of being uncensored (column C) indicate that, among women who reported no depressive symptoms, being Christian instead of Muslim is associated with a 14.5% higher probability of reporting any depressive symptoms. Also among women reporting no depressive symptoms, a one point deterioration in self-rated health was associated with a 8.6% increased probability of reporting any depressive symptoms, and a one point increase in husband’s CES-D score was associated with a 3.5% increased probability of reporting any depressive symptoms.

**Adjusted Analyses for Men and Women Combined**

The final combined regression model for men and women (Table 5.5) echoes many of the findings from the men’s and women’s individual models. The following characteristics were associated with a higher value on the latent variable measuring depressive symptoms: having a larger education difference with one’s partner, higher commitment, lower communication, and partner’s higher latent CES-D score. There were also significant interactions between sex and relative SES, and sex and self-rated health. For men, a higher relative SES level was associated with lower latent CES-D score, while for women the reverse was true. Similarly,
for women better self-rated health was associated with lower latent CES-D score, while for men the reverse was true. Among men and women who reported any depressive symptoms (column B), a one point increase in relationship commitment was associated with a 0.03 point increase in CES-D score, but a one-point increase in relationship communication was associated with a 0.04 point decrease in CES-D score. A one-year increase in education difference between partners was associated with a 0.02 point increase in CES-D score, conditional on being uncensored. Also, a one-point increase in partner’s CES-D score was associated with a 0.16 point increase in respondent’s CES-D score.

Reflecting the individual models, the sex by relative SES interaction effect indicates that a one-point increase in relative SES was associated with a 0.29 point decrease in CES-D score for men, but a 0.03 point increase in CES-D score for women, conditional on being uncensored. The sex by self-rated health interaction effect indicates that a one-point increase in self-rated health (toward poorer health) is associated with a 0.17 point decrease in CES-D score for men, but a 0.41 point increase in CES-D score for women, conditional on being uncensored. Among men and women who report no depressive symptoms, a one-point increase in partner’s CES-D score is associated with a 3.4% increased probability of reporting any depressive symptoms. The interaction effect between sex and relative SES indicates that, among men who report no depressive symptoms, a one point decrease in relative SES is associated with a 6.9% increase in the probability of reporting any depressive symptoms, while for women in the same situation, this change is associated with a 1.1% decrease in the probability of reporting any depressive symptoms. Similarly for the sex by self-rated health interaction, among women who report no depressive symptoms, a one point deterioration in self-rated health is associated with an 8.1% increased probability of
reporting any depressive symptoms, while for men in the same situation, this change is associated with a 3.3% decrease in the probability of reporting any depressive symptoms.

**Discussion**

In this study, we explored factors associated with depressive symptoms among couples in Kumasi, Ghana using multivariable Tobit regression models. While a strong body of literature exists on risk and protective factors for – as well as gender differences in – depression in high-income countries, this topic has not been sufficiently explored in sub-Saharan Africa. (28)

*Factors associated with depressive symptoms*

Using responses to a ten-item version of the CES-D, participants in this study were each assigned a CES-D score ranging from 0 to 10. Overall men and women reported significantly different mean levels of depressive symptoms, as well as different levels of all independent variables, except marriage type and religion. An individual who reports a high level of depressive symptoms on the CES-D might have a disorder, but might also be mourning the loss of a child, have a medical condition causing these symptoms, or might not meet the criteria for a disorder for many other reasons. A diagnostic assessment would be needed to determine whether someone with a high level of depressive symptoms has a depressive disorder. Although the CES-D is not diagnostic, it was designed to be sensitive to levels of depressive symptomology severity, and to certain life events. Tools assessing depressive symptomology can be used to identify high-risk population groups in need of intervention, and to identify correlates of depressive symptoms, but individual scores should not be interpreted. (13)
In all final Tobit regression models (men, women, combined), respondent’s CES-D score was significantly positively associated with his or her partner’s latent CES-D score. For women, being Muslim and having better self-rated health were also significantly protective against depressive symptoms. For men, higher relative SES, fewer biological children, and lower age difference with his partner emerged as protective individual/household characteristics. Also for men, the picture of risk was more complex with regard to relationship quality. While a higher level of men’s own trust in their partners was associated with a higher average CES-D score for men, a higher level of their partner’s trust was associated with a lower average CES-D score for men. Also, men’s higher commitment score, but lower communication score, were both associated with a higher latent CES-D score for men. In the combined men’s and women’s models, some of these differences persisted. As was the case with the men’s models, good communication was again protective, while higher commitment was associated with more depressive symptoms, although these effects were both attenuated compared to the men’s model. Similarly, education difference between partners was positively associated with CES-D score in the combined model, but attenuated relative to the men’s model. There were two important interactions with sex in the combined model: with relative SES and self-rated health, reflecting the different relationships between each of these variables in the men’s and women’s individual models. Higher relative SES was associated with lower CES-D score for men, but higher CES-D score for women. Poorer self-rated health was associated with lower CES-D score for women, but higher CES-D score for men.

Depression, couples and relationship quality

For both men and women in this study, partner’s depressive symptoms were significantly
associated with the respondent’s depressive symptoms, independent of their own individual, household, and relationship quality exposures. This reflects other research findings that depression clusters within families, friend groups, and neighborhoods. (29,30) Rosenquist outlines three possible explanations for this clustering of depression: 1) induction, where depression in one person causes depression in another, 2) homophily, when depressed individuals choose one another as partners or friends, or 3) confounding, where individuals experience the same events that increase their risk of depression. (30) The possible role of confounding is likely stronger in married couples than other groups, given their joint exposure to economic, health, and other stressors. Given that depressive symptoms were only measured at one time point in this study, it is difficult to assess the role of induction or homophily. In terms of confounding, the interactions between sex and self-rated health and sex and relative SES indicate that, at least in part, men and women in the study population were subject to different risk factors for depressive symptoms.

There is also evidence in our results, as well as previous research, that relationship quality plays a role in increasing or buffering the risk of depression in couples. We examined associations between depressive symptoms and four dimensions of couple relationship quality: commitment, communication, trust, and satisfaction. Relationship satisfaction was not significantly associated with depressive symptoms in any of the Tobit regression models. In the men’s models and combined models, higher commitment appeared to increase risk of depressive symptoms, while better communication appeared to be protective. Whitton and colleagues found that relationship characteristics, such as level of commitment and interdependence, moderated the association between satisfaction and depressive symptoms in young American adults. They describe the potentially different role that commitment
plays in relationships for men compared to women, arguing that men prioritize the good of a relationship over their own immediate self-interest only when they feel a high level of commitment, whereas women tend to prioritize the good of the relationship regardless of commitment level. (31) In that context, the results of this study related to commitment might reflect a perception by men that increased relationship commitment is associated with increased responsibilities and reduced focus on his own immediate self-interest. In contrast to the findings on commitment, higher relationship communication, measured by high constructive communication and low destructive communication in this study, was protective against depressive symptoms. This is consistent with previous research on conflict in relationships as a risk factor for depression. Beach and colleagues investigated cross-spouse effects of marital discord on depressive symptoms over time in a sample of American married couples. They found that reports of marital discord at baseline predicted depressive symptoms at follow-up for men and women themselves, as well as for their partners, and that the magnitude of these effects were comparable for men and women. (31) More broadly, Teo and colleagues found that, among adult Americans with and without a history of major depression at baseline, both relationship quality with a spouse and relationship quality with other family members predicted risk of major depression at follow-up. They also found that both negative and positive aspects of relationships, i.e. strain and support, were independently associated with depression. (32) Although research on sex differences in the effect of relationship quality on depression is inconclusive, Beach and colleagues argue that there is theoretical reason to believe that sex differences diminish in longer-term relationships as men’s and women’s levels of commitment converge. (29)
In this study, there was a statistically significant interaction effect between sex and relative SES; better SES was associated with higher depressive symptoms for men, but lower depressive symptoms for women, the latter of a smaller magnitude. In addition, increased education difference between men and women was associated with a higher latent CES-D score in the combined models. Previous research indicates that both poverty and education likely have a two-way relationship with depression. Skeen and colleagues (2010) describe social causation theory, which argues that people living in poverty are at an increased risk of developing mental disorders due to factors such as stress and malnutrition, while social drift theory argues that people living with mental disorders are also more likely to fall into poverty due to exclusion and stigma. (33) Given the consistent negative association between SES and depression in the literature, (34) the positive association for women in this study is somewhat surprising. In a cross-national study of depression in 23 European countries, Van de Velde and colleagues found that SES moderated the relationship between sex and depression. For example, retired men were significantly more likely to be depressed than working men, but this difference was not observed for retired women. Similarly, education was more strongly protective against depression for women than men. Despite this interaction between sex and SES, overall they found that respondents with higher levels of absolute SES tended to have lower risk of depression. (2)

