Health-related Quality of Life and Well-being Impact of Depression in Ethiopia

Esubalew Ayalew Assefa

A thesis submitted to the Open University for the degree of
Doctor of Philosophy

Department of Economics
School of Social Sciences and Global Studies
Faculty of Arts and Social Sciences
The Open University, United Kingdom

September 2020

Abstract

Depression is a common mental disorder with significant health, economic and social effects. Despite being ranked among the leading causes of disability, little is known about its impact on quality of life in Ethiopia. This thesis aims to examine the burden of depression in Ethiopia by assessing its impact on quality of life. Specifically, it examines the impact of depression on health-related quality of life, health status and subjective well-being; it develops and validates a multidimensional quality of life instrument using the capability approach; and, it examines how depression affects multidimensional quality of life applying the data collected through the instrument.

With a secondary data analysis of a national health survey, the thesis first investigates the burden of depression on health-related quality of life and subjective well-being. Specifically, applying recently available information on EQ-5D preference weights for Ethiopian population, it estimates health utility values and analyses the impact of depression on health utilities. In addition, it examines the impact of depression on self-assessed health and satisfaction with health. By developing a contextually relevant instrument using the capability approach, the thesis then provides an analysis of the impact of depression on broader well-being. Specifically, building on works that attempt to operationalise the Sen-Nussbaum's capability approach, a new capability well-being instrument was designed and validated for use in Ethiopia. The thesis then provides empirical evidence on the impact of depression on well-being by collecting survey data with the new instrument. Working with the limits of the data, studies in the thesis apply statistical methods, such as propensity score matching and instrumental variables, to estimate the potential impact of depression on the outcomes of interest.

The empirical results show depression is associated with decrements in health outcomes. Depression is associated with lower health-related quality of life, lower self-rated health and lower health satisfaction. The results are robust to adjustments to socioeconomic, demographic factors and the presence of other common chronic physical illnesses. Depression is associated with lower health outcomes on its own and even lower decrements in health outcomes when comorbid with other chronic illnesses. Additional analyses were also conducted using propensity score matching methods, by matching respondents experiencing depression with respondents who are not depressed but are comparable on the distribution of the socioeconomic, demographic factors and

health condition profile. The results can be interpreted as the causal impact of depression, and they show a significant negative impact of depression on health-related quality of life and subjective well-being outcomes. Similarly, the results show that depression is negatively and significantly associated with broader well-being. There is a negative association between depression and wide range of capabilities as well as overall well-being as measured by an aggregate capability index. Accounting for potential endogeneity, the results also show a ceteris paribus impact of depression on well-being.

The analyses in this thesis are based on cross-sectional data and may not provide information on causation despite the best attempts to use alternative estimation techniques to address such issues. Further longitudinal work will be needed. However, the thesis tells a story, albeit a snapshot. It tells an untold story on the burden of depression in Ethiopia. It describes how depression is associated with lower health and non-health outcomes. It shows how depression is associated with limitations on broader dimensions and aspects of life. The results will have an important implication in designing intervention and evaluating the impact of policy and program interventions. It will vital to consider the interplay of health and non-health dimensions in assessing the burden of depression, in designing interventions to address mental health problems and in evaluating the effectiveness of such interventions.

To my family:
the kind, generous and loving souls of the past and the present.

Acknowledgements

I once caught up with my friend over coffee. I do not recall what prompted it, maybe a disenchanted reply when asked about how the PhD was going, but he opined about something that stayed with me. He remarked - with a tone that seems half a comment and half reflection on his own journey and using the analogy of building a house - that as researchers we are often used to neatly working on things from the foundation up, building brick on a brick to the finish in a structured way. But, he continued, things are not always that way, and sometimes you have to think as if you are making a bird's nest and keep on tirelessly gathering and putting together the sticks, the grass and other material, and before you know it the nest will take shape. If you read this thesis and do not find it like a well-structured house, I will not blame you. In so many ways, I became to see it as a nest. Nevertheless, I hope I have put the sticks together and given them some shape to highlight the effects of depression in Ethiopia, and this temporary settlement will hopefully become a place where more ideas and works would be hatched and grow.

As I look back at my life, it also has that resemblance of a nest, and countless people have helped shape it. Although I cannot list all names in these limited pages, I am immensely gratefully for every one of you.

Table of Contents

List of Tables

List of Figures

Chapter 1. General Introduction

This thesis aims to assess the impact of depression on individual well-being in Ethiopia. I will argue that it fills several gaps in the literature. The study of depression often stems from epidemiology and clinical studies aimed at morbidity, mortality or symptomatic burden of depression or from health economics studies which aim to generate evidence of the economic impact of depression. While these kinds of literature are central to my thesis in the way it measures depression and identifies some of its key factors and effects, they often do not communicate with each other, and the impacts of depression are often constricted to narrow dimensions of well-being or economic consequences. To explore the full impact of depression, I will discuss alternative ways in which individual well-being has been conceptualised and argue why I have adopted the capability approach in my thesis as a way of framing the different dimensions and areas of the individual well-being where depression may have an impact. This chapter is structured as follows. Section 1 establishes depression as a health problem and its impact on individuals. Here, it will provide an overview of the evidence of the effects of depression. Following that, I will review the literature on outcome assessment in mental health and will argue for an outcome measure that aims to capture the multifaceted nature of depression in Section 2. Section 3 outlines a brief overview and background of well-being research in economics. There have been recent theoretical and empirical efforts to expand and improve concepts and measures how well individuals are doing in life, how social and health problems affect individuals and of how to assess the impact of interventions and policies. One of these efforts is the capability approach. Concerning this, Section 4 discusses the capability approach and its relevance in outcome measurement for people with depression. Section 5 provides a brief overview of the Ethiopia context with a focus on mental health research. The final section, Section 6, offers a summary and outlines the contours and scope of the thesis while clarifying the use of some key terms in the thesis.

1. Epidemiology and Burden of Depression

Depressive disorder, or as commonly referred to as depression, is a highly prevalent mental disorder, which manifests in sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness, and poor concentration (APA, 2013; WHO, 2017). Depression and anxiety disorders are dubbed as *common mental disorders*. Depression affects people of all ages, gender and world regions with some degrees of variation. In 2015, the estimated global prevalence rate was 4.4% with an equivalent of 322 million people of all ages and gender (WHO, 2017). The rates vary by gender, where it is more prevalent among women than men (5.1% among women, 3.6% among men). It also varies by age groups where it was lower among children and adolescents and higher in late adulthood (ibid.). The epidemiologic burden in terms of prevalence is not only the issue of magnitude but also the observed rising trend overtime associated with it. Between 2005 and 2015, the estimated number of people with

depression increased by 18.4% (GBD 2015 Disease and Injury Incidence and Prevalence Collaborators, 2016). Although such increase may be partly attributable to patterns in the overall growth of population and higher distribution of people living in age groups where depression is relatively more prevalent (GBD 2015 Disease and Injury Incidence and Prevalence Collaborators, 2016; WHO, 2017), there was a 0.7 percentage point increase in age-standardised prevalence during the same period (GBD 2015 Disease and Injury Incidence and Prevalence Collaborators, 2016).

These prevalence estimates are not necessarily small. However, they are more likely to mask the true magnitude of the problem by underestimating the prevalence of depression as it is a health problem that mostly goes unnoticed and undetected as well as its high likelihood to be a comorbid condition with other health problems (Hirschfeld, 2001; Cassano & Fava, 2002; Andrade et al., 2003; Wang et al., 2007; Bromet et al., 2011). Over the years, various cross-country studies have demonstrated a larger magnitude of the problem where depression was comorbid with other health problems such as diabetes, stroke or other physical health conditions (Hirschfeld, 2001; Roy & Lloyd, 2012; Kessler & Bromet, 2013; Kang et al., 2015; among others). Research also documented cross-nationally consistent demographic, social and economic correlates of depression such as gender, marital, social and economic status (Andrade et al., 2003; Bromet et al., 2011; Kessler & Bromet, 2013). A recent systematic review of literature on the social determinants of mental illnesses reported that the female gender, poverty, homelessness, unemployment, food insecurity, neighbourhood deprivation, lower level of education were among a host of factors that are associated with increased risk of depression (Lund et al., 2018).

Depression is not only a highly prevalent mental disorder, but it is also one of the highly disabling health problems substantially impairing individuals' ability to function or cope with daily life leading to considerable losses in health and premature deaths (Jiang et al., 2004; Bromberger & di Scalea, 2009; WHO, 2013; Liu et al., 2017). There is growing evidence that people with mental disorders experience disproportionately higher rates of mortality (Walker et al., 2015). Compared to the general population, individuals with major depression, schizophrenia, bipolar disorder and other psychiatric disorders die 10 to 20 years prematurely (Liu et al., 2017). Depression is a significant risk factor and contributor to suicide, which accounted close to 800,000 deaths in 2015 and disproportionately higher among the young age group and in low- and middle-income countries (Ferrari et al., 2013; WHO, 2017). People with depression also experience higher levels of disability and morbidity. Using the Disability-Adjusted Life Years (DALYs), Murry and Lopez (1996) found that depression was the fourth leading cause of burden worldwide in 1990, amounting to 3.7 per cent of all DALYs. A decade later, in 2000, Ustun *et al.* (2004) obtained similar results. Still, when using Years Lived with Disability (YLDs), which takes into account non-fatal outcomes, depression was the leading cause of disability (ibid). Another study recently found depression to be the

third leading cause of disability worldwide, after lower back and neck pain and sense organ diseases (GBD 2015 Disease and Injury Incidence and Prevalence Collaborators, 2016). This study also found an 18.2% increase in YLDs due to depression between 2005 and 2015 (ibid).

Depression tends to have an overwhelming economic impact on individuals and their families. The direct costs of treatment, healthcare expenditures for people with depression, indirect costs of productivity and human capital losses among workers with depression as well as costs of premature mortality and morbidity are significant. It is associated with chronicity, increased service healthcare utilisation and costs (Wang et al., 2007; Goar et al., 2012; Reed et al., 2013). A recent work that performed a meta-analysis of studies that compared costs of depressed and non-depressed participants reported significantly higher costs among depressed individuals in all different categories of direct health care and indirect costs (König et al., 2019). It was a quantitative synthesis of 48 studies with a total 55,898 depressed and 674,414 non-depressed study participants. Although admittedly, most of the studies are from high-income countries, the results are telling of the impact of depression. For instance, the average total direct costs were 179% higher among depressed adolescents than non-depressed adolescents. The figures were 158% and 73% in depressed adults and old age groups than their non-depressed peers, respectively (ibid). Indirect costs were 128% per cent higher among depressed adults. Depression is also a leading cause of absenteeism and reduced productivity at work (Wang et al., 2003; Donohue & Pincus, 2007). It leads to large losses in human capital, work participation and productivity with equally large economic consequences for the individual but also for the economy. An equivalent of US$ 16.3 trillion lost economic output is estimated to be the cumulative global impact of mental disorders between 2011 and 2030 (Bloom et al., 2011). The main underlying factors in absenteeism, presenteeism and lost economic outputs associated with depression are shown to be role, functioning and cognitive impairments and disability that substantially reduce overall productivity (Jaeger et al., 2006; McIntyre et al., 2015). Because of its multifaceted nature and because of the significant impact it has on individuals' body and mental functioning and participation in social and economic activities, the costs of depression can go beyond the reported direct and indirect cost estimates. Studies have shown the broader impact of depression and its multidimensional nature, where it predicts a high risk of marital disruption, unstable employment, significant decrements in role functioning such as low marital quality, low parental functioning, low work performance and low earnings or financial success (Kessler, 2012). Overall, evidence has emerged that with some degree of variation in prevalence, age-onset and severity, depression is a significant public health concern across countries (Andrade et al., 2003; Bromet et al., 2011; Kessler & Bromet, 2013).

2. Outcome Assessment in Mental Health

The previous section highlights a wide-ranging burden that depression inflicts as a health problem, drawing from epidemiological and health economics literature. Depression exerts a burden on different dimensions of human life and is highly associated with low quality of life. Implicit in these discussions is the issue of how outcomes are expressed and measured. This section aims to expand on that. Outcome assessment has been central to mental health service provision and mental health research for various purposes and intents. This section will discuss the main domains and purposes of outcome assessment, highlight how this literature has evolved, identify some of its drawbacks and outline what the focus of the thesis will be.

Putting aside measurements and schedules for clinical assessment to diagnose and ascertain mental health problems, assessments in mental health are often used to evaluate the impact of mental illness on patients and to assess how mental health services and interventions improve outcomes in clinical and non-clinical settings (Speer, 1988; Trauer, 2010; among others). Outcome measurement will provide critical information for clinicians, researchers, program evaluators, administrators and others on outcome assessment of treatments, interventions and services for people with mental health problems (Lehman, 1996).

Issues related to what to measure and domains of outcome assessment have evolved. An early focus of outcome assessment has been on domains of psychopathology such as symptom severity and service use (Thronicroft & Tansella, 1996). However, recognition of the narrowness in the scope of such domains have resulted in adapting broader perspectives and domains that go beyond symptoms and service utilisation (ibid). Although the importance of symptoms and symptom severity and how they improved with treatments and provision of mental health services is still core to these measurements, the existing measures are criticised for lacking broader dimensions that capture overall well-being. Recently, there is increased advocacy for multidimensional measures to adequately capture the full impact of depression and treatment outcomes (IsHak et al., 2011; IsHak et al., 2013). This research is conducted against the backdrop of emerging criticisms of existing and widely used measures as well as arguments for and developments in alternative approaches to outcome assessment.

One such development is the quality of life-based measures. Particularly, these measures are believed to provide information on outcomes beyond symptoms covering functional status, access to resources and opportunities and patients' perspectives on life circumstances, satisfaction and well-being (Lehman, 1996). Despite acknowledging the importance of quality of life measures, the significant majority of studies in mental health still largely rely on symptom-based measures of outcome (White et al., 2016). White et al.

(2016) also pointed out and credited recent approaches, such as what is known as the personal recovery approach, that emphasises the importance of recovery to patients and conceptualises recovery as a 'unique process' by which individuals live a 'satisfying, hopeful and contributive life' despite limitations caused by mental health problems. As opposed to 'clinical recovery' which emphasises symptoms, functioning, remission or relapse, personal recovery brings in the personal level to the process of changing values, goals, feelings, skills and roles as one move beyond the negative consequences of mental health problems. There are arguments for such approaches which promote subjective well-being as important ventures in outcome measurement. However, there is some reservation as to the compatibility of the personal recovery approach with outcome measurements (Trauer, 2010). This is due to the view that the recovery approach tends to emphasise the uniqueness to each individual of their recovery journey and hence of the outcome assessment that tries to capture that. However, in general, outcome measurements tend to focus on having a generic, standardised and widely applied set of measures. Also, despite its appeal in capturing individual-level experiences, recovery and well-being, its failure to account for broader contextual factors to outcome such as opportunities, agency, citizenship and social justice, is cited as a potential limitation of the approach (White et al., 2016).

Outcome measurement can be used for routine monitoring to assess progress in treatments and monitor change over time, identify hidden problems and needs, inform clinical decision making, caseload management and promotion of service quality, among others, at the level of clinicians and consumers (Trauer, 2010). At the level of policymakers and funders, outcome measurement can assist the process of assessing and demonstrating effectiveness and value for money of mental health services and equitable allocation of resources (ibid). Most of this literature falls under the umbrella term economic evaluation. For economic evaluation purposes, the choice of outcomes will depend on the method chosen. Cost-effectiveness analysis (CEA), cost-utility analysis (CUA) and cost-benefit analysis (CBA) are the commonly used methods of economic evaluation in mental health (Knapp & Wong, 2020).

In a CEA, the aim is to produce an outcome, often a single outcome, which is usually measured in natural units (Gray et al., 2011; Drummond et al., 2015; Knapp & Wong, 2020). For instance, the outcome can be any or several indicators such as mortality, disability, depressive symptoms, burden, absenteeism, cases detected or other clinical or non-clinical outcomes that are relevant for a given intervention or study. However, health problems or interventions to address them will often have more than a singular effect. For example, a treatment for depression can decrease depression severity, increase depression-free days, decrease disability, improve absenteeism or increase productivity (Wang et al., 2003; Donohue & Pincus, 2007). Focus on a single outcome, although justifiable on specific circumstances, will narrow the scope of the impact of the illness or fail to capture broader benefits that may accrue from interventions. In addition,

employing outcome measures specific for one health area or one health condition, or using more than one outcome measured in different units, will make it difficult to rank, compare or evaluate interventions across different health areas for decision-makers (Gray et al., 2011).

Cost-utility analysis (CUA) is a variant of CEA (Drummond et al., 2015) that provides an alternative and potential improvement to these drawbacks. A CUA applies a generic measure of health outcome. A typically used generic health outcome measure aims to capture the health-related quality of life changes by integrating effects on morbidity and mortality into a single measure (Gray et al., 2011; Drummond et al., 2015). First, this involves the measurement or 'description' of health status using generic, multi-attribute measures that do not focus on impacts of a particular health problem but take into account a broad range of health dimensions and quality of life (Drummond et al., 2015; Brazier et al., 2017). For example, the EuroQol five dimensions questionnaire (EQ-5D), which is one of the widely used generic, multidimensional systems to describe health states, considers a range of dimensions including physical problems, pain and mental well-being that could be impacted by any health condition (Kind et al., 2005). Aggregating these dimensions into a single indicator then involves 'valuation' by applying population preference weights to the different health states (Brazier et al., 2017). These two components of measurement and valuation form the basis for the quality-adjusted life-year (QALY) measurement which takes values between 1 and 0, where 1 corresponds to full health and 0 indicates a health state equivalent to dead (Gray et al., 2011; Brazier et al., 2017). CUA has some advantages such as allowing for impacts on multiple dimensions of health to be aggregated and measured and allowing comparison across different health conditions or interventions (Brazier et al., 2017). Currently, most published works in economic evaluation apply CUAs (Drummond et al., 2015). Although there is a debate about the appropriateness of generic preference-based health outcome measures such as the EQ-5D for people with mental illnesses, they have performed adequately well as outcome measures for depression (Brazier, 2010; Brazier et al., 2014).

While the CEA and CUA methods describe, measure or value outcomes, they do not attach a monetary value to them. CBA is the other approach to economic evaluation that attempts to monetise outcomes. This involves identifying and describing outcomes of health problems or interventions like the other approaches but further translating or expressing these outcomes in monetary terms (Drummond et al., 2015; Gray et al., 2011). Various techniques are used to arrive at monetary valuations, including market prices or willingness to pay (Drummond et al., 2015; Brazier et al., 2017). The potential to account for broader health and non-health outcomes is considered to be one advantage of a CBA (Brazier et al., 2017). In addition, it also makes comparisons across sectors and programs easier given that outcomes are expressed with a common metric. However, it is of limited use in health economic evaluations owing to

conceptual or practical problems of the valuation techniques and the ethical and conceptual issues of attaching monetary values to health or life in general (Gray et al., 2011).

CBA has its conceptual roots in traditional welfarist views, while CUA is considered as extra-welfarist (Gray et al., 2011; Brazier et al., 2017). In the context of health economic evaluations, welfarist approaches tend to base their assessment of interventions on their effects on utility. Health is taken into account only insofar as individuals get utility from it (Coast et al., 2017). On the other hand, extra-welfarist approaches evaluate healthcare interventions based on their direct effects on health status or something else such as capabilities (Brouwer et al., 2008; Coast et al., 2017).

Although these methods of economic evaluation and associated outcome measures are well developed and utilised, they were criticised for reliance on maximising utility or health gains and missing important non-utility information and dimensions of well-being (Coast et al., 2008; Lorgelly et al., 2010; Al-Janabi et al., 2012; Coast et al., 2015). The limitations of the existing measures and calls for improved measures underscore the need for a better framework and instrument to assess outcomes in mental health. This research fits into emerging efforts to improve outcome measurements in mental health so that measures can capture multifaceted impacts of mental health problems and do not rely on inadequate assumptions about individual behaviour and preferences when it comes to health. In so doing, it will adapt the capability approach to outcome measurement as it will provide a broader informational basis to outcome assessment.

As discussed, most studies drawn from epidemiological or health economics literature focus on outcomes of narrow scope. However, depression as a health problem exerts a burden on different dimensions of human life and is highly associated with low well-being and life quality. Given the broader well-being impact of depression on individuals, it is of paramount importance to have multidimensional measures to assess and better capture its impact, and ultimately to evaluate the full encompassing effectiveness of related interventions. It merits an approach that considers and captures various dimensions of burden to assess its impact on individuals and society, particularly when the information basis of existing aggregate measures will miss out on relevant and significant dimensions of quality of life. What is more, a multidimensional impact of depression implies that outcomes of programs and interventions to tackle depression will likely have a bearing beyond health outcomes, reduction in symptoms or health-related quality of life measures. As a result, it is also critical to have measures to assess these broader outcomes that go beyond the health-related outcomes. The study aims to appreciate and incorporate additional dimensions of burden that have not been well explored and assess the broader effects of depression on individuals and society in Ethiopia. As the focus of this research is on making a case for broader measures

of well-being and assess the impact of depression that goes beyond the existing narrower measures of health outcomes and quality of life, it is worth providing some background to the well-being research. The next section presents a brief overview of well-being research in economics.

3. Brief Overview Well-being Research in Economics

Theories and conceptualisations about well-being and what constitutes a good life have been explored in many disciplines including philosophy, ethics, religion, sociology, psychology and economics (Anand, 2016; Stoll, 2014). This section will not go into a lengthy review of the history of well-being theories and research since the literature is massive and diverse and it will require broader space to do so. This section will attempt to provide a concise overview focusing on economic research on well-being. However, it will also touch up on research in other social sciences particularly psychology since, as Bruni and Porta (2007) have pointed out, the renewed interest (or 'rediscovery' as they put it) and advances around happiness and well-being in economics that is seen in recent years has been linked to research and advances in these areas in the field of psychology. In addition, it will have some bearing in highlighting the well-being and mental health nexus.

A word of caution about terminology will be helpful from the outset. The interchangeable use of terms such as well-being, happiness, utility, satisfaction and welfare appears widespread in economics literature (Bruni & Porta, 2007; Gasper, 2007; MacKerron, 2012). As the literature review below covers wide ranging works and traditions, these terms may appear and interchangeably applied as used in the works without necessarily ascribing to a certain definition or conceptualisation.

3.1. Utility and Early Approaches to Well-being in Economics

In economics, utility has long formed one of the core concepts in the analysis of the economic behaviour of a consumer, where a consumer is loosely described as an individual or a household composed of one or more individuals (Salvatore, 2008). The term utility is used to capture the notion of happiness, want satisfaction and well-being (Mahanty, 1980). And over the years, utility has alternatively been formulated and defined in various ways including a hedonistic view of pleasure, desire fulfilment and preference satisfaction (Kauder, 1965).

Utilitarianism, which dominated welfare economics for a long time, often reduce individual well-being to and represent it by utility (Gasper, 2007; Sen, 2008). This view of well-being has its roots in the early days of classical utilitarianism with proponents such as Jeremy Bentham whose interest at the time was the development of methods that can be used to establish the contribution of policies and social reforms to well-being (Rojas, 2019). He argued public policy and social reforms that aim to contribute to well-being

should be guided by people's experiences of happiness not just abstractions or definitions of how to lead a good life put forward by philosophers or moralists (ibid). As such, his approach shifted the focus of well-being from philosophical or academic constructs and debates of the good life to people's experiences of being well (ibid). Pain and pleasure formed the conception of utility and the maximisation of pleasure and the minimisation of pain for the greatest number of people was proposed as a principle to guide policies and actions (Stoll, 2014; Rojas, 2019). He also believed in the interpersonal comparison of how well people are doing and argued it provides a good framework to guide and evaluate policies, actions or laws (Sen, 2008; Rojas, 2019). These required the numeric measurement of utility and he put forward an algorithm to implement that.

While Bentham was the main forerunner of the measurable concept of utility and utilitarian principles from the late 18th century, his views and formulations can be considered part of the cardinal concept of utility, which viewed utility as cardinally measurable. His proposition of direct measure of pleasure or his indirect measure by the amount of money paid to obtain it made it theoretically possible to cardinally measure utility (Moscati, 2018). His ideas were incorporated into economics whereby economists' attempt to explain market dynamics and the determination of prices rested on the idea that happiness is the factor that explains prices as well as support economic decisions (Rojas, 2019). The cardinal concept of utility garnered much attention and stayed dominant in economics until the early 1900s (Moscati, 2018). However, criticisms of and challenges to the cardinalist and utilitarian ideas started to emerge on different fronts. Some criticisms emanate from the complex and impractical approach to utility measurement as proposed by Bentham (Rojas, 2019). The other source of challenge was related to the broader ordinal utility movement in economics that was taking shape from the early 1900s (Moscati, 2018) and influenced the conception of utility starting from 1930s (Frey & Stutzer, 2002; Sen, 2008; Moscati, 2018). What is known as the ordinal revolution was not only convinced that utility could not sensibly be measured cardinally but also argued that the cardinal measurement of utility is not necessary for economic theory and the main results of demand and equilibrium analysis can be obtained with less restrictive formulations of ordinal utility (Frey & Stutzer, 2002; Moscati, 2018; Rojas, 2019).

3.2. The Emergence of Ordinal Utility

Due to the ordinal revolution, the idea that utility should be cardinally measured in order to explain individual choices has been eventually replaced by ordinal utility (Frey & Stutzer, 2002). It was argued that utility should be used to explain the choices made by individuals and it should be empirically inferred from observed choices (ibid). While early works, such as of Irving Fisher or Wilfredo Pareto were not objecting or ruling out the existence of utility or people's experience of being well, they argued and showed ordinal ranking of options was sufficient to address the issues of choice (Rojas, 2019). In addition, the scientific

rationale for interpersonal comparisons of utility and whether they can be reasonably made were deeply questioned (Sen, 2008). Although these developments sidestep the challenges of cardinal measurement of utility, they also transform the well-being or happiness foundation of utility and reduce it to a number or an index only used to order options (MacKerron, 2012; Rojas, 2019). It is argued that well-being is enhanced when individuals can satisfy more of their personal preferences and that utility is reflected by revealed preferences or behaviours (Frey & Stutzer, 2002; Dalziel et al., 2018). What is known as the new welfare economics, which emerged following the advent of the ordinal utility revolution, continued to rely on utility without any substantive meaning as a measure of well-being (Frey & Stutzer, 2002; Sen, 2008). With ordinal utility and adoption of preferences, the definition and focus of utility moved away from the domain of people's experiences of being well to that of commodities (Rojas, 2019). Furthermore, interpersonal comparison about how much better one individual is compared to another was given up altogether (Sen, 2008). From societal perspective, well-being improvement was assessed by Pareto criterion which stated there is well-being improvement if a policy or a social state allows at least one person to enjoy more utility without anyone having less utility (Sen, 2008; Dalziel et al., 2018). Welfare economics continued to rely on Pareto optimality concepts and the promotion of competitive markets, which is assumed to serve as a condition to reach optimality, while remaining silent about people's experiences of being well (Rojas, 2019).

Economics in the 20th century tend to focus on the study of objective variables, such as bundles of commodities, income, prices, and observed decisions and side-line the subjective conception of utility (Rojas, 2019). Modern economic theory has moved away from a substantive and empirically measurable idea of utility in terms of satisfaction or happiness in favour of preferences (Frey & Stutzer, 2002). However, there were developments within economics and other disciplines, notably psychology, that challenged the well-being accounts of the new welfare economics and shed light on their limitations. Below, I will discuss some of these relevant developments focusing on three.

3.3. Recent Developments and a Reconsideration of Well-being in Economics

A. Individual Preferences and Happiness

One of these developments is related to a growing body of literature and evidence that shows failures in the axiomatic assumptions on which ordinal utility theories were built on. For example, revealed preference theory advocates that economics should study what people do rather than what they experience or report (Rojas, 2019). In order for utility to be inferred from revealed behaviour, individual preferences need to be complete, transitive and consistent (Salvatore, 2008). And economic theory typically relies on the assumption that individuals derive utility from the consumption of goods and services and their choices and behaviours are guided or explained by what is referred to as "self-regarding

preferences" (Dhami, 2016). However, more real-world and experimental evidence has been accumulating that indicate that people often exhibit direct or indirect concern about others and their choices and behaviours cannot be well explained solely by self-regarding preferences (Frey & Stutzer, 2002; Dhami, 2016). When people exhibit other preferences (such as altruistic behaviour) contrary to self-regarding preferences, it is no longer possible to establish a direct relationship between observed behaviour, individual preferences and utility (Frey & Stutzer, 2002). This also holds true if other axiomatic assumptions are violated such as if the consumer is not well informed, where there is ample evidence of such failure in meeting the assumptions. Furthermore, with the emergence of economic-psychology and behavioural economics, theories and evidence have started to emerge suggesting people - due to cognitive biases or various contextual factors - are not always able to choose the greatest amount of utility for themselves. While the mainstream economics following the ordinal utility revolution argued utility can be derived from observed choices or preferences, these recent developments in the economics literature questioned whether these inferences can be generally made and pointed to the distinction or even often divergence between individual preferences and individual happiness or utility (Frey & Stutzer, 2002).

B. Concept and Measurement of Well-being in Psychology

The second major development that facilitated the reconsideration of utility and well-being in economics is related to progress that has been made on the concept and measurement of happiness in the field of psychology. With the advent of the new welfare economics, the mainstream economics was convinced that it is not possible nor necessary to measure utility. With the dominance of a preference satisfaction account of well-being and the shift of focus of utility from people's experiences of being well to the realm of commodities and preferences, there was a marked turn in the study of well-being in economics (MacKerron, 2012; Stoll, 2014; Rojas, 2019). While research on well-being can be characterised by dormancy in economics, it was flourishing in the field of psychology. One of the burgeoning areas in psychology was the concept and measurement of subjective well-being and happiness. By the mid-20th century, the consideration of subjective experience as a significant indicator started to receive attention in psychology and the topic of subjective well-being began to gain a central focus (Sirgy et al., 2006). Subjective well-being was considered to be a broad term with affective and cognitive aspects (Sirgy et al., 2006; Bruni & Porta, 2007; Stutzer & Frey, 2010). The affective component refers to a positive and negative affect or emotion that people experience, whereas the cognitive component is related to the subjective evaluation or judgment of people's lives (often called life satisfaction) (ibid).

One view on subjective well-being, which is referred to as the ''hedonic view'', has hedonic philosophical roots and advocated the maximisation of pleasure as the goal of life and the source of happiness (Sirgy et al., 2006). With this approach, well-being consists of happiness or pleasure and it results from a balance

between positive and negative affect (Bruni & Porta, 2007; MacKerron, 2012). Another approach is the "eudaimonic view" that has its roots in the Aristotelian ethics or perspective of the highest human good (Sirgy et al., 2006; Bruni & Porta, 2007; Ryff, 2014). Approaches to well-being with the eudaimonic view argues that well-being consists of more than just hedonic pleasure-seeking or subjective happiness. As a result, these approaches tend to downplay the central role happiness or pleasure plays in well-being. Instead, it places emphasis on well-being through the prism of non-material pursuits, self-realisation and striving to achieve the best in people (Sirgy et al., 2006; Bruni & Porta, 2007; MacKerron, 2012; Ryff, 2014). Despite the varying views of these approaches on the meaning or the primary sources of well-being, it was argued that they offer complementarity that has enhanced our understanding of well-being (Sirgy et al., 2006).

Overall, subjective well-being has been characterised by three main features (Diener, 1984). First, subjective well-being is subjective that is inherent in the individual based on his or her unique experience of the world (Diener, 1984; Sirgy et al., 2006). While this is not to ignore the potential influence of objective factors or events on subjective well-being, they were not considered as an essential part of it. Second, it includes positive experience not just the absence of negative factors. And finally, subjective well-being is seen at a broader level with measures that include overall assessment of people's life; and while the focus or emphasis is global assessment, specific aspects or domains of life may also be assessed.

Numerous measurements or scales have been designed to assess subjective well-being. Overtime, the measurement has seen a considerable growth and refinement with increased sophistication with design and implementation (Sirgy et al., 2006; Miao et al., 2013; Cummins, 2013). Some scales, such as the Positive and Negative Affect Schedule (PANAS) or the Affect Valuation Index, attempt to capture the affect or emotion components of subjective well-being; whereas other scales focus on the cognitive component with life satisfaction measures (Sirgy et al., 2006; Miao et al., 2013; Stone & Mackie, 2013). The dimension of well-being captured through the affect or satisfaction scales is also referred to as emotional well-being (Keyes et al., 2002; Keyes & Lopez, 2002). Scales with a focus on the cognitive component are mostly employed in subjective well-being research using surveys. They include questions asked to elicit reports of either global life satisfaction or happiness (i.e., level of satisfaction with life as a whole) or satisfaction with some aspects or domains of life such as health, work, income, housing or social relationships (Kahneman & Krueger, 2006; Sirgy et al., 2006; Stone & Mackie, 2013). The validity and reliability of self-reported measures of subjective well-being have been widely established (Sirgy et al., 2006; Miao et al., 2013). However, self-reported measures are not without limitations. They are prone to recall or memory bias, influenced by moods at the time of response or influenced by issues such as item-ordering (preceding questions) (Kahneman & Krueger, 2006; Sirgy et al., 2006; Miao et al., 2013). Alternative measures of subjective well-being, such as the Experience Sampling Method (ESM) or the Daily Reconstruction Method

(DRM), have been employed to address some of the limitations of global self-reported subjective well-being measures (Kahneman & Krueger, 2006; Sirgy et al., 2006; Miao et al., 2013; Stone & Mackie, 2013). However, wider application these alternative measures have been limited. For instance, the ESM is considered to be burdensome on respondents and difficult to implement in large population samples (Kahneman & Krueger, 2006; Sirgy et al., 2006; Miao et al., 2013); and the DRM, which tends to ease the respondent burden, needs more research to establish the psychometric properties (Stone & Mackie, 2013).

Proponents of the eudaimonic view of well-being have similarly advocated for and pursued the development of well-being measures. This reflects the view that well-being consists of more than just pleasure, happiness or satisfaction and instead lies in the actualisation of human potentials (Ryan & Deci, 2001). Notable works in this avenue are the psychological and social well-being conceptualisations and measurements (Ryff, 1989; Ryff & Keyes, 1995; Keyes, 1998; Ryff, 2014). Ryff (1989) criticised reliance on happiness or satisfaction scales to assess well-being and went as far as to suggest such measures lack a theoretical foundation or formulation of well-being (Ryff, 1989; Ryff & Keyes, 1995). The psychological well-being literature argued happiness or satisfaction, which much of the literature on well-being used, is not the only indicator of well-being and misses the deeper question of what it means to be well or what are the defining features of well-being (Ryff, 2014). Psychological well-being builds heavily on positive psychological functioning and formulations of human flourishing and it proposed six key features of well-being (Ryff, 1989; Ryff, 1995). These are self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life and personal growth (ibid). This provided a multidimensional approach to the measurement of psychological well-being, which was operationalised, surveyed and validated (Ryff, 1989; Ryff, 1995; Ryff & Keyes, 1995; Keyes et al., 2002). However, Keyes (1998) has also argued that, besides the personal or psychological aspects, the social element is equally important to functioning well in life. He proposed social well-being to represent one's assessment of their functioning in society. The proposed five dimensions of social well-being are social coherence, social actualisation, social integration, social acceptance and social contribution (ibid). The reliability and validity of the social well-being scales have also been established (Keyes, 1998; Keyes et al., 2002; Ryff, 2014). One notable contribution of the psychological and social well-being literature, in addition to the conceptualisation and measurement of well-being, was the attempt to define mental health through well-being dimensions. Dimensions of emotional, psychological and social well-being were considered as "mental health symptoms" (Keyes, 2002). People exhibiting high levels of well-being were described as flourishing and those with low well-being as languishing (ibid). Mental health was characterised not by mere absence of mental illnesses or the presence of high levels of well-being; rather, it was defined as a continuum consisting of the presence or absence of mental illness and that of mental health symptoms (Keyes, 2002; Keyes, 2005; Keyes & Lopez, 2002). Thus, people with complete mental health are flourishing in life and not

experiencing mental illness, i.e., they are functioning well emotionally, psychologically and socially as well as there is absence of recent mental illness (Keyes & Lopez, 2002). On the other hand, complete mental illness is a state that combines low levels well-being and experiences of recent mental illness (ibid). Furthermore, two incomplete states were defined. While incomplete mental health combines low levels of well-being and absence of recent mental illness, incomplete mental illness is characterised by presence of mental illness but also moderate to high levels of emotional, psychological, and social well-being (ibid). Despite the growing interest and advances in eudaimonic well-being (Ryff, 2014), there has been less research into it than into hedonic well-being (Stone & Mackie, 2013) and self-rated subjective well-being questions that elicit satisfaction or happiness are most frequently used in research (Kahneman & Krueger, 2006).

How did these developments on well-being research in psychology inform a reconsideration of well-being in economics? As noted in the previous section, one of the fundamental ideas in the new welfare economics was that it is impossible to measure utility and the cardinal measure of utility and interpersonal comparison was not considered necessary for economic theory. While the mainstream economics maintained people are the best judges of their well-being, utility was usually inferred from observed behaviour or revealed preferences. The developments in the measurement of subjective well-being offered a new impetus in economics to those who question the idea of the inability to measure utility (Frey & Stutzer, 2002) and those who advocate for a subjective view of utility that acknowledges observed behaviour is an incomplete indicator for individual well-being (Frey & Stutzer, 2002). Reliable, valid and direct reports of subjective well-being may have a useful role in the measurement of consumer preferences and social welfare (Kahneman & Krueger, 2006). The advent of the self-reported subjective well-being measures on life satisfaction or happiness offered proxies for utility (Frey & Stutzer, 2002). However, this has taken a considerable time to take root in economics. The first known empirical attempt in economics that used data on self-reported happiness or life satisfaction and assess the trend of well-being is that of Easterlin (1974) and it took more than two decades for economic research in subjective well-being to see a considerable growth in interest (Sirgy et al., 2006; Bruni & Porta, 2007; Stoll, 2014; Rojas, 2019). In recent economic research, data on subjective well-being have been used by to examine questions both in macro- and microeconomic areas (Kahneman & Krueger, 2006; MacKerron, 2012; Frey & Stutzer, 2002) and new ways are pursued to approach individual well-being (Stutzer & Frey, 2010). Outside of academic research, subjective well-being has also gained attention in the public policy arena whereby countries or multinational organisations have started compiling statistics on well-being. Notable examples are the United Kingdom' Office for National Statistics national well-being (Oguz et al., 2013) and the Organisation for Economic Cooperation and Development's well-being measures (OECD, 2011; OECD, 2013). The subjective well-being measures, particularly the self-rated global satisfaction or happiness questions, have

started to be widely used in economic research. Notwithstanding these advances, such measures face methodological limitations such as recall biases, context biases or effects of mood (Kahneman & Krueger, 2006; Stutzer & Frey, 2010; Miao et al., 2013; among others). However, there is more pointed criticism that questions the adequacy of such measures to capture broader well-being and the use of the measures as a basis for well-being evaluation. This will be the focus of the next discussion.

C. The Capability Approach and Limitations of Subjective Well-being Approaches to Well-being

The emergence of the capability approach, initiated by Amartya Sen, is another major development I would like to highlight. It, among other criticisms, challenged the existing approaches to well-being on the narrowness of the informational basis for well-being. Sen has long criticised the reliance on utility and revealed preferences to analysing human behaviour and well-being (Sen, 1987). This "choice-based" approach to well-being where utility is viewed as an index or numerical representation of choice was a "non-starter" for him (Sen, 1999). Even with the emergence and wider application of subjective well-being measures in economics, the shift appears to be from utility without substantive value to utility approximated by self-reported happiness or life satisfaction. Although I focus on highlighting some of the limitations of using information on happiness as a basis for well-being evaluation, criticism has also been equally levied on approaches that relied on access to resources or commodities to judge well-being (Sen, 1999).

Several limitations have been raised that highlight the inadequacy of the happiness or satisfaction approaches to gauge well-being. To mention few, one is related to the informational limitation imposed by relying solely on happiness to approximate well-being. With subjective well-being approaches, reliable source of information in examining well-being was considered self-reported happiness or satisfaction coming from individuals (Bruni et al., 2008). However, this could come at the cost of neglecting other important considerations to well-being (Sen, 1985; Comim, 2008). Happiness, considered as a mental state, can ignore other non-happiness information and aspects of individual well-being (such as material, immaterial or other mental aspects) (Sen, 1985). Although we can acknowledge the relevance of happiness to well-being, it remains inadequate representation for well-being (Sen, 1985; Sen, 2008). Another critical limitation raised with the subjective well-being approaches has been that they can be prone to biases and distortions due to what is known as adaptive preferences (Bruni et al., 2008; Comim, 2008). This line of criticism argued that people such as oppressed minorities or those living in persistent deprivation may learn to adjust or adapt their desires or preferences to what they experience as feasible (Sen, 1999; Sen, 2008; Comim, 2008). As Sen puts it, people living in deprivation and learn to be happy in "small mercies" (Sen, 1999; Sen, 2008) may "come to terms with" their deprivation (Sen, 2017). As a result, happiness or satisfaction measures can be biased metrics to represent well-being.

The capability approach emerges as an alternative normative framework for evaluating well-being. The approach argued for moving away from approaches to well-being that rely on narrow informational basis to assess well-being such as on resources, income or utility (expressed as happiness or satisfaction). The capability approach distinguishes between what people can do and be (their capabilities) and what they are actually achieving in terms of beings and doings (their functionings) (Robeyns, 2017). It places a central role on a person's achievements and freedoms and actual ability to do the different things her or she has reason to value doing or being (Robeyns, 2017); and it views the informational basis for well-being evaluation in terms of functionings and capabilities (Sen, 1993). As a result, the capability approach moves the evaluation framework for well-being from resources or happiness to the freedoms and opportunities people have to achieve what they want to do or to be and what they are actually able to achieve, thereby providing a rich and multidimensional approach to well-being assessment. The approach has its philosophical roots in Aristotelian ethics (Sen, 2008) and is linked to the idea of human flourishing (Anand, 2016). While there was a debate about the difficulty to operationalise the capability approach, it has emerged as important alternative framework for well-being and it has been used in a range of fields including, but not limited to, economics, international development, public health, disability, health economics, development ethics, education and technology (Robeyns, 2017). Similarly, it has also been used to guide influential public policy research and metrices. For instance, the foundation of the widely known Human Development Index or Multidimensional Poverty Index produced by the United Nations is laid on the capability approach. This thesis applies the capability approach as a framework for assessing well-being and the next section (Section 4) expands on and provides an overview of the approach.

4. The Capability Approach

Overview

The capability approach is an influential framework introduced by Amartya Sen and further developed by other scholars, which has been used for well-being evaluation. This section largely draws on Robeyns (2017) which provides a systematic synthesis of works on the capability approach yet, from concepts to applications. This brief overview of the capability approach is meant to highlight different components of the approach, how they relate with each other in a simplified way and their relevance to my research at hand. The discussion on capabilities, functionings and conversion factors that are presented below will be picked up further in Chapter 5 as a way of thinking about how depression fits into the framework of the capability approach or, more specifically, as a conceptual framework of how depression may affect capabilities.

The capability approach provides a normative framework for evaluating well-being and a basis for its multidimensional representation. One of the central merits associated with the capability approach is that

it provides a different perspective from welfarist approaches and the primary focus on material resources and accumulation of such resources or utility (Robeyns, 2017, pp. 8–10). The approach offers an alternative perspective by distinguishing between capabilities (what people can do and be) and functionings (what people are actually achieving in terms of beings and doings), a significant departure from neoclassical economics which relies on what people choose in order to infer their preferences and willingness to pay. By also looking at capabilities, the range of choices available, the capability approach creates an intellectual space where one cannot talk about well-being without talking about freedom. Policies, practices and evaluations, in design or assessment, aimed at improving well-being, ought to incorporate their impact on people's capabilities, i.e., their opportunities and freedoms to do and to be of what they value, and not just on their functionings. These two concepts, functionings and capabilities, are at the core of the capability approach and as a normative framework, they form the 'evaluative space'.

One fundamental feature of the capability approach is the characterisation of capabilities generated by a mechanism that transforms resources and endowments into capabilities and achieved functionings. There are important components which underlie the capability approach and the well-being generation mechanism, which will be briefly highlighted below.

As just mentioned above, the core concepts in the capability approach are capabilities and functionings, where the former represents what people are able to be and to do and the latter capture corresponding achievements (Robeyns, 2017, p. 38). Various examples of 'beings' and 'doings' can be found in the literature. Being educated, being healthy, being well-nourished are few examples of 'beings'; and examples of 'doings' include reading, caring for a family, travelling. Functionings underscore whether, e.g. a person is educated or literate or otherwise, whereas capability focuses on whether a person is endowed or lacks the opportunities to be educated.

Capabilities are described as real freedoms and opportunities to achieve functionings and distinction between the two is often presented as the difference between the realised and the effectively possible. For instance, take travelling, to illustrate the distinction with a simple example from Robeyns (2017, p. 39). Travelling is an example of 'doings' and a functioning. While the notion of functioning tries to capture the act of travelling, capabilities are concerned with the real freedoms and opportunities to travel whether or not an individual chooses to act on them. One important issue worth pointing out here in the discussion of capabilities and functionings is that not all have a positive value as some 'beings' or 'doings' may have a negative value such as being illiterate, being ill, experiencing abuse and assault. Although the question of what capabilities and functionings that people would like to promote or protect and those they would

like to reduce or eliminate is imperative, they are conceptually constructed to be 'value-neutral' (Robeyns, 2017, pp. 41–45).

Several factors will influence the capabilities one has at her disposal, which brings us to another important component in the capability approach that is resources or endowments. Resources refer to a broader notion of goods and services from either market or non-market production and provisions. Resources constitute the means to achieve capabilities and are often conceptualised as capability inputs. For instance, take the capability of being able to be educated. It depends on resources and inputs in education, such as human resources, financial resources, educational and learning facilities, household income (Chiappero-Martinetti & Sabadash, 2014). One key formalisation about resources was that they were viewed in terms of their characteristics, i.e., the desirable properties resources possess (Sen, 1999). For example, properties of food may include satisfying hunger, providing nutrition or providing pleasure. Command over resources gives a person command over corresponding characteristics. Having a house gives the owner access to different properties of a house such as accommodation, security, privacy, stable home, asset ownership. Two issues are also important to point out here. First, it is argued that although access to resources and command over their properties may vary across individuals, the characteristics will not differ with the personal features of the individual. For example, a car is considered as having the characteristics of transportation, whether a particular person possessing the car is disabled or able-bodied, depressed or not depressed. Second, access to resources and the characteristics of resources do not tell us what a person will be able to do with those properties.

What resources will enable a person to do will depend on their abilities to convert resources into capabilities and functioning. Conversion factors refer to factors that determine the extent to which persons' abilities differ in converting resources. A car and its corresponding characteristics of transportation enable the mobility functioning and to be able to move oneself from one place to another freely and more quickly than, say, if walking. However, converting the resource into a valuable functioning of mobility will be different from one person to another depending on their conversion factors. For example, a person with a disability such as visual impairments or blindness or a person without disability but never learnt how to drive will have lower conversion factors enabling them to turn the car into efficient mobility than a person without a disability who also know how to drive.

Conversion factors arise from different sources and realities a person faces and differences in conversion factors are considered as one source of human diversity. Three groups of conversion factors are identified in the literature (Robeyns, 2017, pp. 45–47). These are personal, social and environmental conversion factors. Personal conversion factors are those individual characteristics and factors internal to the person,

such as physical conditions, age, sex, abilities. Social conversion factors refer to those arising from the society in which one lives, such as social norms, societal hierarchies, public policies, power relations. Conversion factors stemming from the physical or built environment in which one lives include geographical location, climate or infrastructure. Conversation factors influence how a person can be or is free to convert resources into a functioning, and they underscore that to assess the well-being a person has achieved or could achieve, it is not enough to know about the resources they command as utilisation can be influenced by these different conversion factors.

Structural constraints play a significant role in the capability approach. It represents a set of 'institutions, policies, laws, social norms and the like that people in different social positions face' that can influence conversion factors as well as capabilities directly (Robeyns, 2017, pp. 65–66). Structural constraints affect a person's set of conversion factors and therefore shape one's ability to convert resources into capabilities. For example, consider education for a simple illustration. The opportunity to be able to attend school will, in part, depend on the availability of different educational inputs such as schools, teachers. Despite the availability of these resources, the ability to convert these resources into the capability being educated will be different for boys and girls if they live in a society that does not value or support women attending school. These social norms are, therefore, part of a structural constraint that influences the social conversion factors one has. Structural constraints also influence the formation of capabilities that may not heavily draw from resources, without impacting the conversion of resources into capabilities.

Given the capability set people have, achieved functionings will result from a choice they make. The choice people make is considered to be constrained in some way. Decisions and choices may be influenced by different factors such as preferences, different psychological and behavioural factors and structural constraints people face. One last component is satisfaction, which indicates the level of satisfaction or dissatisfaction a person will have from one's capability and functionings (Robeyns, 2017, p. 82).

The capability approach can be formally represented with notation as follow. The formalisation will follow representation by Sen (1999) and subsequently expanded by others. Let x_i be the vector of resources possessed by person i. Given the vector of resources, the achieved functionings can be represented as:

$$b_i = f_i(c(x_i)) \qquad (1)$$

where

x_i represents a vector of resources of person i;

$c(.)$ the function converting a resource vector into a vector of characteristics of those resources;

$f_i(.)$ the function, which is termed as personal utilisation function, generating a vector of functionings from a vector of characteristics; and

b_i represents a vector of functionings.

Feasible functioning vectors of person i for the choice of resource vectors restricted to the set X_i is given by:

$$Q_i(X_i) = \{b_i | b_i = f_i(c(x_i)), \text{for some } f_i(.) \in F_i \text{ and for some } x_i \in X_i\}. \qquad (2)$$

Q_i is the capability set of person i that reflects the various combinations of functionings she can achieve.

Sen's ideas and formulations provided a framework by which human well-being is viewed as multidimensional and is not reduced to resources, income or utility. It also allows for differences not only in resources but also in people's abilities to convert resources into valued states or activities. However, his work intentionally avoids the task of proposing specific dimensions of well-being or enumerating what goes into informational bases of well-being evaluation, which is part of the reason why the capability approach is not a theory in itself and not a theory of social justice. Another major contribution to the development of such theory is attributed to the works of Martha Nussbaum. Among the contributions of Nussbaum, and one notable difference from Sen, was the proposal of a list of capabilities. Nussbaum has advocated for a list of what she referred to as "central human capabilities" or "central capabilities" (Nussbaum, 2000, p. 70; Nussbaum, 2011, p. 32). These capabilities are (1) life; (2) bodily health; (3) bodily integrity; (4) senses, imagination and thought; (5) emotions; (6) practical reason; (7) affiliation; (8) other species; (9) play; and (10) control over one's environment. The list was considered as an attempt to outline a minimal conception of social justice and central requirements of living a life with dignity (Nussbaum, 2006).

Capability Approach in the Health Context

In the area of health broadly and health economics specifically, two strands of works can be identified. The first one is related to applying the capability approach to better understand and conceptualise health while the second is concerned with using the capability approach to design extra-welfarist, multidimensional frameworks and tools for well-being assessment and resource allocation (Kinghorn, 2015).

Starting with the first, in the capability literature, there have been attempts to use the lenses of the capability approach to conceptualising some aspects of health or health broadly. For instance, Mitra (2006) outlined how the capability approach may provide a framework to understand disability better than most of the alternative models of disability. Impairments (physical or mental) would lead to disability if individuals are deprived of opportunities as a result of their impairments. The author argued that disability can be analysed at a capability or functioning level. At a capability level, impairments will lead to a

reduction in opportunities individuals can enjoy. This is referred to as a potential disability. At a functioning level, disability, which is referred to as actual disability, will depend on actual restrictions on their functionings as a result of their impairments and given what they value doing or being. Similarly, other scholars have offered the capability approach as complementary to current disability models (Burchardt, 2004; Venkatapuram, 2014; among others). The capability approach has also been proposed as a relevant framework to conceptualise and assess well-being among individuals with autism (Robeyns, 2016).

At a broader level, there are arguments to conceptualise health as a capability. Law and Widdows (2008) suggested adopting the capability approach to health and argued that health could be considered as a capability constituting a various combination of functionings than considering health as a single functioning. Ruger (2009; 2010) took this further and proposed the concept of "health capability". Health capability, which is viewed as the "ability to be healthy", is distinguished from health functioning, which is considered as health achievement or outcome of actions that lead to health. An account of how health capability is determined by a combination of individual, societal and systems-level environments and factors was also proposed. A recent analytical exposition focused on not simply conceptualising health from a capability approach perspective but on how it relates to other capabilities. Tengland (2019) argued that health, particularly aspects of health that include basic abilities and dispositions, is "a constitutive" part of all capabilities. For instance, being able to live a life of normal length, which is one of Nussbaum's core capabilities, will require being healthy. Similarly, other capabilities such as practical reason or emotions will require achieving minimal health and lacking some of these capabilities is considered as a manifestation of poor health.

The other area of application of the capability approach in health is related to measurement. Despite its appeal as a conceptual framework for multidimensional outcome assessment, the capability approach has not been widely applied due to the challenge in operationalising and applying it to measurement. This is in part owing to its theoretical underpinnings which Comim (2008, p. 160) referred to as "under-specification", whereby the capability approach provided a rationale for a multidimensional approach to well-being assessment or human development but, by design, steered clear of being prescriptive on the practicalities of what constitutes well-being dimensions and evaluative spaces. However, recent works have ventured in that effort. Its potential to provide a broader evaluative space for outcome assessment in health has been recognised, and there are some efforts to develop instruments that aim to measure capabilities (Coast et al., 2015; Lorgelly, 2015).

There are two main strands considered as leading and well-developed in this area (Coast et al., 2015; Lorgelly, 2015; Helter et al., 2019). The first one is what can be termed as the ICECAP family of instruments

(Grewala et al., 2006; Al-Janabi et al., 2012; Al-Janabi et al., 2013; Coast et al., 2015; Lorgelly, 2015) and the second one is the OCAP or OxCAP instruments (Anand et al., 2008; Anand et al., 2009; Lorgelly et al., 2015; Simon et al., 2013; Coast et al., 2015; Lorgelly, 2015). The ICECAP instruments emerged from a capability well-being instrument for older populations using a participatory approach to solicit what older person value and further adopted for the general adult population and for use at the end of life (Grewala et al., 2006; Al-Janabi et al., 2013; Sutton & Coast, 2014). This family of instruments were further developed for use in economic evaluation by developing population tariffs (Flynn et al., 2015; Huynh et al., 2017). The OCAP instruments, on the other hand, have their roots in operationalising capabilities drawing from Nussbaum's list of capabilities starting with Anand et al. (2009), further refined using factor analysis and qualitative approaches (Lorgelly et al., 2015) and adapted for use in mental health studies (Simon et al., 2013).

Building on these efforts, this research seeks to operationalise the capability approach to measure outcome and assess the broader well-being impacts of depression. In the context of the thesis, the proposition is that as an evaluation framework, the capability approach will provide an invaluable perspective in terms of formulating and assessing the impact of depression. As discussed in the previous section, depression is a mental health problem with an impact on various dimensions and aspects of people's lives. Hence, the use of outcome measurements that primarily focus on symptoms, functionings, achievements and satisfaction is too narrow a measure to understand and capture the broader impact of depression on people's freedoms and opportunities in achieving the things they value or in being the people they aspire to be.

5. The Ethiopia Context

Ethiopia is witnessing what is known as "the epidemiological transition", whereby people in low-income countries start to have longer life expectancies and begin to increasingly experience health problems that are widely observed and documented in high-income countries. In addition, the shift in terms of prevalence away from communicable diseases towards growing non-communicable related health problems has been observed (IHME, 2016). The estimates for Ethiopia in the Global Burden of Disease (GBD) 2015 study are quite illustrative of these transitions. In 2015, life expectancy had reached 63.6 and 66.8 years for men and women respectively from 43 and 47.6, respectively in 1990 (IHME, 2016). The top three causes of premature death in 2015 were lower respiratory infection, diarrheal diseases and tuberculosis. Although the leading causes of premature death in Ethiopia remain due to communicable diseases, there has been a noticeable shift since the past decade. There was a fall in the percentage change of premature deaths caused by the aforementioned three causes by 57.8, 63.1 and 39.4% respectively between 2005 and 2015. On the other hand, the burden caused by non-communicable diseases has started

to rise. From the list of top 10 diseases and disorders that cause the most disability in 2015, as measured by YLDs, the majority (seven out of 10) were non-communicable diseases, and depression tops this list of leading causes of disability (ibid). In addition to these transitions, one particularly alarming observation is the fact that depression was similarly ranked as the leading cause of disability in 2005 and depression associated disability has increased by 6.8 per cent between 2005 and 2015. This increased burden and an unparalleled leading cause of disability would merit a better understanding of the contextual appraisal of the multifaceted burden of depression in Ethiopia, where despite the rise in prevalence and disease burden, the empirical evidence on the broader well-being impact of depression is scant.

Studies in Ethiopia have been largely focused on the epidemiology and prevalence of depression, with study designs including cross-sectional and cohort studies, facility-based to community-based and national surveys. Estimated prevalence rates range between 2.2% and 11.9% (Fekadu et al., 2007; Hailemariam et al., 2012; Fekadu et al., 2017). A population-based cross-sectional study of adults has also documented a 13.8% prevalence rate of common mental disorders (Fekadu et al., 2014). Fekadu and Alem (2020) described how studies on mental health in Ethiopia have evolved. They outlined four generations of studies from facility-based interviews by psychiatrists to population-based studies applying screening instruments in the first- and second-generation studies, respectively. The third and fourth generation studies were characterised by more advances in methods and applications by utilising more structured diagnostic interviews, longitudinal studies, clinical trials and more complex interventions to understand mental disorders and design and test scalable interventions. Despite a recent increase in mental health studies, studies that assess the full impact of depression are still scarce. The currently available limited studies focus on areas such as disability (Mogga et al., 2006; Habtamu et al., 2019), mortality (Fekadu et al., 2015) and recently on the household economic burden associated with mental disorders (Hailemichael et al., 2019; Lund et al., 2019). This research aims to contribute to narrowing the evidence and knowledge gap in this area. It will assess the burden of depression in Ethiopia and will argue that depression exerts a multifaceted burden on individuals and society and calls for outcome measures that accommodate and assess such broader impacts.

6. Summary and Thesis Outline

To sum up, depression is one of the leading causes of disability, but evidence has also accumulated highlighting the multifaceted nature of its impact. From my reading of literature, the gap in Ethiopia is twofold. On the one hand, there is still evidence gap on the burden of depression, even applying the currently and widely applied measures of outcomes elsewhere. On the other hand, these widely used measures are not without limitations, and there are recent attempts to measure broader and multidimensional outcomes (IsHak et al., 2011; Brazier et al., 2014; Simon et al., 2013; Mitchell et al., 2017).

As a result, "catching-up" and measuring the impact of depression with currently applied paradigms may not suffice. This double objective is, therefore, what the thesis aims to achieve. First, arguing on the overall gap of adequate evidence, it will assess the impact of depression on health-related quality of life. In this regard, it will also venture beyond current studies and try to establish the impact of depression beyond association, employing causal inference techniques. Second, it proposes applying the capability approach as a multidimensional quality of life assessment framework, develop a contextually relevant and valid instrument to assess the broader quality of life and investigate the impact of depression on broader well-being.

This may bring the question of where does the thesis stand on some of the key issues? More importantly, what do key terms such as depression or quality of life mean in the space of this thesis? I will offer some clarifications about the key terms used while also trying to map the contours of the thesis. The clarifications specifically focus on three domains. These are concerned with: (a) the condition or the problem of interest; (b) the outcome of interest; and (c) the traditions of assessing outcomes in health or economic evaluation.

The first clarifying discussion is concerning the problem of interest, i.e., depression. Depression is a commonly occurring mental illness. Although it is often confused and conflated with the familiar everyday use of the term that signifies occasionally depressed or sad mood, the disorder is rather complex with wide-ranging pathologies, explanatory models, established diagnosis with classifying system and a spectrum with different types, subtypes and severity. While it is important to clarify that discussion concerning these broad and wide-ranging issues are outside of the scope of the thesis, one issue is worth addressing. The empirical analyses in this thesis have used depression variables, and these variables were based on non-clinical questionnaires rather than clinical diagnosis. In one study, depression assessment or defining "caseness" was based on the Composite International Diagnostic Interview (CIDI), which is the WHO's structured non-clinical interview. In another study, it was based on a brief screening instrument known as the 9-items Patient Health Questionnaire (PHQ-9). These questionnaires map to the well-established diagnosis and classification systems of the International Classification of Diseases and the Diagnostic and Statistical Manual of Mental Disorders and can reliably identify probable depression cases. Therefore, in this thesis, the term depression was colloquially used to represent depression cases based on these lay screening instruments, without implying clinical diagnosis or typifying the types or severity of depression. However, whenever a well-established and contextually validated criteria based on scores of the instruments that allow for such classification is available, there was an attempt to apply that.

The second point in clarifying terms used and in outlining the scope of the study is related to outcome measures. The primary aim of the thesis was investigating the impact of depression on people's lives. To accomplish that, it has limited itself to health-related quality of life and (broader and) multidimensional quality of life. There is wide literature that discusses and debates the concepts, the evolution of the concepts, measurement and their applications. Again, addressing these issues is beyond the scope of this thesis. However, I will clarify the view around the use of the terms. Health-related quality of life is used to describe health outcomes as described by the five health dimensions of the EQ-5D questionnaire and a summary index constructed by valuing health status using Ethiopian population value sets (Karimi & Brazier, 2016; Welie et al., 2019). The multidimensional assessment of quality of life measure in this thesis was grounded in the capability approach. As such, the terms quality of life, well-being, capabilities or capability well-being are used interchangeably to discuss the broader aspects of people's lives and how depression affects these aspects.

This brings me to the third clarifying discussion. This is concerned with the traditions or perspectives that different outcome measures are associated with. Health-related quality of life, particularly as applied in the context of this thesis, has its roots in extra-welfarist approach. With this approach, traditional welfare analysis was supplemented by non-good characteristics such as health states or health utilities building on the capability approach criticism of the welfarist traditions. However, it was still criticised as a limited application of the capability approach where the focus was only on health (Coast et al., 2008). Similarly, the use of the capability approach as applied in the exploration and analysis of the broader quality of life or well-being can be mapped to the extra-welfarist perspective. I could appreciate the slight unease in the minds of some readers for bringing these two approaches together in the space of this thesis, particularly given the criticisms on health-related quality of life by the proponents of the capability approach. However, given the aim of the thesis was highlighting the burden of depression, there was no specific dogmatic alignment to a specific tradition or perspective as such. It was rather working with a pragmatic approach where the main focus was understanding and bringing to the fore the burden of depression in Ethiopia. This is the reason that the health-related quality of life tradition (with its focus on health dimensions and widely applied methods in health economic evaluation) and the capability approach (with a focus on broader well-being, freedoms and opportunities) were both applied in exploring the impact of depression in the space of this thesis. Having clarified that, overall, the study can be positioned within the extra-welfarist tradition of well-being analysis. Furthermore, while the work is dominantly from economics perspective, the diversity of the traditions it derives from, the diversity of methodological approaches employed and the openness to draw from other areas outside economics places the study at the interface between economics discipline and wider social sciences.

Thesis Outline

The remainder of the thesis is structured into self-contained empirical chapters preceded by a methods chapter to provide an overview of the approaches, methods and data for the empirical chapters in one place. Specifically, Chapter 2 presents the methods overview, outlining the objective of the thesis and description of approaches and data employed to meet the objectives. Chapter 3 presents an empirical analysis work on the impact of depression on health-related quality of life, self-rated health and subjective well-being. Chapter 4 presents the approaches and results of instrument development and validation work to assess broader well-being using the capability approach. An empirical analysis of the impact of depression on broader well-being by applying the new capability instrument was explored and presented in Chapter 5. Finally, Chapter 6 offers summary and concluding remarks.

Chapter 2. Methods

Each of the main analysis chapters in the thesis are structured in a standalone, article-like format that includes a methods section. However, what this chapter aims to accomplish is to provide an overall high-level overview of the methods in one place that each chapter can refer to. While some common issues such as study area and study settings can be addressed here, other specifics to some of the methodological approaches will be further elaborated in each chapter. This chapter starts by outlining the research objectives in Section 1. It is followed by a discussion of the methods with a focus on data types, sources and description of participants in Section 2. Ethical issues are discussed in Section 3.

1. Study Objectives

The overall aim of this research is to examine the burden of depression in Ethiopia with a focus on its impact on health and overall well-being.

To achieve this primary aim, the research specifically sought to:

i. investigate the impact of depression on health-related quality of life;

ii. develop a multidimensional measure of well-being based on the capability approach framework and examine its validity and reliability; and

iii. examine the effect of depression on overall well-being.

2. Methods Overview

The research was conducted in Ethiopia. It was of a cross-sectional design, drawing from primary and secondary data sources to achieve the different objectives it sets out. The secondary data were from a national survey (***health survey data***) and has been utilised to address the first objective of analysing the impact of depression on health-related quality of life. This study is reported in Chapter 3, and it represents the first study, to the best of my knowledge, to examine this issue using data from a large-scale national health survey and to apply well-established outcome measures in health economics in Ethiopia. However, as will be further discussed, the study will also highlight the limits of the secondary data in analysing the multidimensional impact of depression, which motivated the design and implementation of primary data collection. The primary data (***own survey data***) were used to address the remaining two objectives of capability well-being instrument development and validation and assessment of the impact of depression on broader well-being, subsequently presented in Chapter 4 and 5, and were designed and implemented specifically for this thesis. A summary is provided in Table 1 below with additional descriptions on the sources and approaches to give an overview while still leaving a room for additional details in each chapter. The table also shows the link of each objective with the chapters in the thesis.

Table 1. Summary of Study Objectives, Data Types and Sources

Study/Objective	Data source	Study design and data type	Link to thesis chapters
i. Investigate the impact of depression on health-related quality of life	*Health survey*	cross-sectional; quantitative	Chapter 3
ii. Develop a multidimensional measure of well-being based on the capability approach framework and examine its validity and reliability	*Own survey*	cross-sectional; mixed	Chapter 4
iii. Examine the effect of depression on overall well-being	*Own survey*	cross-sectional; quantitative	Chapter 5

2.1. Health Survey Data

The secondary source of data for the first study was the World Health Survey (WHS). This was a multi-country study by the World Health Organization conducted between 2002 and 2003 and implemented in 72 countries where Ethiopia was one of the participating countries (Ustun et al., 2003). The approaches, the development process and broad sketch results of the survey are extensively documented elsewhere and will not be the focus here (see Murry and Evans (2003) for more details). One of the objectives of the WHS was the development of a "valid, reliable, and comparable household survey modules" to help countries collect data on numerous topics of priority in a cost-effective way (Ustun et al., 2003).

In Ethiopia, the survey was conducted in collaboration with Jimma University (Hailemariam et al., 2012). It followed a multi-stage stratified sampling where administrative regions and residence were used as stratification variables. As per the overall methodological approach of the WHS, the survey in Ethiopia employed a probability sampling design, where every individual in the sampling frame has a known, non-zero chance of being selected into the sample (WHO, 2012; Hailemariam et al., 2012). While the final observational units were individuals, households were the sampling units. The sample selection stages went from Regions to *Woredas* (District), *Kebeles* (locality) and Households. The survey respondent, which is one individual per household, was then selected from all eligible members of the Household (i.e., 18 years of age or older members) using Kish table, a method that provides each eligible person an equal probability of selection into the sample (WHO, 2012; Hailemariam et al., 2012; Gaziano, 2008). From 4,990 adults selected from participating households, 4,936 were interviewed (99% response rate) (Hailemariam et al., 2012; WHO, nd). The survey is comprised of household and individual level questionnaires with

different modules covered in each (Ustun et al., 2003). The data used in this study came from the individual level questionnaire. Overall, the sample is representative of the population in terms of its age and sex composition. This was reflected in the sample population deviation index. The index calculates the age or sex composition in the sample as compared to the composition in the general population, and it is considered as an indicator of the quality of the sample in terms of representativeness (Ustun et al., 2003). An index of one indicates that the survey sample matches the composition of the general population. However, this is rarely achieved in surveys due to sampling error. An index greater than one indicates over-sampling, and vice versa, from a given age or sex group. Figure 1 shows the sample population deviation index for Ethiopia. For most of the age groups and both male and female population, the index is close to one signifying how the sample closely resembles the general population in age and gender distribution. The geographical distribution of the survey participants is also shown in Figure 2.
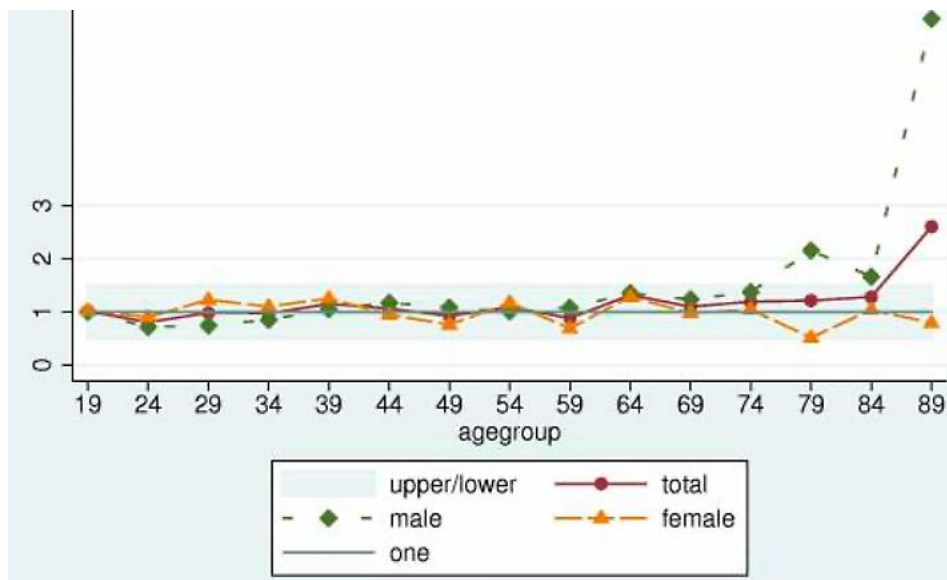
Figure 1. Sample Population Deviation Index

(Source: (WHO, nd))
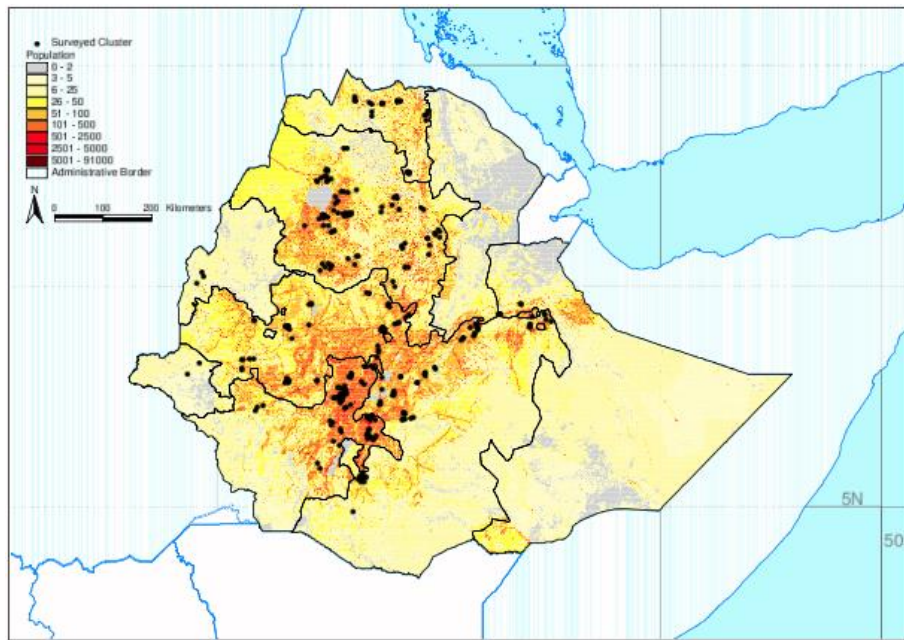
Figure 2. WHS Sampling Distribution for Ethiopia

(Source: (WHO, nd))

The secondary data from the WHS have information on variables of importance for this study, such as depressive symptoms, other health conditions and on health outcomes of limited domains. It allowed me to construct a health-related quality of life index by applying a recently available EQ-5D value sets for the Ethiopian population (Welie et al., 2019) for the first time. This provided a unique opportunity to assess the impact of depression on health-related quality of life using data from a large-scale and nationally representative sample. It also provided an opportunity, as detailed in Chapter 3, to apply alternative estimation techniques to assess the impact of depression. However, with all its advantages, the data were limited in what they can offer about the broader well-being impact of depression, which motivated the design and implementation of a survey specifically for this study.

2.2. Own Survey Data

Primary data were used to meet the remaining two objectives of the study that relates to instrument development and examining the well-being impact of depression. Data were collected through own survey designed for this purpose. The process involved a number of steps and employed a mixed-methods approach. The first major task was instrument development to assess well-being applying the capability approach by identifying capability domains and items building on similar works in country contexts different from Ethiopia. The survey instrument was contextualised for use in Ethiopia drawing from literature on well-being, instrument development and cross-cultural adaptation of instruments and qualitative field research. The qualitative research employed focus group discussions and interviews to

further inform the development of the instrument and to assess its conceptual, cross-cultural and semantic validity. This was then followed by a pilot survey, and the data were used to examine the instrument validity and reliability using quantitative, statistical methods. Details of these steps of instrument development and assessment of its validity and the psychometric properties are presented in Chapter 4. After the pilot, additional cross-sectional survey was conducted to collect data on a larger sample of participants in rural Ethiopia. The survey data is examined to explore how depression is associated with overall well-being, which is the focus of the study reported in Chapter 5. Brief additional details on the qualitative and survey data as well as the study area are provided below.

A. Study Area Description

The study was carried out in the Sodo district in Gurage Zone, the Southern Nations, Nationalities and Peoples Region (SNNPR) of Ethiopia. It is located 100 km south of the capital city, Addis Ababa and has a total population of 181,418 (Bureau of Finance and Economic Development, 2016). The district is predominantly rural, and representative of a typical rural area of Ethiopia, where close to 89% of the population are rural residents. It is located close to one of the six Demographic Surveillance and Health Research sites in Ethiopia, the research infrastructure of the Butajira research project of severe mental disorders for over 20 years (Fekadu et al., 2015) and Ethiopian research site of the Programme for Improving Mental Health Care (PRIME), a program which aims to generate evidence on the implementation and scaling up of integrated packages of care for priority mental disorders in primary and maternal health care settings in Ethiopia, India, Nepal, South Africa and Uganda (Lund et al., 2012). The district has 58 sub-districts, and it is served by one hospital, health posts in each sub-district and eight health centres, where five are located in rural and three in urban areas (Fekadu et al., 2017). Health posts are staffed by health extension workers, female high school graduates with one year of training in health, focusing on disease prevention. On the other hand, health centres are staffed by nurses and health officers who are health professionals with 3–4 years of clinical and public health training.