We chose to include a measure of relative rather than absolute SES in our models given previous literature indicating that relative SES is more closely associated with mental health, (21,35) and the important role of perception in stress. However, it is possible that women’s assessments of relative SES would have been different from men’s, which might have
accounted in part for the different relationship between SES and depressive symptoms for men and women. For the purpose of comparison, we also developed a measure of absolute SES, by conducting a principal components analysis with a series of assets, (20) which was not significantly associated with CES-D score in unadjusted or adjusted models. No other associations changed substantively when we included absolute SES instead of relative SES in the model. When we included both relative SES and absolute SES, all conclusions remained the same except that communication and the sex by self-rated health interaction were no longer statistically significant (results not shown).

Self-rated health, depression, and gender

Overall, women in this study reported poorer self-rated health, and higher levels of depressive symptoms, which is consistent with research in other populations. (18) Further, poorer self-rated health was associated with higher depressive symptoms for women, but lower depressive symptoms for men. In contrast, some studies have found that self-rated health is more strongly associated with mortality for men than for women. (16,17) In addition to extensive research supporting an association between self-rated health and mortality, (16-18) numerous studies have also found that self-rated health is a significant predictor of mental distress or illness. Tomita and colleagues found that poorer self-rated health was associated with a higher level of depressive symptoms for men and women in South Africa, although they did not examine whether this mechanism was different for men and women. (5) According to Jylha, the cognitive process of rating one's health takes into account numerous factors, including cultural conceptions of health, individual expectations of health, and positive or negative disposition, including depression status. (16) This difference in the effect of self-rated health for men and women potentially reflects a
difference in the cognitive process that men and women adopt for assessing their health, such as a greater emphasis on mental health factors by women compared to men.

**Strengths and limitations**

This study has some important limitations. The timing of data collection on depressive symptoms – which took place on average ten months after the data collection on other variables – creates the possibility of misclassification. For example, it is possible that household relative SES status changed for some respondents during the ten months between data collection. However, given our interest in understanding how acute and chronic exposure to stressors might increase risk of developing depressive symptoms, some lag time between exposure to stressors and measurement of depressive symptoms was desirable. In addition, missing data on key covariates, and the desire to analyze data for complete couples, required that we use only a subset of the data available. To assess the impact of the missing data, we used hotdeck multiple imputation to replace missing data, and re-estimated the bivariate models in Table 5.3. The directions and approximate magnitude of all estimates remained the same, although several estimates changed statistical significance (satisfaction for men; education, education difference, and parity for women). Last, the Family Health and Wealth Study did not collect data on some key risk factors for depressive symptoms that emerged from a previous literature review and qualitative research, including intimate partner violence and infertility. (36-38)

Despite these limitations, this study has several important strengths. Depression in couples is an important topic in sub-Saharan Africa in terms of disease burden, (1) but has been understudied to date. The use of couples data allowed us to examine the effects of partner
and relationship characteristics on men’s and women’s risk of developing depressive symptoms. Inclusion of partner’s depressive symptoms in our analyses provided information on the clustering of depressive symptoms within couples. Given the interest in gender roles, inclusion of four scales measuring relationship quality was also a useful addition. Previous qualitative research used to inform this study indicated that relationship quality was an important cause of depressive symptoms for men and women in the study population.

Future directions

The results of our analyses indicate that factors associated with depressive symptoms differ for men and women in the study population. This is evidenced by the different results in the men’s and women’s models, as well as the significant interaction effects between sex and self-rated health and relative SES. Future research should explicitly address and explore gender differences in causes of depression, either through separate models or interaction effects. In addition, our results indicate the importance of partner characteristics, especially partner’s level of depressive symptoms, in predicting individual depressive symptoms. Future research should also focus on longitudinal exposures and repeated measures of depressive symptoms in couples, as well as symptoms of other common mental health disorders. Quantitative research on mental health should be complemented by qualitative research to inform interpretation of results and help identify additional important risk and protective factors for consideration. Also, given evidence that marriage is associated with lower levels of depression in many populations, future research should explore risk and protective factors for depression among single men and women of all ages.
Policy and program implications

The results of this study indicate that depression prevention and treatment interventions with married or cohabiting individuals should involve both partners. The important role of depressive symptoms in the study site also underlines the need for efforts to integrate depression screening into primary healthcare services. Associations between depressive symptoms and self-rated health for women also point to an opportunity to supplement physical screening practices with patients’ inputs on their own health. More broadly, continued efforts are needed in contexts similar to the study population to raise awareness about symptoms of depression and sources of care in the community.
Chapter Five References


Chapter Five Tables and Figures

Table 5.1 Questions from the ten-item version of the Center for Epidemiologic Studies Depression Scale

<table>
<thead>
<tr>
<th>Item</th>
<th>Question (in the past week...)</th>
<th>Response Option: Yes, No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I felt depressed</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I felt everything I did was an effort</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>My sleep was restless</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I was happy</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I felt lonely</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>People were unfriendly</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I enjoyed life</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>I felt sad</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>I felt that people disliked me</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I could not get going</td>
<td></td>
</tr>
</tbody>
</table>
Figure 5.1 Histogram of CES-D scores by sex and normal distribution line (n = 1084)
<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 542)</td>
<td>(n = 542)</td>
<td></td>
</tr>
<tr>
<td>CES-D score</td>
<td>2.1</td>
<td>2.6</td>
<td>0.02</td>
</tr>
<tr>
<td>Mean (range)</td>
<td>(0-10)</td>
<td>(0-10)</td>
<td></td>
</tr>
<tr>
<td>Religion (% Christian)</td>
<td>51.3</td>
<td>52.6</td>
<td>0.67</td>
</tr>
<tr>
<td>Marriage type (% polygynous)</td>
<td>8.1</td>
<td>10.2</td>
<td>0.25</td>
</tr>
<tr>
<td>Relative SES</td>
<td>4.4</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Mean (range)</td>
<td>(1-8)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Education, years</td>
<td>7.0</td>
<td>6.2</td>
<td>0.003</td>
</tr>
<tr>
<td>Mean (range)</td>
<td>(0-22)</td>
<td>(0-16)</td>
<td></td>
</tr>
<tr>
<td>Age, years</td>
<td>42.3</td>
<td>34.8</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean (range)</td>
<td>(24-56)</td>
<td>(20-47)</td>
<td></td>
</tr>
<tr>
<td>Parity, number</td>
<td>3.8</td>
<td>3.5</td>
<td>0.03</td>
</tr>
<tr>
<td>Mean (range)</td>
<td>(0-30)</td>
<td>(0-10)</td>
<td></td>
</tr>
<tr>
<td>Pregnant/post-partum (% yes)</td>
<td>--</td>
<td>7.9</td>
<td>--</td>
</tr>
<tr>
<td>Commitment</td>
<td>32.6</td>
<td>29.8</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean (range)</td>
<td>(8-36)</td>
<td>(7-36)</td>
<td></td>
</tr>
<tr>
<td>Trust</td>
<td>27.3</td>
<td>26.8</td>
<td>0.09</td>
</tr>
<tr>
<td>Mean (range)</td>
<td>(10-35)</td>
<td>(7-35)</td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>19.6</td>
<td>16.6</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean (range)</td>
<td>(0-27)</td>
<td>(-20-27)</td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>5.0</td>
<td>4.5</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean (range)</td>
<td>(1-6)</td>
<td>(1-6)</td>
<td></td>
</tr>
<tr>
<td>Self-rated health</td>
<td>1.4</td>
<td>1.6</td>
<td>0.0001</td>
</tr>
<tr>
<td>Mean (range)</td>
<td>(1-3)</td>
<td>(1-5)</td>
<td></td>
</tr>
</tbody>
</table>

Note: T-tests were conducted to assess differences in means for continuous variables; one-way ANOVA tests were conducted to assess differences in proportions for categorical variables.