B. Instrument Development and Pilot Survey

The initial instrument development process involved weighing on the options of developing a capability well-being instrument anew or contextualising existing instruments. The processes are described with additional details in Chapter 4 but to provide a highlight here working with existing instruments was taken as a starting point due to several constraints associated with developing one from scratch. This was followed by choosing the appropriate instrument among the ones available, selecting and drafting items through iterative process informed by literature and experience and develop an initial instrument for field testing. Once an initial draft of capability instrument was developed, additional data using qualitative methods were collected to ensure the survey instrument was suitable to the country context. The

qualitative work involved undertaking focus group discussions and semi-structured interviews in the study area with participants of varied backgrounds, age, gender and profession to represent a diversity of opinions and voices. Some of the participants in the qualitative study had lived experiences of depression and they were part of the depression cohort of the PRIME study (Lund et al., 2012; Lund et al., 2019; Chisholm et al., 2020). One of the main goals was to supplement the development of capability instrument using a consultative and participatory approach. Both the focus group discussions and interviews explored how the concepts in the capability domains and items are viewed and understood in the local context, whether they are relevant and appropriate in the context and whether the language and phrasings are contextually and culturally sensitive. In addition to that, it aimed to explore and identify if there were any missing dimensions that may be considered relevant but may not have been included in the instrument. Furthermore, the interviews also served a cognitive debriefing purpose to understand and clarify issues that are not clear, vague or objectionable.

Participants were informed about the plan of the study to develop an outcome assessment instrument and their participation in the study will provide input in the tool development process. In focus group discussions, participants were asked to discuss what they understood by each capability items, to discuss the perceived relevance of the items, to identify and discuss any items that are not clear or they found problematic or objectionable and to outline and point out any issue of relevance for individuals and their community which is not discussed and asked in the instrument. They were encouraged to interact with each other. In addition to focus group discussions, individual interviews were conducted in a semi-structured way where respondents were asked to respond to the instrument as well to think-aloud in the process of answering and to discuss their comprehension of the capability items and issues about clarity and relevance of the questions. Furthermore, the cognitive debriefing involved methods of paraphrasing by asking respondents what they understood by the items and if they would phrase any of the items differently. Participants were asked and encouraged to express what they think about the items, if any items seem unclear, confusing or in any way objectionable and if any items were difficult or problematic to respond to. This approach allowed for undertaking conceptual, content and semantic equivalence validations in an integrated manner. Presenting the capability items and prompting discussions among participants about what the items mean to them and what they understand by the items and mapping that with the underlying concepts in the capability items allowed soliciting how the capability concepts translate into the local contexts. Similarly, asking participants about what their views are on the relevance and acceptability the capability items as well as clarity of the language used and soliciting alternatives aimed at ensuring the questions are appropriate, acceptable, useful, clear and understandable in the local context.

Consent was obtained from all participants. Participant information sheet and consent forms are attached in Appendix 2A. Please refer to the ethical consideration section (Section 3) for more information on ethical issues related to the study. Discussions and interviews were audio-recorded, transcribed verbatim and translated to English. Transcripts were reviewed to identify and review any emerging issues in comprehension, clarity and contextual relevance. Summary of the research participants is shown in Table 2 below.

Table 2. Summary of Qualitative Research Participants

	Gender	Age	Marital status	Employment	Occupation	Participated in
1	Female	45-64	Married	Unemployed	Housewife, farming	Interview
2	Male	45-64	Married	Unemployed	Occasional farming	Interview
3	Female	45-64	Married	Unemployed	Housewife	Interview
4	Male	25-44	Divorced	Employed	Daily labourer	Interview
5	Female	25-44	Married	Employed	Public service	Interview
6	Male	25-44	Married	Employed	Public service	Focus group
7	Male	65+	Married	Unemployed	Community elder	Focus group
8	Female	45-64	Married	Employed	Community organiser	Focus group
9	Male	65+	Married	Unemployed	Pensioner	Focus group
10	Male	25-44	Single	Employed	Public service	Focus group
11	Male	18-24	Single	Employed	Health professional	Focus group
12	Male	25-44	Single	Employed	Health professional	Focus group
13	Female	18-24	Single	Employed	Health professional	Focus group

The instrument was then pilot tested. Data from the pilot were used to investigate the psychometric properties of the instrument further and examine the reliability and validity of the newly developed capability instrument. Data collection was implemented through a facility-based cross-sectional survey conducted in Sodo district. Data were collected as part of an initial instrument development and inter-rater reliability and validity testing for the IDEAS (Improving Detection of Depression in Primary Care in sub-Saharan Africa) study[1]. Given the primary objective of this phase of the IDEAS study was to assess inter-rater reliability of depression screening instruments and generate evidence to support the choice of instrument for later use, participants were first interviewed using four instruments. The instruments were the 9-item Patient Health Questionnaire (PHQ-9), the 15-item Patient Health Questionnaire (PHQ-15), the World Health Organization (Five) Well-being Index (WHO-5) and the suicide-related items of the Composite International Diagnostic Interview, version 2.1 (CIDI) (WHO, 1997). Subsequent assessments of disability,

---

[1] Additional details can be found here: https://gtr.ukri.org/projects?ref=MR%2FM025470%2F1

health service use and capabilities were carried out if participants scored above a pre-defined cut-off point on the screening tools.

The cut-off points were a score of five and above for PHQ-9 and PHQ-15; a score of 50 or less for WHO-5 and answering yes to either of the three items on the CIDI. Erring on over-selection, participants progressed to the next phase of the interview and were subjected to the full-length survey questionnaire if they met the cut-off points with any of the instruments. Participants who show high depressive symptoms or suicidal ideation were referred for further clinical review by trained mental health professionals based in a primary care facility. Data were collected by six enumerators who have knowledge of the local area. Two of the enumerators were randomly paired to interview a given participant independently, where one served as an assessor and the other as an observer. Interviews were also supervised by a psychiatric nurse, and they were provided supervisory support by a psychiatric nurse, two experienced field supervisors and a psychometrician who adapted the CIDI for use in Ethiopia (Rashid et al., 1996).

Participants were recruited from three facilities: one hospital and two health centres. Patients who visited the health centres and the outpatient division of the hospital and satisfy eligibility criteria were invited to participate. Participants had to be 18 years of age and above and residents of the district. Participants were not included if they had cognitive impairment or developmental disability or hearing impairment significant enough to impede clinical assessment, obvious severe and acute physical illness (e.g. injuries, high fever), primary substance use disorder and primary psychotic disorder.

Outpatient visitors were asked their willingness to participate in the study after explaining its objectives and what it will involve. They were also given additional written information, the participant information sheet, and additional time to process the information and decide their participation. The survey instrument is included in Appendix 2B. Interviews were conducted once they confirm they well understood the details, agreed to participate and signed the consent form.

The number of participants who agreed to take part and were screened was 54. From these, 43 participants had scored above the pre-defined thresholds with either of the screening tools and were subjected to further interview, including the capability instrument. Table 3 provides summary statistics of participants by socio-demographic characteristics such as gender, age, place of residence, marital status, level of education.

Table 3. Socio-demographic Characteristics of Pilot Survey Participants

(*n*=43)	count or mean	percentage or s.d.
Gender		
Male	24	55.81
Female	19	44.19
Age	32.98	13.36
18-24	13	30.23
25-34	15	34.88
35-44	5	11.63
45+	10	23.26
Residence		
Urban	13	30.23
Rural	30	69.77
Marital Status		
never-married	12	27.91
married	29	67.44
divorced	2	4.65
Education		
can't read/write	13	30.23
can read-write (no formal education)	5	11.63
primary education	15	34.88
High school education or above	10	23.25
Have children		
Yes	28	65.12
No	15	34.88
Number of Children	3.82	2.06

C. Survey Data Collection

After the pilot, a large scale survey was conducted. It was a facility-based cross-sectional study, and it followed similar procedures to the pilot. Summary description of participants is presented in Table 4. The data were used in the empirical analysis of the impact of depression on overall well-being, which is explored in Chapter 5.

While the secondary data from the health survey was based on a national household survey with thousands of participants across Ethiopia (additional description of participants will be presented in Chapter 3), the primary data collected in this setting were a facility-based survey with fewer observations from a predominantly rural district. It may not be practical to compare the characteristics of participants or other data elements between the two data sources. However, it is worth drawing a contrast between the two focusing on its implication for depression cases. Depression tends to be comorbid with other health problems (Hirschfeld, 2001; Cassano & Fava, 2002; Andrade et al., 2003; Bromet et al., 2011). It is reasonable to expect higher depressive symptoms among people presenting at health facilities than in the general population. In Ethiopia, the prevalence of depression is also shown to vary depending on where study participants were sampled. For instance, the prevalence of depression was reported to be 9.1 per cent in a national survey (Hailemariam et al., 2012). On the other hand, a health facility-based survey has

shown a 42.8% of participants with probable depression at a PHQ-9 cut-off score of 5 (Fekadu et al., 2017). However, the percentage was lower (11.6%) at a cut-off score of 10 and with a gold standard depression diagnosis (7.1 per cent) (ibid). Given the different settings and sampling between the secondary health survey data and the primary data collected, it will be expected to have relatively over-representation of depression cases in the latter data. For instance, the depression cases were estimated to be 9.3 per cent in the secondary health survey data. On the other hand, the percentage of those who screen positive for depression in the facility-based survey was around 58% in the pilot survey and 43% in the main survey. However, it is important to caution this figure is based on a smaller sample of participants based on the PHQ-9 score of 5. The psychiatrist confirmed cases and prevalence might be lower.

Table 4. Socio-demographic Characteristics of Participants

(*n*=408)	frequency or mean	percentage or s.d.
Gender		
Male	203	49.8
Female	205	50.2
Age	35.99	13.6
18-24	90	22.1
25-34	112	27.5
35-44	92	22.5
45-64	93	22.8
64+	21	5.1
Residence		
Urban	118	28.9
Rural	290	71.1
Marital Status		
Never-married	81	19.9
Married	308	75.5
Divorced	9	2.2
Widowed	10	2.5
Education		
can't read/write	116	28.4
can read-write (no formal education)	54	13.2
primary education	141	34.6
High school education or above	97	23.8
Have children		
No	95	23.3
Yes	313	76.7
Number of Children	4.44	2.40

3. Ethical Considerations

Ethics approval for this study was obtained from the Human Research Ethics Committee (HREC) of the Open University. Data access permission for the WHS was obtained from the WHO Multi-Country Studies

Data Archive[2]. The primary data collection was conducted in collaboration with IDEAS (Improving Detection of Depression in Primary Care in sub-Saharan Africa) study. IDEAS is MRC-UK funded project working to improve the detection and treatment of depression in Ethiopia[3] , and ethics approval was obtained from the Institutional Review Board of the College of Health Sciences of Addis Ababa University. The study adhered to the institutional, national and international ethical guidelines in the collection of information. The data collection upheld the dignity of participants, explain the nature of the study and obtain consent before participation. Participants were only allowed to take part after they obtained information about the nature of the study, understood what it entails and provided consent for voluntary participation. The interview strategies were also designed to ensure the privacy and well-being of participants. Interviews were supervised by a psychiatric nurse and two experienced field supervisors. There were also arrangements through IDEAS for participants to get mental health treatments if they need one. Participants who show high depressive symptoms or suicidal ideation were referred for further clinical review by trained health professionals based in the primary care facilities.

---

[2] WHO Multi-Country Studies Data Archive:
https://apps.who.int/healthinfo/systems/surveydata/index.php/catalog/37
[3] See the project website for more details: https://gtr.ukri.org/projects?ref=MR%2FM025470%2F1

Chapter 3. Impact of Depression on Health-Related Quality of Life, Self-Rated Health and Subjective Well-Being

1. Introduction

Depression is one of the leading causes of disability in Ethiopia. In the 2017 estimates of the Global Burden of Disease, as measured by years lived with disability (YLD), depression was ranked the second leading cause of disability only to preceded by lower back pain (IHME, 2018). It was also listed as the third leading cause of disability a decade earlier, and there was an increase in depression attributed YLDs by 34.2% between 2007 and 2017 (ibid). While there is growing evidence on the prevalence and epidemiology of depression in Ethiopia, there is a dearth of evidence on the impact of depression on quality of life. This chapter aims to empirically examine the effect of depression on health-related quality of life and other aspects of well-being in Ethiopia. Specifically, it explores the impact of depression on health-related quality of life, self-assessed health and subjective well-being. Furthermore, given other physical health problems are often comorbid with depression (Stubbs et al., 2017), it examines the impact of comorbid depression and physical illness multimorbidity on quality of life.

By drawing data from a national health survey, I want to make the case that the analysis in this chapter has made some contributions on three fronts. First, given the limited data on the burden of depression on quality of life, the results will contribute to the evidence base on the impact of depression in Ethiopia. Second, by applying a preference-based measure of quality of life, it will contribute to evidence and debates that aimed to move from symptom-based, disease-specific or other generic non-preference measures with limited application in economic evaluations. Third, employing a quasi-experimental type of approach based on matching techniques, the analysis will offer estimates that can highlight the impact of depression on quality of life. The following paragraphs will expand on these.

In Ethiopia, studies on depression are starting to grow in size and scope. Various studies are conducted on depression among multiple groups of population such as the general population of adults (Fekadu et al., 2007; Fekadu et al., 2014; Hailemariam et al., 2012), among older people (Mirkena et al., 2018), tuberculosis patients (Ambaw et al., 2017; Ambaw et al., 2018), during pregnancy and maternal depression (Bisetegn et al., 2016; Bitew et al., 2017), among cancer patients (Alemayehu et al., 2018; Wondimagegnehu et al., 2019), patients with diabetes (Habtewold et al., 2016; Habtewold et al., 2016), people with epilepsy (Chaka et al., 2018), people with podoconiosis (Bartlett et al., 2016), among prisoners (Adraro et al., 2019; Alemayehu et al., 2019; Reta et al., 2020). While the list is not exhaustive, most of the studies in Ethiopia have a predominant focus on prevalence and correlates of depression. Some studies have examined

consequences of depression including on disability (Mogga et al., 2006; Habtamu et al., 2019), mortality (Fekadu et al., 2015) and household economic burden (Hailemichael et al., 2019; Lund et al., 2019). These studies have made significant stride in understanding the epidemiology of depression and to some extent on its burden in Ethiopia. However, as discussed in Chapter 2, in recent years there has been a shift in mental health research and services from an emphasis on symptoms based narrow notion of outcomes to a more holistic approach that takes into account broader well-being dimensions and quality of life (Brazier et al., 2014; IsHak et al., 2011). Notably, for health problems such as depression that exerts an impact on broader aspects of life, investigating its impact on quality life is of paramount importance to highlight the burden as well as for use in economic evaluations to investigate effectiveness or cost-effectiveness of treatments or interventions. There is still a lack of studies in this domain in Ethiopia, and this chapter aims to contribute towards that by providing empirical evidence on the impact of depression on quality of life in Ethiopia.

How do we measure or approximate quality of life? Admittedly, there is no simple answer to this nor one metric that is fit for purpose. But broadly speaking, in health economics, the interest in these outcome metrics is twofold. The first is measurement, and the second is valuation (Gray et al., 2011, pp. 83–84). The measurement aspect refers to outcome assessment in symptoms, health states, quality of life or other aspects. It is concerned with often a score-based description of quality of life or other domains of interest, applying what is known as non-preference-based measures (ibid). An example of this can be the patient health questionnaire to describe and measure depressive symptoms, the WHO quality of life measure to describe quality of life or other similar instruments. On the other hand, the valuation part aims to attach values to the descriptive states obtained from the measurement. The valuation involves soliciting preferences from the general public about various health states, developing weights for different states and estimating an index that provides a summary measure of quality of life often referred to as health state utility values (Roberts et al., 2014). These outcome assessment systems that include measurement and valuation aspects are known as generic preference-based measures (Drummond et al., 2015; Brazier et al., 2017). These measures provide a generic quality of life index that are applied across different health conditions. They form the basis for quality-adjusted life years (QALY), which is widely used in economic evaluations and resource allocation decisions in most advanced economies such as the UK (Gray et al., 2011). One widely used example of such generic preference-based measures is the EuroQol five-dimensional (EQ-5D) instrument (Kind et al., 2005; Szende et al., 2014). It has five dimensions of health-related quality of life, each with five levels that together define 3125 possible health states. A health state for a respondent is assigned based on their response to the short questionnaire in which they indicate the level best describing their health on each dimension. The preference weights are obtained from valuations by members of the general public using a valuation technique known as time trade-off (TTO), whereby

respondents are asked how many years in full health are equivalent to a more extended period in an ill-health state (Brazier et al., 2017). The summary health utility index has a value of 1 for full health has and 0 for states equivalent to being dead, with states worse than dead being negative. While these measures are widely applied in mental health (Sobocki et al., 2007; Saarni et al., 2007; Mann et al., 2009; Brazier et al., 2014; among others), their application in research or decision making in mental health or other health areas in Ethiopia is still lacking. However, there has been a recent attempt to facilitate the applicability of EQ-5D measures for the Ethiopia context and preference weights for Ethiopian population has become recently available (Welie et al., 2019). In this chapter quality of life was assessed applying this generic preference-based measure, and the chapter further investigates how depression impacts quality of life. In so doing, it aims to contribute to the broader literature on preference-based outcome measures as well as the burden of depression evidence in Ethiopia.

The analysis draws from a cross-sectional health survey data and inferring causality from the investigation would prove difficult. Although there are still unknowns about the models of depression, there is ample evidence on a host of social, economic, demographic and health characteristics and correlates of depression to suggest it does not happen in random. As a result, the characteristics of depressed participants may systematically differ from those who are not depressed. In estimating the association between depression and the outcome variables with regression analysis, it adjusts for additional characteristics of participants included in the model. However, it does not fully account for systematic differences in the characteristics between depressed and non-depressed participants, and the two groups may not be comparable (Rosenbaum, 2001; Guo & Fraser, 2015). This chapter estimates the causal effect of depression on quality of life by drawing from the literature on impact evaluation and causal inference. The main challenge of causal impact estimations, of say a program, is having a good counterfactual, i.e., the outcome an individual would have achieved had they not participated in the program. In the context of this analysis, the counterfactual entails what would have been the outcomes in quality of life and subjective well-being had an individual not been experiencing depression. Using the participant characteristics to estimate the probability of experiencing depression, which is known as propensity score, a comparison group of people who are not depressed was constructed. To assess the causal impact of depression, a difference in quality of life and other outcome variables was then estimated between people who are depressed and matched comparators who are not experiencing depression. Working within the limits of the cross-sectional nature of the data, it was possible to estimate the potential causal impact of depression.

Overall, the results suggest a negative impact of depression on quality of life, self-rated health and subjective well-being. Comorbid depression also appears to lead to more significant decrements in quality

of life than experiencing only depression or only physical illnesses. The remainder of the chapter will proceed as follows. In Section 2, details of the data source, description of variables and the methods of data analysis are outlined. Results and discussion are presented in Section 3, and summary and concluding remarks are offered in Section 4.

2. Methods

2.1. Data and Variables

A. Data Source

This chapter relied on a secondary analysis of a national health survey data drawn from the World Health Survey (WHS). WHS is a multi-country, cross-sectional survey initiated by the World Health Organization (WHO) and implemented between 2002-2003 in more than 70 countries including Ethiopia (Ustun et al., 2003). Data in Ethiopia were collected from a representative sample of the general adult population with a multistage stratified sampling survey using administrative region and location as stratification variables (Hailemariam et al., 2012). From 4,990 eligible adults selected from participating households, 4,936 were interviewed (99% response rate) (Hailemariam et al., 2012; WHO, nd). Additional details about the survey and sample are also provided in Chapter 2.

B. Description of Variables and Measurements

Depression Variable

Depression screening items in the survey questionnaire are based on the depression module of the WHO's Composite International Diagnostic Interview (CIDI) (Ustun et al., 2003). CIDI is a comprehensive diagnostic interview for the assessment of mental disorders per the definitions and criteria of International Classification of Diseases (ICD-10) and Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (Kessler & Ustün, 2004). In line with previous studies that used the WHS data (Mommersteeg et al., 2013; Loerbroks et al., 2014; Apfelbacher et al., 2017), the identification of depression relies on a combination of self-reported diagnosis of or treatment for depression and a standardised algorithm based on responses to items that solicits information about the presence or absence of depressive symptoms. Specifically, a major depressive episode (MDE) was defined using self-reported responses to five items on the presence of symptoms related to (i) depressed mood, (ii) loss of interest, (iii) decreased energy, (iv) loss of appetite, (v) cognitive complaints during the last 12 months and two items on duration and persistence of symptoms. A MDE was considered present if at least four symptoms were reported and if individuals answered affirmatively to both items on the duration of symptoms (2 weeks) and their persistence (most of the day, nearly every day). A depression classification was based on an individual (1) being categorised as a MDE case, or (2) gave an affirmative answer to a diagnosis of depression ("Have you ever been diagnosed with depression?"), or (3) gave an affirmative answer to receiving treatment for depression ("Have you ever

been treated for it?''). The definition of depression, therefore, captures a recent experience of a MDE as well as a history of diagnosis or treatment of depression.

Outcome Variables

Three outcome variables are the focus of this research: **health-related quality of life (HRQoL)**, **self-rated health** and **satisfaction with one's health**.

HRQoL is measured using a health index constructed from five health domains in line with the EuroQol five-dimensional (EQ-5D) instrument, which is a multi-attribute health state utility measure (Kind et al., 2005). It measures health states on five physical and mental health domains. These are mobility, self-care, usual activities, pain or discomfort and anxiety or depression. Respondents were asked to indicate the level of problem they experience in each of the five domains from 1 to 5 with increasing degree of severity: no difficulty (1), mild difficulty (2), moderate difficulty (3), severe difficulty (4) extreme difficulty or unable to perform (5).

Health states for respondents are derived based on the level of responses to the five domains. For instance, 11111 would signify no problems on any of the five dimensions, while 11223 would indicate no problem with mobility, no problem with self-care, mild difficulty with performing usual activities, mild pain or discomfort, moderate anxiety or depression. Once a health state description for respondents based on their answers was obtained, the next step was to attach valuation or utility value to that health state, which is a quality of life index that is anchored between 0 (dead) and 1 (perfect health) value scale. The coefficients or preference weights to convert health states into a single quality of life index were obtained from a valuation of health states by Ethiopian population using a time trade-off and discrete choice experiment methods (Welie et al., 2019).

EQ-5D measures were shown to be valid instruments in assessing health status among people with mental illnesses (Lamers et al., 2006; Brazier et al., 2014). Although the instrument has been widely used to measure and value health states in outcome assessment and economic evaluations (Szende et al., 2014), it has not been applied in an Ethiopian context before as there have been no health state valuations conducted and no preference weights available for the country. However, this has become recently available (Welie et al., 2019). To my knowledge, the analysis in this chapter is the first study to estimate health utility values applying these newly available population value sets and assess how depression impacts health-related quality of life in Ethiopia. However, it is important to note a few differences from the official EQ-5D measure. First, the questions in the WHS survey have a recall period of 30 days while the EQ-5D does not have recall period. Second, the EQ-5D is a two-part instrument often complemented with a visual analogue scale (VAS) asking respondents to indicate their health state on a rating scale from worst health imaginable to best imaginable, while the WHS dataset lacks information on scores of the VAS.

Nevertheless, the estimated health utility values will provide an approximation of the preference weighted health utility values and as Lamu et al. (2017) have shown preference weighing has minimal effects if the unweighted values are anchored on the same scale as the preference-weighted value sets.

Self-rated or self-reported health is often used to assess individual's perception of health, and it is the most widely used comprehensive health measurement (Crossley & Kennedy, 2002; Robine et al., 2003; Simon et al., 2005; Jylhä, 2009). The exact wording and response options of self-rated health questions vary from instrument to instrument (Jürges et al., 2008). In the survey question used for this study, participants were asked "in general, how would you rate your health today?" and responses were given on a five-point scale ranging from very good (1) to very bad (5). For the sake of consistency in presenting lower scores with lower levels of health status, the responses were recoded so that 1 reflects very bad health assessment and vice versa. The responses were dichotomised into 0 to represent poor or less than good health (by collapsing "very bad", "bad" and "moderate" response categories) and 1 to indicate reporting good health (by collapsing "good" and "very good" response categories). The dichotomous measures of self-rated health have been shown to be valid and reliable health measures that are comparable to uncollapsed categorical measures of self-rated health (Manor et al., 2000; Shahidi et al., 2019).

The third outcome measure used was *satisfaction with one's health*. This draws from the subjective well-being measurement literature. A single item question which asks about in general how happy or satisfied people are has been widely used as a proxy for subjective well-being (Layard, 2010). Countries have also started introducing national statistics on personal well-being using these measures. For instance, the UK's Office for National Statistics has started compiling national well-being measures based on a battery of four questions, including satisfaction and happiness (Oguz et al., 2013). In the WHS dataset, there are no similar general life satisfaction questions. However, respondents were asked how satisfied they were with their health. Responses to the health satisfaction question range from very dissatisfied (1) to very satisfied (5). The response to this question was considered as a subjective evaluation of health status and an aspect of their overall subjective well-being. In addition, as the question was posed without any particular time reference, it can be considered as an overall assessment and evaluation of how respondents are satisfied with their health in general. I used a binary measure of satisfaction where 1 indicates satisfaction with one's health (grouping "satisfied" and "very satisfied" response categories) and 0 otherwise (representing "very dissatisfied", "dissatisfied" and "neither satisfied nor dissatisfied" categories).

Taken all together, the three measures will shed light on the impact of depression on well-being as measured by different domains of health, self-perceived health status and a subjective evaluation of how happy or satisfied they are with their health.

Additional Explanatory Variables

The empirical analysis on the association between depression and outcome variables also adjusted for the potential impact of various demographic and socioeconomic variables such as age, sex, marital status, education, employment status, residence and a composite asset index (which was constructed based on information on household permanent income indicators such as ownership of durables). Given the significant level of comorbid depression with other chronic health conditions, the analyses also accounted for a range of self-reported health problems and complaints namely angina, arthritis, diabetes, tuberculosis (TB), asthma and back pain. The information on chronic illnesses was summarised into a binary variable indicating absence or presence of one or more chronic illnesses, given the interest in exploring the impact of having one or more chronic comorbid conditions regardless of what the condition is. Description and additional details of these covariates are presented in Appendix 3A.

C. Conceptual Basis for Outcome Variables

Before moving to the methods of data analysis, it will be useful to provide a quick summary of the outcome variables and their underlying concepts. Our outcome variables of interest such as health or quality of life are constructs encompassing a range of phenomena. Admittedly, discussion and debates around the conceptual bases of the measurements is a broad and monumental task to tackle here. In addition, many instruments that are used to measure health outcomes were characterised by lacking or having unclear conceptual basis (McDowell, 2006; Krabbe, 2017). However, I will attempt to provide a brief overview of concepts drawing from existing literature and through the lenses of the measurements of the variables.

The first outcome variable is a health index or health utility value estimated using the EQ-5D instrument. EQ-5D is described as "a standardized health-related quality of life questionnaire" developed with the aim of providing "a simple, generic measure of health for clinical and economic appraisal" (Szende et al., 2014). It is a generic preference-based health outcome measure: it is generic because the measure does not focus on the impact of a particular disease, nor was it specifically designed to describe or measure health states or aspects of health that are important for patients with a particular disease or condition; and it is called preference-based measure since it involves constructing a summary index weighted by preferences or valuations that individuals, who are typically drawn from representative sample of the general population, place on different health states (Gray et al., 2011; Drummond et al., 2015). Therefore, the EQ-5D measure aims to tap health-related quality of life (Kind et al., 2005; Szende et al., 2014). However, HRQoL is rather an abstract and subjective concept with its own measurement difficulty (Gusi et al., 2010) and that has been defined and applied in different ways (Karimi & Brazier, 2016).

HRQoL is generally considered as an expanded conception of health status that encompasses physical functioning, emotional and psychological well-being and social interactions (Krabbe, 2017). However, Karimi and Brazier (2016) reported as identifying not less than four varying definitions of HRQoL in the literature. The first one conceptualises HRQoL as perceived or subjective feelings about how an individual is functioning in broad aspects of health that include physical, mental and social domains. The second takes a broader notion of quality of life that includes both health and non-health domains and HRQoL considers those factors that are part of an individual's health and impact upon quality of life. The third definition of HRQoL is related to aspects of quality of life affected by health or illness. And finally, HRQoL is associated with not a description of health states but also the valuation, that serves as a basis for estimating QALYs. Given the description of health states across different domains is the first step in the valuation, I would argue there is a significant overlap between the first and last applications of HRQoL in the literature. This is also reflected by the EQ-5D measure. It acknowledges the multidimensionality of HRQoL but also tried to balance domains covered with feasibility and brevity of the instrument (Kind et al., 2005; McDowell, 2006). It solicits information on self-reported description of current health in five domains (i.e., mobility, selfcare, usual activities, pain/discomfort and anxiety/depression) and this is used to estimate a summary index or health utility value to capture overall quality of life (Kind et al., 2005; Gusi et al., 2010; Szende et al., 2014). Therefore, the conceptual basis for EQ-5D is HRQoL as characterised by a broader notion health status or holistic view of health (Kind et al., 2005; Gusi et al., 2010; Szende et al., 2014; Krabbe, 2017).

The other two outcome variables are self-rated health status and satisfaction with health. As described in the variables section above (Subsection B), the variables measure self-perceived ratings of one's health status and state of satisfaction with one's health. These measures are part of what is known as "single-item health indicators" or "single-item summary ratings" that aim to provide subjective summary indicators for various aspects of health such as health in general, or satisfaction or feelings about specific aspects of health (McDowell, 2006).

Self-rated health, also known as self-perceived health, provides a global or general approach to health (Robine et al., 2003). The conceptual basis for such single-item summary ratings of health is the need to elicit individual's assessment of their health and an appreciation for the significant advantage of measuring overall health through a single question (Robine et al., 2003). It stresses the subjective evaluative nature of health status, involves a cognitive process and requires that the respondent integrate many aspects of his or her current health condition and experience (McDowell, 2006; Jylhä, 2009). Self-rated health was shown to influence individual well-being (Oguz et al., 2013) and consistently explain variations in objective health indicators such as mortality (McDowell, 2006; Jylhä, 2009). Similarly, the idea behind self-rated satisfaction with health is the subjective evaluation of aspects of subjective well-being.

Subjective well-being is often assessed with a single item question asking individuals to evaluate how satisfied they are with life (Layard, 2010). Such questions are similarly used to elicit reports of satisfaction with some domains of life such as health (Kahneman & Krueger, 2006; Sirgy et al., 2006; Stone & Mackie, 2013). Table 5 provides a summary of the variables, underlying concepts and instruments used.

Table 5. Summary of Outcome Variables, Underlying Concepts and Measurement Instruments

Outcome variable	Underlying concept(s)	Instrument
Health utility values	Health-related quality of life	EQ-5D
Self-rated health	General health status	Single-item summary ratings
Self-rated satisfaction with health	Subjective well-being	Single-item summary ratings

2.2. Data Analysis

A. Descriptive Statistics and Preliminary Analysis

Descriptive summary statistics were first estimated for demographic, socioeconomic variables, chronic illness profiles and health outcome variables. The participant characteristics were summarised by depression status, and differences between subgroups were assessed using Pearson's chi-squared and t-test statistics. As a preliminary exploration on the association between depression and outcome variables, the summary statistics of the health domains, health utilities, self-rated health and health satisfaction was calculated for the total sample and further compared how they vary by depression status. The correlation of the outcome variables with each other and with depression was also explored.

Additional analysis was performed to assess the impact of comorbidity by including a variable that captures the interaction of depression and other chronic physical illnesses. Presence or absence of depression and physical illnesses were combined to create a 4-category variable indicating (1) neither depression nor comorbid physical illnesses reported, (2) no depression but one or more comorbid physical illnesses, (3) depression but no comorbid physical illnesses, and (4) both depression and one or more comorbid physical illnesses. How the outcome variables vary among these groups was explored.

The descriptive analyses were followed by a more in-depth exploration using regression analysis.

B. Regression Analysis

This stage involved univariate and multivariate analyses regressing outcome variables on depression and additional explanatory variables to examine the association between depression and outcome variables. A series of models were estimated by: (1) including only depression as the explanatory variable in univariate analysis; (2) adding an indicator for chronic physical illnesses; and (3) further adding socio-demographic and economic variables in addition to depression and chronic physical illnesses. The third

one is the preferred model as it allows analysing the association between depression and the outcome variable adjusting for a range of covariates.

From the three outcome variables of interest, two (self-rated health and health satisfaction) are binary while the health-related quality of life scores or health utilities is considered continuous. Given the difference in the type of outcome variable, a linear regression equation was fitted for the health-related quality of life variable while logistic regression was performed for the self-rated health and health satisfaction variables. Formally, the estimating equations for the linear and binary response models, respectively, take the form:

$$y_i = \alpha + \beta d_i + \gamma x_i + u_i \tag{1}$$

$$P(y_i = 1 | d_i, x_i) = \Phi(\alpha + \beta d_i + \gamma x_i + u_i) \tag{2}$$

where y_i represents outcome variable y of individual i, d_i is an indicator of depression status, x_i represents a vector of covariates, u_i represents error term and Φ is the cumulative distribution function of the logistic distribution.

Coefficient estimates with standard error are reported for the linear regression model. The parameters are interpreted as the change in the average health utility values associated with marginal changes in the explanatory variables, holding all other variables constant. For the depression variable, it is interpreted as the effect of depression on the average health utility scores, holding the correlation depression may have with the remaining covariates constant. For logistic regression estimates, odds ratio with standard errors is reported. The odds ratio is interpreted as the factor by which the odds are expected to change for a unit change in a given explanatory variable, holding all other variables constant. If the odds ratio is greater than one, the odds are larger; if it is less than one, the odds are smaller; and if it is equal to 1, the given variable does not affect the odds (Long & Freese, 2014, p. 229). For depression variables, the odds ratio provided information on by what factor the odds of reporting good self-rated health or health satisfaction are expected to change due to depression, holding other variables constant. In addition, average marginal effects are reported, which is the marginal effect of each explanatory variable on the predicted probabilities of the outcome variable holding all other variables constant. For depression variable, the average marginal effects are interpreted as the marginal effect of depression on the probability of being in good health (or being satisfied with one's health).

C. Propensity Score Matching

Propensity score matching (PSM) technique was applied to compare quality of life and subjective well-being outcomes for individuals experiencing depression with those who are not and to obtain the closest comparison group of individuals amongst them to serve as controls. With matching on their propensity to

experience depression, we expect to have a comparable group of people experiencing depression and matched controls from a sample of non-depressed individuals.

The PSM procedure was implemented in three steps (see, for instance, Garrido et al., 2014; Gertler et al., 2016). First, the probability that an individual will experience depression based on a set of observed characteristics was estimated, i.e. the propensity score. This involved estimating the following logit model:

$$P(d_i = 1| x_i) = \Phi(\alpha + \beta x_i + u_i) \tag{3}$$

where d_i is a binary variable indicating whether individual i is depressed or not, the vector x_i is a vector of covariates including the demographic, socioeconomic and health characteristics (as described in section 2.1 above) and u_i is an error term.

Second, after the propensity score has been computed for all, participants who are experiencing depression were matched with those who are not on the propensity score. Multiple matching algorithms were employed in selecting the matched controls. The adequacy of the models used to estimate the propensity score was evaluated by examining the balance of covariates that results on average across the matched groups. A check was performed on matching quality and balance of covariates before estimating the causal impact of depression on outcome variables. For each covariate used in the model to estimate the propensity scores, the matching quality was assessed by evaluating the magnitude of the standardised difference, which is the differences in means between treated and control groups divided by the square root of the average of the sample variances of the two groups. Although there is no single suggested value, a standardised difference of no more than 0.10 is considered to indicate a negligible difference in the mean or prevalence of a covariate between treatment and control groups (Austin, 2011). Others also suggest a standardised difference of up to 0.25 as acceptable (Garrido et al., 2014).

Finally, we estimated the difference in average outcomes between the depressed and matched control groups. Average treatment effect on the treated (ATT), which captures the average treatment effect for those who are typically depressed, was estimated. To formally define this, let for each participant i ($i = 1, \dots, n$) in the sample of depressed and control groups, D is an indicator variable denoting depression status and taking the value $D = 1$ for depressed participants and $D = 0$ for the control group, $Y_i(1)$ will be the outcome for the depression group while $Y_i(0)$ will be the outcome for the control group. The treatment effect on the treated is defined as (Morgan & Winship, 2015):

$$ATT = E\left(Y_i(1) - Y_i(0)|D = 1\right) = E\left(Y_i(1)|D = 1\right) - E\left(Y_i(0)|D = 1\right) \tag{4}$$

where $E\left(Y_i(1)\right)$ and $E\left(Y_i(0)\right)$ are the expected values of Y_i for all the participants in the depression and control group, respectively.

The average treatment effects were estimated on the assumptions of unconfoundedness and common support (Rosenbaum & Rubin, 1983; Imbens & Wooldridge, 2009). The first assumption states that treatment assignment is independent of the potential outcomes conditional on the covariates. It implies that beyond the observed covariates there are no (unobserved) characteristics associated both with the potential outcomes and the treatment. To estimate the causal impact of depression on outcome variables based on matching, it was assumed that experiencing depression is independent of the potential outcomes, conditional on the covariates. Although the assumption cannot be tested, a robustness analysis to the sensitivity of the results for potential deviations from the assumption was performed.

The common support assumption states that participants have a nonzero probability to be in the depression group conditional on the observed covariates. It implies that a substantial region of common support can be found in the propensity score distribution between depressed and non-depressed participants and it ensures that participants in the depression group can find matching participants from the control group that are comparable in terms of the observed characteristics.

Robustness of the results of the health burden of depression was assessed by employing multiple matching techniques, namely nearest-neighbour matching, radius matching and kernel matching. Robustness analysis of the sensitivity of the results for potential deviations from the PSM assumptions was performed. To examine the robustness of the estimates with respect to using observations in the tails of the common support, a sensitivity analysis with alternative specifications on common support was performed for the kernel and radius matching approaches. Sensitivity analysis was performed by dropping 1%, 5%, 10% and 15% of the treated individuals for which the propensity score density of the untreated observations is the lowest. If the average treatment effects do not change much, this is an indication that the results are robust with respect to the way the common support is imposed.

To assess the robustness of the estimated average treatment effects to possible deviations from the unconfoundedness assumption, a simulation-based sensitivity analysis following Nannicini (2007) was performed. The analysis supposes that the unconfoundedness assumption is not satisfied given the observed covariates but would be satisfied if we could observe an additional binary variable, U. The potential confounding variable U can be simulated in the data, with different distribution assumptions to capture different hypotheses on the nature of potential confounding factors, and used as an additional covariate in the matching process (ibid). To what extent the baseline results are robust to failure of the assumption can be shown by comparing the estimates obtained with and without matching on the simulated confounder. Assuming a binary outcome variable (such as self-rated health or health satisfaction variables in this study), the distribution of the binary confounding factor U can be characterised by choice of four parameters (Nannicini, 2007):

$$p_{ij} = Pr(U = 1 | D = i, Y = j) = Pr(U = 1 | D = i, Y = j, X)$$

with $i, j \; \epsilon = \{1, 0\}$ and X is observed covariates, it defines the probability that $U=1$ based on depression status and the value of the outcome variables. For continuous outcome variables such as the health utility values, the outcome variable configuration can be modified to $I(Y > y*) = j$ where I is the indicator function and $y*$ is a chosen value on the distribution of Y such as mean or median (ibid). The unobserved confounder U is assumed to be independent of the observed covariates (Nannicini, 2007; Ichino et al., 2008). A value of U is attributed to each participant, according to the definition of the four parameters on depression status and the outcome value. The simulated U is then included as a covariate and is used to estimate the propensity score and to compute an ATT.

To be more concrete, the interest with this sensitivity analysis was to test whether there is an unobserved confounder that is associated with the chances of being depressed (i.e., selection into treatment) and with outcome variables and to what extent it might influence both the selection and outcomes if it were observed and included in the propensity scores estimations. Under a set of hypothetical scenarios for the distribution of the unobserved covariate that ranges from 0 per cent to 80% probability that U=1, a sensitivity analysis was performed to test the robustness of the treatment effect estimates and the magnitude of the selection and outcome effects of the unobserved confounder to overturn the estimates obtained assuming its absence.

Statistical analyses were carried out using Stata (StataCorp, 2019). Propensity score analyses were implemented with the official Stata and user-written treatment effects and propensity score analysis packages (Nannicini, 2007; Leuven & Sianesi, 2003; StataCorp, 2019).

3. Results

3.1. Descriptive Statistics and Preliminary Analysis

This section starts with a summary of the main variables of interest. In Table 6, a summary of depression and the three outcome variables is presented. These are further expanded and cross-tabulated in subsequent summary tables. The results indicate about 9.3 per cent of respondents were categorised as depressed. Overall, health utility values were high with a mean score of 0.83 (SD=0.25). The health utility values ranged from -0.72 to 1. These values were identical to the minimum and maximum values as reported by Welie et al. (2019) in the EQ-5D health state valuation study for Ethiopia. While most participants report experiencing good health, close to a quarter have reported poor self-rated health. On the other hand, majority of the respondents have expressed dissatisfaction with their health (60.1%).

Table 6. Summary of Depression and Outcome Variables

(n=4936)		Frequency or mean	Percentage or SD
Depression			
	No	4471	90.7
	Yes	465	9.3
Health utility values		0.83	0.25
Self-rated health			
	Poor	1239	24
	Good	3685	76
Health satisfaction			
	Dissatisfied	3034	60.1
	Satisfied	1848	39.9

Table 7 provides summary statistics of demographic, socioeconomic characteristics and health profiles of participants. In addition, it reports how these characteristics differ by depression status along with statistical significance test results of the differences. The total number of observations used in the analysis were 4936. There were approximately similar proportions of male and female participants, 49 and 51 per cent respectively. The mean age was 35.5, and the majority are married or cohabiting (64.2%), with no formal schooling (53.7%), either self-employed or not working for pay (95%), living in rural areas (84.3%) and lower socioeconomic status (0.07 mean score on the asset index). Some 39% reported one or more chronic illnesses of the six common chronic illnesses accounted for (20.9% reported only one, 11.1% two, 4.8% three and 2.2% reported four or more). On average participants reported 0.67 number of chronic illness. However, among those who reported one or more chronic illnesses, the average number of chronic illness was 1.7.

All of these socioeconomic and health characteristics, with the exception of gender, employment status and place of residence, were significantly different among participants with depression and those who are not. Participants experiencing depression tend to be older, separated, divorced or widowed, less educated, lower socioeconomic status and report more chronic illnesses. Among participants who did not report chronic physical illnesses, the prevalence of depression was approximately 3 per cent while the prevalence was around 19% among those who reported one or more chronic illnesses. The higher prevalence of depression among people experiencing other chronic illnesses was similarly reported in other studies. For instance, Moussavi et al. (2007), using WHS data but pooled across 60 countries, reported a 23% prevalence of depression among participants who experience health problems with two or more chronic illnesses. Additional statistics on the distribution of chronic illnesses are presented in Table 8. The comparison of depression among the groups of people experiencing different chronic illnesses shows that depression is more prevalent among those with physical illnesses than those not experiencing a given physical health

condition. These associations appear to hold among all health conditions accounted for in this study. The associations were all statistically significant with the exception of diabetes, which may be as a result of a very small number of diabetes cases (n=17) to obtain reliable estimates.

Table 7. Demographic and Clinical Characteristics of Participants Stratified by Depression Status

Characteristics		Total sample (n=4936)		Depression Yes (n=465)		No (n=4471)		
		n [a]	% [b]	n	% [b,c]	n	% [b,c]	p [d]
Gender	Male	2390	49	218	9	2172	91	0.460
	Female	2546	51	247	9.6	2299	90.4	
Age group	18-24	1162	27.9	65	5.8	1097	94.2	<0.001
	25-34	1340	27.3	118	8.7	1222	91.3	
	35-44	1042	18.1	100	11.2	942	88.8	
	45-64	1034	20.6	122	11.9	912	88.1	
	65+	356	6.2	59	14.4	297	85.6	
Marital Status	Never married	860	24.3	56	7.1	804	92.9	<0.001
	Married or cohabiting	3359	64.2	290	9.2	3069	90.8	
	Separated or divorced	326	5.3	44	11.6	282	88.4	
	Widowed	391	6.2	75	17.8	316	82.2	
Education	No formal schooling	2824	53.7	321	11.3	2503	88.7	<0.001
	Some primary school	408	8.2	33	8.1	375	91.9	
	completed primary school	632	13.4	45	7.6	587	92.4	
	completed high school or above	1070	24.7	66	6.5	1004	93.5	
Employment status	Employee (government or private sector)	256	5	18	8.5	238	91.5	0.703
	Self-employed	2600	49.1	262	9.7	2338	90.3	
	Not working for pay	2030	45.9	179	9	1851	91	
Residence	Urban	752	15.7	67	8.7	685	91.3	0.715
	Rural	4184	84.3	398	9.5	3786	90.5	
Chronic illnesses	No	2992	61	92	3.1	2900	96.9	<0.001
	Yes (one or more)	1944	39	373	19.1	1571	80.9	
		Mean	SD	Mean	SD	mean	SD	p [e]
Age (years)		35.5	15	39.9	16.5	35.1	14.8	<0.001
Multidimensional Asset Index		0.07	0.16	0.04	0.12	0.08	0.17	0.003
Number of chronic illnesses		0.67	1.02	1.72	1.35	0.56	0.91	<0.001
Number of chronic illnesses if one or more is reported		1.71	0.93	2.15	1.14	1.61	0.84	<0.001

[a] The total numbers for all variables may not add up to the total sample due to missing values.

[b] The percentages are based on survey design adjusted proportions and will not correspond to the percentages that can be calculated from the number of observations reported.

[c] Row percentages reported.

[d] p-values for Pearson's X^2 test statistic.

[e] p-values for two-sample t-test for mean differences.

Table 8. Summary of Chronic Illnesses and Comorbidities

		Total sample (n=4936)		Depression		
				Yes (n=465)	No(n=4471)	
		n [a]	% [b]	% [c]	%	p [d]
Asthma	No	4546	92.3	7.8	92.2	<0.001
	Yes	379	7.7	27.8	72.2	
Diabetes	No	4608	99.6	9.1	90.9	0.642
	Yes	17	0.4	6.8	93.2	
Angina	No	4222	85.8	6.6	93.4	<0.001
	Yes	714	14.2	26.2	73.8	
Backpain	No	3878	78.9	5.5	94.5	<0.001
	Yes	1058	21.1	23.9	76.1	
Arthritis	No	4230	85.4	7.7	92.3	<0.001
	Yes	706	14.6	18.9	81.1	
TB	No	4469	91	7.7	92.3	<0.001
	Yes	449	9	26.3	73.7	
Number of chronic illnesses (multimorbidity)	0	2992	61	3.1	96.9	<0.001
	1	1035	20.9	12.9	87.1	
	2	566	11.1	20.7	79.3	
	3	240	4.8	28.1	71.9	
	4+	103	2.2	49.8	50.2	

[a] The total numbers for all variables may not add up to the total samples due to missing values.

[b] The percentages here and the next columns are based on survey design adjusted proportions and will not correspond to the percentages that can be calculated from the number of observations reported.

[c] Row percentages reported.

[d] p-values for Pearson's X^2 test statistic.

Overall, the majority of participants reported no problem or difficulty in all the five health domains (Table 9). On average, people with depression reported more problems in all health domains than people who were not experiencing depression. The average utility values were lower among participants experiencing depression compared to those who did not (0.57 and 0.86, respectively).

Respondents in the depression group also reported lower health status in the other health outcome indicators. Overall, 76% of participants reported good self-rated health. However, the picture is mixed when comparing people with and without depressive symptoms. While 79% of those without depression reported good self-rated health, only 46% of those with depression reported the same. Similarly, only 29% of those experiencing depression expressed satisfaction with their health status, while the figure was more than double of that proportion (42%) for those not experiencing depression.

Table 9. Summary Statistics of Outcome Measures by Depression

Outcome variables [a]		Total sample (n=4936)	Depression Yes (n=465)	No (n=4471)		Total sample (n=4936)	Depression Yes (n=465)	No (n=4471)	
Health Domains		% [b]	% [c]	%	p [d]	mean (SD)	mean (SD)	mean (SD)	p [e]
Mobility	No difficulty (1)	67.8	5	95	<0.001	1.51 (0.87)	2.22 (1.19)	1.44 (0.80)	<0.001
	Mild (2)	19.1	13	87					
	Moderate (3)	7.8	19.6	80.4					
	Severe (4)	4.5	38.4	61.6					
	Extreme (5)	0.8	26.8	73.2					
Self-care	No difficulty (1)	74	6.6	93.4	<0.001	1.41 (0.79	1.93 (1.15)	1.35 (0.72)	<0.001
	Mild (2)	15.7	11.8	88.2					
	Moderate (3)	6.7	19.1	80.9					
	Severe (4)	3	38.5	61.5					
	Extreme (5)	0.6	31.7	68.3					
Usual activities	No difficulty (1)	60.3	4.7	95.3	<0.001	1.67 (0.97	2.45 (1.18)	1.59 (0.91)	<0.001
	Mild (2)	19.6	8.4	91.6					
	Moderate (3)	13.2	20.9	79.1					
	Severe (4)	6	31.3	68.7					
	Extreme (5)	0.9	23.5	76.5					
Pain or discomfort	No difficulty (1)	53.2	4.5	95.5	<0.001	1.85 (1.10	2.74 (1.34)	1.76 (1.03)	<0.001
	Mild (2)	22.5	7.3	92.7					
	Moderate (3)	12.5	16.2	83.8					
	Severe (4)	9.4	25.6	74.4					
	Extreme (5)	2.5	36	64					
Anxiety or depression	No difficulty (1)	54.7	3	97	<0.001	1.84 (1.14	2.85 (1.27)	1.74 (1.08)	<0.001
	Mild (2)	21.7	10.8	89.2					
	Moderate (3)	11.4	16.9	83.1					
	Severe (4)	8.3	30.3	69.7					
	Extreme (5)	3.9	23.8	76.2					
Health Utility Values	(full health=1)					0.83 (0.25)	0.57 (0.38)	0.86 (0.22)	<0.001
Self-rated Health	Poor (0)	24	21.1	78.9	<0.001	0.76 (0.43)	0.46 (0.50)	0.79 (0.41)	<0.001
	Good (1)	76	5.6	94.4					
Health Satisfaction	Dissatisfied (0)	60.1	11.7	88.3	<0.001	0.40 (0.49)	0.24 (0.43)	0.42 (0.49)	<0.001

Satisfied (1)	39.9	5.6	94.4	

[a] The five health domain items are measured on a scale of 1 to 5 where 1 indicates experiencing no problem and 5 indicates having extreme difficulty or unable to do in the given domain. Health utility values is a preference weighted HRQoL measure. Self-rated health is a self-reported rating of own health: 0 indicates poor health, 1 indicates good health. Health Satisfaction is self-reported satisfaction with one's own health: 0 indicates dissatisfaction, 1 indicates satisfaction.

[b] The percentages here and the next columns are based on survey design adjusted proportions.

[c] Row percentages reported.

[d] p-values for Pearson's X^2 test statistic.

[e] p-values for a t-test for mean differences.

Table 10 presents Spearman's rank correlation coefficients for all the health domains, health utility values, self-rated health, health satisfaction and depression variables. Recall that increase in the level of the health domain variables indicate increased difficulty and decrement in health in a given domain. On the other hand, for health utilities, self-rated health and health satisfaction, higher values indicate better outcomes. The results show that indicators of health-related quality of life and the other health outcome variables are positively correlated with each other and negatively correlated with depression. All correlations were statistically significant. The correlation results among outcome variables suggest there are particular groups of people more likely to experience low levels of health outcomes in all dimensions. The correlation with depression also suggests one of these vulnerable groups who experience low levels of outcomes can be people with depression.

Table 10. Correlation Matrix of Outcome Variables and Depression

(n=4823)		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mobility	(1)	1							
Self-care	(2)	0.5328*	1						
Usual activities	(3)	0.6111*	0.4376*	1					
Pain or discomfort	(4)	0.5325*	0.4091*	0.5418*	1				
Anxiety or depression	(5)	0.4092*	0.3782*	0.4208*	0.4528*	1			
Health utilities	(6)	-0.6688*	-0.5536*	-0.7008*	-0.7719*	-0.759*	1		
Self-rated health	(7)	-0.4517*	-0.3073*	-0.6087*	-0.4608*	-0.2924*	0.5012*	1	
Health satisfaction	(8)	-0.2616*	-0.2462*	-0.2956*	-0.2844*	-0.1592*	0.2916*	0.2644*	1
Depression	(9)	0.2422*	0.1828*	0.2383*	0.2407*	0.2781*	-0.2872*	-0.2297*	-0.1069*

* significant at 1% significance level.

The final set of summary statistics in Table 11 reported the average health outcomes across four categories to explore the differences in outcome associated with comorbid depression. Compared to other groups, those who neither reported chronic illnesses nor experienced depression had the highest outcomes in all HQRoL scores, self-rated health and health satisfaction outcome measures. On the contrary, those with comorbid depression (depression and one or more chronic illness) reported lowest scores in the same health outcome measures. On average, those who experienced only depression, but no chronic illnesses had lower health outcomes (lower average health utility values and lower self-rated health) than those who only experienced one or more chronic illnesses but not depression.

All the differences in health outcomes were statistically significant, highlighting a significant association of depression and lower health status, lower perceived health and lower levels of satisfaction with one's health. Next, these associations are further explored with univariate and multivariate regression analyses.

Table 11. Summary Statistics of Outcome Measures by Depression Status and Comorbid Chronic Illnesses

Outcome variables [a]	No depression		Depression		
	and no comorbid chronic illnesses (n=2900)	but one or more comorbid chronic illnesses (n=1571)	but no comorbid chronic illnesses (n=92)	and one or more comorbid chronic illnesses (n=373)	
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	p [b]
Health Domains					
Mobility	1.31 (0.68)	1.67 (0.95)	1.86 (1.04)	2.31 (1.21)	<0.001
Self-care	1.28 (0.63)	1.49 (0.86)	1.48 (0.88)	2.05 (1.19)	<0.001
Usual activities	1.43 (0.77)	1.91 (1.07)	1.95 (1.14)	2.58 (1.16)	<0.001
Pain or discomfort	1.49 (0.82)	2.26 (1.20)	1.97 (1.13)	2.93 (1.32)	<0.001
Anxiety or depression	1.61 (1.02)	1.99 (1.14)	2.35 (1.13)	2.98 (1.27)	<0.001
Health Utility Values	0.90 (0.17)	0.78 (0.28)	0.76 (0.31)	0.52 (0.38)	<0.001
Self-rated Health	0.88 (0.33)	0.63 (0.48)	0.59 (0.49)	0.43 (0.50)	<0.001
Health Satisfaction	0.50 (0.50)	0.26 (0.44)	0.40 (0.49)	0.20 (0.40)	<0.001

[a] The five health domain items are measured on a scale of 1 to 5 where 1 indicates experiencing no problem and 5 indicates having extreme difficulty or unable to do in the given domain. Health utility values is a preference weighted HRQoL measure. Self-rated health is a self-reported rating of own health where 0 indicates poor health and 1 indicates good health. Health Satisfaction is self-reported satisfaction with one's own health measured on a scale of 1 (satisfied) and 0 (dissatisfied).

[b] p-values for a t-test for mean differences.

3.2. Estimation Results

A. On the association between depression and health outcomes

Health-related quality of life decreased with depression, and the decrements were statistically significant and robust to the inclusion of additional covariates (Table 12). After adjusting for chronic health conditions, socioeconomic and demographic variables, depression was associated with a reduction in health utility values of 0.228. Having one or more chronic illnesses was associated with a 0.108 decrease in health utility values. These estimates can be viewed in terms of quality-adjusted life years (QALY) losses. One year in full health, i.e., the health utility value of 1 is considered as 1 QALY. Depression was associated with an average loss of 0.228 QALYs. Hence, people experiencing depression would only achieve 0.772 QALYs as compared with living 1 year in full health. To highlight some of the results for the control variables, age, marital status, education and socioeconomic status were found to be significantly associated with health-related quality of life. Health utilities decreased with an increase in age and with separation, divorce or becoming a widow. On the other hand, quality of life was positively associated with level of education and socioeconomic status.

Depression was also shown to be negatively associated with self-assessed health status and satisfaction with one's health. Table 13 reports the odds ratios for having good self-rated health. The odds ratio for depression variable for good self-rated and satisfaction with health, in univariate and multivariate analyses, were less than one indicating depression is associated with lower odds of reporting good health and expressing satisfaction with health. The results are statistically significant and robust to the inclusion of additional control variables. Depression is associated with a decrease in the odds of having good self-rated health by a factor of 0.37 or by approximately 63%. In other words, holding all other variables constant, the odds of reporting good health are lower by a factor of 0.37 for a person who is depressed than for a person who is not depressed.

Similarly, depression is associated with a decrease in the odds of being satisfied with one's health by 0.70.

As it may sometimes be easier to read probabilities than odds ratio, average marginal effects are also reported (Table 14). The average marginal effects show the change in the probabilities of having good self-rated health or satisfaction with health associated with a change in depression status, keeping other variables constant at the mean. The average marginal effect of depression on good health was -0.18, and the marginal effect on health satisfaction was -0.08. This is interpreted as, on

average, depression is associated with a decrease in the probability of good self-rated health and being satisfied with one's health by 0.18 and 0.08, respectively.

Having one or more chronic illnesses was found to be associated with lower self-rated health and health satisfaction. Other factors that were associated with lower self-rated health and health satisfaction were being older and being separated or divorced. Level of education and place of residence (rural areas) were positively associated with self-rated health. On the other hand, employment status (being self-employed or not working for pay) and rural residence were associated with lower health satisfaction.

Table 12. Association of Depression and Health-Related Quality of Life

	(1) Coef.	(2) Coef.	(3) Coef.
Depression (ref: no)	-0.292***	-0.233***	-0.228***
	(0.0230)	(0.0232)	(0.0233)
Chronic Illness (ref: no)		-0.132***	-0.108***
		(0.0112)	(0.0102)
Sex (reference group: male)			
Female			0.0108
			(0.00904)
Age group (ref: 18-24 years)			
25-34			-0.0251**
			(0.0105)
35-44			-0.0320**
			(0.0124)
45-65			-0.0469***
			(0.0144)
65+			-0.130***
			(0.0257)
Marital status (ref: never married)			
Currently Married or Cohabiting			-0.0151
			(0.0131)
Separated or Divorced			-0.0579**
			(0.0233)
Widowed			-0.0743***
			(0.0239)
Education (ref: no formal schooling)			
Some primary school			-0.0114
			(0.0144)
Primary school complete			0.0321***
			(0.0105)
High school complete or above			0.0263**
			(0.0118)
Employment status (ref: government or private sector employee)			
Self-employed			0.0112
			(0.0180)
Not working for pay			-0.0271
			(0.0167)
Place of residence (ref: urban)			
Rural			0.0255
			(0.0245)
Asset Index			0.0691**
			(0.0323)
Observations	4871	4871	4765
R-squared	0.11	0.17	0.21

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

Table 13. Association of Depression with Self-rated Health and Health Satisfaction (odds ratio)

	Self-rated health			Health satisfaction		
	(1)	(2)	(3)	(1)	(2)	(3)
Depression (ref: no)	0.223***	0.368***	0.370***	0.445***	0.698**	0.700**
	(0.0260)	(0.0483)	(0.0474)	(0.0625)	(0.0996)	(0.107)
Chronic Illness (ref: no)		0.254***	0.302***		0.356***	0.419***
		(0.0219)	(0.0285)		(0.0365)	(0.0436)
Sex (ref: male)						
Female			0.952			0.899
			(0.116)			(0.0726)
Age group (ref: 18-24 years)						
25-34			0.751*			0.814*
			(0.122)			(0.0861)
35-44			0.656**			0.728**
			(0.118)			(0.0892)
45-65			0.584***			0.591***
			(0.105)			(0.0725)
65+			0.345***			0.480***
			(0.0795)			(0.0939)
Marital status (ref: never married)						
Currently Married or Cohabiting			0.859			0.884
			(0.147)			(0.106)
Separated or Divorced			0.557**			0.638**
			(0.137)			(0.131)
Widowed			0.723			0.840
			(0.164)			(0.182)
Education (ref: no formal schooling)						
Some primary school			1.047			0.964
			(0.163)			(0.131)
Primary school complete			1.341*			1.074
			(0.236)			(0.145)
High school complete or above			1.353*			0.925
			(0.235)			(0.108)
Employment status (ref: government or private sector employee)						
Self-employed			0.932			0.689**
			(0.179)			(0.114)
Not working for pay			0.964			0.720*
			(0.211)			(0.126)
Place of residence (ref: urban)						
Rural			1.589***			0.615**
			(0.251)			(0.116)
Asset Index			1.533			1.815
			(0.686)			(0.780)

Observations	4924	4924	4813	4882	4882	4774

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

Table 14. Association of Depression with Self-rated Health and Health Satisfaction (average marginal effects)

	Self-rated health			Health satisfaction		
	(1)	(2)	(3)	(1)	(2)	(3)
Depression (ref: no)	-0.333***	-0.191***	-0.182***	-0.175***	-0.0787**	-0.0756**
	(0.0276)	(0.0276)	(0.0259)	(0.0270)	(0.0303)	(0.0315)
Chronic Illness (ref: no)		-0.245***	-0.205***		-0.235***	-0.192***
		(0.0164)	(0.0176)		(0.0220)	(0.0224)
Sex (ref: male)						
Female			-0.00769			-0.0231
			(0.0189)			(0.0175)
Age group (ref: 18-24 years)						
25-34			-0.0412*			-0.0466*
			(0.0230)			(0.0239)
35-44			-0.0627**			-0.0714**
			(0.0261)			(0.0274)
45-65			-0.0822***			-0.116***
			(0.0273)			(0.0268)
65+			-0.180***			-0.158***
			(0.0407)			(0.0399)
Marital status (ref: never married)						
Currently Married or Cohabiting			-0.0230			-0.0270
			(0.0254)			(0.0268)
Separated or Divorced			-0.0960**			-0.0961**
			(0.0417)			(0.0433)
Widowed			-0.0506			-0.0383
			(0.0357)			(0.0475)
Education (ref: no formal schooling)						
Some primary school			0.00745			-0.00795
			(0.0251)			(0.0294)
Primary school complete			0.0450*			0.0155
			(0.0263)			(0.0295)
High school complete or above			0.0463*			-0.0167
			(0.0260)			(0.0250)
Employment status (ref: government or private sector employee)						
Self-employed			-0.0109			-0.0826**
			(0.0292)			(0.0372)
Not working for pay			-0.00561			-0.0732*
			(0.0332)			(0.0393)

Place of residence (ref: urban)						
Rural			0.0760***			-0.109**
			(0.0266)			(0.0436)
Asset Index			0.0661			0.129
			(0.0690)			(0.0926)
Observations	4924	4924	4813	4882	4882	4774

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

Multimorbidity, comorbid depression and health outcomes

In the results presented above, the association of depression with health outcomes was estimated while controlling for the presence of chronic physical illnesses and other demographic and socioeconomic covariates. The chronic illness indicator was a binary variable taking a value of 0 and 1 to signify whether there was no reporting of any of the chronic illnesses and reporting one or more chronic illnesses, respectively. In what follows, the effect of chronic illnesses was further examined first by including more indicators that capture multimorbidity and second by introducing a variable to capture how the association of experiencing comorbid depression (depression and one or more other chronic illnesses) with health outcomes. For the first analysis, a categorical variable of chronic illnesses indicator was included as an explanatory variable. The categories were having one illness, two illnesses, three illnesses and four or more illnesses, where the base group was reporting no chronic illnesses. For the second analysis, a variable that captures the interaction of depression and chronic illnesses was introduced and a model that allowed for health outcome differences among 10 groups was estimated. The groups were: (1) neither depression nor comorbid physical illnesses reported, (2) no depression but one comorbid physical illness, (3) no depression but two comorbid physical illnesses, (4) no depression but three comorbid physical illnesses, (5) no depression but four or more comorbid physical illnesses, (6) depression but no comorbid physical illnesses, (7) depression and one comorbid physical illness, (8) depression and two comorbid physical illnesses, (9) depression and three comorbid physical illnesses and (10) both depression and four or more comorbid physical illnesses. Taking the first one as a reference group, i.e. reporting no depression and no chronic illness, I estimated and tested health outcome differentials between the different groups and the base and examine the role of depression.

The association of depression with health-related quality of life and self-rated health remained negative and significant with these extended models accounting for the impact of multimorbid chronic illnesses and other socioeconomic and demographic variables. However, the association of

depression and health satisfaction, while still negative, lost statistical significance with the extended models. Variations in health satisfaction appear to be explained better by chronic illnesses.

After adjusting for multimorbid chronic illnesses and other control variables, depression was associated with a 0.20 decrease in health utility values (Table 15). Similarly, depression was associated with lower odds of reporting good self-rated health by a factor of 0.43. In terms of probabilities, on average, the decrease in the probability of good self-rated health associated with depression was 0.15. Multimorbidity appears to have a negative and significant impact on all three health outcomes. The results also showed that an additional chronic illness was associated with higher decrements in health outcomes. For instance, compared to the base group of no chronic illnesses, having one chronic illness was associated with a decrease in health utility values of 0.05; on the other hand, experiencing two, three and four or more chronic illnesses were associated with a decrease of 0.16, 0.21 and 0.27, respectively. Adjusting for depression and other control variables, a relatively similar gradient was also observed in the association between multimorbidity and self-rated health as well as health satisfaction.

A more detailed association on the interaction of depression chronic illnesses is presented in Table 16. The results show, compared to a healthy group, depression alone exerts higher decrements in health-related quality of life and self-rated health than one chronic illness. The magnitude of the decrease in health-related quality of life associated with depression is comparable with two chronic illnesses, 0.12 and 0.14 decrements in health utility values, respectively. Experiencing a comorbid depression was also associated with a higher decrease in health outcomes than experiencing chronic illnesses without depression.

The coefficient estimates can be applied to get a gross estimate of the population-level burden of depression in terms of QALY losses per annum (Saarni et al., 2007; Fernandez et al., 2010). The following is a gross estimate to highlight the magnitude of the population-level burden of depression, and the coefficient estimates from regression estimations that account for comorbid depression, physical illness multimorbidity and additional covariates were taken (see Table 16). With the estimated 0.12 QALY loss associated with depression and with an estimated depression prevalence of 9.3% in our sample (see Table 6), the population-level burden of depression can translate to an annual QALY loss of 1116 per 100,000 people. To compare it with chronic physical illnesses, with an estimated QALY loss associated with reporting one chronic illness of 0.052 and

estimated prevalence of reporting one chronic illness of 20.9% in our sample (see Table 8), this translates to an annual QALY losses of 1086.8 per 100,000 people.

Table 15. Association of Depression, Multimorbidity and Health Outcomes

	Health Utilities	Self-rated health		Health satisfaction	
	(1)	(2a)	(2b)	(3a)	(3b)
	Coef.	odds ratio	marginal effects	odds ratio	marginal effects
Depression (ref: no)	-0.199***	0.428***	-0.149***	0.776	-0.0538
	(0.0232)	(0.0589)	(0.0270)	(0.124)	(0.0333)
Chronic Illness (ref: no)					
1 chronic illness	-0.0548***	0.444***	-0.127***	0.533***	-0.144***
	(0.00912)	(0.0525)	(0.0204)	(0.0591)	(0.0249)
2 chronic illnesses	-0.155***	0.206***	-0.291***	0.322***	-0.241***
	(0.0183)	(0.0228)	(0.0244)	(0.0458)	(0.0272)
3 chronic illnesses	-0.213***	0.197***	-0.301***	0.212***	-0.306***
	(0.0201)	(0.0397)	(0.0440)	(0.0417)	(0.0296)
4+ chronic illnesses	-0.268***	0.105***	-0.450***	0.265***	-0.273***
	(0.0598)	(0.0319)	(0.0689)	(0.107)	(0.0636)
Control variables included	All	All		All	
Observations	4765	4813		4774	

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

Table 16. Association of Multimorbidity, Comorbid Depression and Health Outcomes

	Health Utilities	Self-rated health		Health satisfaction	
	(1)	(2a)	(2b)	(3a)	(3b)
	Coef.	Odds ratio	marginal effects	Odds ratio	marginal effects
Health problems (ref: no depression; no chronic illnesses)					
(1) no depression; 1 chronic illness	-0.0518***	0.411***	-0.134***	0.524***	-0.149***
	(0.00967)	(0.0497)	(0.0205)	(0.0583)	(0.0250)
(2) no depression; 2 chronic illnesses	-0.139***	0.193***	-0.297***	0.345***	-0.232***
	(0.0183)	(0.0221)	(0.0247)	(0.0511)	(0.0291)
(3) no depression; 3 chronic illnesses	-0.198***	0.175***	-0.320***	0.157***	-0.347***
	(0.0260)	(0.0339)	(0.0434)	(0.0442)	(0.0352)
(4) no depression; 4+ chronic illnesses	-0.265***	0.109***	-0.433***	0.291***	-0.261***
	(0.0698)	(0.0398)	(0.0855)	(0.128)	(0.0736)
(5) depression; no chronic illnesses	-0.115***	0.229***	-0.257***	0.701	-0.0842
	(0.0370)	(0.0582)	(0.0561)	(0.192)	(0.0633)
(6) depression; 1 chronic illness	-0.251***	0.225***	-0.261***	0.454***	-0.179***
	(0.0325)	(0.0554)	(0.0545)	(0.127)	(0.0578)
(7) depression; 2 chronic illnesses	-0.401***	0.0954***	-0.465***	0.172***	-0.336***
	(0.0353)	(0.0228)	(0.0556)	(0.0459)	(0.0346)

(8) depression; 3 chronic illnesses	-0.438***	0.101***	-0.451***	0.307***	-0.252***
	(0.0541)	(0.0325)	(0.0714)	(0.119)	(0.0669)
(9) depression; 4+ chronic illnesses	-0.463***	0.0384***	-0.649***	0.183***	-0.328***
	(0.0750)	(0.0145)	(0.0621)	(0.105)	(0.0734)
Control variables included	All	All		All	
Observations	4765	4813		4774	

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

B. Causal Impact Estimates from Propensity Score Matching Methods

After estimating propensity scores, i.e., the likelihood of being depressed conditional on observed covariates, matching on propensity scores was performed between depressed and control groups using different matching algorithms or methods. As discussed in the methods section (Section 2), the propensity score is a balancing score whereby conditional on the propensity score, depressed and non-depressed participants will have the same distribution of measured covariates. One key identifying assumption is that conditional on the observed covariates, experiencing depression is independent of the potential outcomes. To assess whether matching results in balancing the distribution of the covariates, a balancing check is performed after matching for each outcome variable. The results of the covariance balance diagnostic show that the distribution of indicators for the socioeconomic, demographic and comorbid health problem characteristics of the depression group are considerably closer after matching than it was before (Table B1-B3, Appendix 3B). All matching methods have achieved a considerable balance in the covariates and established a comparable group of depressed and non-depressed individuals.

Table 17 presents the estimated average treatment effects on the treated for health-related quality of life, self-rated health and health satisfaction outcome variables. The results of the three matching methods differ only slightly. This can be viewed as an indication of the robustness of the results. All treatment effect coefficients were negative and statistically significant, indicating the decrements in health outcomes resulting from experiencing depression. To make the interpretations of the impact of depression, recall health utility values are the preference weighted scores of health-related quality of life. The self-rated health and health satisfaction variables are binary variables, where 1 indicates reporting good health or being satisfied respectively and 0 representing poor health or dissatisfaction with health. The results can be interpreted as the proportion of people reporting good health or satisfaction in health.

People with depression are estimated to have a 0.21 to 0.24 lower health utility values, depending on the matching method. Compared with the control group, 20 to 23% fewer people with depression are estimated to report good self-rated health. Similarly, 7 to 9 per cent fewer people with depression are estimated as being satisfied with their health.

Table 17. Impact Estimates of Depression Using Alternative Matching Methods

Outcomes Variable	Method	ATT [a]	SE [95% CI] [b]	Observations (treated/control)
Health Utility Values	Nearest Neighbour Matching	-0.205***	0.02 [-0.246, -0.183]	884 (442/442)
	Radius Matching	-0.213***	0.02 [-0.259, -0.166]	2703 (379/2324)
	Kernel Matching	-0.239***	0.02 [-0.276, -0.201]	4709 (441/4268)
	Regression results (marginal effects) [c]	-0.228***	0.02 [-0.274, -0.181]	4765 (465/4300)
Self-rated Health	Nearest Neighbour Matching	-0.199***	0.03 [-0.253, -0.146]	898 (449/449)
	Radius Matching	-0.20***	0.03 [-0.261, -0.140]	2740 (387/2353
	Kernel Matching	-0.227***	0.03 [-0.278, -0.175]	4757 (448/4309)
	Regression results (marginal effects) [d]	-0.182***	0.03 [-0.233, -0.130]	4813 (465/4348)
Health Satisfaction	Nearest Neighbour Matching	-0.087***	0.03 [-0.136, -0.037]	888 (444/444)
	Radius Matching	-0.074***	0.03 [-0.125, -0.022]	2711 (384/2327)
	Kernel Matching	-0.081***	0.02 [-0.122, -0.041]	4719 (443/4276)
	Regression results (marginal effects) [d]	-0.076**	0.03 [-0.138, -0.013]	4774 (465/4309)

[a] Coefficients are the average treatment effect on the treated estimated from the corresponding propensity score matching or weighting method.

[b] Standard errors (SE) and 95% confidence interval (CI). Abadie and Imbens (AI) Robust standard errors are reported for the nearest neighbour matching and inverse probability weight regression adjustment estimates; bootstrapped standard errors (with 500 repetitions) are reported for the radius matching (radius=0.0001) and kernel matching estimates.

[c] see Table 12.

[d] see Table 14.

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

With sensitivity analysis under a set of parameters concerning depression status and outcome, the average treatment effects and the outcome and selection impact of the unobserved covariate, *U,* if *U* were observed were estimated. The treatment effect estimates seem to be robust to an unobserved confounder with a potential effect on health outcomes and the likelihood of experiencing depression. The results show that even with the existence of potential unobserved confounder that is associated with a large selection and outcome effects, the average treatment

effects were still statistically significant and close to the baseline estimate. Specifically, the impact estimates of depression on health-related quality of life were shown to be robust to unobserved covariate that may increase the relative probability of having the outcome variable above the mean by a factor greater than 21 or increase the relative probability of experiencing depression by a factor greater than 4. One can question the plausibility of the presence of a confounder with such characteristics. The estimates for self-rated health and health satisfaction were also robust. Details are reported in Tables C1-C3, Appendix 3C and these simple sensitivity analyses support the robustness of the matching estimate. Results from alternative methods of imposing common support also suggest the estimates were robust to restricted or relaxed common support assumptions. More specifically, the average treatment effect estimates were robust to the exclusion of 1 to 10%, Tables D1-D3, Appendix 3D.

4. Concluding Remarks

This chapter set out to assess the impact of depression on quality of life, health and subjective well-being in Ethiopia. Despite the estimated burden of depression as a leading cause of disability in Ethiopia, a closer examination of its impact on quality of life is largely missing. The impact of depression on health-related quality of life was examined by utilising a generic preference-based measure and a widely used framework of outcome assessment in economic evaluation, the EQ-5D. In addition, how depression impacts self-assessed health and the subjective valuation of an individual's satisfaction with their health status was assessed. The results show that all health outcomes examined were adversely affected by depression. The estimates were robust to the inclusion of covariates such as age, sex, education and other demographic, socioeconomic and physical health conditions.