* Men’s and women’s mean values/proportions are significantly different at the alpha = 0.01 level

**Men’s and women’s mean values/proportions are significantly different at the alpha = 0.05 level"
Table 5.3 Bivariate Tobit Regression of Socio-demographic Characteristics, Relationship Quality and Self-rated Health on CES-D score, by sex

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christian (Muslim)**</td>
<td>-3.33 (0.01)</td>
<td>-3.04 (0.01)</td>
</tr>
<tr>
<td>Monogamous (polygynous)</td>
<td>2.06 (&lt;0.0001)</td>
<td>0.27 (0.84)</td>
</tr>
<tr>
<td>Relative SES</td>
<td>-1.31 (0.007)</td>
<td>-0.57 (0.09)</td>
</tr>
<tr>
<td>Education</td>
<td>0.008 (0.91)</td>
<td>-0.12 (0.19)</td>
</tr>
<tr>
<td>Education difference</td>
<td>0.02 (0.70)</td>
<td>0.04 (0.07)</td>
</tr>
<tr>
<td>Age</td>
<td>0.04 (0.32)</td>
<td>0.10 (0.04)</td>
</tr>
<tr>
<td>Age difference</td>
<td>-0.03 (0.59)</td>
<td>-0.07 (0.46)</td>
</tr>
<tr>
<td>Parity</td>
<td>-0.01 (0.79)</td>
<td>0.08 (0.56)</td>
</tr>
<tr>
<td>Not pregnant/post-partum</td>
<td>--</td>
<td>0.86 (0.43)</td>
</tr>
<tr>
<td>Commitment</td>
<td>0.03 (0.92)</td>
<td>-0.26 (0.13)</td>
</tr>
<tr>
<td>Trust</td>
<td>0.13 (0.51)</td>
<td>-0.37 (0.04)</td>
</tr>
<tr>
<td>Communication</td>
<td>-0.39 (0.005)</td>
<td>-0.16 (&lt;0.0001)</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>-1.11 (0.03)</td>
<td>-2.05 (0.02)</td>
</tr>
<tr>
<td>Self-rated Health</td>
<td>-1.30 (0.44)</td>
<td>2.26 (0.045)</td>
</tr>
</tbody>
</table>

Note: All estimates are controlling for clustering by site.

**3 women and 15 men reported their religion as “other”, regression includes only those couples who reported their religion as Christian or Muslim.
Table 5.4.a Multivariable Tobit Decomposition of Individual/Household Characteristics, Relationship Quality, Self-rated Health and Partner Characteristics on Men’s CES-D Scores (n = 542)

<table>
<thead>
<tr>
<th>Individual/Household Characteristics</th>
<th>Coefficient (p-value)</th>
<th>Effect on CES-D score for those with a CES-D score &gt; 0</th>
<th>Effect on probability that individuals with CES-D score = 0 will develop depressive symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christian (Muslim)</td>
<td>-2.26 (0.07)</td>
<td>-0.78</td>
<td>-20.73%</td>
</tr>
<tr>
<td>Monogamous (Polygynous)</td>
<td>-0.26 (0.65)</td>
<td>-0.09</td>
<td>-2.39%</td>
</tr>
<tr>
<td>Relative SES</td>
<td>-0.79 (&lt;0.0001)</td>
<td>-0.27</td>
<td>-7.25%</td>
</tr>
<tr>
<td>Education</td>
<td>-0.007 (0.93)</td>
<td>-0.002</td>
<td>-0.06%</td>
</tr>
<tr>
<td>Education difference</td>
<td>0.11 (0.047)</td>
<td>0.04</td>
<td>0.99%</td>
</tr>
<tr>
<td>Age</td>
<td>0.005 (0.94)</td>
<td>0.002</td>
<td>0.04%</td>
</tr>
<tr>
<td>Age difference</td>
<td>0.04 (0.63)</td>
<td>0.013</td>
<td>0.3%</td>
</tr>
<tr>
<td>Biological children</td>
<td>0.31 (0.002)</td>
<td>0.012</td>
<td>0.3%</td>
</tr>
<tr>
<td>Relationship Quality and Self-Rated Health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commitment</td>
<td>0.31 (0.002)</td>
<td>0.11</td>
<td>2.88%</td>
</tr>
<tr>
<td>Trust</td>
<td>0.13 (0.02)</td>
<td>0.05</td>
<td>1.19%</td>
</tr>
<tr>
<td>Communication</td>
<td>-0.30 (0.002)</td>
<td>-0.10</td>
<td>-2.75%</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>-1.11 (0.16)</td>
<td>-0.38</td>
<td>-10.20%</td>
</tr>
<tr>
<td>Self-rated health</td>
<td>-0.12 (0.62)</td>
<td>-0.04</td>
<td>-1.11%</td>
</tr>
<tr>
<td>Partner Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wife’s CES-D</td>
<td>0.36 (0.001)</td>
<td>0.13</td>
<td>3.34%</td>
</tr>
<tr>
<td>Wife’s commitment</td>
<td>0.04 (0.71)</td>
<td>0.013</td>
<td>0.33%</td>
</tr>
<tr>
<td>Wife’s trust</td>
<td>-0.16 (0.002)</td>
<td>-0.06</td>
<td>-1.50%</td>
</tr>
<tr>
<td>Wife’s communication</td>
<td>-0.02 (0.76)</td>
<td>-0.006</td>
<td>-0.16%</td>
</tr>
<tr>
<td>Wife’s satisfaction</td>
<td>-0.51 (0.15)</td>
<td>-0.18</td>
<td>-4.68%</td>
</tr>
</tbody>
</table>

Notes: Religion: 1 = Christian, 2 = Muslim; Marriage type: 1 = polygynous, 2 = monogamous; Relative SES: 1 (poorest) through 9 (wealthiest); Education: continuous years completed; Education difference and age difference: Husband’s value – wife’s value; Biological children: continuous number; Commitment: possible range from 4 (low) to 36 (high); Trust: possible range from 10 (low) to 35 (high); Communication: possible range from -6 (low) to 27 (high); Satisfaction: possible range from 1 (low) to 6 (high); Self-rated health: 1 (very good) to 5 (very bad). All models reported with robust standard errors to adjust for clustering within study site.
Table 5.4.b Multivariable Tobit Decomposition of Individual/Household Characteristics, Relationship Quality, Self-rated Health and Partner Characteristics on Women’s CES-D Scores (n = 542)

<table>
<thead>
<tr>
<th>Individual/Household Characteristics</th>
<th>Coefficient (p-value)</th>
<th>Effect on CES-D score for those with a CES-D score &gt; 0</th>
<th>Effect on probability that individual with CES-D score = 0 will develop depressive symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Religion</td>
<td>-2.49 (0.02)</td>
<td>-0.80</td>
<td>-14.47%</td>
</tr>
<tr>
<td>Marriage type</td>
<td>-0.39 (0.78)</td>
<td>-0.13</td>
<td>-2.27%</td>
</tr>
<tr>
<td>Relative SES</td>
<td>0.18 (0.31)</td>
<td>0.056</td>
<td>1.02%</td>
</tr>
<tr>
<td>Education</td>
<td>-0.18 (0.14)</td>
<td>-0.059</td>
<td>-1.06%</td>
</tr>
<tr>
<td>Education difference</td>
<td>-0.03 (0.62)</td>
<td>-0.009</td>
<td>-0.16%</td>
</tr>
<tr>
<td>Age</td>
<td>0.013 (0.86)</td>
<td>0.004</td>
<td>0.08%</td>
</tr>
<tr>
<td>Age difference</td>
<td>-0.07 (0.42)</td>
<td>-0.023</td>
<td>-0.42%</td>
</tr>
<tr>
<td>Parity</td>
<td>-0.05 (0.78)</td>
<td>-0.016</td>
<td>-0.29%</td>
</tr>
<tr>
<td>Pregnant/post-partum</td>
<td>0.003 (0.99)</td>
<td>0.0009</td>
<td>0.02%</td>
</tr>
<tr>
<td>Relationship Quality and Self-Rated Health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commitment</td>
<td>-0.03 (0.61)</td>
<td>-0.0009</td>
<td>-0.16%</td>
</tr>
<tr>
<td>Trust</td>
<td>-0.11 (0.27)</td>
<td>-0.036</td>
<td>-0.65%</td>
</tr>
<tr>
<td>Communication</td>
<td>0.008 (0.92)</td>
<td>0.003</td>
<td>0.05%</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>-0.62 (0.47)</td>
<td>-0.20</td>
<td>-3.62%</td>
</tr>
<tr>
<td>Self-rated health</td>
<td>1.47 (&lt;0.0001)</td>
<td>0.48</td>
<td>8.56%</td>
</tr>
<tr>
<td>Partner Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Husband’s CES-D</td>
<td>0.61 (0.04)</td>
<td>0.20</td>
<td>3.53%</td>
</tr>
<tr>
<td>Husband’s Commitment</td>
<td>-0.04 (0.82)</td>
<td>-0.013</td>
<td>-0.23%</td>
</tr>
<tr>
<td>Husband’s Trust</td>
<td>0.017 (0.78)</td>
<td>0.006</td>
<td>0.10%</td>
</tr>
<tr>
<td>Husband’s Communication</td>
<td>-0.082 (0.16)</td>
<td>-0.026</td>
<td>-0.48%</td>
</tr>
<tr>
<td>Husband’s Satisfaction</td>
<td>-0.06 (0.93)</td>
<td>-0.018</td>
<td>-0.32%</td>
</tr>
</tbody>
</table>