The results are in line with other studies that examined the depression and quality of life nexus. Previous studies in other countries have shown that depression is negatively associated with health-related quality of life (Saarni et al., 2007; Sobocki et al., 2007; Mann et al., 2009; Saarni et al., 2010; Wu et al., 2015; Kolovos et al., 2017; among others). A recent study in Ethiopia has shown similar results (Shumye et al., 2019). However, the approach was different from the current work. While this investigation was based on a nationally representative sample, their study was facility-based, with samples drawn from a single specialised mental health hospital. In addition, there was a difference in the way health outcomes were measured. While I applied a preference-based generic measure of health-related quality of life, their study was based on the WHO quality of life brief questionnaire

(Skevington et al., 2004). Furthermore, this study has considered the association of depression with other aspects of health and well-being such as self-rated health and health satisfaction, and it has applied techniques that allowed me to explore the causal impacts of depression.

The results show that depression comorbid with other chronic illnesses has a substantial impact on health outcomes compared to experiencing only depression or chronic illnesses. Depression is often comorbid with other chronic illnesses, and the results highlight the importance of examining the treatment and management of physical illnesses, the need to acknowledge the interrelation not only in the prevalence of comorbidity but also in the treatment and management of comorbid physical and mental illnesses.

The findings contribute to the limited evidence on the burden of depression in Ethiopia and, to the best of my knowledge, this is the first study to examine the impact of depression on health-related quality of life, self-rated health and subjective well-being on a nationally representative sample and applying a preference-based measure of health-related quality of life. However, it is not without limitations. As a study with cross-sectional data and the potential for omitted variables and confounders with influence on depression and health outcomes, drawing a causality based on the regression estimates will prove difficult. I tried to tackle this and estimate the causal impact of depression utilising propensity score-based techniques and limiting the comparison between people with depression and healthy groups with similar distribution in their covariates and their conditional probabilities to be depressed. The results were consistent with regression-based estimates, were robust to potential deviations from the underlying propensity score analysis assumptions and highlighted the causal impact of depression. Despite these efforts, further longitudinal and follow-up studies may shed a better light on causality.

In an extended analysis, multimorbid physical illnesses were controlled for statistically. However, measures of health conditions, including depression, were self-reported and further studies with professional diagnosis and biomarkers to ascertain health problems may address problems that may arise with measurements and improve estimates of causality. Furthermore, this study did not delve into exploring the mechanisms or channels of impact. Similarly, it did not explore how outcomes may vary by severity in depressive symptoms or severity of other chronic physical illnesses due to the type of questions used to identify the health conditions. Future studies using score-based measures of depressive symptoms may provide additional details on severity and

outcomes. This includes extending the investigation to examine how health outcomes are impacted by the onset, severity, remission or persistence of depression.

Finally, the burden of depression discussed and impact assessed in this study are narrow in scope while the impact of depression is admittedly broad. While outcomes, such as health-related quality of life or quality-adjusted life years, are widely used measures in outcome assessment and economic evaluation, their inherent focus is on health dimensions. This has resulted in a call for a broader outcome measure that reflects non-health aspects and a broader well-being impact of health conditions or interventions to address them (Anand, 2005; Coast et al., 2008; Lorgelly et al., 2010). Depression is shown to have an impact on other aspects a person's lives beyond health (Donohue & Pincus, 2007; Kessler, 2012). Therefore, to better understand the broader impact of depression and to assess potential non-health benefits of interventions, it will be critically important to have outcome measures that go beyond health-related quality of life and reflect broader well-being or quality of life.

Chapter 4. Development and Validation a Capability Well-being Instrument for Outcome Assessment in Ethiopia

1. Introduction

The previous chapter examined the impact of depression on health-related quality of life, self-rated health and subjective well-being. The results are crucial in highlighting the burden of depression in Ethiopia. However, the focus of the outcome measures was dominantly on health dimensions and, as argued in Chapter 1, the impact of depression is much broader and multidimensional. This chapter presents the work of developing and contextualising a capability instrument to assess well-being in Ethiopia with the aim of applying it to investigate how depression affects overall individual well-being. The capability approach, as initially proposed and advocated by Sen, is a general framework conceptualisation of well-being that attempts to bridge limitation in the welfarist approaches (Anand et al., 2011). Therefore, it was consistent with iis proposition to avoid having a specific list of capabilities that can apply to different areas. On the other hand, other scholars, notably Martha Nussbaum, have argued for a list of capabilities. However, one consensus that seems to emerge from these debates is that the capability approach is versatile and applicable for different purposes of well-being analysis. Hence, there cannot be one list that applies to all the various purposes (Robeyns, 2017, pp. 24–25). This particularly highlights the importance of acknowledging human and context diversity in the capability approach and hence the need to have capability-based measurements that are fit for the specific purpose.

Operationalisation of the capability approach is considered an essential element in translating the conceptualisations and normative approaches to practical use in measurement and evaluation (Comim, 2008, p. 159). The question is then, how to go about operationalising capabilities and to develop a contextually relevant instrument? The current literature on the capability approach outlined two practical approaches to the development of capability measures. One follows a participatory, bottom-up approach while the other is expert-led, top-down approach (Alkire, 2005; Lorgelly et al., 2010; Robeyns, 2017). Although both approaches have their critics and proponents, there is a suggestion that combining both approaches will prove useful (Coast et al., 2015). In addition to the merit of the approaches, other factors influence the selection of an approach. Robeyns (2017, pp. 61–62) specifically outlined two factors. One is related to the purpose of the study, and the other factor is constraints faced, such as time, financial, social, psychological, political constraints that will limit decisions and choices. However, one critical piece of advice in the

development of capability measures and selection of dimensions is not to treat it "as a technocratic exercise" (ibid). For this study, I made subsequent pragmatic choices and decisions about how best to approach the development of capability measures. In that process of developing the capability instrument, I have kept that advice in mind.

This chapter is organised as follows. Section 2 outlines the methods and approaches of instrument development and validation. It is followed by a presentation of the results in Section 3. Discussion and concluding remarks are put forward in Section 4.

2. Methods

The study has two main interrelated but separate components. The first one, which I loosely termed as instrument development, is related to the process of preparing the capability instrument including the drafting of capability items, the revision of the instrument and the work of contextualisation and validation of the instrument for use in Ethiopia using qualitative methods. The second component is part of the overall instrument development, but it is specifically focused on instrument validity and reliability with additional statistical methods to examine the psychometric properties of the capability instrument. Chapter 2 briefly described the methods related to these works. Here I have expanded on some of the issues and provided additional context on the conceptual bases of the validation works as well as the approaches and the steps undertaken.

2.1. Instrument Development

2.1.1. Choice of Instruments and Items Drafting

The first decision in the instrument development was whether to build on current works of operationalisation and to adapt them to the context of the study area or to develop a capability measure anew instead. I chose the first option of contextualising and adapting existing works. This was mainly influenced by several constraints including time, logistic and financial that made the latter exercise challenging and less feasible for the short timeframe of a PhD research and limited resources. However, as will be discussed further, this was complemented with a participatory approach to bring in insights from the local context and ensure the validity of the measure.

Based on a recent systematic review of studies on health that apply the capability approach (Mitchell et al., 2017), two relevant strands of work were identified and considered as a starting point for the capability instrument development at hand. These works were studies that focus on developing and applying capability-based measures to assess outcomes in health and health care

interventions. Both groups of work that operationalise and measure capability are based on the UK context and started being implemented in other countries.

The first group of work is rooted in the study by Anand et al. (2009) and it aims to operationalise a list of central human capabilities identified by Martha Nussbaum. The central human capabilities include 'life', 'bodily health', 'bodily integrity', 'senses, imagination and thought', 'emotions', 'practical reason', 'affiliation', 'other species', 'play', and 'control over one's environment' (Nussbaum, 2000). A later effort has managed to reduce the dimensions and produced an instrument known as OCAP-18, an 18-item capability assessment instrument, which was based on the UK context (Lorgelly et al., 2015). There was a recent attempt to use the approach in the mental health context, and that has eventually led to a capability assessment instrument for mental health contexts, known as OxCAP-MH (Simon et al., 2013).

The second strand of work developed a set of capability assessment instruments known as ICECAP-O and ICECAP-A based on a qualitative study that identified and developed items that people value in life (Grewala et al., 2006; Al-Janabi et al., 2012; Al-Janabi et al., 2013). A recent study assessed the validity of the latter instrument (i.e., ICECAP-A) for use among adults with depression (Mitchell et al., 2017). Given the initial use of the instrument was among adults in the general population, this validation for use among people with depression involved concept mapping to examine how the constructs of depression are associated with that of capabilities, assess the discriminant validity of the instrument (i.e., to what extent it is possible to differentiate depression status with the capability scores) as well as examine to what extent depression explains variations in capability scores.

Although capabilities and well-being are of equal significance for high, middle and low-income countries alike, the efforts to expand the work of assessing capabilities particularly in health evaluation has been largely missing in low- and middle-income country settings (Greco et al., 2016). This research aims to contribute to the development of capability-based outcome measures in the Ethiopian context and to apply the measure to assess how depression impacts capabilities and freedoms of individuals.

After choosing to contextualise and adapt existing works on the capability approach, the second decision in this research was as to which instrument to adapt from the aforementioned two strands of studies. Given a set of constraints discussed earlier, the two families of capability instruments (i.e., the OCAP and subsequently revised instruments as well as the ICECAP-O related instruments)

were evaluated for contextual relevance, ease of adaptation and the process of instrument development and underlying conceptual basis of capabilities. Although both instruments were developed in the UK context, the former derives from a general set of core capabilities and contextualised them for the UK population. In contrast, the latter was designed entirely based on the experiences and choices of people in the UK. Therefore, the former group of instruments, i.e., the OCAP instruments, were taken as a starting point for the development of capability instrument in the local context.

There are very few instances of works that used these capability instruments in other countries. Anand et al. (2011) reported the use of OCAP survey instrument in Argentina. They reported the original instrument was translated into Spanish with minimal adjustment to some of the questions "to reflect the cultural context". However, details of the process are missing in the article to make an assessment of the steps taken. Similarly, there was a report from Thailand where a capability index based on OCAP-18 was used in an economic evaluation of HIV prevention program, along with other outcome measures such as health status, HIV risk score (Teerawattananon et al., 2011). While the authors reported that the instrument was translated into Thai language, there were no further details about the steps taken to validate the instrument for use in the local context. Recently, a study evaluated the use of the OxCAP-MH survey instrument in Germany and reported the feasibility of using it in the German language and cultural context (Simon et al., 2018). Compared to the other studies, it provides details of the process of cross-cultural validation of the capability instrument, including the translation, the piloting and the subsequent revision processes.

The underlying conceptual framework for the OCAP and the derivative instruments was the Nussbaum's list of core capabilities. However, the development of capability items, the refinement of the questions, the item reductions and the final results of the chosen capability instruments are rooted in a social and cultural context different from Ethiopia. It was, therefore, important to go beyond a simple translation of one instrument to the local language but to build on these earlier works while being mindful of the research area context. To that end, I reviewed the list of capability items from the OCAP, OCAP-18 and OxCAP-MH instruments for relevance and assessed how the capability items fit in the social and cultural context. An initial list of relevant capability items and questions were identified followed by iterative item reduction with rounds of discussions and feedback from the research team members (supervisors) who are experienced researchers in outcome measurement, well-being and capabilities, health systems and developing countries

context. This was complemented by qualitative research to revise the instrument and ensure relevance and acceptability in the local context.

In addition to research on the capability approach, the instrument development process drew from the literature on cultural adaptation of survey instruments (Guillemin et al., 1993; Herdman et al., 1998; Chávez & Canino, 2005), development and adaptation of patient-reported outcomes measures (Wild et al., 2005; Cappelleri et al., 2014) and works that explore quality of life and well-being in the local context (Camfield, 2006; Copestake & Camfield, 2009; Skevington, 2009). These strands of literature have been instrumental in providing key insights on various considerations of the instrument development. The literature on outcome measures and cross-cultural adaptation have informed considerations in instrument design from wording to assessing reliability and validity. Similarly, works on quality of life and well-being have been informative in the process of selecting and drafting capability items.

2.1.2. Instrument Contextualisation

The primary focus of this phase of the instrument development process was to assess the validity of the instrument and ensure concepts and language used are contextually relevant and culturally sensitive. The literature on instrument contextualisation and cross-cultural adaptation proposes five types of evaluation. These are conceptual, content, semantic, criterion and technical equivalence (Salvador-Carulla, 1996; Patel, 2003; Chávez & Canino, 2005).

These validation concepts are closely related. However, from the five parameters, the first three were the primary focus of this work and a validation exercise was undertaken to ensure a conceptual, content and semantic equivalence of the instrument. The latter two, i.e., criterion and technical equivalence, are not fully explored in this study. Criterion equivalence requires examining and comparing the capability measures obtained using the new instrument against a well-established external criterion, also known as "gold standard" (Mokkink et al., 2010; Chávez & Canino, 2005; Prince, 2003). Given there is no such well-established measure for the capability measure, assessing the criterion validity of the instrument was not a feasible exercise. Similarly, technical equivalence, also referred to as operational equivalence, requires ensuring issues such as the formatting, layout, administration (such as self-completion, interviewer-administered) between the original instrument and the adapted one will not affect the results (Herdman et al., 1998; Chávez & Canino, 2005). It also involves addressing any issues that can make questions in an instrument difficult to comprehend or answer. Some aspects of technical equivalence are

addressed as part of the other approaches. For instance, examining the content and semantic equivalence also address issues of comprehension and clarity. In addition, only one type of questionnaire administration (interviewer-administered) was considered at this point due to literacy issues in collecting data in rural Ethiopia and part of the instrument reliability assessment undertaken in this study can be seen as one way of examining the appropriateness of the assessment technique (Chávez & Canino, 2005). For these reasons, criterion and technical equivalence were not the focus of the investigation at this point.

A conceptual equivalence requires exploring how different cultures conceptualise the issues at hand and ensuring instruments capture the same underlying conceptual constructs in different cultures (Herdman et al., 1998; Chávez & Canino, 2005). In the health and quality of life literature, it involves exploring how different cultures conceptualise health and quality of life and the values they place on different domains of health and quality of life (Herdman et al., 1998). In the context of the current research, the conceptual equivalence is interpreted as attempting to ensure that the domains of core human capabilities as defined and measured in other contexts are relevant concepts for Ethiopia context. The core capabilities are developed based on "a universalist account of central human functions" (Nussbaum, 2000) and considered to be core and basic human capabilities irrespective of geopolitical, economic differences across countries. Furthermore, they are considered reasonably high-level conceptualisations of core capabilities that can be operationalised for the local context. Research on quality of life and well-being in Ethiopia also identifies issues that align with the central capabilities. For instance, having good (physical and mental) health, being educated, being materially secure, owning assets, relationships with family and friends, faith and religion were identified as important aspects of quality of life (Camfield, 2006; Copestake & Camfield, 2009). Based on these considerations, the capability instrument included all dimensions of core capabilities. The qualitative work conducted as part of this study further explored and validated the decision through information collected from participants in the target context.

The second important consideration for the validation exercise was content equivalence. It involves examining and ensuring the relevance of items designed to tap the different dimensions of the core capabilities. Content equivalence also considers not only the critical examination of relevance but also the acceptability of items in the target culture. As described in the previous section, the capability instrument has gone through a serious of iterations to ensure content equivalence from the perspective of the researcher informed by existing literature and personal experience. The

qualitative work additionally explored content equivalence to ensure relevance and acceptability of items of the capability instrument in Ethiopia context.

Finally, the third consideration was examining semantic equivalence to ensure the translation from English to local language leads to transfer of semantically equivalent meanings. The capabilities instrument was translated to Amharic by two native speakers with knowledge of the local context and a third native individual who was not involved in the translation reviewed both and proposed a consolidated version which was adapted after revision. This was further iterated based on feedback on the results of the qualitative phase that provided additional input for semantic equivalence and ensured clarity and comprehension of the capabilities items.

Given a strand of capability literature that emphasises on a consultative and bottom-up development of capability assessment, the validation exercise through the participation of the target population provided an important and desired balance to the instrument development process. Although the approach here cannot be considered purely bottom-up, input was sought from participants in the study area that makes the process not a purely "technocratic" endeavour either. This was facilitated through focus group discussions and interviews by recruiting participants from the research area. Additional details on the qualitative research and participants are presented in Chapter 2. However, it is worth restating that the qualitative work was part of the contextualisation exercise that was undertaken to elicit and ensure conceptual, content and semantic validity of the instrument. By conducting interviews and focus group discussions, the study examined how the items in the instrument capture the capability concepts as intended. Particularly, by asking to explain and discuss what participants understood by the items and comparing themes emerging from these responses with the underlying concepts of the instrument, this study solicits how the domains and items of capability are conceptually and semantically valid. In addition, it assessed comprehension, contextual relevance and acceptability of the items by asking respondents to voice their views on the content coverage, ease or difficulty to answer, wording and relevance of the capability items. High-level topic guides were prepared to facilitate group discussions and interviews, and they are presented in Appendix 4A.

2.2. Examining Instrument Reliability and Validity

Reliability and validity are key concepts to gauge the quality of assessment instruments (Salvador-Carulla, 1996). Validity assesses to what extent a measure does measure what it sets out to measure, and reliability examines the consistency of a measure when applied repeatedly under similar

circumstances (Prince, 2003). Reliability reflects the extent of random and systematic errors inherent in any measurement (Streiner et al., 2015). Ensuring the reliability of a measure is a necessary step in establishing its usefulness. The validity of a measure refers to the extent to which an instrument measures what it is supposed to measure. It allows us to determine if we can draw accurate inferences and conclusions about the presence and degree of an attribute for a subject (Salvador-Carulla, 1996; Streiner et al., 2015).

There are multiple aspects and parameters of reliability and validity nested within these broad concepts, some of which can be demonstrated empirically, while others cannot be. This section discusses the conceptual and methodological aspects of instrument reliability and validity, which was undertaken as part of the instrument development and contextualisation process. These additional reliability and validity tests ensure the capability instrument has desirable psychometric properties. The section below describes the concepts of reliability and validity relevant for the instrument and outlines the associated statistical approaches and tests for reliability and validity.

2.2.1. Instrument Reliability

The work in this study focused on **inter-observer reliability** and **test-retest reliability**. These reliability tests attempt to establish the degree to which the results of an instrument are reproducible despite changes in different external parameters such as raters or time. The third aspect of reliability that was tested in this study, **internal consistency**, is concerned with the internal item structure and stability of a measure.

A. Inter-observer reliability

Inter-observer reliability also termed as inter-rater reliability, tests the stability of the measure when administered or rated by different observers (Prince, 2003). When a measure is administered by different observers and scores obtained, inter-rater reliability measures the extent to which the variance in the scores is as a result of variance among subjects, not of variance among observers (Streiner et al., 2015). High inter-rater reliability indicates consistency or agreement among raters, and observed score variance is a result of 'true' variance among subjects. When it comes to the capability questionnaire, the assessment will not involve subjective evaluation by different raters. However, as different interviewers will administer the capability instrument, it was important to test and ensure inter-rater reliability. By doing so, the plan is to evaluate the consistency or reliability of measurements by different interviewers and assess the amount of any measurement error associated with the instrument being administered by different enumerators. Two different

interviewers administer the instrument for each participant, and the intraclass correlation coefficient (ICC) was calculated to measure the consistency of measurements between the two interviewers.

The estimation for the reliability tests emanates from the idea that reliability is inversely related to measurement error, where measurement error includes random variation within subjects, systematic variation between subjects, or both types of variation. Reliability can be formally defined as the ratio variability between subjects to total variability (i.e., the sum of subject variability and measurement error) (Cappelleri et al., 2014).

For the test of inter-rater reliability, the ICC is reliability coefficient that measures the strength of agreement between repeated measurements on the same set of participants by assessing the proportion of between-participant variance to the total variance, where the total variance is the sum of between-participant variance and within-participant variance (which in turn is the sum of between-interviewers variance and measurement error).

Based on Streiner et al. (2015), the ICC reliability coefficient formula takes the form:

$$r = \frac{\sigma_p^2}{\sigma_p^2 + \sigma_i^2 + \sigma_e^2}$$

where σ_p^2 represents the variance for the systematic differences between participants;

σ_i^2 represents between-interviewer variance; and

σ_e^2 represents measurement error variance.

The interpretation is that *r* per cent of the variance in the scores results from 'true' variance among participants. The reliability coefficient, *r*, ranges from 0 to 1 and higher values indicate more reliability. If *r* is large (close to 1), then inter-rater variance and measurement error is low relative to between-participant variability, indicating high reliability. If *r* is low (close to 0), then inter-rater variance and measurement error variability dominate over between-patient variability, indicating low reliability.

The ICC was estimated with a one-way random-effects model as it was assumed that the participants being interviewed are randomly selected from the population of potential participants, and each participant is interviewed by a different set of two interviewers randomly drawn from the population of potential interviewers.

B. Test-retest reliability

A measure may be administered to the same subjects at more than one occasion separated by a time interval under the same conditions, such as by the subjects themselves or same interviewer. Test-retest reliability, or intra-measurement reliability, measures the stability of a measure over time (Prince, 2003). As a measure of capability well-being, we would like to make sure and test the instrument will assess the outcome consistently and in a stable manner over time. Although data were not collected data on repeated measures and on different occasions to measure outcome during this pilot, alternative approaches were used to examine test-retest reliability, as will be discussed in the following subsection.

Test-retest reliability assess the consistency of a measurement by administering it to the same group of participants at more than one occasion. However, this is time demanding and particularly impractical for this PhD project. The split-half method is one practical alternative to test-retest reliability (Bartolucci et al., 2016). Such reliability estimation procedures require participants to complete the measurement at one occasion and treat different parts of the questionnaire as if they were different questionnaires. The split-half reliability method involves creating two parallel subsets by dividing the items of a measure into two subsets of the same dimension, which are then correlated with each other. Although there are many ways to split a measure into half, the study adapted one of the easiest ways of splitting known as "odd-even" which consists of assigning odd-numbered items to one half and even-numbered items in the instrument into the second half. If the scale is internally consistent, the two halves should have a high correlation. However, since the correlation coefficient directly obtained from the correlation of the two subsets will underestimate the true reliability, it is suggested to adjust the correlation coefficient with the Spearman-Brown formula which corrects the simple correlation coefficient from the split-half for a full-length test (Streiner et al., 2015; Bartolucci et al., 2016).

C. Internal consistency

The Internal consistency reliability approach to a measure assesses to what extent different items of a measure address a common underlying construct (Prince, 2003). It indicates the solidity of the internal structure of a measure, the degree to which different items are interrelated and the possibility of combining them to get overall scores (Salvador-Carulla, 1996). To a greater or lesser extent, each item will correlate with each other and with the total score. Once a measure is administered to a sample of subjects, covariances are calculated between all the pairs of items

comprising the instrument. These individual correlations can then be summarised for the whole scale by a single statistic that represents a measurement for internal consistency.

The internal consistency as a reliability method overcomes some of the drawbacks of the split-half method. These include the difficulty with the many ways to divide a measure and its inability to provide information about item(s) that may be contributing to low reliability (Streiner et al., 2015). Once the complete instrument is administered to a sample of participants, covariances are calculated between all the pairs of items (Bartolucci et al., 2016). A well-known measure of internal consistency reliability is what is known as coefficient α (also called Cronbach's alpha). The coefficient is computed based on variances of each items in the instrument and variances of the total score. For an instrument with n items and total or summed score of y, the Cronbach's alpha formula is given by (Cappelleri et al., 2014, p. 67):

$$\alpha = \frac{n}{n-1}\left(1 - \frac{\sum_{i=1}^{n} \sigma_{x_i}^2}{\sigma_y^2}\right)$$

where $\sigma_{x_i}^2$ represents item variance and σ_y^2 represents variance of the total score.

The alpha coefficient varies between 0 and 1, and scores of 0.6–0.8 are moderate but satisfactory, while scores above 0.8 indicate a high internally consistent scale (Prince, 2003). However, as Bartolucci *et al*. (2016) noted such measures of internal consistency could be artificially inflated by the presence of a high number of items and the presence of very similar items (i.e., redundant items). Therefore, measures of internal consistency above 0.90 should be regarded with suspicion, and low values (<0.60) indicate that items are very different from each other or are ambiguously defined.

Internal consistency was assessed by calculating the Cronbach's alpha coefficient for the capability instrument. In addition, the analysis considered additional measures to describe and evaluate the response distribution of each item as well as the relationship between responses to an item and the internal consistency. Particularly, the possibility of item redundancy in the capability instrument was examined by checking the homogeneity of the scale using the item-total correlation. It is the correlation of the individual item with the scale total omitting that item (Streiner et al., 2015). The rule of thumb for the item-total correlation coefficient is between 0.20 and 0.80, as items with lower correlations are considered contributing little to none while items with higher correlations are a mere restatement of another resulting in a scale likely too narrow and specific (ibid).

2.2.2. Instrument Validity

There are various facets and parameters of instrument validity. Being mindful of varied terminology used around validity in the literature and for the sake of consistency, this section outlines aspects of validity assessment based on Cappelleri et al. (2014). The forms of validity assessment outlined are **content validity** and **construct validity**.

A. Content Validity

Content validity refers to the degree to which the content and set of items in an instrument adequately reflect the construct(s) the instrument purports to measure (Salvador-Carulla, 1996; Cappelleri et al., 2014). It ensures that an instrument has enough items and adequately covers the domains under investigation (Streiner et al., 2015) and it shows the extent to which an instrument covers important concepts of the unobservable or latent attribute it sets out to measure (Cappelleri et al., 2014). Validity testing is concerned with making sure an instrument or a measure will allow us to draw inferences and accurate conclusion about what it intends to measure, and content validity stresses that an instrument does not miss important facets of a construct thereby leading to invalid inferences (Streiner et al., 2015). Therefore, if the content validity of a measure is higher, the inferences that can be validly drawn are broader (ibid).

Despite its relevance as validity testing, content validity differs from other forms of validity testing in that it cannot be tested and demonstrated empirically based on scores from the instrument or similar forms of statistical analysis (Salvador-Carulla, 1996; Prince, 2003; Cappelleri et al., 2014; Streiner et al., 2015). However, we still can seek evidence to support it. Such evidence to support content validity and solicit judgment concerning the content of items largely draws from qualitative works such as interviews and focus group discussions with the target population, experts and other stakeholders. This will then be complemented with other approaches to validity testing.

Ensuring content validity is important for the newly developed capability instrument, and the study sought some evidence to support that. As discussed in the previous section, a serious of qualitative investigations were undertaken in the process of the instrument development, contextualisation and revision. The results have shown good content validity for the instrument. Additional validity assessment was undertaken as discussed below.

B. Construct Validity

Some instruments attempt to tap into and measure abstract attributes or constructs that, unlike physical attributes, are not readily observable and measurable. Construct validity becomes very relevant for such instruments. It refers to "the extent to which the construct that the measure seeks to address is a real and coherent entity, and then also to the salience of the measure to that construct" (Prince, 2003). It can be further defined as "the degree to which the scores of a measurement instrument are consistent with hypotheses (for instance, with regard to internal relationships, relationships with scores of other instruments or differences between relevant groups)" (Mokkink et al., 2010). Therefore, it "involves constructing and evaluating postulated relationships involving a scale intended to measure a particular concept of interest" and an expectation that the instrument "under consideration should indeed measure the postulated construct under consideration" (Cappelleri et al., 2014).

A typical feature of construct validity is that it is an ongoing process (Cappelleri et al., 2014; Streiner et al., 2015) and no one single test or experiment can "unequivocally 'prove' a construct" (Streiner et al., 2015). However, it has been argued that all aspects of validity are essentially some form of construct validity (Cappelleri et al., 2014; Streiner et al., 2015). With that in mind, an aspect construct validity relevant for the capability instrument is outlined below.

Convergent validity and divergent validity examine the association between a measure and other measures building on the assumption that a measure will be more closely related to alternative measures of similar constructs than it will be to measures of different constructs (Prince, 2003). Convergent validity refers to the extent to which scores of a measure are associated with the scores of other measures with similar constructs to which it is expected to be related (Cappelleri et al., 2014). On the other hand, divergent validity refers to the degree to which scores of a measure are uncorrelated with scores of other measures with different constructs to which it is expected to have weak or no correlation.

To evaluate the construct validity of the capability instrument, the convergent and divergent validity of the instrument was assessed by examining the association of capability scores with scores of other instruments that measure related constructs. Specifically, the analysis looked at the association of the capability instrument with instruments designed to assess depressive symptoms, severe somatic symptoms, well-being and disability. These instruments are the 9-item Patient Health Questionnaire (PHQ-9), the 15-item Patient Health Questionnaire (PHQ-15), the World Health

Organization (Five) Well-being Index (WHO-5) and the 12-item World Health Organization Disability Assessment Schedule 2.0 (WHODAS-12). Convergent validity was assessed by calculating the Pearson correlation coefficients for the capability instrument and the scores of PHQ-9, PHQ-15, WHO-5 and WHODAS-12.

The PHQ-9 is a nine-item questionnaire designed to asses depressive symptoms and a widely used instrument for screening and case finding in clinical and research settings (Moriarty et al., 2015). It asks respondents to state how often they have been bothered by different problems with responses ranging from not at all (0) to nearly every day (3). The instrument is validated in hospital and primary care settings in the study country context (Gelaye et al., 2013; Hanlon et al., 2015).

The PHQ-15 is a 15-item instrument to identify and measure somatic complaints and symptoms (Kroenke et al., 2002). The scores range from 0 (no somatic complaints) to 30 (severe somatic symptoms).

The WHO-5 is a short 5 item questionnaire designed to tap into the subjective well-being of respondents. It asks respondents how they have felt in the past two weeks in a positively worded statements where they would respond by answering from not at all (0) to all of the time (5). The raw score ranges from 0 to 25, and a score ranging from 0 to 100 is obtained by multiplying the raw score by 4 per the WHO-5 scoring guidance. Lower scores indicate poor well-being and vice versa. The instrument is shown to have adequate validity as a depression screening tool as well as an outcome measure in interventions (Topp et al., 2015).

The WHODAS-12 is the short 12 item version of the WHODAS 2.0. It aims to measure functioning and disability covering six domains of cognition, self-care, mobility, getting along, life activities, participation (Ustun et al., 2010). Item responses range from no difficulty (1) to extreme difficulty (5). The raw score can be converted to a summary score ranging from 0 to 100, where 0 indicates no disability and 100 signifies a full disability. The WHODAS instrument is validated for use in the country context (Habtamu et al., 2017).

Finally, the capability instrument, as will be further discussed in the next section, is a 22-item instrument where all items are answered on a 1 to 5 Likert scale. The raw scores range from 22 to 110, which was then converted to a 0 to 100 scale with higher scores indicating better capabilities.

It was hypothesised that the capability measure would correlate with these measures modestly to highly because they tap into some physical health or emotional well-being aspects of the broader

dimensions the capability instrument tries to capture. It was expected that the scores of the capability instrument would positively correlate with the WHO-5 and negatively correlate with the PHQ-9, PHQ-15 and WHODAS-12.

Another aspect of construct validity is what is known as criterion validity, which involves assessing the correlation of a scale of an instrument with another measure that has been used and accepted in the field. It is tested by comparing measures obtained with the new instrument to those obtained with an existing criterion measure, which is the current 'gold standard' measure (Prince, 2003) and can be defined as "the degree to which the scores of a measurement instrument are an adequate reflection of a gold standard" (Mokkink et al., 2010). For instance, scores of a new scale for depression will be compared with a current gold standard measure of a psychiatric assessment. However, given there is no such gold standard measure related to capabilities, it is impossible to pursue this aspect of validity.

All in all, the validity tests performed, along with internal consistency, homogeneity and reliability tests, will provide us with some evidence about the psychometric properties and soundness of the capability instrument.

3. Results

3.1. Instrument Development and Contextualisation

The first step in the choice of capabilities and development of capability items was reviewing capability questions as designed by Anand et al., (2009) (OCAP capability instrument), Lorgelly *et al.*, (2015) (OCAP-18 instrument) and Simon *et al.*, (2013) (OxCAP-MH instrument). Instead of relying on a single instrument, in this study, I chose to review questions on all the instruments because an initial review of the instruments indicated some items that can be important and relevant for the local context have been dropped in the process of refining and developing the instrument from OCAP to OCAP-18 and to OxCAP-MH. I reviewed the capability items in these instruments for relevance in the research area local context, and a preliminary list of capability items was developed. The choice of the capability items was subjected to an iterative process of selection based on discussion and feedback from supervisors. Next, relevance and wording of items were scrutinised, leading to further refinement and revision of the questions including wording, response scales as well as dropping and adding questions. This initial version of the instrument is presented as Version 1 in Appendix 4B along with the three instruments: OCAP, OCAP-18 and OxCAP-MH. The initial list of items in Version 1 largely tracks the items in these instruments with minor wording

revisions on items and dropping other items that are deemed less relevant. While the items in the three instruments range between 16 and 64, the initial version of the capability instrument had 29 items included.

There were additional considerations in the revision process informed by literature on outcome measures development. These include being mindful of the cognitive task completing the instrument will demand. Other considerations include ensuring brevity of survey instrument without compromising its ability to collect desired information, intent in designing consistent item responses categories and desire in reducing potential distress among participants by designing positively worded capability items. Positively worded items have also added benefits. As pointed out in Streiner et al. (2015), respondents tend to endorse a negative item rather than reject a positive one. In addition, children and adults with lower-functioning tend to have difficulty comprehending the concept they have to disagree with. In addition, mixing negatively worded items with positively worded items tend to polarise factor loadings irrespective of content and compared to positively worded items, negatively worded ones have lower validity coefficients. Therefore, they suggest designing positively worded items and avoiding the used of negatively worded ones whenever possible. With these suggestions in mind, some items wording was revised. For instance, a question which was posed as "does your health in any way limit your daily activities, compared to other people your age?" was revised as a positively worded statement "given my age, I feel I am in good health". The revision was also informed by studies on well-being in Ethiopia. In addition to revisiting items for relevance and wording as done in the first stage of revision, this stage also considered adding items relevant to the local context. For instance, material security and asset ownership were relevant dimensions of quality of life (Camfield, 2006; Copestake & Camfield, 2009) and the revised version included these items. Based on these additional deliberations and discussions, informed by literature on outcome measures development and well-being, I further revised the capability items. The result of these subsequent revisions was the development of another version of the instrument which is presented as Version 2 in Appendix 4C. This version of the capability instrument had 30 items.

Once items were refined and the second version of the instrument obtained, it then went through pre-testing and initial pilot through a process that involved consultation with different groups of people. The instrument was first presented to and discussed with experienced mental health professionals and researchers with research experience in Ethiopia and other low and middle-income countries to solicit expert opinion. This was followed by discussion and consultation with

people who are involved in mental health research and have knowledge of the local context (field research assistants, data collectors) as well as testing it out on three participants randomly selected at one health centre. The consultation and pre-testing were conducted in December 2017. These consultations offered varied representations, opinions and feedbacks. Feedbacks ranged from format to content. One of these was related to the item response designs and scales used. Specifically, the comment highlighted the challenges of mixing different item responses as well as the feasibility of asking questions with Likert-scale type responses. This was practical feedback based on observation in other field works that employed similar scale, and that is respondents do not generally appear to appreciate the difference from one scale to the other. In addition to these and related overall structure and format related comments, there were item-specific feedbacks. Issues have been raised about items that may not contextually resonate. This issue was particularly pointed at a question that asks respondents about appreciating and valuing plants, animals and the world of nature. Similarly, there were items that were generally considered impractical in the context. This relates to items, for instance, that asks to what extent respondents are able to reflect on their lives and being able to plan for oneself on life. Furthermore, there were items that are deemed contextually sensitive and as a result that may not only put respondents in inconvenient position to answer, limit their engagement but also may have a potential to pose a risk in obtaining ethics approval locally. These concerns revolve around items that ask about the ability to express political views and to take part in political activities. After this initial consultation, additional validation and adaptation work that involved broader qualitative research and revision was done. The work considered the feedbacks obtained and was aimed at ensuring the instrument is culturally relevant and appropriate. Results of the qualitative work and subsequent instrument revision are further described in the next section.

3.2. Qualitative Data Analysis and Instrument Revision

Data Analysis, Results and Instrument Revision

To restate, the qualitative work aims to inform the instrument contextualisation and validation process by exploring how the capability instrument is conceptually and semantically valid, contextually relevant and acceptable. Therefore, the analysis focused on: (i) how issues raised by participants align with proposed capability domains and themes and (ii) explore if any new themes emerge from the discussion and interviews. Moreover, the study aims to explore and clarify any issues or problems with comprehension and presentation in the instrument.

A thematic framework approach was used as a method of data analysis. It is credited with providing flexibility to accommodate both a priori themes and emergent ones (Smith & Firth, 2011; Connell et al., 2012; Gale et al., 2013). The analysis followed stages as outlined in the thematic framework approach literature (Ritchie & Lewis, 2003; Smith & Firth, 2011; Gale et al., 2013). These stages include data management (transcription, familiarisation, coding), developing descriptive accounts (summarising and synthesising themes, developing analytical framework) and developing explanatory accounts (developing associations and patterns, applying the analytical framework, charting data into the framework).

One of the goals of the qualitative research was to explore how the capability concepts and constructs are understood in the local context and identify any topic that does not fit or might be missing. Therefore, first, an analytical framework was prepared. The framework was shaped by the themes of the capability domains and capability items included in the instrument. These a priori themes were then used to compare and map themes that emerge from the analysis of the qualitative data.