Notes: Religion: 1 = Christian, 2 = Muslim; Marriage type: 1 = polygynous, 2 = monogamous; Relative SES: 1 (poorest) through 9 (wealthiest); Education: continuous years completed; Education difference and age difference: Husband’s value – wife’s value; Parity: continuous number; Commitment: possible range from 4 (low) to 36 (high); Trust: possible range from 10 (low) to 35 (high); Communication: possible range from -6 (low) to 27 (high); Satisfaction: possible range from 1 (low) to 6 (high); Self-rated health: 1 (very good) to 5 (very bad). All models reported with robust standard errors to adjust for clustering within study site.
Table 5.5 Multivariable Tobit Decomposition of Individual/Household Characteristics, Relationship Quality, Self-rated Health and Partner Characteristics on Men’s and Women’s CES-D Scores ($n = 1084$)

<table>
<thead>
<tr>
<th>Individual/Household Characteristics</th>
<th>Coefficient (p-value)</th>
<th>Effect on CES-D score for those with a CES-D score &gt; 0</th>
<th>Effect on probability that individuals with CES-D score = 0 will develop depressive symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>-6.69 (&lt;0.0001)</td>
<td>-2.23</td>
<td>-47.02%</td>
</tr>
<tr>
<td>Religion</td>
<td>-2.42 (0.06)</td>
<td>-0.81</td>
<td>-17.01%</td>
</tr>
<tr>
<td>Marriage type</td>
<td>-0.43 (0.63)</td>
<td>-0.14</td>
<td>-2.99%</td>
</tr>
<tr>
<td>Relative SES</td>
<td>-2.12 (0.002)</td>
<td>-0.70</td>
<td>-14.87%</td>
</tr>
<tr>
<td>Education</td>
<td>-0.05 (0.56)</td>
<td>-0.016</td>
<td>-0.35%</td>
</tr>
<tr>
<td>Education difference</td>
<td>0.06 (0.001)</td>
<td>0.019</td>
<td>0.39%</td>
</tr>
<tr>
<td>Age</td>
<td>0.014 (0.66)</td>
<td>0.005</td>
<td>0.10%</td>
</tr>
<tr>
<td>Age difference</td>
<td>-0.01 (0.79)</td>
<td>-0.004</td>
<td>-0.08%</td>
</tr>
<tr>
<td>Biological children/parity</td>
<td>0.03 (0.63)</td>
<td>0.01</td>
<td>0.22%</td>
</tr>
<tr>
<td>Sex*SES Interaction</td>
<td>1.13 (&lt;0.0001)</td>
<td>0.38</td>
<td>7.97%</td>
</tr>
<tr>
<td><strong>Relationship Quality and Self-Rated Health</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commitment</td>
<td>0.09 (0.03)</td>
<td>0.03</td>
<td>0.65%</td>
</tr>
<tr>
<td>Trust</td>
<td>0.08 (0.20)</td>
<td>0.03</td>
<td>0.55%</td>
</tr>
<tr>
<td>Communication</td>
<td>-0.12 (&lt;0.0001)</td>
<td>-0.04</td>
<td>-0.83%</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>-0.84 (0.13)</td>
<td>-0.28</td>
<td>-5.92%</td>
</tr>
<tr>
<td>Self-rated health</td>
<td>-2.09 (0.03)</td>
<td>-0.70</td>
<td>-14.67%</td>
</tr>
<tr>
<td>Sex*Self-rated Health Interaction</td>
<td>1.62 (0.01)</td>
<td>0.54</td>
<td>11.40%</td>
</tr>
<tr>
<td><strong>Partner Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner’s CES-D</td>
<td>0.48 (0.01)</td>
<td>0.16</td>
<td>3.35%</td>
</tr>
<tr>
<td>Partner’s Commitment</td>
<td>0.03 (0.88)</td>
<td>0.01</td>
<td>0.20%</td>
</tr>
<tr>
<td>Partner’s Trust</td>
<td>-0.08 (0.19)</td>
<td>-0.03</td>
<td>-0.54%</td>
</tr>
<tr>
<td>Partner’s Communication</td>
<td>-0.04 (0.44)</td>
<td>-0.01</td>
<td>-0.26%</td>
</tr>
<tr>
<td>Partner’s Satisfaction</td>
<td>-0.60 (0.14)</td>
<td>-0.20</td>
<td>-4.23%</td>
</tr>
</tbody>
</table>

Notes: Religion: 1 = Christian, 2 = Muslim; Marriage type: 1 = polygynous, 2 = monogamous; Relative SES: 1 (poorest) through 9 (wealthiest); Education: continuous years completed; Education difference and age difference: Husband’s value – wife’s value; Biological children/parity: continuous number; Commitment: possible range from 4 (low) to 36 (high); Trust: possible range from 10 (low) to 35 (high); Communication: possible range from -6 (low) to 27 (high); Satisfaction: possible range from 1 (low) to 6 (high); Self-rated health: 1 (very good) to 5 (very bad). All models reported with robust standard errors to adjust for clustering within study site.
CHAPTER SIX: CONCLUSION
Introduction

Depression is an important public health issue globally, and accounts for an increasingly large proportion of disease burden in low-income countries. (1,2) Research on gender differences in depression indicates that biological and social factors account for the two-fold higher risk of depression for women compared to men in diverse geographic and cultural contexts. (3,4) Depression is also associated with a 70% higher risk of all-cause mortality, (5) and an increased risk of cancer, diabetes, and growth faltering for children of depressed mothers. (6-8) Although a strong body of research exists on gender and depression in Western settings, (3) research on depression in low-income settings, especially outside of the post-partum period, has been limited. (9)

This dissertation examined gender differences in depressive symptoms among men and women in Kumasi, Ghana. Given the critical role that sex and gender play in determining depression incidence and prevalence, examining this issue through a gender lens provides useful information on factors associated with depression and opportunities for intervention. The mixed methods approach provided an opportunity to contextualize quantitative findings using the perspectives of men and women in the study community. The following section summarizes the findings from each manuscript. This summary is followed by a presentation of overall conclusions, implications, strengths, and limitations.

Overview of Chapter Three

Chapter three presented the results of focus groups with male and female FHWS respondents and in-depth interviews with community mental healthcare providers. This study aimed to explore local understandings of depressive symptoms, as well as perceived
causes, consequences, and treatments. Similarities and differences in these factors for men and women were highlighted.

A conceptual model of depression in the study community emerged through the qualitative data analysis process. Respondents described depression as the result of an underlying problem or stressor, consistent with previous cross-cultural research on conceptualizations of depression. (Karasz; Kleinman) The common causes described for men and women differed, but both were rooted in a combination of family/relationship and economic factors. For men, the most important stressor identified was economic hardship, which had the potential to cause stress within a marriage. Women echoed this belief, reporting that a husband’s inability to provide financially for his family was a common stressor. For women, the most important stressors were related to pressure to get married and have children at the appropriate age, as well as concerns that their husbands were cheating.

In terms of consequences and treatment for depression, the responses for men and women appeared to converge. Respondents described a process of excessive thinking, or adwendwen in Twi, in response to a stressor, which could develop into behavior resembling depression. For both men and women, respondents recommended that talking to someone, especially religious leaders in their communities or trusted friends, could help a depressed person recover. They explained that the process of sharing one’s concerns could alone be helpful, in addition to the possibility that religious leaders or friends could help the depressed individual to solve the problem that had initially caused the depression. However, many respondents warned of severe consequences if a depressed person does not seek help, including high blood pressure, disgrace for oneself and family, madness, and suicide.
Overall these findings suggest that a condition similar to depression exists in the study community, and study respondents described a clear conceptualization of its causes, consequences, and treatment. The description of gender-specific causes of depression indicates that depression prevention interventions in this community should target different factors for men and women, including the gendered expectations underlying many of the causes described. It is promising to note that the study community appears to have in place a support system that can be utilized for people experiencing depression, including an extensive network of religious leaders. However, of concern is the fact that respondents, including community care providers, mentioned suicide repeatedly as a common outcome of depression, and at times described specific methods of suicide. This is particularly striking given the fact that suicide is illegal in Ghana, and families of suicide victims are sometimes prosecuted. (10)

**Overview of Chapter Four**

Chapter Four examined the reliability and validity of the ten-item CES-D scale in the study community using a mixed methods approach. We provided evidence of the internal consistency reliability, face validity, content validity, and construct validity of this scale, and suggested adjustments to improve future measurement of depressive symptoms in similar settings.

Using a summary score, approximately 29% of men and 34% of women reported “high” levels of depressive symptoms. (11) Women reported significantly more depressive symptoms than men overall, and were significantly more likely to endorse five out of the ten scale items. A low proportion of men (<10.0%) endorsed the two items related to
interpersonal symptoms. Our analyses indicated adequate face validity and content validity. However, the results of the qualitative data analyses highlighted several additional symptom groups that appear relevant in the study population: loss of concentration, loss of appetite, suicidal ideation, and becoming quiet/withdrawn. The first three of these symptom groups are represented in the revised version of the CES-D, and captured in the fourth and fifth revisions of the DSM. (12)

Many previous CES-D scale validation studies have found support for a four-factor structure, representing depressed affect, positive affect, somatic and retarded activity, and interpersonal symptoms. (13,14) However, especially in non-Western settings, many researchers have also found different factor structures, including the existence of additional symptom groups. (15) Our CFA and EFA analyses indicated that a one-factor structure, representing depressive symptoms, was the best fit for the data for men and women. Although all ten scale items were significantly related to the underlying latent construct, depressive symptoms, the interpersonal symptoms appeared less salient for men compared to women. It is possible that this factor structure reflects the way respondents view depressive symptoms, but it is also possible that this measure did not capture some key symptom groups that would load on additional underlying factors.

These findings provide evidence of the reliability and validity of the ten-item CES-D scale in the study setting, as well as recommendations for adjustments that would improve measurement of depressive symptoms in similar contexts in the future. Although the CES-D 10 scale provides useful information on a group of symptoms that appear related to depression, it does not capture the full construct of depression in the study community.
Future analyses using an expanded version of the scale that integrates additional relevant symptoms would likely identify factors associated with depressive symptoms, and gender differences, even more effectively. While using the same scale across cultural groups – or for men and women – is appealing for comparison purposes, it might be necessary to use different scales in these groups when the goal is to identify causes and design effective interventions.

**Overview of Chapter Five**

Chapter Five presents the results of a series of multivariable Tobit regression models identifying factors associated with depressive symptoms for men and women. We assessed the role of individual and household factors, as well as partner characteristics, in increasing the risk of depressive symptoms for men and women, as well as the role of sex/gender as a moderator of these relationships.

We used Tobit regression to address the censoring of CES-D responses at zero, and ran the models separately for men and women, before combining them into a joint model to assess interactions by sex. Men in the final analytic sample were older, had higher levels of education and perceived relationship quality, more children, and better self-rated health than women in the sample. Similar to the sample used in Chapter Four, women in the Chapter Five sample reported more depressive symptoms than men. In the final men’s regression model, the following characteristics were associated with more depressive symptoms: lower relative SES, higher education difference with his partner, more biological children, higher commitment, higher trust, lower communication, higher partner’s CES-D score and lower partner’s trust. In the final women’s regression model, the following characteristics were
associated with more depressive symptoms: being Christian vs. Muslim, poorer self-rated health, and higher partner’s CES-D score. The final combined regression model for men and women echoed many of the findings from the men’s and women’s individual models. The following characteristics were associated with more depressive symptoms: having a larger education difference with one’s partner, higher commitment, lower communication, and partner’s higher latent CES-D score. There were also significant interactions between sex and relative SES, and sex and self-rated health. For men, a higher relative SES level was associated with lower latent CES-D score, while for women the reverse was true. Similarly, for women better self-rated health was associated with lower latent CES-D score, while for men the reverse was true.

These findings provide evidence of factors associated with depressive symptoms for men and women in the study community, and indicate important directions for future research and interventions addressing this issue. For both men and women in this study, partner’s depressive symptoms were significantly associated with the respondent’s depressive symptoms, independent of their own individual, household, and relationship quality exposures. In addition, while the role of relationship quality was less clear for women, the results indicated that lower commitment but better communication in relationships were potentially protective for men. Self-rated health was also strongly associated with depressive symptoms for women, while this relationship was less clear for men.

**Overall Conclusions of the Dissertation**

Taken together, the findings from this dissertation provide useful information to inform future research and interventions to address depression in the study community and similar
Chapter Three presented a conceptual model of depression in the study community, highlighting the important role of financial and relationship/fertility factors for men and women. The results of Chapter Four indicated that, while the CES-D 10 scale appears to be a valid measure of depressive symptoms in this context, it should be expanded to include additional culturally appropriate symptom groups. Finally, Chapter Five built on the results in the preceding chapters, and provided further evidence of gender differences in factors associated with depressive symptoms. Partner characteristics and relationship quality emerged as important for men and women, consistent with the results in Chapter Three.

There is strong evidence for gender differences in depressive symptoms in the study community, as well as interesting areas of similarity. Consistent with previous research, women reported significantly more depressive symptoms than men. Returning to the Diathesis Stress Model of mental illness, gender differences could be due to differences in underlying vulnerabilities (e.g. tendency toward internalizing behaviors, higher neuroticism), and/or differences in stress exposures. While we did not collect data on vulnerabilities, on nearly all of the key independent variables, women reported mean values consistent with higher exposure to stress. For example, women reported lower relationship quality on all four scales, as well as less education and poorer self-rated health compared to men. As Parker and Brotchie point out, gender differences could also be due to artifactual factors, for example, women might feel more comfortable reporting depressive symptoms, or the CES-D scale might measure symptoms that are more salient for women.

Qualitative research respondents also described different potential causes of depression for men and women, with a focus on relationship/fertility factors for women, and financial
factors for men. The different role of financial factors for men and women was reflected in the interaction effect between relative SES and depressive symptoms in the regression models in Chapter Five. However, we were unable to assess ability to pay children’s school fees for all respondents, which emerged in the qualitative research as a key financial stressor for both parents. Because study participants were all married or cohabiting, we were unable to assess associations between being unmarried and depressive symptoms for women. We were also unable to assess the potential role of perceived infertility for men and women. It is possible that concerns about partner infidelity were reflected in women’s reports of relationship quality, but we were unable to measure this factor directly. However, beyond the qualitative findings, the quantitative results demonstrated the importance of partner’s CES-D score and self-rated health as factors associated with depressive symptoms, the latter for women in particular.