Discussions and interviews were transcribed verbatim and translated into English for coding and analysis. This was followed by a thorough reading, re-reading, listening back to audio recordings to get familiar with the whole dataset, contents and issues raised. After familiarisation, the transcript was coded for further analysis. Coding was performed through a line by line reading of responses of participants and identifying segments which could range from single words to few lines or entire parts of a paragraph or sentences. The coding reflects a combination of both data-driven (semantic) code and researcher-driven (latent) codes. While semantic codes are based on the semantic meaning in the data and provide a summary of the explicit content of the data, latent codes go beyond explicit meaning to explore and identify any latent and implicit meanings within the data (Braun & Clarke, 2013).

An initial list of codes was identified, reviewed and synthesised. Once the transcripts have been coded highlighting issues raised by participants, the codes were further summarised into themes. The themes identified from the data were analysed and compared with themes from the capability domains to explore how issues raised may diverge from or map to a priori capability themes so as to identify any emergent themes worth including or excluding from the instrument. The information is summarised in Table 18. For a cognitive debriefing, in addition to posing a direct question to ask for any issues or difficulties participants face, interviews and transcripts were analysed in the same manner to identify issues with comprehension. Below, a discussion illustrating some of the key

issues is presented. Selected quotes from participants are included to highlight points raised in the analysis (Sandelowski, 1994).

The life capability domain explores the notion of "being able to live to the end of human life of normal length, not dying prematurely or before one's life is so reduce as to be not worth living". Various issues that underscore the views and understanding of the notions of this capability were raised. These include the freedom and value attached to a healthy life, longevity, burdens of ill health, lifestyle, living conditions and its impact on health and longevity, precariousness, insecurities in life and concerns of premature death. Discussions reveal how people attach great value to this notion. Particularly, the opportunities or the lack thereof that may curtail or interfere in realising the ability to live a long and healthy life. Participants have raised how much they value this capability. People not only value life but also eager to find ways to ensure any barriers in realising long and healthy life, such as illness, are removed:

> "I want to live a long and healthy life… I want to find any means to get better" (ID11, Female, 50s)

The weight of not being able to live to the end of human life and of dying prematurely was also evident. As one participant puts it:

> "I sometimes face health problems … and I feel concerned that will… I may not be able to stay around for long and watch my children grow into adulthood" (ID03, Female, 40s)

Others also highlighted circumstances that could impede them in realising the life capability such as illness and precarity:

> "leading long and healthy life, it's a question that bothers me… if life is secure, a human being will not get flu, let alone serious illness. Something that's causing us, causing me illness is a precarious life." (ID10, Male, 50s)

Another recurring theme in this regard also includes the importance and impact of family environment in life and health.

Similarly, for the bodily health capability domain, participants have raised issues of good health, health in relation to one's own age and in relation to peers and conditions and circumstances that provide a supportive environment for good health. These include adequate accommodation and housing, where participants pointed out the importance and some dimensions of it, such as

ownership, affordability, adequate space with access to infrastructure and facilities. The results underline the notion of bodily health capability domain also translates well to the local context.

Discussions on the bodily integrity capability domain brought issues pertinent to and in line with the underlying themes of the domain. The domain explores the notion of "being able to move freely from place to place, to being secure against assault including sexual and domestic and having the opportunities for sexual satisfaction and choices in matters of reproduction". The issues participants raised include safety, safe movement, safe neighbourhood and security. Other issues include reproductive health choices and societal, personal and environmental barriers and facilitators in these choices. The role of gender and education were particularly highlighted. Discussions also abound that provides support for the inclusion of matters of reproduction health. The results demonstrate not only the value of that capability but also the barriers in realising it and the strong gender dynamics around the topic. Although the value and relevance of the issues are acknowledged, the sensitivity of some topics was highlighted. Concerning sexual assault, for instance, participants highlight the taboo surrounding the issue and problem of having an open discussion and question about it. In the draft instrument (Version 2) detailed questions concerning assault and violence such as if participants have ever experienced one, by whom and continued concern were included. By reflecting on the discussions and while appreciating the capability of leading a life free from violent assault, a single-item question that emphasises being able to have a secure life against violent assault was included.

The results underscore the value of some of the newly added capability items, items that were not part of similar capability instruments identified in the literature. One of these newly added items that were also shown to be relevant is related to the capability of control over one's environment. Particularly, the opportunities and freedom to own assets, productive or otherwise, was highlighted. The importance and relevance of the capability were emphasised. Furthermore, aspects of gender, health and illness disparities in this capability were underlined in the discussion of its relevance. As some participants pointed out:

> "to give you one example, if we take the question of women's right to own assets, umm, there can be legal protection provided but when you take the practical implementation, it is a daily problem" (ID05, Male, 30s)

> "people would say because someone is slightly ill or even getting better, "he can't", "he can't manage assets", "he will waste resources" ... there are situations where he will be restricted

> *from owning assets, leading, supporting and actively participating, I think asking the freedom to own assets and getting a response is good"* (ID07, Male, 30s)

Another capability item related to control over one's environment was effective political participation. It was quite a sensitive issue in the country, and we went into the qualitative research with feedback pertinent to its sensitivity during the initial pre-testing. The following quote highlights a telling suspicion that inherently surrounds questions that touch on issues related to politics or political views:

> *"the questions you asked me [about being able to express political views freely] … what was that for? What is going to happen with it?"* (ID10, Male, 50s)

Nevertheless, as a topic that has a bearing on the capability of effective participation as well as freedoms of expression, it was important to include items that explore this topic. These issues have informed the revision of items that aim to solicit opportunities and freedoms in thought, expression and political participation. To address concerns raised without minimising the relevance of including the issue in the instrument, the number of items that touch on political expression and participation was reduced from two in version 2 to one in the final version and put that question at the end of the instrument so that it is not imposed early and raise concern among participants and potentially affect responses to other items.

In the same manner, the issues participants identified and raised in other domains were analysed. Issues raised were consistent with the concepts and themes of the capability domains underlining the relevance and conceptual equivalence of the capability items to the research area. Summary of the main themes generated from the data together with the a priori themes from the capability domains is presented in Table 18.

Overall, the results highlight that issues raised and discussed by participants do not fall outside of the capability domains initially outlined in the instrument as the issues identified in the analysis maps to the themes identified based on the capability domains. It indicates the concepts are well understood with good conceptual and linguistic equivalence as demonstrated by the issues and nuanced discussions the participants put forward. As a result, the original domains of core capability were maintained in finalising the instrument. The questionnaire was further revised taking into account inputs from the results of the qualitative study as well as additional considerations on questionnaire design such as positive wording and consistency of item responses. The resulting instrument is presented as Version 3 in Appendix 4B. The final version of

the instrument has 22 capability items covering ten domains of the core human capabilities. All items are positively worded, and item responses consistently defined.

Table 18. A Priori Themes Based on the Capability Domains and Data-driven Themes

Capability Domains	Pre-set Themes	Themes from Data	
		Themes	Sub-themes
Life	Long and healthy life	Longevity Premature death Healthy life	Lifestyle, living conditions and its impact Precariousness, insecurities in life and its impact Burdens of ill health Own and family members' health
Bodily Health	Good health Adequate shelter	Good health Accommodation	Health given own age Health compared to peers Housing (ownership, affordability) Facilities and infrastructure (availability, accessibility)
Bodily Integrity	Freedom of safe movement Safe and secure life Freedom of reproductive health choices	Safety and security Reproductive health	Safe movement Safe neighbourhood Reproductive health choices Barriers and facilitators in reproductive health (personal, societal and cultural, role of gender and education) Taboo around discussing certain issues

Senses, Imagination, and Thought	Opportunities to use senses, imagination and reason Freedom of expression Religious freedom	Freedom to exercise imagination and reason Freedom to express and share ideas Freedom to practice one's religion	Rights of expression Education, social interaction and expression of ideas and thoughts Dialogue and discussion in society Barriers to using the senses, to imagine and to express ideas (social, cultural, environmental)
Emotions	Attachments Emotions, love and care	Socializing and friendships Family relationships Love and care	Making friends Maintaining friendship Values of strong family relationships Impacts of loss and lack of love and care
Practical Reason	Critical reflection Good life notion and choice	Notion of life and reflection Freedom to make plans in life	Thinking about one's life Planning for the future Broad notion of life and diversity in people Aspects of good life (family, education, job, income, happiness)
Affiliation	Living with and toward others Respected and appreciated by others Social interaction and non-discrimination	Respect, tolerance, living together Appreciating others and being appreciated Community activities	Expectation of society to show respect Reciprocity in showing and receiving respect and appreciation Living in peace with others Joy of joining community activities, religious and cultural festivities
Other Species	Valuing other species	Plants Animals	Enjoying plants and animals Benefits of valuing other species General lack of appreciation in the community

Play	Play and enjoyment	Enjoyment Recreational activities	Relaxation, humour and laughs Meeting friends Barriers to enjoyment and recreations (time, money, resources)
Control Over One's Environment	Political freedom Material freedom (freedom to own assets or property) Contribution and recognition	Multifaceted reach of politics in life Benefits of political participation Contribution and mutual recognition Asset and property ownership	Barriers to political participation General reluctance to freely express political views Valuing own contribution and expectation to be recognised Gender and health disparities in asset ownership

Comparison with OxCAP-MH Capability Instrument

After finalising the instrument, the study further compares the items included in the instrument with a similar capability instrument from which ours derive. Particularly, a comparison with the OxCAP-MH, which is an instrument specifically designed to assess capability outcome among people with mental health problems, was performed. There is a significant overlap between the OxCAP-MH and our instrument. Among the 16 capability items that comprise the OxCAP-MH questionnaire, 12 of them can be found in the newly developed instrument. Among these overlapping items, only four items were similarly worded, while the majority are worded differently and have different item responses. For instance, a question that tries to capture a bodily health capability asks "does your health in any way limit your daily activities, compared to most people of your age?" with five-point responses ranging from "always" to "never" in the OxCAP-MH questionnaire, whereas in our instrument it was posed as a statement "given my age, I feel I am in good health" and invites respondents to give their assessment on the five-point scale ranging from "strongly disagree" to "strongly agree". Similarly, a question on bodily integrity and safety asks "please indicate how safe you feel walking alone in the area near your home" with responses ranging from "very safe" to "very unsafe" in the OxCAP-MH instrument while we asked respondents to rate their situation with the statement "I am able to move from place to place in my neighbourhood without fearing for my safety" on the five points agree/disagree scale. However, despite these similarities, the new instrument went further and included other items that are not in the OxCAP-MH questionnaire but

found to be contextually relevant. These include items that explore capabilities in reproductive health, asset ownership, social interactions and being valued by others as well as opportunities to join community activities. The two capability instruments are presented in Appendix 4D.

Comparison with Other Well-being Measurements

The focus of this chapter is the development of an instrument that aims to capture a broader notion of well-being using the capability approach. Chapter 1 (Section 3.3.) outlines how the approach emerged as a critique and alternative to the existing and dominant well-being frameworks such as the resource based or subjective well-being approaches. The arguments of the capability approach for broader informational basis for well-being evaluation that go beyond resources, income, happiness or satisfaction are well-documented. However, it may also be helpful to discuss some of the instruments in the other well-being traditions and highlight some of the distinctions with our instrument.

Here, I will focus on well-being instruments developed by Ryff (Ryff, 1989; Ryff & Keyes, 1995) and Keyes (Keyes, 1998). As discussed in Chapter 1, the development of these instruments of psychological and social well-being was also motivated by what was perceived as the lack of prior prevailing well-being measurements to capture the "deeper question" of what constitutes well-being (Ryff, 2014), which the authors argued is beyond simply hedonic pleasure, happiness, or satisfaction. To answer that, the psychological well-being measurement resorted to the eudaimonic perspective with its philosophical roots in Aristotle's *Nichomachean Ethics* (ibid). It takes the characterisation of the highest human good as "striving for perfection that represents the realisation of one's true potential" (Ryff, 1995). To operationalise the concepts of psychological well-being, the instrument focused on self-actualisation, functioning and optimal human development working at the intersection of concepts drawn from different fields such as developmental psychology, clinical psychology and mental health (Ryff, 1989; Ryff, 1995). The resulting psychological well-being instrument has six distinct domains that are described as follows (Ryff, 2014): (1) *purpose in life*: having meaning, purpose and direction in life; (2) *autonomy*: living in accordance with own personal convictions; (3) *personal growth*: making use of personal talents and potential; (4) *environmental mastery*: managing life situations; (5) *positive relationships*: the depth of connection people have in ties with significant others; and (6) *self-acceptance*: the knowledge and acceptance people have of themselves, including awareness of personal limitations.

The social well-being measure was developed and introduced with the argument that, further to psychological well-being which is individualised, it is important to consider social interactions and functioning in social dimensions in conceptualising and measuring well-being (Keyes, 1998). The measurement proposed five dimensions of social well-being. These are (Keyes, 1998): (1) *social integration*: the quality of one's relationship to society and community; (2) *social acceptance*: the construal of society through the character and qualities of other people as a generalised category; (3) *social contribution*: the evaluation of one's social value, including the belief that one is a vital member of society with something of value to give to the world; (4) *social actualisation*: the evaluation of the potential and the trajectory of society; and (5) *social coherence*: the perception of the quality, organisation, and operation of the social world including a concern for knowing about the world. The psychological and social well-being measures along with emotional well-being and absence or presence of mental illness were used as a basis to construct a definition for human flourishing, languishing as well as states of mental health (Keyes, 2002; Keyes & Lopez, 2002; Keyes, 2005). These well-being measurements share some things in common with the capability well-being instrument, but also differ in a number of ways. Below I will highlight some of these points.

It would be recalled that the capability approach provides the conceptual framework for the well-being instrument development in this chapter and the operationalisation derives from Nussbaum's list of core human capabilities. Sen's conceptualisation of well-being and the development of the capability approach was informed by Aristotle's *Nicomachean Ethics*, the achievement of valuable functionings and the ability to achieve combinations of functionings (Sen, 2008). Similarly, Nussbaum's formulation and list of her central human capabilities were influenced by Aristotle's ideas of human functioning (Nussbaum, 2000). As such, the conceptual and philosophical foundations of both the capability well-being and the psycho-social well-being instruments can be traced to similar roots.

The two approaches and measurements share a similar core objective of examining well-being and have shared roots. But they diverge in what well-being constitutes and offer distinctive informational basis for well-being evaluation. Although there is an overlap in some of the areas of the psychological and social well-being measures and the capability well-being instrument, they also differ in a considerable way. One such difference is in the scope of the domains of well-being. The focus of the psycho-social well-being instruments is on positive human functionings restricted to psychological and social domains, and sometimes emotional well-being is considered in their model of mental health continuum. This rather narrow focus limits the informational basis or space

for well-being evaluation. On the other hand, the well-being account the capability well-being measurement draws from and the instrument subsequently developed offers a more broader dimensions of well-being that go beyond psychological well-being, social interactions or emotions.

Another point of departure worth highlighting is the concept of capabilities. The capability approach recognises functionings (described as beings and doings, or states and activities, that people value or have reason to value) as central to well-being. However, within the capability approach framework functionings are distinguished from capabilities, where the latter refers to the various combinations of functionings (beings and doings) that a person can achieve. While functionings represent (observed) achievements, capabilities represent the real opportunities that people have to achieve or accomplish what they value. Therefore, in addition to the narrow scope and domains of well-being considered, the psycho-social well-being measurements ignore this vital conceptualisation of opportunities or freedoms in well-being assessment, which emphasises empowerment and agency on the part of individuals.

There are also few points worth pointing out on a more practical or operational level. Compared to the capability well-being instrument, the complexity and the number of items to respond to in the psychological and social well-being instruments will make them relatively difficult to implement widely and in large scale studies or surveys. In addition, with all its drawbacks, a summary measure facilitates the construction of an index to capture overall well-being with a single measure. Lack of such summary measures from the psychological and social well-being instruments may reduce their utility in employing them for economic or program evaluations. However, these drawbacks may not diminish the role the instruments can play in assessing aspects of psychological or social well-being.

3.3. Psychometric Properties of the Instrument

3.3.1. Instrument Reliability

The instrument was found to have high inter-rater reliability. The individual and average ICC were both high. The individual ICC measures the agreement between individual ratings of the paired interviewers while the average ICC measures the agreement between averages of ratings over the six interviewers. The individual ICC was 0.986 (95% CI: 0.974 - 0.992; p <0.001) and the average ICC was 0.993 (95% CI: 0.987 - 0.996; p <0.001).

Spearman-Brown formula corrected correlation coefficient for the split-half reliability test was 0.80 indicating high reliability of the instrument. Similarly, with estimated Cronbach's alpha of 0.82, the

instrument was found to have substantial internal consistency. Most of the items have an item-total correlation with an acceptable range of 0.23 and 0.62. Only three of the 22 items have a lower item-total correlation coefficient with coefficient values of 0.17 (item assessing capability related to being able to live a life secure against violent assault), 0.13 (reproductive health-related capability item) and 0.01 (capability of valuing and appreciating other species). However, the items will remain in the final questionnaire since there is no sufficient evidence on the basis of the reliability tests (the internal consistency is not significantly affected by the deletion of these items) as well as on the basis of the principles in which the scale is constructed (each item in the instrument is believed to define the capability construct and each specific item matters).

3.3.2. Instrument Validity

The correlations between the total scores of the capability instrument and scores of other established instruments were found to be moderate to high. Pearson correlations were highest with the WHODAS-12 measure (-0.497) followed by the PHQ-15 (-0.402) and the WHO-5 (0.395). The correlation was the lowest with PHQ-9 (-0.283). The correlations, except the PHQ-9, were statistically significant at 1% level. Additional details of these correlations are presented in Table 19.

In addition to the strength of the associations, the direction of the associations was as hypothesised. The correlations of the capability scores between the PHQ-9, PHQ-15 and WHODAS-12 were negative, indicating higher scores on depressive symptoms, somatic symptoms and disability are associated with lower capabilities. On the other hand, the coefficient of correlation between capability scores and WHO-5 scores was positive showing that higher subjective well-being is associated with higher capabilities.

Taken together, these results suggest an acceptable construct validity of the capability instrument.

Table 19. Correlation between Total Scores of the Capability Instrument and Other Measures

	Capability	PHQ-9	PHQ-15	WHO-5
PHQ-9	-0.283*			
	(0.0660)			
PHQ-15	-0.402***	0.531***		
	(0.0075)	(0.0002)		
WHO-5	0.395***	-0.208	-0.289*	
	(0.0088)	(0.1819)	(0.0599)	
WHODAS-12	-0.497***	0.504***	0.618***	-0.475***
	(0.0007)	(0.0006)	(0.0000)	(0.0013)

n = 43; figures in parenthesis are *p* values; *, **, *** indicates significant at 10%, 5% and 1% level respectively.

4. Concluding Remarks

This chapter presents the results of a capability instrument development and validation for use in Ethiopia. The work builds on existing works on the application of the capability approach to assess well-being. As current instruments were developed based on the other country contexts, the capability measure was adapted to ensure relevance to the context of Ethiopia. The capability measures were revised and adapted by including input from participants in Ethiopia using interviews and focus group discussions. The study shows the feasibility, validity and reliability of capability measurement in the Ethiopian context. Given the multifaceted nature of the impact of depression on individuals and inadequacy of exiting outcome assessment frameworks to reflect the impact of depression beyond symptoms, disability or limited aspects of quality of life or well-being, the instrument will provide a useful research tool to investigate the impact of depression on broader well-being empirically. This is further pursued in Chapter 5.

This is, to the best of my knowledge, the first attempt to operationalise the capabilities approach and validate the instrument with a participatory approach in Ethiopia. It will also be the first of such effort to assess the impact of depression on capabilities. However, it is also important to reflect on the process and the results and point out some potential drawbacks. Although the capability domains have been shown to have good conceptual and linguistic validity, the process was not emphatically bottom-up, and the results are based on a validation work focused on a single dominantly rural district in Ethiopia. It has not also followed steps to rank capabilities to help with the development of normative capability index based on value judgements of the participant groups. The application of the instrument for broader Ethiopian population and geographic areas may require further and relatively broader additional works of instrument validation. In addition, the application of the instrument to support economic evaluation or comparison of interventions or programs will require some work to establish a normative basis to construct a capability index and perform such program evaluations.

Chapter 5. Impact of Depression on Well-being: Empirical Analysis Using the Capability Approach

1. Introduction

Results in Chapter 3 showed the impact of depression on health-related quality of life, self-rated health and subjective well-being. Although the measures are designed to assess a core set of domains that are linked to certain aspects of health and believed to impact on quality of life, they may not adequately reflect the broader well-being impact of depression. The capability approach was used as an alternative framework to develop an instrument that can facilitate the assessment of the well-being impact of depression. A capability instrument was developed, contextualised and piloted for use in Ethiopia, as described in Chapter 4. The capability measures are focused on a broader notion of well-being and can be used to better understand and capture the multidimensional impact of depression on people's lives. This chapter put to use the data collected through the newly developed capability questionnaire. Hence, the main focus of this study is twofold. First, it aims to measure capabilities. In that regard, it builds on the literature of operationalisation of capabilities such as Anand et al. (2008; 2009; 2011), Lorgelly et al. (2015) and Simon et al. (2013). These works present efforts to develop indicators of a capability set by developing a survey instrument to solicit information from respondents about their opportunities and freedoms on different domains of life. Second, it sets out to empirically assess how depression influences capabilities.

The rest of the chapter is structured as follows. Section 2 introduces the conceptual framework and sets out the arguments how depression fits in the capability approach framework for the sake of this analysis. Section 3 provides details of the empirical data analysis strategy, discussion on data, variables and preliminary descriptive statistics. Section 4 presents estimation results on the impact of depression on well-being, and Section 5 offers concluding remarks.

2. Conceptual Framework

In this section, I will first try to outline different ways to conceptualise the role of depression in the capability approach framework, in line with the overview and framework discussed in Chapter 1 as well as the context of the literature on capabilities and mental health outcomes highlighted. Before proceeding with the discussion, one issue of clarifying semantics will be useful. Although depression

falls into one of the broad categories of mental and neurological disorders, in the discussion that follows, the term mental health will be used to indicate not experiencing depression or not being depressed for conciseness and lack of a better descriptor.

One way to conceptualise the role of depression in the capability approach framework will be to treat mental health as a means and part of resources that form the resource endowment bundle. With this view, mental health is considered as part of the capability inputs from which a capability set one can have will be formed. It may give the impression that this is separating or disembodying mental health from the individual. However, it is important to note resources in the capability approach have a wider meaning to include both material and immaterial resources. Moreover, one of the early contributions of the field of health economics was the view and formulation of health production whereby health is considered as a valued asset and can be produced and accumulated (Zweifel et al., 2009, p. 75). The health stock can, in turn, increase well-being directly or indirectly, for instance, through increased labour income, leisure or other valued activities and resources. Similar arguments can be made about mental health where it will be part of the health stock and resources that form the endowment bundle of capability inputs.

Another possible conceptualisation about the role of depression will be to consider it as part of the constraints that shape conversion factors and abilities one has in order to convert resources into capabilities. The capabilities a person have will be influenced by the individual characteristics and internal factors such as mental health status as these factors play a role in one's potential to enjoy a set of capabilities from a given set of resources. Therefore, for a given set of resources, individuals may end up having different levels of capabilities owing to their differences in their mental health status. (Robeyns, 2017, p. 98) highlighted the role of mental health conditions in ensuring reliability and robustness of capabilities, where, for instance, an individual may have opportunities for having a job, but those opportunities may be hampered by mental health problems.

Although these views are equally important, I will argue that a more conceptually plausible way to characterise depression will be to see it as a capability. I will also argue that taking this view will not minimise the role mental health potentially plays as discussed above. With this view, the real opportunities and freedoms to live a life without depression and to have a 'blissful' life free from the agony of the symptoms of depression can be considered as a capability. Although in this description, it is phrased as a capability with a positive value, the converse can also be considered as a capability. That is, being depressed can also be considered as a capability with a negative value.

Mental health as a capability can have both intrinsic and instrumental values, and in fact, this value duality is considered as a property of some capabilities and functionings (Gandjour, 2008; Robeyns, 2017, pp. 54–55). As a capability with intrinsic value, mental health can be considered an end and argue the opportunity to have a life free from depression or other mental disorders is something that will be valued in its own right. People will value enjoying a state of mental health without necessarily for its material values where a person with mental health will be able to achieve better outcomes in other areas of life. This argument also builds on the literature that argues that mental health has an intrinsic value (Lehtinen et al., 2005).

As a capability with instrumental value, mental health also plays a role that facilitates the realisation of other outcomes. The literature on depression outcomes underscores the role of depression in the various aspects of human lives ranging from physical health and disability, cognitive impairments, education, financial and social outcomes (see, for instance, Kessler (2012) for a review of the impact of depression). People experiencing depression are shown to have more negative outcomes in other dimensions of physical, social and material value than people who are not depressed. Hence, as a capability with instrumental value, depression will have an impact on what opportunities people can have and what they achieve. From this perspective depression, along with other resources and structural constraints, will have an impact on opportunities one can enjoy or capabilities one can realise.

The view of mental health as a capability with an intrinsic value and an end in itself is reputable and worth pursuing. However, in this study, I am interested in the instrumental value of mental health and aim to explore how depression is associated with capabilities. I am particularly interested in examining how experiencing depression affects other aspects and dimensions of capabilities. For this purpose, I will propose slightly extending the representation of the capability set to take into account the role of depression.

The hypothesis is that depression, as a capability with instrumental value, will impact the capability generating capacity of individuals regardless of the conversion factors at their disposal or structural constraints they face. To capture the impact of depression, a function $d(.)$ is introduced, which is simply termed as 'augmented utilisation function', to reflect the difference due to depression in the pattern of use of resources a person can make in generating a vector of achieved functionings for a

given vector of resources and conversion factors. I extended representation of achieved functionings b_i as follows:

$$b_i = d(f_i(c(x_i)))$$ (1)

where

x_i represents a vector of resources of person i;

$c(.)$ the function converting a resource vector into a vector of characteristics of those resources;

$f_i(.)$ the function, which is termed as personal utilisation function, generating a vector of functionings from a vector of characteristics;

b_i represents a vector of functionings; and

$d(.)$ represents the 'augmented utilisation function'. We interpret the depression 'augmented utilisation function' $d(.)$ to be different among individuals depending on their state of depression and reflect the possibility of differences in achieved functionings due to depression.

The capability set Q_i will, therefore, be given by:

$$Q_i(X_i) = \{b_i | b_i = d(f_i(c(x_i))) \text{, for some } f_i(.) \in F_i \text{ and for some } x_i \in X_i\}.$$ (2)

Equation (2) represents the underlying relationship for the empirical investigation of the impact of depression on capabilities.

3. Methods and Preliminary Analysis

3.1. Model Estimation

The following model was estimated to empirically investigate the proposed relationship between capabilities and depression, assuming a linear approximation of the underlying model presented in equation (2):

$$Q_i = \alpha_0 + \alpha_1 d_i + \gamma_j x_{ij} + u_i$$ (3)

where Q_i denotes capability variable for individual i, d_i represents depression variable, x_{ij} is shorthand for several other n explanatory variables ($j = 1, \ldots, n$) including resources and conversion factors and u_i represents an error term.

There are different issues at hand to choosing appropriate estimation methods that produce unbiased and consistent estimators of the ceteris paribus effect of depression on capabilities. There are reasons to suspect endogeneity in the model, which will make the ordinary least square (OLS) estimators inconsistent. Two potential sources of endogeneity are worth highlighting here. First, omitted variables that could potentially influence capabilities but are part of the error term will result in a correlation between the dependent variable and the error term. If the omitted variables are also correlated with depression, this will also mean the error term is correlated with the explanatory variable, depression. This concern is not unreasonable given the argument in this chapter that depression is a capability and a set of factors could simultaneously affect depression and other capabilities but are not part of our measurement. Therefore, potential omitted variable bias may affect the coefficient estimates. Another potential source of endogeneity is simultaneity. Depression enters the model as an explanatory variable, given the objective of the analysis is exploring how depression affects capabilities. Although the model in equation (3) outlines the direction of impact from depression to capabilities, there may also be reverse causation and capabilities may be part of a set of predictor variables for depression. Given these potential sources of bias, the coefficient estimates obtained by applying the usual OLS can be biased and inconsistent. The results of the OLS estimations are presented in Section 4.1 and 4.2. The issue of endogeneity is further explored with an instrumental variable approach, with a discussion on the model estimation and the choice of instruments in Section 4.3.

3.2. Description of Data and Variables

As the main objective of this investigation is to estimate the relationship between depression and capabilities, this section will proceed with the description of data focusing on these two sets of variables.

Capability Variables

The capability measures derive from data collected with an instrument designed to elicit and measure individuals' opportunities and freedoms of beings and doings in various domains of life. The details of the instrument development and validation process are outlined in Chapter 4. The capability instrument is comprised of 22 capability indicators with self-reported degrees of agreement to different statements related to aspects of life; bodily health; bodily integrity; senses, imagination and thought; emotions; practical reason; affiliation; other species; play; and control over the environment. Respondents provide answers indicating their level of agreement on a scale

of 1 to 5, where 1 indicates strong disagreement and the lowest level of capability and 5 indicates strong agreement and the highest level of capability. Therefore, the capability indicators are ordinal variables with five response categories. Summary statistics of the indicators are presented in Table 21.

As a summary measure, a total capability index was constructed in two steps. First, a summary index was constructed by adding up the responses over the 22 capability questions. Given the five categories of responses ranging from 1 to 5, this raw total capability score ranges between 22 and 110. A normalised capability index was then constructed, in line with previous work (Vergunst et al., 2017). The normalised capability index was constructed based on the raw total capability scores employing a min-max feature scaling method of the form:

$$Q = \left(\frac{Q^* - min}{max - min} \right) * 100$$

where Q is the normalised total capability index and Q* is the raw total capability score. The total capability index ranges from 0 to 100, indicating the lowest and highest levels of capability. Summary statistics for the capability index is reported in the last row of Table 21. The capability index, as described above, is an example of an index with normative weighting that applies equal weights to all capability items (Decancq & Lugo, 2013). This well-being measure is the one mainly used in the analysis.

As a robustness check, I constructed alternative aggregate capability measures using a count method. The aggregate capability indicator constructed with a count method follows a similar approach to Anand et al. (2011). The five-item responses for each capability indicator was converted into a binary indicator of capability based on whether responses were higher or lower than a predetermined response threshold. This first step results in a binary capability indicator to capture whether an individual enjoys or is deprived of each capability. Specifically, each binary capability indicator $\tilde{q}_j$ was constructed as follows:

$$\tilde{q}_j = \begin{cases} 1 \ if \ q_j \geq \ q_j^* \\ 0 \ otherwise \end{cases}, \ for \ all \ j = 1, \dots, 22$$

where q_j^* is a predetermined threshold on the responses of the capability indicators to indicate deprivation or presence of a given capability indicator j, where j=1,…,22 in our case. I constructed capability count indicators for each item by setting the threshold at 4, i.e., $q_j^* = 4$ such that the associated capability count indicator is 1 and the respondent is considered to enjoy the given

capability if the respondent either provide an agreement or strong agreement to the statement that elicits the capability and 0 otherwise. These binary capability indicators are then used to develop a summary capability index, Q,

$$Q = \Sigma_{j=1}^{22} \tilde{q}_j$$

This summary capability index will measure the number of indicators that a person enjoys. It ranges from 0 to 22 where lower values indicate capability deprivation and higher values indicate higher levels of capability. The total capability indicator obtained this way had a high correlation with the capability index (r=0.7849, *p*<0.0001).

In addition, a summary capability index was constructed using latent factor method, which is an example an index with data-driven weights (Decancq & Lugo, 2013). With this method, I assumed there is an unobserved latent capability, and we can think of it as a variable that can be inferred from responses elicited for the capability indicators in various dimensions of life. A generalised structural equation model was estimated to predict a latent capability variable from the 22 capability observed indicators. The latent capability indicator obtained through this alternative approach was also highly correlated with the capability index (r=0.9807, *p*<0.0001).

Depression Variable

The measure of depression is based on the 9-item Patient Health Questionnaire, PHQ-9. The PHQ-9 is a brief symptom-based depression module that asks respondents to express to what extent they have been affected in the past two weeks by different problems that are relevant for the identification and severity of depression such as affect, cognition, sleep, movement and speech impairment and suicidal ideation. The responses for the 9-items take one of four values ranging from 0 (not at all) to 3 (nearly every day). The total PHQ-9 score ranges between 0 and 27 increasing in severity of depression as the score increases. It is a widely used measure in screening depression in primary care settings, and it has been validated in Ethiopia in hospital and primary health facility settings and found to be a valid measurement of depression (Gelaye et al., 2013; Hanlon et al., 2015). This study applies different measures of depression. First, it treats the PHQ-9 score as a continuous variable. Second, in an instrument validation study in Ethiopia, a depressive symptom score of five or higher was shown to have adequate sensitivity and specificity to detect depression (Hanlon et al., 2015). This information serves as a basis to construct a binary variable for depression. This variable uses the PHQ-9 score of 5 as the cut-off point, taking the value 0 for scores below 5 and the value 1 for scores higher than or equal to 5. Furthermore, additional depression status variable was explored using the PHQ-9 score of 10 as a cut-off as it has been shown to provide an optimal cut

point for the diagnosis of major depressive disorders (Gelaye et al., 2013). So, we expect with these two variables to pick up all respondents with probable depression, and all respondents with severe depression, respectively.

Additional Explanatory Variables

The multivariate regression equations, modelling capabilities as a function of depression, accounted for other socio-demographic and economic factors. These include gender, age, level of education and marital status. To capture socioeconomic status, the estimations also include a multidimensional deprivation score by constructing a deprivation indicator using education and living standards indicators such as access to clean water, sanitation facilities, electricity, asset ownership. The multidimensional deprivation score calculation and the domains selected followed the deprivation calculation method of the multidimensional poverty index (MPI) (UNDP, 2018) and it was inspired by adaptations of the measure for individual-level measurement of multidimensional poverty (Vijaya et al., 2014). (See Appendix 5A for the details of the deprivation score calculation.) In addition, the analyses included other explanatory variables to account for the potential impact of experiences and environments such as experiencing stressful life events (measured using the Life Threatening Events, LTE, questionnaire) and social support and networks (Oslo-3 Social Support Scale, OSS-3 questionnaire).

3.3. Summary Statistics

Before presenting some descriptive statistics related to depression and the capability measures described in Sections 3.1 and 3.2 above, this section provides summary statistics of participants by socio-demographic characteristics such as gender, age, place of residence, marital status and level of education. From a total of 408 participants, the gender distribution of participants was almost evenly split between female (50.2%) and male (49.8%) participants. The mean age of participants is close to 36 years of age, and around 50 per cent of all respondents are 34 years of age or younger. See Table 20 below for details of additional summary statistics.

Table 20.Socio-demographic Characteristics of Participants

(*n*=408)	Count	mean	percentage or s.d.
Gender			
Male	203		49.8
Female	205		50.2
Age	408	35.99	13.60
18-24	90		22.1
25-34	112		27.5

35-44	92			22.5
45-64	93			22.8
64+	21			5.1
Residence				
Urban	118			28.9
Rural	290			71.1
Marital Status				
Never-married	81			19.9
Married	308			75.5
Divorced	9			2.2
Widowed	10			2.5
Education				
can't read/write	116			28.4
can read-write (no formal education)	54			13.2
primary education	141			34.6
High school education or above	97			23.8
Depressive symptoms score (PHQ-9; 0-27)	408	5.54		5.53
minimal (<=4)	233			57.1
mild to moderate (5-14)	140			34.3
moderately severe to severe (>14)	35			8.6
Multidimensional deprivation score (0-1)	408	0.48		0.21
Number of recent stressful events (LTE; 0-12)	408	1.68		1.72
none	114			27.9
one	113			27.7
two or more	181			44.4
Social support score (OSS3; 3-14)	408	10.59		2.28
poor support (<=8)	63			15.4
intermediate support (9-11)	190			46.6
strong support (>11)	155			38.0

Turning to the summary statistics of the capability indicators (Table 21), and treating these as continuous variables, on average, respondents seem to have reported enjoying high levels of capabilities where the mean score of the capability indicators ranges between 3.74 and 4.72 on the scale of 1 to 5. The lowest reported average capability score was in the domain of good health (3.74, SD=0.93), being able to have adequate accommodation (3.79, SD=0.87) and the political freedom capability (3.86, SD=0.89). On average, respondents have reported the highest capability score in religious freedom capability (4.72, SD=0.45). The mean score of the capability index was also high (71.4, SD=14.09). The distribution of the capability index is visualised with a histogram in Figure 3.