The qualitative research also indicated that men and women appear to converge with regard to sources of support for people with depressive symptoms, and outcomes for those who do not receive help. We were not able to assess this similarity in our quantitative analyses, however. Given the gender differences in potential causes of depressive symptoms, it is likely, for example, that the content of conversations between religious leaders and people experiencing depressive symptoms would differ. Similarly, outcomes likely differ in important ways for men and women. Research in other settings indicates that women attempt suicide more often than men, but men successfully complete suicide more often than women. (17) Also, the outcome might differ for men and women depending on the cause. For example, previous research in Ghana has found that women suffer disproportionately socially and psychologically when a couple experiences infertility. (18,19)
In terms of measurement of depressive symptoms, our results indicate that a one-factor model is the best fit for the CES-D scale responses for both men and women. However, the addition of scale items related to culturally relevant symptom groups could produce different results. For example, if there are gender differences in suicidal ideation, responses to scale items related to this symptom group might reflect that difference. There is also some evidence in our data that interpersonal symptoms are less salient for men than women, which warrants further exploration. As noted, while comparison of depressive symptom levels between men and women is desirable for some purposes, when designing and assessing interventions it could be more appropriate to use gender-specific scales.

Beyond gender differences and similarities in depressive symptoms, this dissertation also provides useful information on the importance of couple and household factors. Respondents in the qualitative research described the interconnected nature of stressors and marital relationship quality, such as the impact of financial problems and infertility on marriages. In the regression models, for both men and women, partner’s CES-D score was significantly associated with the respondent’s CES-D score. For men, number of biological children was also associated with more depressive symptoms, perhaps reflecting the financial stress posed by more children. In addition, in the combined men’s and women’s models, education difference and two aspects of relationship quality were associated with depressive symptoms.
Strengths and Limitations

The results of this dissertation should be viewed in the context of some limitations. The study sample, for both the quantitative analyses and the focus group discussions, included married or cohabiting couples. This limits our ability to draw inferences for non-married couples, who have been found to have higher levels of depressive symptoms in previous research. (20) Our qualitative sample also did not include any formal mental healthcare providers because we did not identify anyone in this category in the study community. While we chose to focus on community care providers rather than mental health experts, the input of Ghanaian mental healthcare providers could have also provided useful information.

In terms of our quantitative analyses, the timing of data collection on depressive symptoms – which took place on average ten months after the data collection on other variables – created the possibility of misclassification. However, given our interest in understanding how acute and chronic exposure to stressors might increase risk of developing depressive symptoms, some lag time between exposure to stressors and measurement of depressive symptoms was desirable. We also did not have data on some key risk factors for depressive symptoms, including intimate partner violence and infertility. (18,21,22) We did not collect a gold standard measure of depression, which would have provided evidence of the criterion validity of the CES-D 10 in this setting, as well as informing a locally-derived cutoff for high depressive symptoms. The high correlation between CES-D scale items meant that we were unable to formally test the validity of the four-factor model, (13) although it also provided evidence of a stronger shared underlying factor. Last, in our analyses for Chapters Four and Five we chose to drop observations for whom complete data on key independent variables (or CES-D score) were not available. Our assumption, based on missing data patterns and
our understanding of the data collection process, is that data were missing at random. Comparison of our final analytic datasets with complete imputed datasets indicated that the impact of the missing data on our substantive conclusions was minimal.

This study also has some key strengths. Depression in couples is an important topic in sub-Saharan Africa in terms of disease burden, (2) but has been understudied to date. The mixed methods approach allowed us to contextualize quantitative findings with the perspectives of community members, as well as to adjust our quantitative hypotheses as necessary. The qualitative research provided valuable information on causes, treatment and outcomes of depression that were not available in our quantitative dataset. Comparison of the results of the qualitative and quantitative analyses gave us a more complete picture of gender differences in depression in the study community, and helped us to identify opportunities for future research and interventions. The use of couples data allowed us to examine the effects of partner and relationship characteristics on men’s and women’s risk of developing depressive symptoms. Inclusion of partner’s depressive symptoms in our analyses provided information on the clustering of depressive symptoms within couples. We were also able to assess the reliability and validity of a common measure of depressive symptoms in the study community, and compare the results for men and women. We are not aware of any other studies that have sought to validate the CES-D scale in a sub-Saharan African setting. Finally, we were able to identify additional potentially important symptom groups using the qualitative data results.
Public Health Implications

Future research on depressive symptoms in similar settings should build on these findings and explore additional important areas. Although FHWS is following couples over time, currently data on depressive symptoms are only available at one time point. Longitudinal research, including data on risk factors and depressive symptoms collected at regular intervals, would be useful in providing more information on the causality underlying associations identified in our research. There are also important unmeasured factors, such as intimate partner violence and perceived infertility, which should be included in future research. Given our findings, future research should also explicitly address gender differences in causes of and treatments for depression, as well as integrate important couple and household level factors. Last, measurement tools should be culturally appropriate and take into account the goals of the research, e.g. is the goal to compare groups or identify risk factors within groups, or both?

Ultimately the goal of research on depressive symptoms in low-income communities is to inform approaches and interventions to prevent and treat this condition. The government of Ghana revised its mental health policy in 2000 to emphasize decentralization and community-based interventions. However, following the 2000 revision, Bhana and colleagues found that many healthcare providers were unaware of the current mental health policy, and the government continued to allocate inadequate resources to its implementation. The Parliament of Ghana passed a new Mental Health Act (Act 846) in March 2012 that, among other stipulations, creates a Mental Health Service, including establishment of regional and district oversight committees to ensure that the law is being implemented as designed. Despite growing political attention to mental health, the lack of quality services for
people experiencing severe mental illness in Ghana presents another barrier to de-
stigmatization and increased care-seeking behavior. (24) The qualitative research revealed
that the study communities have a strong network of care providers in place, and that these
groups interact with and provide support to community members regularly, especially those
who seek their help. Consistent with the government of Ghana’s mental health policy, (24)
providing training and support to these community care providers in provision of mental
health services could result in an accessible and high quality source of treatment for
individuals experiencing mild to moderate depressive symptoms. The same providers could
be engaged as liaisons with trained mental health professionals to provide more effective
treatment for people with severe depressive symptoms than the current system of referral or
commitment to psychiatric hospitals. (24)

Although support exists within the study community, there is also evidence in our findings
of damaging stigma toward depressed individuals and their families. Community awareness
raising campaigns could be an effective approach to normalizing depressive symptoms,
emphasizing that healthy people sometimes experience stress, sadness, and other symptoms,
and can benefit from seeking help. Transforming norms around mental illness and care
seeking could result in a higher proportion of people with depressive symptoms seeking
help, ideally from trained counselors. This could lead to quicker and more effective
resolution of symptoms, and referral for further treatment when necessary. Finally,
interventions to prevent and treat depression in the study community should target gender-
specific risk factors, and also address gender norms that might increase the risk of
depression for men and women.
Conclusion

Depression is an important public health issue globally, and accounts for an increasingly large proportion of disease burden in low-income settings. This dissertation provides evidence of the importance of depression in Kumasi, Ghana, and gender differences in possible causes, treatments, and outcomes. Our results can be used to further develop culturally-relevant tools to measure depressive symptoms in similar settings, and to inform future research and interventions to address this issue.
Chapter Six References


### APPENDIX A: Key Questions from the Family Health and Wealth Study

<table>
<thead>
<tr>
<th>Variable</th>
<th>Question(s)</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Depressive Symptoms</strong></td>
<td>In the past week, I felt depressed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the past week, I felt everything I did was an effort</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the past week, My sleep was restless</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the past week, I was happy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the past week, I felt lonely</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the past week, people were unfriendly</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the past week, I enjoyed life</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the past week, I felt sad</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the past week, I felt that people disliked me</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the past week, I could not get going</td>
<td>Yes/No</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td>(Respondent line number)</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td>How many years of schooling did [name] complete?</td>
<td>0-20</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td>Constructed: male education level – female education level</td>
<td>0-20</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>M/FQ: Please tell me your date of birth or your age in years.</td>
<td>Age in completed years (18-59); Day, Month and Year; Don’t know (88)</td>
</tr>
<tr>
<td><strong>Age Difference</strong></td>
<td>Constructed: male age – female age</td>
<td>0-40</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td>What is your religion?</td>
<td>(Recoded): Christian (1); Muslim (2); Other (3)</td>
</tr>
<tr>
<td><strong>Relationship type</strong></td>
<td>Does your partner have other wives?</td>
<td>Yes (1); No (2); Don’t know (88); Respondent doesn’t answer (99)</td>
</tr>
<tr>
<td><strong>Parity</strong></td>
<td>Extracted from the household register</td>
<td>0-30</td>
</tr>
<tr>
<td><strong>Commitment Scale</strong></td>
<td>I expect my love for this partner to last for the rest of my life</td>
<td>1-9 (1 is not at all, 9 is extremely)</td>
</tr>
<tr>
<td></td>
<td>I view my relationship with this partner as permanent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I am committed to maintaining my relationship with this partner</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I have confidence in the stability of my relationship with this partner</td>
<td></td>
</tr>
<tr>
<td><strong>Trust Scale</strong></td>
<td>My partner is perfectly honest and truthful with me</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I feel I can trust my partner completely</td>
<td></td>
</tr>
<tr>
<td></td>
<td>My partner is truly sincere in her/his promises</td>
<td></td>
</tr>
<tr>
<td></td>
<td>My partner treats me fairly and justly</td>
<td>1-7 (1 is strongly agree, 7 is strongly disagree)</td>
</tr>
</tbody>
</table>
| Constructive Communication Subscale | We try to discuss the problem  
We express our feelings to each other  
We suggest possible solutions and compromises | 1-10 (1 is *very unlikely*, 10 is *very likely*) |
|-------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------|
| Destructive Communication Subscale  | We threaten each other with negative consequences  
I call my partner names, swear at him/her, or attack his/her character  
My partner calls me names, swears at me, or attacks my character | | |
| Relationship Satisfaction           | Please rate how happy you are in your relationship | 1-6 (1 is *unhappy*, 6 is *perfectly happy*) | |
| Pregnant/post-partum                 | Are you currently pregnant?  
Have you ever given birth?  
In what month and year was [name] born? | Yes (1); No (2)  
Yes (1); No (2)  
*Month, Year* | |
| Relative SES                         | Imagine a 9-step ladder where on the bottom, the first step, stand the poorest people, and on the highest step, the 9th, stand the rich. On which step is your family located today? | 1-9 (1 is *poorest*, 9 is *richest*) | |
| Self-rated health                    | Tell me, please, how would you evaluate your health? Is it: | Very good (1); good (2); Average – not good, but not bad (3); Bad (4); Very bad (5) | |
APPENDIX B: Focus Group Discussion Field Guides

Women

Thank you all for agreeing to speak with me. I’m going to read you a short description of a woman like those in your community. She has been having some difficulties lately. I’m interested in hearing your thoughts about what you think she might be experiencing, what might have caused it, and what might help her feel better. There are no right or wrong answers.

Women’s Vignette:

For the past two weeks, Abena had felt that something was wrong with her. When she watched her TV shows in the afternoon, she realized she could not concentrate on the stories. Often during the day her eyes filled with tears, and she felt very sad. Her friends and family tried to cheer her up, but they had no success. There was a wedding that she was supposed to go to with her friend, but she decided she had no interest in going. Abena was not enjoying anything she used to enjoy.

Questions:

- What are the terms/names used by this community to describe Abena’s feelings?
- What do you think caused this?
- Is there anything you can think of that could have helped her to prevent her current feelings?
- What impact will the way Abena is feeling have on her?
  - On her family?
  - On her community?
- On a scale of 1-3, with 3 being the most serious, how serious do you think it is? Why?
- How long do you think these feelings will last?
- What do you think she can do to feel better?
  - Is there anyone within this community who might be able to help her?
  - Is there anyone outside of this community who might be able to help her?
Men

Thank you all for agreeing to speak with me. I’m going to read you a short description of a man like those in your community. He has been having some difficulties lately. I’m interested in hearing your thoughts about what you think he might be experiencing, what might have caused it, and what might help him feel better. There are no right or wrong answers.

Men’s Vignette:

For the past two weeks, Kwabena had felt that something was wrong with him. When he listened to sports and politics on the radio in the mornings, he realized he could not concentrate on the discussions. Often during the day his eyes filled with tears, and he felt very sad. His friends and family tried to cheer him up, but they had no success. When his brother asked Kwabena if he wanted to go watch a football match at a bar, like they used to do, he had no interest. Kwabena was not enjoying anything he used to enjoy.

Questions:

- What are the terms/names used by this community to describe Kwabena’s feelings?
- What do you think caused this?
- Is there anything you can think of that could have helped him to prevent his current feelings?
- What impact will the way Kwabena is feeling have on him?
  - On his family?
  - On his community?
- On a scale of 1-3, with 3 being the most serious, how serious do you think it is? Why?
- How long do you think these feelings will last?
- What do you think he can do to feel better?
  - Is there anyone within this community who might be able to help her?
  - Is there anyone outside of this community who might be able to help her?
APPENDIX C: In-Depth Interview Field Guide

Thank you for agreeing to speak with me. As I've mentioned, I'm interested in learning more about health issues in your community, and specifically depression. I'm interested in speaking to you because members of your community have told me that (name of provider group, e.g. faith healers) provide important support to people in need. There are no right or wrong answers to these questions, I just want to understand your perspectives.

- What is a typical day like for you?
- How would you describe the kinds of people who usually come to you for help?
- What are the most common reasons that people come to you for help?
  - Are they primarily men? Women?
  - How old are they?
  - Are they married or single?
  - Are they usually employed? Earning an income?
- How do you help them?
- Can you describe the last person who came to you with depression?
  - How did you know this person was depression? What did he or she do or tell you?
  - What do you think was the cause of depression?
  - Did this person require treatment? What did you do to treat/help this person?
  - Did you ask this person to come back again? If so, for what?
- What happens if a person who is experiencing depression doesn’t get help from anyone?
- Is there anything that could have been done to prevent depression?
- How common is this depression in your community?
  - Would you say it is very common, common, not so common, or rare?
- How can you be assisted to improve your services to the community?
APPENDIX D: Coding Scheme for Qualitative Data

1. Names for depression
   a. Excessive worry
   b. Life is full of issues
   c. Madness
   d. Mental illness/problem/disorder/sickness
   e. Head is heating up
   f. Bad ways of life
   g. Broken heart
   h. Spiritual sickness
   i. Thinking severely

2. Symptoms of depression
   a. Loss of concentration
   b. Loss of appetite
   c. Crying
   d. Becoming quiet/withdrawing
   e. Talking to yourself
   f. Hair problems

3. Causes of depressive symptoms
   a. Relationship problems
      i. General
      ii. Conflict
      iii. Broken heart
      iv. Oppressive husband
      v. Gender roles
      vi. Lack of support/attention
      vii. Lack of financial support
      viii. In-laws or parents
      ix. No sex
      x. Husband cheating
      xi. Not married yet
      xii. Infertility
   b. Financial problems
      i. Need money
      ii. Difficult job
      iii. Support for children
      iv. Job loss
      v. Loan debt
      vi. Cost of socializing
   c. Illness
      i. STIs, including HIV/AIDS
      ii. High blood pressure
      iii. Heart problems
   d. Unplanned pregnancy
   e. Menopause
   f. Death of spouse

4. Effects of depressive symptoms
a. Schizophrenia  
b. Suicide  
c. Getting hit by a car  
d. Pressure/stroke  
e. Heart disease  
f. Withdrawal/isolation from people  
g. Problems with children  
h. Family sad/worried  
i. Problems marrying  
j. Community gossip  
k. Madness/crazy/insane  
l. Headaches  
m. Ulcer  
n. Problems for family members  
o. Problems for community  
p. Marital problems  
q. Affect your mind/become stupid  
r. Lose dignity  

5. What/who can help/treatment for people with depressive symptoms  
   a. Pastor/church elder/church counselor  
   b. Malam/Imam  
   c. Herbalist/fetish priest  
   d. Husband/Wife  
   e. Solve the problem  
   f. Be patient  
   g. Friend  
   h. Prayer/God/Allah  
   i. Family/mother  
   j. Money/employment  
   k. Socialize  
   l. Someone who has been through it  
   m. Take medicine  
   n. Doctor/hospital  
   o. Be pampered  
   p. Wash the brain  
   q. Do things you used to enjoy  
   r. Stop worrying/thinking  
   s. Travel  
   t. Forgiveness  

6. Severity of this problem
STEPHANIE R. PSAKI

HIGHLIGHTS
• Eleven years of experience in international girls’ education and women’s health.
• Strong quantitative and qualitative research skills, including experience with multiple software programs.
• Experience conducting international research, including collecting primary data and training local researchers.
• Research and programmatic experience in 14 low-income countries, with a focus on sub-Saharan Africa.
• Working fluency in French.