Table 21. Summary of Capability Variables

Capability Domains		n	Mean	Median	SD	Min	Max
Life	(1) long and healthy life	408	4.00	4	0.69	1	5
Bodily health							
	(2) good health	408	3.74	4	0.93	1	5

	(3) adequate accommodation	408	3.79	4	0.87	1	5
Bodily integrity							
	(4) free and safe movement	408	4.11	4	0.86	1	5
	(5) security against violence	408	4.11	4	0.81	1	5
	(6) reproductive health choices	408	4.16	4	0.69	1	5
Senses, imagination and thought							
	(7) imagination and reason	408	4.20	4	0.65	1	5
	(8) free expression of ideas	408	4.29	4	0.60	1	5
	(9) religious freedom	408	4.72	5	0.45	3	5
Emotions							
	(10) lasting friendships	408	4.18	4	0.68	1	5
	(11) love and support	408	4.16	4	0.75	1	5
Practical reason							
	(12) reflect on life	408	4.31	4	0.52	2	5
	(13) plan life	408	4.24	4	0.57	2	5
Affiliation							
	(14) respect and appreciate others	408	4.29	4	0.59	2	5
	(15) respected and appreciated by others	408	4.05	4	0.76	1	5
	(16) meet socially	408	4.19	4	0.58	2	5
	(17) join community activities	408	4.24	4	0.66	2	5
Other species	(18) value and appreciate other species	408	4.40	4	0.50	3	5
Play	(19) enjoy recreational activities	408	4.05	4	0.71	1	5
Control over one's environment							
	(20) asset ownership	408	4.22	4	0.63	1	5
	(21) valuable association	408	4.10	4	0.65	1	5
	(22) free expression of political views	408	3.86	4	0.89	1	5
Capability Index	Total capability score	408	71.40	70.77	14.09	0	100
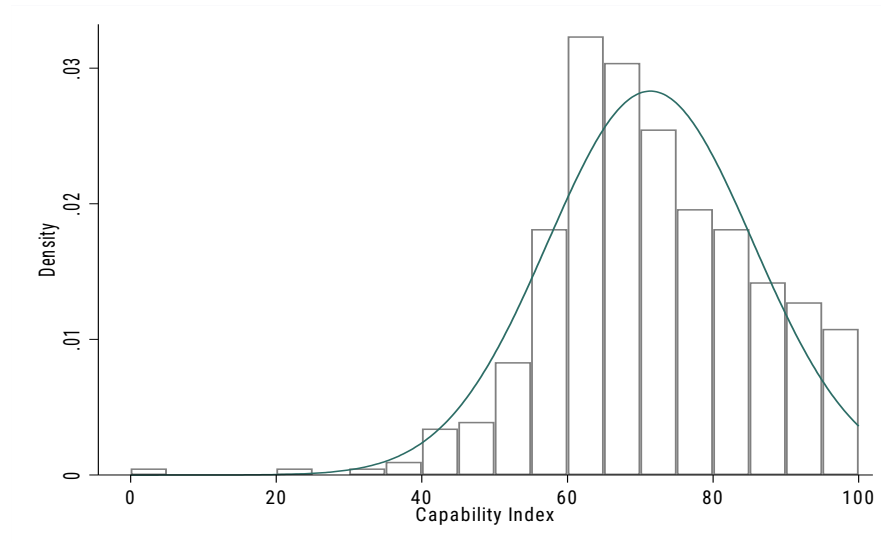
Figure 3. Histogram of the Capability Index

An additional summary of the capability indicators based on the count method is provided below. This summarised the extent to which respondents report the level of capabilities they enjoy per the binary classification of capability that was defined based on scores a higher level of capability threshold. To recall, the binary capability indicator was created based on a predetermined threshold, and 1 represents responses with 4 or higher on the 1 to 5 scale of a given capability indicator and 0 represents scores less than 4. The mean values of the binary capability indicators represent the percentage of respondents who are reported as enjoying each capability. The results are graphically presented in Figure 4. Similar to the previous summary results, a large percentage of respondents seem to enjoy each capability. About 36 per cent (148/408) respondents report enjoying each capability at the same time, while only one respondent reported capability deprivations in all indicators at the same time. The highest percentage of respondents reported enjoying religious freedom capability. On the other hand, the higher percentage of people reporting deprivation in capabilities were found in the capability of being healthy, followed by adequate accommodation and political freedom, where an estimated 25.7, 24 and 21.1 per cent of respondents reporting capability deprivations in these capability indicators, respectively. The results with these measures are consistent with the average scores presented earlier.
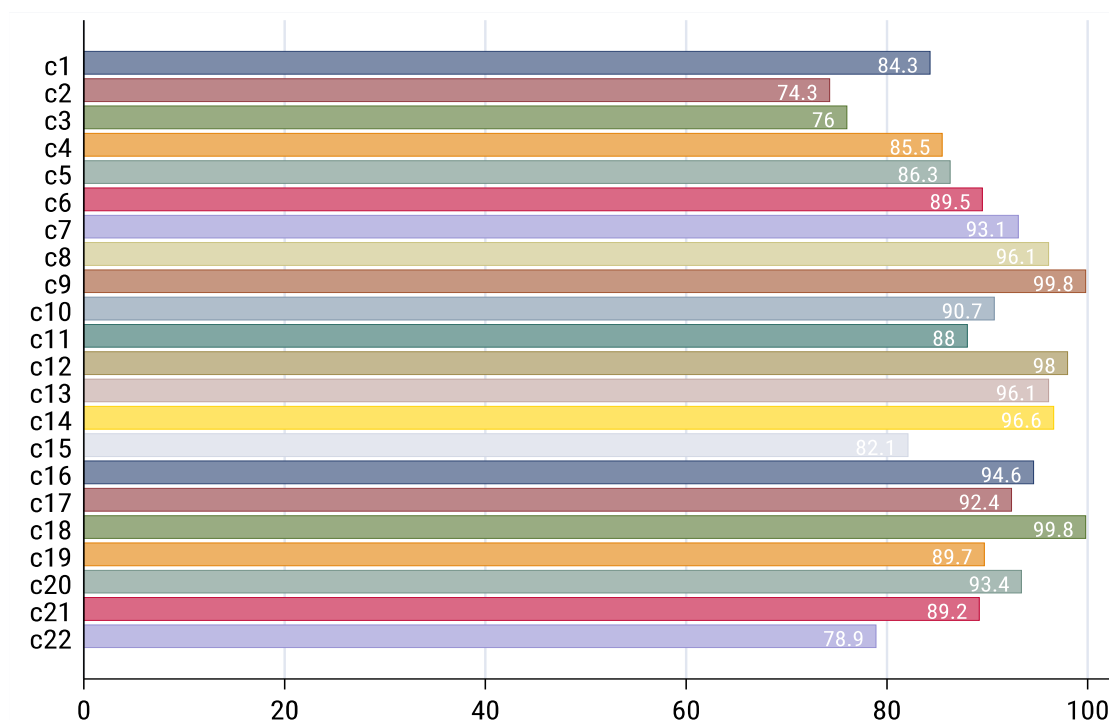
Figure 4. Percentage of Respondents Enjoying Each Capability

[***Note on capability indicators***. ***c1***: long and healthy life; ***c2***: good health; ***c3***: adequate accommodation; ***c4***: free and safe movement; ***c5***: security against violence; ***c6***: reproductive health choices; ***c7***: imagination and reason; ***c8***: free expression of ideas; ***c9***: religious freedom; ***c10***: lasting friendships; ***c11***: love and support; ***c12***: reflect on life; ***c13***: plan life; ***c14***: respect and appreciate others; ***c15***: respected and appreciated by others; ***c16***: meet socially; ***c17***: join community activities; ***c18***: value and appreciate other species; ***c19***: enjoy recreational activities; ***c20***: asset ownership; ***c21***: valuable association; ***c22***: free expression of political views]

To descriptively explore the difference in capabilities according to depressive symptoms respondents experience, Table 22 presents a two-way summary of capability indicators and depression. This analysis used the binary indicator of depression which was constructed based on the total PHQ-9 depressive symptom score. Those participants who score less than 5 are labelled as screening negative, and participants who score 5 or more are labelled as screening positive. The distribution of the PHQ-9 score is depicted in Figure 5

112
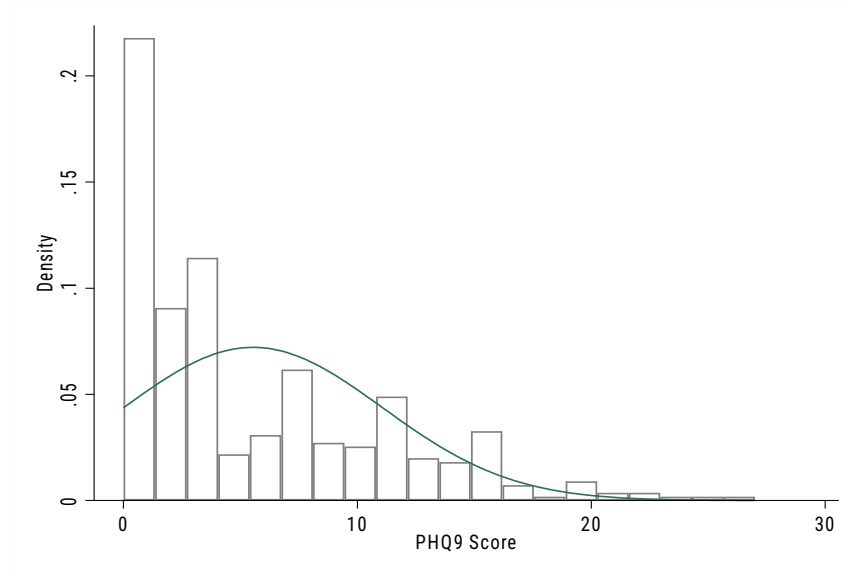
Figure 5. Histogram of PHQ-9 Scores

Respondents who screen positive for depressive symptoms have a slightly lower average score with all the capability indicators as well as the total capability index. These differences were also statistically significant except for the capability to appreciate and value other species and the political freedom indicators, which implies that on average people with higher depressive symptoms tend to report lower levels of capabilities compared to people with minimal or no depressive symptoms.

Table 22. Summary of Capability Index by Depression Status

Capabilities	Screening negative (n=233)				Screening positive (n=175)				
	Mean	SD	Min	Max	Mean	SD	Min	Max	p-value [a]
long and healthy life	4.18	0.57	2	5	3.74	0.76	1	5	<0.001
good health	4.07	0.74	2	5	3.30	0.97	1	5	<0.001
adequate accommodation	3.93	0.81	1	5	3.60	0.91	1	5	<0.001
free and safe movement	4.27	0.80	1	5	3.89	0.90	1	5	<0.001
security against violence	4.25	0.73	2	5	3.93	0.88	1	5	<0.001
reproductive health choices	4.24	0.66	1	5	4.05	0.72	2	5	0.007
imagination and reason	4.29	0.61	2	5	4.09	0.69	1	5	0.002
free expression of ideas	4.38	0.52	2	5	4.18	0.68	1	5	<0.001
religious freedom	4.76	0.43	4	5	4.66	0.49	3	5	0.026
lasting friendships	4.27	0.65	1	5	4.06	0.70	2	5	0.002
love and support	4.28	0.67	2	5	3.99	0.83	1	5	<0.001
reflect on life	4.38	0.49	3	5	4.22	0.55	2	5	0.002
plan life	4.33	0.52	2	5	4.13	0.60	2	5	<0.001
respect and appreciate others	4.36	0.53	2	5	4.18	0.64	2	5	0.002

respected and appreciated by others	4.17	0.65	2	5	3.89	0.86	1	5	<0.001
meet socially	4.28	0.49	2	5	4.08	0.66	2	5	<0.001
join community activities	4.39	0.53	3	5	4.03	0.76	2	5	<0.001
value and appreciate other species	4.42	0.50	4	5	4.38	0.50	3	5	0.34
enjoy recreational activities	4.22	0.52	2	5	3.82	0.86	1	5	<0.001
asset ownership	4.32	0.57	2	5	4.10	0.68	1	5	<0.001
valuable association	4.20	0.55	2	5	3.97	0.74	1	5	<0.001
free expression of political views	3.91	0.90	1	5	3.81	0.88	1	5	0.26
capability index	75.23	12.33	49.23	100	66.29	14.69	0	98.46	<0.001

[a] p-values of two-sample t-test. *, ** and *** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively.
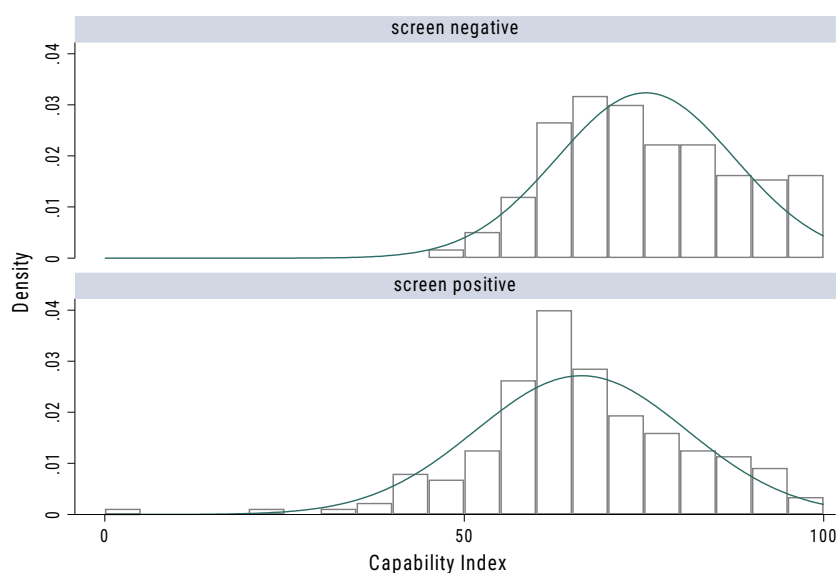
Figure 6. Histogram of the Capability Index by Depression Status

Finally, I present a summary of the capability index by different socio-demographic characteristics of respondents and analysis of variance results to assess if there is a meaningful difference between the capability score among the different groups. The average scores vary across different groups highlighting the role of gender, age and other conversion factors and resources play in the varying degrees individuals enjoy capabilities. The average scores of the capability index vary between gender, age groups and other characteristics of participants and these differences were found to be statistically significant except for levels of education and place of residence. The results indicate women have lower capability score than men highlighting the potential role of gender in the opportunities and freedoms people have. On the other hand, people in the older age groups or those who are married have reported higher levels of capabilities. We have seen above how people

who screen positive for a probable depression tend to report lower levels of capabilities. A gradient look at the difference in capabilities with respect to depressive symptoms severity below also highlights that people who show moderately severe to severe depressive symptoms have the lowest capability score than those with mild to moderate or minimal depressive symptoms. Experiencing recent stressful or life-threatening events appear to negatively correlate with capabilities, whereas having stronger social support and networks seems to have a positive association.

Table 23. Summary of the Capability Index by Socio-demographic Characteristics of Participants

Variable	N	Mean	Sd	Min	Max	p-value [a]
Gender						0.016**
Male	203	73.08	14.38	0	100	
Female	205	69.73	13.63	21.54	100	
Age						0.0246**
18 – 24	90	67.38	13.59	21.54	100	
25 – 34	112	71.68	13.76	36.92	100	
35 – 44	92	73.46	15.65	0	100	
45 – 64	93	72.01	12.98	40	98.46	
65+	21	75.31	12.97	50.77	96.92	
Education						0.9560
Illiterate	116	70.82	13.65	36.92	98.46	
read/write, no formal education	54	71.85	13.05	44.62	96.92	
primary school	141	71.42	15.46	0	100	
high school or above	97	71.78	13.24	43.08	100	
Marital status						0.1141*
Never married	81	68.07	14.50	21.54	100	
Married	308	72.33	13.98	0	100	
divorced	9	70.26	11.44	56.92	93.85	
widowed	10	70.62	14.07	56.92	96.92	
Place of residence						0.7571
urban	118	71.73	12.62	44.62	100	
rural	290	71.26	14.67	0	100	
Depressive symptoms (PHQ-9 score)						<0.001***
Minimal	233	75.23	12.33	49.23	100	
mild to moderate	140	68.24	13.18	38.46	98.46	
moderately severe to severe	35	58.46	17.75	0	89.23	
Recent stressful events (LTE)						<0.001***
none	114	78.15	12.70	50.77	100	
one	113	74.06	12.31	44.62	98.46	
two or more	181	65.47	13.60	0	95.38	
Social support (OSS3 score)						<0.001***
poor support	63	62.32	15.06	0	95.38	
intermediate support	190	69.21	11.68	36.92	100	

strong support	155	77.77	13.63	21.54	100

4. Results

4.1. Association between Depression and Capability Domains

The initial exploration involves examining the association between depression and each capability indicator. Here, we started with a univariate OLS estimation where the dependent variable is a capability indicator, and the explanatory variable is depression. This ignores the capability indicators are of categorical nature and treats them as continuous variables. However, it will serve as a starting point in examining the association, and additional analyses are conducted, taking into account the categorical characteristic of the capability variables. As explained in Section 3.2, depression was measured as a continuous variable with PHQ-9 depressive symptoms score and two binary variables constructed based a PHQ-9 cut-off score of 5 and 10, an optimal score that can identify people with probable depression and major depressive disorder respectively.

The OLS estimation results are presented in Table 24. The three columns represent the results for the three depression variables; column (1) represents a continuous variable of PHQ-9 scores, column (2) represents a binary variable at a cut-off score of 5, and column (3) is a binary depression variable at a cut-off score of 10. Separate equations for each capability indicator and the three depression variables were estimated and reported. Each row in the table represents these separate regression results for a given capability indicator and a depression variable. For instance, the results of the first row report the association between depression and life capability domain.

The results highlight a significant negative association between depression and capabilities. All capability indicators were negatively associated with elevated depressive symptoms as measured by higher PHQ-9 score (column 1). Similarly, all capability indicators but two were negatively associated with probable depression (column 2). The two capability variables that were not statistically significant were being able to appreciate and value other species and the freedom for political expression. The results also show a negative association between major depressive disorder and capabilities (column 3). The associations were statistically significant for all capability indicators but two, namely the freedom and opportunity to make reproductive health choices and practice one's religion. All in all, these initial explorations highlight a significant and negative association between depression and capabilities.

Table 24. Results of Univariate Ordinary Least Square Regressions

dependent variable [a] (n=408)	(1) Coefficient [b]	(2) Coefficient [c]	(3) Coefficient [d]
long and healthy life	-0.0445***	-0.442***	-0.521***
	(0.00666)	(0.0682)	(0.0879)
good health	-0.0693***	-0.776***	-0.782***
	(0.00862)	(0.0879)	(0.112)
adequate accommodation	-0.0307***	-0.327***	-0.410***
	(0.00797)	(0.0870)	(0.105)
free and safe movement	-0.0405***	-0.379***	-0.493***
	(0.00789)	(0.0858)	(0.102)
security against violence	-0.0375***	-0.328***	-0.486***
	(0.00771)	(0.0818)	(0.103)
reproductive health choices	-0.0166***	-0.185***	-0.0976
	(0.00617)	(0.0694)	(0.0822)
imagination and reason	-0.0261***	-0.202***	-0.345***
	(0.00657)	(0.0656)	(0.0818)
free expression of ideas	-0.0273***	-0.201***	-0.288***
	(0.00666)	(0.0614)	(0.0807)
religious freedom	-0.0109**	-0.101**	-0.0662
	(0.00427)	(0.0461)	(0.0560)
lasting friendships	-0.0318***	-0.209***	-0.313***
	(0.00662)	(0.0682)	(0.0863)
love and support	-0.0394***	-0.289***	-0.425***
	(0.00757)	(0.0763)	(0.0976)
reflect on life	-0.0241***	-0.161***	-0.283***
	(0.00476)	(0.0524)	(0.0633)
plan life	-0.0235***	-0.205***	-0.291***
	(0.00503)	(0.0570)	(0.0662)
respect and appreciate others	-0.0216***	-0.182***	-0.227***
	(0.00556)	(0.0596)	(0.0724)
respected and appreciated by others	-0.0339***	-0.286***	-0.416***
	(0.00692)	(0.0778)	(0.0967)
meet socially	-0.0238***	-0.199***	-0.254***
	(0.00570)	(0.0595)	(0.0749)
join community activities	-0.0358***	-0.356***	-0.380***
	(0.00626)	(0.0675)	(0.0850)
value and appreciate other species	-0.00710	-0.0477	-0.0978*
	(0.00440)	(0.0497)	(0.0574)
enjoy recreational activities	-0.0428***	-0.396***	-0.511***
	(0.00748)	(0.0734)	(0.0972)
asset ownership	-0.0301***	-0.220***	-0.347***
	(0.00710)	(0.0639)	(0.0824)
valuable association	-0.0272***	-0.226***	-0.267***
	(0.00707)	(0.0665)	(0.0872)
free expression of political views	-0.0181**	-0.0999	-0.280***

(0.00779)	(0.0890)	(0.104)

Table 25 reports the results of an ordered logistic regression accounting for the categorical nature of the capability indicators. Column 1a presents results where the explanatory variable is a continuous depression variable, whereas Columns 2a and 3a report results on the association between capabilities and depression where depression is treated as a binary variable. The results show depression is negatively associated with all capability indicators. Coefficient estimates of only one capability variable, namely being able to appreciate and value other species, was not statistically significant although the coefficient estimate was still negative. Most of these associations were consistently reflected in another set of analyses where depression was treated as a binary variable (based on the PHQ-9 cut-off score of 5, Column 2a). In these estimations as well, all capability indicators were negatively associated with depression, and all but two indicators were statistically significant (the capability of being able to appreciate and value other species and political freedom and expression capability). The results also show a consistent negative association between major depressive disorder (based on the PHQ-9 cut-off score of 10) and capabilities (Column 3a). In these estimations, only two capability indicators were not statistically significant, namely the freedom and opportunity to make reproductive health choices and practice one's religion.

Given the dependent variables in Table 25 are ordinal variables, interpretation and the magnitude of the effect of depression on the capability variables is not straight forward. To make that easier, marginal effect estimates are included. These are reported in Columns 1b, 2b and 3b. In reporting the results, we limit ourselves to presenting the marginal effects of depression on reporting the highest score of a given capability indicator. To recall, the capability indicators are 5-levels ordered categorical variables and the reported results are the marginal effect estimates that show the effect of depression on reporting the highest score, i.e., reporting a 5 for a given capability indicator on the scale of 1 to 5.

The interpretation of the marginal effects for the analysis is the effect of a marginal increase in score of depressive symptoms on the likelihood of enjoying a higher level of capabilities. The results suggest that the probability of enjoying higher levels of capability decreases with an increase in depressive symptoms. For instance, a marginal increase in the score of depressive symptoms will decrease the likelihood of having higher capabilities in life domain by 1.9 percentage points. Marginal effects for variables that are statistically significant range between 0.7 percentage points for the capability to express political views to 2.3 for the capability of affiliation and being able to join community activities.

Interpretation of the marginal effects reported in Column 2b and 3b follow a similar logic. In these cases, since the explanatory variable is a dummy depression variable, the effects represent the marginal effect of having a probable depression and major depressive disorder, respectively, on the likelihood of enjoying a higher level of capabilities. For instance, respondents who screen positive for depression are 19 per cent less likely to have reported higher levels of being able to have a capability of long and healthy life than those who screen negative. Similarly, respondents who are likely experiencing major depressive disorder are 17 per cent less likely to have reported higher levels of capability to lead a long and healthy life.

Table 25. Results of Univariate Ordered Logistic Regressions

dependent variable [a] (n=408)	(1a) Coefficient [b]	(1b) dy/dx[c]	(2a) Coefficient [d]	(2b) dy/dx	(3a) Coefficient [e]	(3b) dy/dx
long and healthy life	-0.133***	-0.0187***	-1.388***	-0.186***	-1.559***	-0.173***
	(0.0190)	(0.00278)	(0.230)	(0.0289)	(0.252)	(0.0241)
good health	-0.153***	-0.0177***	-1.848***	-0.196***	-1.641***	-0.151***
	(0.0196)	(0.00255)	(0.222)	(0.0265)	(0.224)	(0.0210)
adequate accommodation	-0.0693***	-0.00879***	-0.757***	-0.0930***	-0.930***	-0.0997***
	(0.0167)	(0.00226)	(0.199)	(0.0250)	(0.217)	(0.0219)
free and safe movement	-0.0989***	-0.0218***	-0.937***	-0.200***	-1.198***	-0.230***
	(0.0176)	(0.00390)	(0.199)	(0.0405)	(0.220)	(0.0367)
security against violence	-0.0961***	-0.0204***	-0.812***	-0.169***	-1.192***	-0.219***
	(0.0189)	(0.00392)	(0.203)	(0.0398)	(0.245)	(0.0371)
reproductive health choices	-0.0485***	-0.01000***	-0.532***	-0.108***	-0.280	-0.0562
	(0.0185)	(0.00377)	(0.204)	(0.0401)	(0.238)	(0.0462)
imagination and reason	-0.0829***	-0.0171***	-0.651***	-0.132***	-1.141***	-0.202***
	(0.0194)	(0.00394)	(0.210)	(0.0413)	(0.263)	(0.0386)
free expression of ideas	-0.0880***	-0.0196***	-0.601***	-0.133***	-0.920***	-0.187***
	(0.0235)	(0.00505)	(0.212)	(0.0451)	(0.292)	(0.0508)
religious freedom	-0.0495***	-0.00985***	-0.479**	-0.0967**	-0.285	-0.0589
	(0.0191)	(0.00377)	(0.223)	(0.0452)	(0.255)	(0.0541)

lasting friendships	-0.0967***	-0.0198***	-0.655***	-0.133***	-0.946***	-0.174***
	(0.0204)	(0.00401)	(0.207)	(0.0406)	(0.273)	(0.0421)
love and support	-0.101***	-0.0216***	-0.727***	-0.154***	-1.107***	-0.209***
	(0.0195)	(0.00402)	(0.203)	(0.0409)	(0.264)	(0.0407)
reflect on life	-0.103***	-0.0224***	-0.602***	-0.130***	-1.201***	-0.227***
	(0.0225)	(0.00471)	(0.216)	(0.0452)	(0.310)	(0.0466)
plan life	-0.0929***	-0.0189***	-0.734***	-0.147***	-1.221***	-0.211***
	(0.0206)	(0.00408)	(0.221)	(0.0420)	(0.293)	(0.0404)
respect and appreciate others	-0.0716***	-0.0159***	-0.567***	-0.124***	-0.791***	-0.161***
	(0.0200)	(0.00435)	(0.212)	(0.0449)	(0.267)	(0.0485)
respected and appreciated by others	-0.0815***	-0.0156***	-0.651***	-0.123***	-1.034***	-0.172***
	(0.0173)	(0.00322)	(0.204)	(0.0362)	(0.247)	(0.0342)
meet socially	-0.0847***	-0.0160***	-0.647***	-0.121***	-0.900***	-0.151***
	(0.0206)	(0.00373)	(0.229)	(0.0399)	(0.295)	(0.0416)
join community activities	-0.105***	-0.0231***	-0.992***	-0.211***	-1.108***	-0.216***
	(0.0188)	(0.00399)	(0.213)	(0.0415)	(0.258)	(0.0423)
value and appreciate other species	-0.0287	-0.00693	-0.188	-0.0452	-0.397	-0.0934*
	(0.0189)	(0.00455)	(0.205)	(0.0490)	(0.247)	(0.0563)
enjoy recreational activities	-0.124***	-0.0192***	-1.108***	-0.167***	-1.561***	-0.189***
	(0.0208)	(0.00304)	(0.240)	(0.0314)	(0.299)	(0.0270)
asset ownership	-0.0968***	-0.0202***	-0.702***	-0.145***	-1.129***	-0.205***
	(0.0239)	(0.00475)	(0.213)	(0.0419)	(0.286)	(0.0419)
valuable association	-0.0812***	-0.0141***	-0.659***	-0.113***	-0.783***	-0.123***
	(0.0222)	(0.00365)	(0.220)	(0.0354)	(0.285)	(0.0378)
free expression of political views	-0.0423***	-0.00675***	-0.272	-0.0431	-0.675***	-0.0961***
	(0.0155)	(0.00256)	(0.194)	(0.0306)	(0.215)	(0.0282)

[a] each row is a separate regression of capability item on depression where ordered logit model was estimated.

[b] the explanatory variable for these univariate estimations is a depressive symptom measure based on a PHQ-9 score, which is treated as a continuous variable.

[c] average marginal effects. The marginal effects are predicted at the highest margin of the capability score.

[d] the explanatory variable for these estimations is a binary probable depression variable (a PHQ-9 cut-off score of 5).

[e] the explanatory variable for these estimations is a binary major depressive disorder variable (a PHQ-9 cut-off score of 10).

*, ** and *** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively; robust standard errors in parenthesis.

Previous work on capabilities and mental health, although not specifically focused on depression, has shown that people with mental illnesses (schizophrenia and other psychotic disorders) on average reported lower capabilities in most of the domains (Simon et al., 2013). The analyses above with a focus on depression have shown similar results on the association between mental illnesses and capabilities. The results are also consistent with literature that focused on various aspects of the impact of depression. For instance, the results show the capability to live a long and healthy life and not dying prematurely is negatively associated with depression. Previous research has

documented the association of depression and increased mortality. Different studies have documented this increased risk of mortality (Wulsin et al., 1999; Cuijpers & Smit, 2002; Cuijpers & Schoevers, 2004; Gilman et al., 2017; Patten et al., 2019). A 10 years follow-up study in Ethiopia has shown that depression was associated with a higher year of life lost (YLL) than other mental health conditions (Fekadu et al., 2015). Although identifying the path of association or establishing causation still needs more work, the current evidence makes the association between depression and excess morality clear.

Depression was also associated with the inability to have and enjoy good bodily health, which is consistent with previous works that showed depression is associated with a reduction both in health and capability (Mitchell et al., 2015). Furthermore, comorbidity of depression with other chronic illnesses may contribute to the limit on people's capabilities to have and enjoy good health. Other dimensions of capabilities and aspects of mental abilities, emotions and feelings such as having enough opportunities to use imagination and reason, freely express and share ideas, reflect on life and plan one's own life were similarly found to be negatively impacted by depression.

The results are illustrative of the negative impact of depression on a wide range of well-being dimensions. The capability indicators cover various aspects of life. These include being physically secure, to move freely and safely and have the freedom and autonomy to make reproductive health choices. The indicators also include emotional, social dimensions as well as economic relationships such as affiliation, being able to meet socially and join community activities, make lasting friendships, enjoy recreational activities, engaging in a valuable association, mutual recognition and asset ownership. The results indicate depression was negatively and significantly associated with most of the capability indicators highlighting not only the broader well-being impact of depression but also, as we argued in introducing these measures, the need to try and capture the impact of depression in a multidimensional manner.

Most of the univariate associations discussed above were robust to the inclusion of additional explanatory variables to account for the role of various conversion factors and resources. The multivariate estimation results are reported in Table 26. The report and discussion here are limited to ordered logistic estimation results with depression as measured by the PHQ-9 score of depressive symptoms. However, additional estimation results with binary indicators of depression as well as OLS regression results with all the three depression variables are included in Appendix 5B.

When including additional explanatory variables, the association between depression and all well-being indicators remain negative and most were significant. The only indicators that were not statistically significant were the freedom to make reproductive health choices, religious freedom, the capability to meet socially, value and appreciate animals, plants and other species and the freedom for political expression.

The results also shed some light on the association of capabilities and other factors. Among these, gender, social support and experiencing stressful life events were the most consistent predictors of capabilities in all dimensions. Specifically, being women was associated with lower levels of capabilities, and these associations were statistically significant across most of the capability indicators. Similarly, having strong social support was associated with higher capabilities compared to poor social support, while experiencing two or more life threatening events was negatively associated with all capability variables.

Table 26. Multivariate Regression Results of Capability Variables on Depression

		c1	dy/dx	c2	dy/dx	c3	dy/dx	c4	dy/dx	c5	dy/dx
Depression		-0.105***	-0.0133***	-0.134***	-0.0138***	-0.0482***	-0.0057**	-0.0482**	-0.0101**	-0.0577***	-0.0116***
		(0.0208)	(0.00280)	(0.0215)	(0.00246)	(0.0182)	(0.00222)	(0.0213)	(0.00453)	(0.0213)	(0.00429)
Gender	Female	-0.305		-0.0280		-0.186		-0.656***		-1.105***	
		(0.262)		(0.240)		(0.232)		(0.242)		(0.244)	
Age	25 – 34	0.315		0.178		0.122		0.669*		0.234	
		(0.348)		(0.346)		(0.328)		(0.356)		(0.344)	
	35 – 44	-0.131		0.00408		0.579		0.679		0.315	
		(0.405)		(0.441)		(0.377)		(0.430)		(0.423)	
	45 – 64	-0.577		-0.373		0.121		0.544		0.0990	
		(0.457)		(0.432)		(0.433)		(0.445)		(0.415)	
	65+	-0.266		0.405		0.380		1.504**		0.832	
		(0.688)		(0.606)		(0.557)		(0.617)		(0.662)	
Education	read/write, no formal education	-0.313		0.136		-0.291		0.0635		-0.799**	
		(0.363)		(0.355)		(0.351)		(0.351)		(0.358)	
	primary school	-0.407		-0.228		-0.0264		-0.108		-0.882***	
		(0.344)		(0.359)		(0.309)		(0.314)		(0.318)	
	high school or above	-0.752*		-0.149		-0.303		-0.707*		-1.144***	
		(0.451)		(0.445)		(0.381)		(0.423)		(0.429)	
Marital status	Married	0.225		0.351		0.225		-0.188		-0.209	
		(0.366)		(0.357)		(0.340)		(0.373)		(0.355)	
	divorced	-0.657		-0.788		-0.0939		0.149		0.563	
		(0.559)		(0.609)		(0.737)		(0.755)		(0.752)	
	widowed	1.182*		1.202**		0.517		-0.526		0.0423	
		(0.676)		(0.606)		(0.611)		(0.654)		(0.636)	
Multidimensional deprivation		-1.269*		-0.783		-1.325**		-0.907		-0.783	
		(0.651)		(0.658)		(0.547)		(0.647)		(0.689)	
Social support	intermediate support	0.0866		-0.314		-0.0212		0.926***		0.898***	
		(0.322)		(0.316)		(0.315)		(0.324)		(0.319)	
	strong support	0.674*		0.0102		0.427		1.753***		1.591***	
		(0.345)		(0.325)		(0.327)		(0.366)		(0.349)	
Stressful life events	one	-0.0859		-0.00317		0.00331		-0.177		-0.271	
		(0.288)		(0.294)		(0.293)		(0.269)		(0.268)	
	two or more	-0.802***		-0.915***		-0.459		-1.133***		-1.060***	
		(0.304)		(0.264)		(0.282)		(0.272)		(0.280)	
Observations		408		408		408		408		408	

Depression: PHQ9 score; Reference group: male, 24 years of age or younger, can't read/write, never married, with poor social support, no recent stressful life events; robust standard errors in parenthesis; *, ** and *** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively.