EDUCATION

Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, September 2013
Ph.D., Department of Population, Family and Reproductive Health
Dissertation: Gender differences in depressive symptoms in Kumasi, Ghana.
Academic Tracks: Women’s Health; Demographic Methods
Certificates: Public Mental Health Research; Demographic Methods
Teaching Assistantship: Introduction to Demographic Methods
Leadership: Member of PFRH Admissions Committee for 2013-2014 doctoral cohort

Harvard School of Public Health, Boston, MA, June 2008
Master of Science in Population and International Health;
Concentration in Women, Gender and Health
Thesis: Development and validation of a measure of women’s empowerment related to HIV risk using Zimbabwe Demographic and Health Survey data

Georgetown University, School of Foreign Service, Washington, D.C., May 2002
Bachelor of Science in Foreign Service, cum laude
Major: International Politics (honors)
Honors Thesis: Contrasting human rights, economic, and national security analyses of HIV/AIDS in Africa

PROFESSIONAL EXPERIENCE

Associate, Girls’ Education, August 2013 – present, New York, NY
Poverty, Gender and Youth Program, Population Council
Lead the Council’s research and program portfolio on girls’ education, including:
• Identify priority areas for study, develop and evaluate innovative interventions, conduct statistical analyses of existing data and collect new data where needed;
• Conduct policy relevant research with Council colleagues and in countries where the Council works;
• Develop funding proposals and establish effective relationships with donors;
• Provide technical advice and strategic guidance to colleagues on girls’ education research and programming;
• Represent the Council in professional meetings, international fora, and the media.
Project Director, July 2012 – June 2013

Gender Department, Family Health International 360
Washington, DC

Serve as senior technical staff on girls’ education programs and gender integration across FHI 360’s portfolio, including:

- Provide technical oversight on gender-sensitive education, including periodic field visits, to national education quality improvement project in Djibouti (Projet AIDE);
- Design and conduct internal and external monitoring and evaluation of girls’ education projects, including field evaluation of GE Foundation’s girls’ education portfolio;
- Serve as technical lead on business development for Gender Department, including conceptualizing and writing proposals to diverse donors on girls’ education, gender-based violence, reproductive health, and evaluation;
- Provide technical assistance on gender integration to projects across FHI 360’s sectors, including education, HIV/AIDS, nutrition, economic development, and health;
- Serve as gender focal point for FHI 360 Cross-Sector Solutions Group (gender, youth, technology, environment).

Research Assistant (Student), August 2011 – August 2012

Advance Family Planning Project, Johns Hopkins Bloomberg School of Public Health
Baltimore, MD

Supported monitoring and evaluation for family planning advocacy program, including:

- Provided feedback on bi-monthly reports from eight local partners;
- Compiled and communicated program successes internally and externally.

Research Associate (Contractor), July 2008 – July 2011

Division of International Epidemiology and Population Studies,
Fogarty International Center, National Institutes of Health (NIH)
Bethesda, MD

Supported launch and execution of $30 million Gates Foundation-funded child health research consortium:

- Member of data coordinating center, responsible for design of field forms, database development, quality assurance and control measures, and data analysis and interpretation;
- Lead researcher on work to construct comparable measures of socio-economic status (SES) across eight study sites, including pilot survey and development of WAMI (water, assets, mother’s education, income) index;
- Lead researcher on analyses of associations between food security measures and infant wasting and stunting;
- Reported findings in peer reviewed publications and conference presentations.

Temporary Data Manager/Research Assistant, June 2010 – August 2010

Fertility and Empowerment Project, International Center for Research on Women (ICRW)
Washington, DC

Conducted preliminary data cleaning and analyses on associations between fertility and empowerment, including:

- Organized Egypt Demographic and Health Survey (DHS) datasets from three time points, including creating codebooks, constructing variables, and merging household and individual datasets;
- Identified questions consistent over time points and conducted exploratory analyses, including examination of birth spacing trends over time and space.


Haiti Zanmi Lasante Program, Partners in Health (PIH) & Harvard Medical School
Boston, MA

Supported research on effectiveness of PIH’s prevention of mother to child transmission of HIV program in Haiti, including:
• Collaborated with Principle Investigators on longitudinal data analyses for PMTCT programs;
• Researched and edited analytical papers on program outcomes and opportunities.

_Quaitative Researcher_, June 2007 – August 2007  
_Durban, South Africa_  
**AIDS Prevention Research Project, Harvard Center for Population and Development Studies**  
Organized and facilitated focus groups with university students to discuss concurrent sexual partnerships, other risk behaviors, and possible behavioral interventions. Manuscript accepted by Sexual Health.

_Student Researcher_, January 2007  
_Kerala, Tamil Nadu, and Delhi, India_  
**Healthcare Provision in Southern India, Harvard School of Public Health**  
Reviewed service delivery in private and government hospitals and clinics; worked with the _Shanti Ashram_ local NGO on provision of education and healthcare services to children.

_Washington, DC_  
**Center for Gender Equity, Academy for Educational Development**  
Key technical team member in project design, start-up, and implementation of the 15-country AGSP Project, including:
• Served on technical design team for initial project proposal and local partner identification;
• Oversaw eight local partners’ implementation in Burundi, DRC, and Eritrea – an over $1 million portfolio – including field training and monitoring distribution of over 15,000 girls’ scholarships.
• Monitored and supported HIV prevention activities of 42 local partners in 15 countries, including site visits, partner trainings, and monitoring of community HIV/AIDS education activities.

**PUBLICATIONS AND PRESENTATIONS**

_Stephanie Psaki, Jessica Seidman, Mark Miller, Michael Gottlieb, Zulfiqar A Bhutta, Tahmeed Ahmed, AM Shamsir Ahmed, Pascal Bessong, Sushil M John, Gagandeep Kang, Margaret Kosek, Aldo Lima, Prakash Shrestha, Erling Svensen, William Checkley; MAL-ED Network Investigators._  
_“Measuring socioeconomic status in multi-country studies: Results from the eight-country MAL-ED study.”_ In review.

_Psaki Stephanie R; Ayivi-Guedehoussou, Nono; and Halperin, Daniel T. _Leveraging changing gender norms to address concurrency: focus group findings from South African university students_. Sexual Health 2013; 10: 369–376._

_Stephanie Psaki; Zulfiqar Bhutta; Tahmeed Ahmed; A.M. Shamsir Ahmed; Pascal Bessong; Munirul Islam; Sushil John; Margaret Kosek; Cebisa Nesamvuni; Prakash Shrestha; Erling Svensen; Stephanie Richard; Jessica Seidman; Laura Caulfield; Aldo A Lima; Mark Miller; William Checkley; MALED Network Investigators._  


“Household food insecurity and nutritional status in children: Results from an eight-country study,” Stephanie Psaki, oral presentation at the Population Association of America (PAA) Conference, April 2nd 2011, Washington, DC.

“Four Approaches to Measuring Socioeconomic Status in a Multi-country Study,” Stephanie Psaki, poster presentation at the Global Health Metrics and Evaluation (GHME) Conference, March 15th 2011, Seattle, WA.


ADDITIONAL SKILLS

Computer: MS Office, STATA, SAS, Mplus, Atlas.ti, RefWorks, EndNote, basic GIS, Sharepoint

Language: English – native speaker; French – proficient spoken and written

International Professional Experience: Burundi, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, France, Ghana, India, Niger, Kenya, Qatar, South Africa, Tanzania, Thailand, and Uganda

HONORS AND AWARDS

- Global Health Field Research Award (GHFRA), Johns Hopkins Center for Global Health, 2012-2013
- Edward J. Dehne Award in Population Dynamics, 2012-2013
- Dr. Michael Koenig Memorial Fund, 2012-2013
- Family Planning Fellowship, Johns Hopkins Bloomberg School of Public Health, 2011-2012
- NIH Fogarty International Center Director’s Merit Award (team) for MAL-ED Study, 2010
- National Institute of Child Health and Development Population Training Grant, 2009-2011
- Harvard School of Public Health, Department of Population and International Health merit-based scholarship, 2007