(*continued*)		c6	dy/dx	c7	dy/dx	c8	dy/dx	c9	dy/dx	c10	dy/dx
Depression		-0.0132	-0.00242	-0.0470**	-0.00919**	-0.0564**	-0.0122**	-0.0296	-0.00570	-0.0607***	-0.0116***
		(0.0202)	(0.00370)	(0.0237)	(0.00466)	(0.0283)	(0.00602)	(0.0227)	(0.00437)	(0.0233)	(0.00445)
Gender	Female	0.127		-0.658**		-0.790***		0.136		-0.555**	
		(0.252)		(0.267)		(0.259)		(0.280)		(0.254)	
Age	25 – 34	0.121		-0.131		0.306		0.247		-0.490	
		(0.373)		(0.381)		(0.368)		(0.376)		(0.372)	
	35 – 44	0.159		0.114		0.441		0.791		-0.0683	
		(0.434)		(0.439)		(0.434)		(0.485)		(0.429)	
	45 – 64	0.138		-0.0330		0.563		0.778		-0.0883	
		(0.451)		(0.450)		(0.464)		(0.506)		(0.458)	
	65+	-0.430		0.107		0.816		1.743**		1.305*	
		(0.556)		(0.633)		(0.671)		(0.869)		(0.777)	
Education	read/write, no formal education	-0.189		-0.725**		-0.934**		-0.610		-0.940**	
		(0.348)		(0.359)		(0.383)		(0.376)		(0.453)	
	primary school	-0.0192		-0.176		-0.0315		0.280		-0.284	
		(0.329)		(0.355)		(0.350)		(0.374)		(0.307)	
	high school or above	-0.236		0.160		-0.0212		0.165		-0.226	
		(0.421)		(0.452)		(0.440)		(0.501)		(0.431)	
Marital status	Married	2.219***		1.021***		0.526		-0.00403		0.684*	
		(0.435)		(0.395)		(0.389)		(0.426)		(0.406)	
	divorced	2.035***		1.297**		0.555		-0.331		1.077	
		(0.620)		(0.618)		(0.621)		(0.817)		(0.692)	
	widowed	1.757***		-0.00165		0.143		-1.327		-0.258	
		(0.642)		(0.760)		(0.991)		(0.852)		(0.915)	
Multidimensional deprivation		-1.120*		0.990		0.526		-0.350		-0.420	
		(0.612)		(0.672)		(0.693)		(0.742)		(0.743)	
Social support	intermediate support	0.380		0.142		0.332		0.347		0.372	
		(0.276)		(0.351)		(0.316)		(0.325)		(0.348)	
	strong support	0.987***		0.764**		0.988***		0.702*		1.322***	
		(0.302)		(0.387)		(0.344)		(0.362)		(0.346)	
Stressful life events	one	0.0882		-0.277		-0.522*		-0.267		-0.564*	
		(0.284)		(0.284)		(0.285)		(0.342)		(0.303)	
	two or more	-0.635**		-1.167***		-1.143***		-0.465		-0.948***	
		(0.267)		(0.289)		(0.281)		(0.312)		(0.303)	
Observations		408		408		408		408		408	

(continued)		c11	dy/dx	c12	dy/dx	c13	dy/dx	c14	dy/dx	c15	dy/dx
Depression		-0.0624***	-0.0127***	-0.0644**	-0.0134**	-0.0431*	-0.00827*	-0.0408*	-0.00887*	-0.0382*	-0.00670*
		(0.0213)	(0.00425)	(0.0255)	(0.00526)	(0.0229)	(0.00442)	(0.0209)	(0.00454)	(0.0199)	(0.00350)
Gender	Female	-0.201		-0.606**		-0.856***		-0.298		-0.473*	
		(0.257)		(0.305)		(0.282)		(0.272)		(0.248)	
Age	25 – 34	0.192		0.638*		0.0140		0.461		0.372	
		(0.358)		(0.362)		(0.381)		(0.344)		(0.315)	
	35 – 44	0.758*		0.742*		0.578		0.505		0.787**	
		(0.408)		(0.445)		(0.447)		(0.391)		(0.367)	
	45 – 64	0.556		0.814*		0.576		0.794*		0.646	
		(0.441)		(0.490)		(0.463)		(0.439)		(0.413)	
	65+	1.733***		1.049		0.658		0.584		1.055	
		(0.654)		(0.743)		(0.634)		(0.607)		(0.666)	
Education	read/write,	-0.739**									
	no formal education			-0.487		-0.130		-0.389		-0.643*	
		(0.363)		(0.409)		(0.379)		(0.405)		(0.377)	
	primary school	-0.202		-0.350		-0.0221		-0.0816		-0.360	
		(0.348)		(0.367)		(0.349)		(0.345)		(0.320)	
	high school or above	-0.388		0.183		0.249		-0.178		-0.432	
		(0.477)		(0.430)		(0.441)		(0.412)		(0.398)	
Marital status	Married	-0.288		0.0579		0.215		-0.464		-0.0202	
		(0.370)		(0.399)		(0.416)		(0.414)		(0.349)	
	divorced	-0.185		-0.0198		0.615		0.0333		0.338	
		(0.677)		(0.871)		(0.752)		(0.798)		(0.632)	
	widowed	-0.421		-0.00161		0.601		-0.573		-0.0883	
		(0.876)		(0.799)		(0.778)		(0.753)		(0.684)	
Multidimensional deprivation		-0.657		0.345		-0.905		0.0172		-0.701	
		(0.769)		(0.645)		(0.709)		(0.663)		(0.585)	
Social support	intermediate support	0.864***		0.650*		0.562		0.613*		1.390***	
		(0.329)		(0.365)		(0.376)		(0.359)		(0.309)	
	strong support	1.930***		1.488***		1.081***		1.259***		2.113***	
		(0.332)		(0.381)		(0.381)		(0.364)		(0.322)	
Stressful life events	one	-0.578**		-0.211		-0.393		-0.317		-0.618**	
		(0.293)		(0.286)		(0.284)		(0.272)		(0.262)	
	two or more	-0.934***		-1.029***		-1.148***		-0.648**		-0.793***	
		(0.284)		(0.298)		(0.297)		(0.269)		(0.279)	
Observations		408		408		408		408		408	

(continued)		c16	dy/dx	c17	dy/dx	c18	dy/dx	c19	dy/dx	c20	dy/dx
Depression		-0.0307	-0.00517	-0.0582***	-0.0124***	-0.00769	-0.00184	-0.0747***	-0.0103***	-0.0464*	-0.00917*
		(0.0223)	(0.00373)	(0.0225)	(0.00476)	(0.0225)	(0.00538)	(0.0245)	(0.00340)	(0.0264)	(0.00512)
Gender	Female	-0.504*		-0.300		-0.257		-0.474*		-0.570**	
		(0.290)		(0.262)		(0.255)		(0.279)		(0.252)	
Age	25 – 34	1.423***		0.993***		-0.0195		0.519		0.807**	
		(0.355)		(0.359)		(0.360)		(0.396)		(0.380)	
	35 – 44	1.414***		1.110***		0.701		0.777		1.033**	
		(0.415)		(0.429)		(0.440)		(0.478)		(0.426)	
	45 – 64	1.185**		0.535		0.458		0.419		0.741	
		(0.464)		(0.454)		(0.463)		(0.491)		(0.461)	
	65+	0.0958		-0.0249		0.0410		-0.366		0.204	
		(0.930)		(0.690)		(0.690)		(0.648)		(0.674)	
Education	read/write,										
	no formal education	0.431		1.224***		0.0115		-0.688*		-0.106	
		(0.411)		(0.423)		(0.377)		(0.386)		(0.351)	
	primary school	-0.0652		0.188		0.142		-0.429		-0.122	
		(0.360)		(0.333)		(0.339)		(0.335)		(0.310)	
	high school or above	0.144		0.132		1.038**		-0.278		-0.203	
		(0.429)		(0.419)		(0.438)		(0.439)		(0.422)	
Marital status	Married	0.0967		-0.130		0.257		0.0860		0.0969	
		(0.370)		(0.391)		(0.384)		(0.403)		(0.385)	
	divorced	-0.0216		-0.361		-0.795		0.715		0.790	
		(0.606)		(0.538)		(0.833)		(0.738)		(0.730)	
	widowed	-0.388		-0.209		-0.215		-0.107		0.470	
		(0.871)		(0.693)		(0.828)		(1.057)		(0.636)	
Multidimensional deprivation		-0.595		-0.246		-0.170		-1.631**		-1.117*	
		(0.688)		(0.668)		(0.646)		(0.744)		(0.644)	
Social support	intermediate support	0.847***		0.622*		0.286		0.824**		0.304	
		(0.328)		(0.334)		(0.323)		(0.350)		(0.347)	
	strong support	1.566***		1.189***		0.875***		1.451***		1.020***	
		(0.340)		(0.369)		(0.333)		(0.376)		(0.361)	
Stressful life events	one	-0.449		-0.0973		0.210		-0.236		-0.345	
		(0.286)		(0.269)		(0.278)		(0.289)		(0.283)	
	two or more	-1.284***		-0.995***		-0.0540		-0.992***		-1.281***	
		(0.299)		(0.269)		(0.277)		(0.313)		(0.273)	
Observations		408		408		408		408		408	

(*continued*)		c21	dy/dx	c22	dy/dx
Depression		-0.0483*	-0.0077**	-0.0056	-0.00082
		(0.0250)	(0.00391)	(0.0178)	(0.00260)
Gender	Female	-0.721**		-0.875***	
		(0.281)		(0.248)	
Age	25 – 34	0.788**		0.475	
		(0.339)		(0.395)	
	35 – 44	0.735*		0.563	
		(0.416)		(0.460)	
	45 – 64	1.181***		0.376	
		(0.448)		(0.470)	
	65+	0.709		0.322	
		(0.843)		(0.648)	
Education	read/write,				
	no formal education	-0.106		0.0605	
		(0.382)		(0.357)	
	primary school	-0.444		-0.272	
		(0.343)		(0.316)	
	high school or above	0.0247		0.0222	
		(0.422)		(0.416)	
Marital status	Married	-0.625*		0.157	
		(0.362)		(0.417)	
	divorced	0.0737		1.179*	
		(0.670)		(0.707)	
	widowed	-1.054**		0.719	
		(0.524)		(0.576)	
Multidimensional deprivation		-0.782		-0.0505	
		(0.689)		(0.683)	
Social support	intermediate support	0.363		0.374	
		(0.358)		(0.291)	
	strong support	1.233***		0.937***	
		(0.372)		(0.304)	
Stressful life events	one	-0.675**		-0.432	
		(0.289)		(0.268)	
	two or more	-0.722**		-0.799***	
		(0.301)		(0.280)	
Observations		408		408	

4.2. Depression and Overall Well-being

The results presented earlier were good starting points in analysing and exploring the association of depression and different dimensions of capabilities. In what follows, the discussion moved to present results based on an aggregate measure of capabilities to reflect the association between depression and overall well-being of individuals. I used the capability indicators to construct a summary indicator, which is simply termed capability index. The capability index was constructed by aggregating the reported scores on each capability variable and standardised it to the scale of 0 to 100, as discussed previously in section 3.2. The analysis hereafter will draw from the capability index as a dependent variable. However, as a robustness check aggregate indicators, as discussed in the data and variables section, were constructed in different ways and used to assess the sensitivity of results.

Three pairs of univariate and multivariate models were estimated, and the results are presented in Table 27. These three pairs of OLS estimations can be viewed as the association between capabilities and depressive symptoms, probable depression and major depressive disorder. The dependent variable was an aggregate capability index in all the estimations, and the explanatory depression variable was: (i) a continuous variable of total PHQ-9 depressive symptoms score (columns 1a and 1b), (ii) a binary variable of depression constructed based on a 5 point cut-off on the PHQ-9 score (columns 2a and 2b), and (iii) a binary variable of depression based on a 10 point cut-off on the PHQ-9 score (columns 3a and 3b). While columns 1a, 2a and 3a reported estimation results where the only explanatory variable is depression, columns 1b, 2b and 3b reported results of multivariate analyses where additional explanatory variables to account for conversion factors are included in the estimations.

One thing consistent across these results is the direction of the association between capabilities and depression. In all the estimations, the results show a negative association between depression and capabilities indicating being depressed is associated with lower levels of overall well-being. From the univariate analysis of only capabilities and depression, depression has a negative and significant association with capabilities. These associations were also robust to the inclusion of additional explanatory variables to account for conversion factors. The negative association between depression and capabilities was evident as the analyses move from the univariate exploration to include additional explanatory variables. The depression coefficient estimates in the

multivariate estimations were also statistically significant at 1% level. The included conversion factors also appear to have a statistically significant association with capabilities although the direction of association is worth highlighting. Being female, deprived and experiencing recent stressful life events is associated with lower levels of capabilities, whereas being older and having strong social support is associated with higher levels of capabilities. A curious case was the association between level of education and capabilities. Even though the associations were not statistically significant, respondents who are literate (either through informal ways or attended some level of formal education) seem to have lower levels of overall well-being compared to the reference group of participants who cannot read or write.

Table 27. Results on the Association between Depression and Overall Capability Well-being

Variables [a]	(1a) [b]	(1b)	(2a)	(2b)	(3a)	(3b)
Depression	-1.020***	-0.574***	-8.947***	-4.186***	-11.66***	-6.979***
	(0.116)	(0.123)	(1.340)	(1.268)	(1.535)	(1.474)
Gender						
Female		-4.229***		-4.334***		-3.974***
		(1.403)		(1.441)		(1.409)
Age						
25 – 34		3.400*		3.218*		3.561*
		(1.911)		(1.935)		(1.905)
35 – 44		4.867**		4.500*		4.732**
		(2.341)		(2.384)		(2.344)
45 – 64		3.681		3.707		3.552
		(2.305)		(2.350)		(2.307)
65+		5.182		5.433		4.957
		(3.402)		(3.472)		(3.405)
Education						
read/write, no formal education		-2.406		-1.880		-1.845
		(1.941)		(1.936)		(1.949)
primary school		-1.890		-1.499		-1.802
		(1.794)		(1.796)		(1.801)
high school or above		-1.527		-1.223		-1.704
		(2.344)		(2.335)		(2.336)
Marital status						
Married		1.933		2.070		2.234
		(2.059)		(2.074)		(2.048)
divorced		3.621		4.929		3.807
		(3.582)		(3.639)		(3.555)
widowed		1.422		2.004		1.089
		(3.976)		(4.069)		(3.903)
Multidimensional deprivation		-6.165*		-6.788**		-7.530**
		(3.320)		(3.426)		(3.347)
Social support						
intermediate support		5.244***		6.316***		5.804***
		(1.758)		(1.864)		(1.788)
strong support		10.99***		12.36***		11.57***
		(1.877)		(1.973)		(1.918)
Stressful life events						

one		-2.355		-2.476		-2.702*
		(1.513)		(1.526)		(1.505)
two or more		-8.410***		-9.162***		-9.203***
		(1.528)		(1.553)		(1.467)
Constant	77.04***	74.07***	75.23***	72.08***	74.17***	72.79***
	(0.907)	(3.666)	(0.877)	(3.601)	(0.749)	(3.638)
Observations	408	408	408	408	408	408
R-squared	0.160	0.356	0.099	0.334	0.124	0.355

Reference group: male, 24 years of age or younger, can't read/write, never married, with poor social support, no recent stressful life events

[a] the dependent variable in all columns is capability index; the explanatory variable depression is total PHQ-9 score, a binary variable at a PHQ-9 score of 5 as cut-off point and a binary variable at a PHQ-9 score of 10 as a cut-off point in columns 1, 2 and 3, respectively.

[b] robust standard errors in parenthesis; *, ** and *** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively.

The results so far demonstrate a consistent negative association between capabilities and depression that are not sensitive to alternative construction or indicators of depression variable. The associations have been further explored using alternative measures for overall capability well-being as a robustness check of results to changes in capability outcome variable measurements. To that end, another set of analyses were performed with two alternative capability indices. The first index was based on count methods and the second was based on latent factor analysis as elaborated in the data and variables section, Section 3.2. Details of the estimation results are presented in Table 28 and Table 29, respectively. The results consistently highlight a negative association between capabilities and depression. The association of depression and capabilities was found to be statistically significant both in a univariate and multivariate estimations using these alternative capability indices. Similarly, the results were robust to different ways in which depression measures were represented, where depression was measured as a continuous variable with raw total PHQ-9 scores, a binary variable at a PHQ-9 cut-off score of 5 to represent probable depression or a cut-off score of 10 to represent major depressive disorder. Similar to previous results, gender, social support and stressful life events were found to be consistent predictors of capabilities. The negative association between multidimensional deprivation and overall well-being was also evident, although it was not significant in some of the estimations. Similarly, age was found to have a positive association, although the statistical significance was not consistent across all results.

Table 28. Regression Results for Capability Index Constructed with Count Method

Variables [a]	(1a) [b]	(1b)	(2a)	(2b)	(3a)	(3b)
Depression	-0.244***	-0.172***	-2.171***	-1.372***	-2.787***	-2.033***
	(0.0237)	(0.0301)	(0.277)	(0.266)	(0.316)	(0.385)
Gender						
Female		-0.792**		-0.818**		-0.720**
		(0.330)		(0.339)		(0.331)
Age group						
25-34		0.208		0.153		0.254
		(0.385)		(0.391)		(0.384)
34-44		0.115		0.00252		0.0725
		(0.463)		(0.470)		(0.460)
45-64		0.0604		0.0823		0.0185
		(0.461)		(0.476)		(0.454)
65+		0.0661		0.168		-0.0057
		(0.620)		(0.626)		(0.619)
Education						
Read or write, no formal education		-0.386		-0.253		-0.211
		(0.398)		(0.384)		(0.383)
Primary school education		-0.710*		-0.591		-0.681
		(0.426)		(0.423)		(0.424)
High school or above		-0.917*		-0.818*		-0.967**
		(0.485)		(0.482)		(0.477)
Marital status						
Married		1.358***		1.396***		1.448***
		(0.506)		(0.519)		(0.509)
Divorced		1.913**		2.258***		1.994***
		(0.746)		(0.809)		(0.726)
Widowed		1.939***		2.119***		1.846**
		(0.718)		(0.783)		(0.753)
Multidimensional deprivation		-2.015***		-2.152***		-2.434***
		(0.771)		(0.800)		(0.796)
Social support						
intermediate support		1.426***		1.731***		1.604***
		(0.445)		(0.479)		(0.451)
strong support		1.885***		2.274***		2.070***
		(0.471)		(0.502)		(0.477)
Stressful life events						
one		-0.141		-0.158		-0.249
		(0.259)		(0.265)		(0.259)
Two or more		-1.123***		-1.301***		-1.376***
		(0.269)		(0.283)		(0.263)
Constant	21.09***	20.53***	20.67***	19.94***	20.41***	20.13***
	(0.185)	(0.788)	(0.181)	(0.771)	(0.154)	(0.775)
Observations	408	408	408	408	408	408
R-squared	0.207	0.342	0.132	0.305	0.161	0.337

Reference group: male, 24 years of age or younger, can't read/write, never married, with low social support, no recent stressful life events

a the dependent variable in all columns is capability index constructed using count method; the explanatory variable depression is total PHQ-9 score, a binary variable at a PHQ-9 score of 5 as cut-off point and a binary variable at a PHQ-9 score of 10 as a cut-off point in columns 1, 2 and 3, respectively.

b robust standard errors in parenthesis; *, ** and *** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively.

Table 29. Regression Results for Capability Index Constructed with Latent Factor Analysis

Variables [a]	(1a) [b]	(1b)	(2a)	(2b)	(3a)	(3b)
Depression	-0.0872***	-0.0448***	-0.756***	-0.306**	-1.008***	-0.563***
	(0.0111)	(0.0108)	(0.127)	(0.120)	(0.146)	(0.130)
Gender						
Female		-0.434***		-0.443***		-0.412***
		(0.132)		(0.135)		(0.133)
Age group						
25-34		0.335*		0.321*		0.349*
		(0.181)		(0.182)		(0.180)
34-44		0.526**		0.498**		0.516**
		(0.221)		(0.224)		(0.221)
45-64		0.416*		0.415*		0.407*
		(0.217)		(0.220)		(0.217)
65+		0.514		0.529		0.498
		(0.333)		(0.338)		(0.333)
Education						
Read or write, no formal education		-0.245		-0.200		-0.204
		(0.183)		(0.183)		(0.184)
Primary school education		-0.126		-0.0955		-0.119
		(0.165)		(0.166)		(0.166)
High school or above		-0.0837		-0.0612		-0.0982
		(0.227)		(0.226)		(0.227)
Marital status						
Married		0.138		0.150		0.162
		(0.190)		(0.190)		(0.189)
Divorced		0.292		0.402		0.299
		(0.357)		(0.355)		(0.357)
Widowed		0.00132		0.0458		-0.0266
		(0.392)		(0.396)		(0.382)
Multidimensional deprivation		-0.424		-0.481		-0.528*
		(0.314)		(0.320)		(0.313)
Social support						
intermediate support		0.450***		0.537***		0.491***
		(0.150)		(0.155)		(0.149)
strong support		1.065***		1.175***		1.105***
		(0.165)		(0.169)		(0.165)
Stressful life events						
one		-0.291*		-0.304**		-0.317**
		(0.152)		(0.153)		(0.152)
Two or more		-0.832***		-0.899***		-0.890***
		(0.149)		(0.150)		(0.144)
Constant	0.483***	0.160	0.324***	0.00195	0.240***	0.0631
	(0.0865)	(0.357)	(0.0832)	(0.351)	(0.0710)	(0.354)
Observations	408	408	408	408	408	408
R-squared	0.133	0.348	0.080	0.332	0.105	0.350

Reference group: male, 24 years of age or younger, can't read/write, never married, with low social support, no recent stressful life events

a the dependent variable in all columns is latent capability index constructed latent factor analysis; the explanatory variable depression is total PHQ-9 score, a binary variable at a PHQ-9 score of 5 as cut-off point and a binary variable at a PHQ-9 score of 10 as a cut-off point in columns 1, 2 and 3, respectively.

b robust standard errors in parenthesis; *, ** and *** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively.

4.3. Estimation Results Accounting for Endogeneity

The OLS regression results highlight that capabilities depend negatively on depression. However, there are good reasons to suspect coefficient estimates can be biased. As explained in Section 3.1, this may be due to omitted variable bias or joint determination of capabilities and depression. Alternative estimations can ameliorate the potential effect of this bias. This section presents estimation results using instrumental variables that are implemented through a two-stage least squares (2SLS) estimation.

In implementing the 2SLS estimation, the depression variable in equation (3) is assumed endogenous and fitted a linear model to estimate an endogenous depression variable in the first stage:

$$d_i = \beta_0 + \gamma_j x_{ij} + \delta z_i + v_i \tag{4}$$

where x_{ij} represents a shorthand for n explanatory variables ($j = 1, \ldots, n$) for individual i that also enters the capabilities equation and z_i represents additional explanatory variables of depression that are not part of the capabilities equation and served as instruments for depression.

The model above was estimated with linear regression and predicted value for depression was obtained. The model in equation (3) was then re-estimated by instrumenting the depression variable with the predicted value of depression obtained from the first stage estimation:

$$Q_i = \alpha_0 + \alpha_1 \widehat{d_i} + \gamma_j x_{ij} + w_i \tag{5}$$

Two of the requirements instruments should satisfy are relevance and exogeneity (Cameron & Trivedi, 2009, p. 175). The instrument relevance condition requires that the instruments must be related to the endogenous explanatory variable either positively or negatively. This means that accounting for other explanatory factors, the instrument must explain a significant fraction of the variation in the endogenous variable. This requirement can be tested by estimating a regression equation where the endogenous depression variable is a function of the instrument and other explanatory factors. A goodness of fit statistics of the first stage regression or a statistically

significant coefficient of the impact of the instrument on the endogenous variable would verify this requirement.

The instrument exogeneity condition requires the instrument variable to be exogenous, i.e., uncorrelated to the structural error term in the main estimating equation of interest. Given its correlation with the endogenous variable, the instrument should not have a direct effect on the main dependent variable - in our case, on capabilities. This requirement is a non-testable assumption. In selecting an instrument, the primary requirements were therefore ensuring the variable (Z) is relevant (correlated with depression) and exogenous (uncorrelated with the error term in the capabilities equation, Equation 3). However, finding a valid and strong instrumental variable that satisfies these properties is a challenge in any empirical investigation. Selecting instrumental variable(s) that correlates with depression but not capabilities and only impacts capabilities through its effect on depression thereby establishing a causal impact of depression on capabilities is also a difficult conceptual and empirical endeavour. Although finding ideal instrument is far from an easy task, the analysis relies on some variables that are correlated with depression, but less so with capabilities not to cause the violation of the exogeneity conditions for the instrument. With this exercise, in the absence of a better instrument, the analysis hopes to demonstrate the use of instrumental variables in exploring the impact of depression on capabilities and addressing potential endogeneity bias in the association. In addition to arguments to lay a conceptual basis for the instrument variables, statistical tests were also performed to assess whether the instruments used satisfy the relevance and exogeneity conditions. The 2SLS estimation was performed using the instrumental variable module of Stata that supports 2SLS.

The instrumental variable exploited the association in scores of two patient health questionnaires to construct an instrumental variable that explains variation in depression but not correlated with capabilities. The PHQ-9 is a measure of depressive symptoms and increase in PHQ-9 scores indicate elevated depressive symptoms. The PHQ-15 is a somatic symptoms measure. Somatic complain was shown to be highly correlated with depression (Kroenke et al., 2010; Kocalevent et al., 2013). In our dataset, the scores from the two scales were highly correlated (r=0.748, $p<0.0001$). We assumed these indicators on average tend to measure depression status, but they are imperfect measures of the actual or latent depression status for individuals. Therefore, for each individual the difference between PHQ-9 and PHQ-15 is random and any difference in the scores of the two in classifying individuals in terms of their depression affects how depression is measured. However, the

difference between the two does not affect underlying depression and therefore it is not correlated with capabilities.

To measure the difference in the position of individuals based on the PHQ-9 and PHQ-15 measures, we ranked them based on the scores of the two measures and calculated a simple rank distance. Specifically, we measured the rank distance by calculating the distance of the rank of each observation based on PHQ-15 from the average rank of the PHQ-9 scores. The rank difference will increase if the position of an individual based on the PHQ-15 scores increases and diverges from the average position based on the PHQ-9 scores and the difference will decrease as the PHQ-15 ranks gets closer to the average PHQ-9 rank. The estimations include the rank difference variable as an instrument for depression in the first stage regression and used the instrumented depression variable in the second stage analysis estimating the capabilities equation.

To recall, the 2SLS estimation is performed in two stages. In the first stage, depression variable was regressed on a number of explanatory variables including the ones that are included in estimating capabilities as well as other variables that serve as instruments for depression. In the second stage, capabilities variable is regressed on the predicted values of depression from the first stage along with additional explanatory variables. This analysis focused on a binary variable of depression constructed based on a cut-off score of 5 on the PHQ-9 scale as an explanatory variable. Additional analysis was also performed using a binary variable of depression status that was constructed at a PHQ-9 cut-off score of 10. Before proceeding with the estimations, we performed a pairwise correlation between the endogenous depression variables and the instrument as a preliminary diagnosis for weak instruments. The correlation between the rank difference variable and depression variables is high signalling the instrument may not be weak.

Table 30. Correlation Matrix for Depression and Instrument Variable

		(1)	(2)	(3)	(4)
PHQ-9 score	(1)	1.0000			
Depression status [a]	(2)	0.8311*	1.0000		
Depression status [b]	(3)	0.8466*	0.6444*	1.0000	
Rank difference	(4)	0.7228*	0.6942*	0.5639*	1.0000

[a] depression status based on a PHQ-9 cut-off score of 5.

[b] depression status based on a PHQ-9 cut-off score of 10.

*p<0.0001.

Before presenting the results of the estimations, some diagnostic tests results are discussed. These tests were performed to assess whether the instrument variable has indeed satisfied the requirements of relevance and exogeneity. Some results from the first stage regression provides support to the relevance of the instrument. The instrument was statistically significant. It was also found to explain a significant variation in depression. The R^2 from the first stage regression was high (0.61). To isolate the explanatory power of the instrumental variable in explaining depression, a partial R^2 of the instrumental variable controlling for other exogeneous covariates is reported. The partial R^2 was also high signalling the relevance of the instrumental variables. Finally, the F statistics for joint significance shows the explanatory variables included in the first stage estimations were jointly significant and the F statistic (149.3) was larger than the rule of thumb value of 10 suggesting the instrumental variable do not seem to be a weak instrument.

The second test was the test for overidentifying restrictions to investigate whether the instruments for depression are appropriately uncorrelated with the disturbance process there by getting an evaluation of the validity of instruments. It tests two different things simultaneously. One is whether the instruments are uncorrelated with the error term. The other is that the equation is misspecified and that one or more of the excluded exogenous variables in the depression equation should in fact be included in the capabilities equation. A significant test statistic could represent either an invalid instrument or an incorrectly specified equation. Since the models were fit by requesting heteroskedastic robust standard errors, Wooldridge's robust score χ^2 test of overidentifying restrictions is performed. The test statistics indicate that the instruments are valid or the model is correctly specified. But given the same exogenous covariates were included in the depression and capabilities equations, the test results may suggest that the instruments variables are not correlated with the error term and can serve as valid instruments.

The other diagnostic test performed was whether depression, the variable which was assumed endogenous, could instead be treated as exogenous. If it was an exogenous variable, the OLS estimator will be consistent and efficient. While the instrumental variable estimator will still be consistent, it will be less efficient than the OLS estimator. The endogeneity tests indicate that depression is indeed endogenous. Since models were estimated accounting for potential heteroskedasticity, the Wooldridge's score and regression-based tests for endogeneity were reported. Based on both tests, we reject the null hypothesis that depression is exogenous variable

at 1% significance level, which lends credence to the treatment of depression as endogenous variable. Overall, the diagnostic tests suggest that the instrumental variable was valid and not weak.

The 2SLS estimation results are presented in Table 31. Depression is negatively and significantly associated with capabilities when we account for potential endogeneity. The coefficient estimates for depression are statistically significant at 1% level of significance in multivariate estimations both for probable depression and major depressive disorders. Similar to the previous OLS results, the direction of association between depression and capabilities is still negative indicating the potential to enjoy higher levels of capabilities and opportunities depend negatively on depression. As we accounted for endogeneity in these estimations, the results also indicate a causal impact of depression on capabilities and they highlight depression as a significant and negative determinant of capabilities.

Table 31. 2SLS Estimation Results for the Capability Index

Variables [a]	(1) [b]	(2)
Depression	-6.834***	-10.24***
	(1.926)	(2.662)
Gender		
Female	-4.224***	-3.775***
	(1.408)	(1.421)
Age		
25 – 34	3.200*	3.745**
	(1.905)	(1.875)
35 – 44	4.459*	4.689**
	(2.343)	(2.321)
45 – 64	4.030*	3.489
	(2.288)	(2.275)
65+	6.034*	4.982
	(3.407)	(3.388)
Education		
read/write, no formal education	-2.444	-2.282
	(1.967)	(1.991)
primary school	-1.460	-1.987
	(1.752)	(1.812)
high school or above	-1.068	-1.853
	(2.326)	(2.397)
Marital status		
Married	2.000	2.348
	(2.053)	(2.038)
divorced	3.847	
	(3.666)	
widowed	2.128	0.900
	(4.121)	(3.910)
Multidimensional deprivation	-5.657*	-6.677**
	(3.430)	(3.359)
Social support		

intermediate support	5.922***	5.549***
	(1.790)	(1.801)
strong support	11.89***	11.10***
	(1.885)	(1.917)
Stressful life events		
one	-2.038	-2.530*
	(1.541)	(1.506)
two or more	-8.079***	-8.380***
	(1.683)	(1.582)
Constant	72.38***	73.01***
	(3.557)	(3.648)
Observations	408	399
R-squared	0.33	0.35
Fist stage regression summary		
R-squared	0.56	0.39
Partial R-squared	0.44	0.29
F statistic for the joint significance (*p*-value)	164.1 (<0.001)	61.7 (<0.001)
Endogeneity tests		
Wooldridge's score chi2 test (*p*-value)	3.13 (0.08)	2.36 (0.12)
Regression based F test (*p*-value)	3.10 (0.08)	2.19 (0.14)
Tests of overidentifying restrictions		
Wooldridge's score chi2 test (*p*-value)	0.07 (0.78)	0.52 (0.47)

Reference group: male, 24 years of age or younger, can't read/write, never married, with poor social support, no recent stressful life events

[a] the dependent variable in all columns is capability index; the explanatory variable depression is a binary variable at a PHQ-9 cut-off score of 5 and 10 in columns 1 and 2, respectively.

[b] robust standard errors in parenthesis; *, ** and *** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively.

In Search of Alternative Instruments

In the absence of any obvious candidate variable to serve as instrument, the analysis below presents estimation results using an alternative instrument. This analysis, similar to the above instrumental variable estimation, uses an instrument based on association in scores of PHQ-9 and a 7-item generalised anxiety disorder (GAD-7) scale. One mental disorder which is found commonly with depression is anxiety disorder and the two are often referred to as common mental disorders (WHO, 2017). Research has shown that the two tally together. For instance, using data from longitudinal cohort that followed up participants over 20 years, Moffitt et al. (2007) reported that 72% of lifetime anxiety cases had a history of depression and 48% of depression cases has anxiety. Similarly, results from the multi-country World Mental Health (WMH) survey showed that around 46% of respondents with lifetime major depressive disorders also had a lifetime anxiety disorder (Kessler et al., 2015). I used the widely applied measure of generalised anxiety disorder scale (GAD-7) to assess anxiety severity (Spitzer et al., 2006; Kroenke et al., 2010). In our data, the scores from the two scales were highly correlated (r=0.732, *p*<0.0001). Similar to the instrumental variable analysis above, a rank

difference between the PHQ-9 and GAD-7 measures was used as an instrument for depression in the first stage regression. The association between the instrument variable and depression variables is presented in Table 32 and the estimation results are reported in Table 33. The diagnostic tests for the instrument indicate the instrumental variable exhibits good characteristics of relevance and exogeneity. The estimation results, accounting for endogeneity of depression with the alternative instrument, highlight a significantly negative impact of depression on well-being.

Table 32. Correlation Matrix for Depression and Instrument Variable

		(1)	(2)	(3)	(4)
PHQ-9 score	(1)	1.0000			
Depression status [a]	(2)	0.8311*	1.0000		
Depression status [b]	(3)	0.8466*	0.6444*	1.0000	
Rank difference	(4)	0.7240*	0.6813*	0.5949*	1.0000

[a] depression status based on a PHQ-9 cut-off score of 5.

[b] depression status based on a PHQ-9 cut-off score of 10.

*$p < 0.0001$.

Table 33. 2SLS Estimation Results for the Capability Index

Variables [a]	(1) [b]	(2)
Depression	-10.94***	-14.16***
	(1.990)	(2.355)
Gender		
Female	-4.052***	-3.476**
	(1.446)	(1.466)
Age		
25 – 34	3.172	3.930**
	(1.960)	(1.914)
35 – 44	4.395*	4.761**
	(2.401)	(2.365)
45 – 64	4.532*	3.681
	(2.355)	(2.329)
65+	6.966**	5.244
	(3.513)	(3.478)
Education		
read/write, no formal education	-3.318*	-2.765
	(1.990)	(2.029)
primary school	-1.400	-2.135
	(1.786)	(1.861)
high school or above	-0.828	-1.966
	(2.423)	(2.483)
Marital status		
Married	1.892	2.391
	(2.136)	(2.094)
divorced	2.168	
	(3.886)	
widowed	2.321	0.519
	(4.397)	(4.053)

139

Multidimensional deprivation	-3.904	-6.076*
	(3.563)	(3.444)
Social support		
intermediate support	5.310***	4.862***
	(1.744)	(1.746)
strong support	11.17***	10.18***
	(1.843)	(1.887)
Stressful life events		
One	-1.358	-2.287
	(1.590)	(1.536)
two or more	-6.401***	-7.434***
	(1.780)	(1.539)
Constant	72.84***	73.71***
	(3.694)	(3.778)
Observations	408	399
R-squared	0.290	0.313
Fist stage regression summary		
R-squared	0.54	0.46
Partial R-squared	0.42	0.37
F statistic for the joint significance (*p*-value)	162.2 (<0.001)	87.6 (<0.001)
Endogeneity tests		
Wooldridge's score chi2 test (*p*-value)	18 (<0.001)	17.6 (<0.001)
Regression based F test (*p*-value)	17.6 (<0.001)	17.7 (<0.001)
Tests of overidentifying restrictions		
Wooldridge's score chi2 test (*p*-value)	2.3 (0.13)	0.2 (0.65)

Reference group: male, 24 years of age or younger, can't read/write, never married, with poor social support, no recent stressful life events

[a] the dependent variable in all columns is capability index; the explanatory variable depression is a binary variable at a PHQ-9 cut-off score of 5 and 10 in columns 1 and 2, respectively.

[b] robust standard errors in parenthesis; *, ** and *** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively.

The interest in this chapter has been examining the impact of depression on broader and multidimensional well-being. As a result, depression was considered an explanatory variable in the estimations and the flow of causality is assumed from depression to well-being. However, simple OLS estimations may be marred by endogeneity. As discussed in Section 3.1, one potential source of endogeneity is the issue of simultaneity where the flow of causality is not only from depression to well-being but also from well-being to depression. Although not specifically related to well-being, there has been a long running interest on the direction of causality between socioeconomic status and mental illness or health broadly (Dohrenwend et al., 1992; Goldman, 1994). Simply stated, the first line of causality argument, which is known as social causation, hypothesises that adverse social and economic conditions increase the risk of mental illness. The second argument, on the other hand, stipulates that mental illness will lead people to adverse socio-economic conditions. This is

called the social selection or social drift hypothesis. There is limited evidence investigating these pathways between socio-economic status and depression in low- and middle-income countries. The ones that are available solely focus on the social causation pathway (Lund & Cois, 2018). Citing such lack of evidence, Lund and Cois (2018) examined the social causation and social drift pathways for depression with a longitudinal data from South Africa. The results demonstrate the potential two-way causation between socioeconomic status and depression and show the importance of considering both the social causation and social drift hypothesis in the relationship between depression and social and economic adversities.

Similar arguments can be made about the relationship between depression and well-being. In line with the social causation argument, the causal pathway can be drawn from lower well-being to depression where having lower achievements or opportunities and freedoms in different dimensions of capability well-being leads to depression. On the other hand, following the social drift argument, one can hypothesise experiencing depression leads to lower well-being. It should be noted that the aim of the empirical investigation in this chapter has been the latter. However, in examining the social drift pathway, the potential for the other pathway (i.e., social causation) was acknowledged. The motivation behind the instrumental variable estimations presented and discussed above was to ameliorate an endogeneity bias that can be in part caused by a possible simultaneous causal pathway. Therefore, the empirical results demonstrate the importance of the social drift pathway and can be interpreted as the causal impact of depression on broader and multidimensional well-being. However, I acknowledge the challenges with finding ideal instrumental variable(s) and concede the results are indicative. This will require additional investigation exploring other potential instruments, alternative approaches or use of longitudinal data. Furthermore, I recognise the importance of examining the question of the social causation pathway from capabilities to depression or how both pathways act simultaneously as a potential future avenue of research.

5. Concluding Remarks

This study sought to explore the impact of depression on well-being. Given the multidimensional and broader impact of depression on individual's lives, it employs the capability approach as a framework to develop and assess the impact of depression on different dimensions and overall well-being. The results show a negative association between depression and capabilities, which is robust to the inclusion of control variables and changes to ways in which either depression or capabilities

are measured. Accounting for possible endogeneity, the analysis also shows a ceteris paribus impact of depression on capability well-being.

The results lend support to our proposition that the impact of depression is indeed broad and measurements that try to capture its impact have to take into account and reflect that. Particularly, the results demonstrate a negative impact of depression on various dimensions of capabilities that are central for individuals to lead a fulfilled and productive life that goes beyond simple outcome measures such as physical impairment, disability or health-related quality of life.

Some results are consistent with previous results on the health impact of depression. The results show that depression is negatively and significantly associated with the capability of being able to have a good health and being able to live to the end of a human life of normal length, which is in line with the negative health impact of depression and premature deaths associated with mental disorders as well as depression-induced suicides.

Other aspects of life that are significantly impacted by depression include being able to move freely without fear of being assaulted, having the opportunities to one's imagination and reason and the freedom to express and share one's ideas and thoughts. Furthermore, it has a negative impact on being able to make friendships which last, enjoy affiliations and being able to laugh, play and enjoy recreational activities.

In a way that may impact the outlook and pursuit of life as well as command over resources, the results show depression is also negatively associated with the capability of being able to engage in critical reflection on and the planning of one's own life and ownership of assets.

Previous results reported in Chapter 3 demonstrate the impact of depression on health-related quality of life, self-rated health and subjective well-being. There is a vast array of evidence, as reviewed in Chapter 1, on how depression affects various aspects of personal and social life. A major motivation in developing a new instrument to assess well-being (Chapter 4) and empirically examining the impact of depression on capabilities (this chapter, Chapter 5) was the inadequacy of outcome measures of narrower scope to capture a broader and multidimensional impact of depression. Taken all together, the results in this chapter highlight the broader impact of depression on diverse and consequential dimensions of life. This demonstrates relative disadvantages, restricted opportunities and freedoms of people with depression face in society. Given the interest and empirical investigation of causal impact of depression, the results indicate a substantial drift to adversities and lower well-being associated with depression. This is in keeping with what is known

as the social drift hypothesis for the association between mental health and socioeconomic status. While I acknowledge the relevance of measures such as health-related quality of life, self-rate health or subjective well-being in certain contexts, from an outcome assessment perspective, the results point to the significance of considering a broader notion of well-being when examining or analysing the burden of depression in society.

Beyond outcome measurement and capturing the multidimensional impact of depression, the study will also have an implication in the design and evaluation of interventions. The focus of interventions to address the problem of depression should not be only on improvement in clinical outcomes of improved depressive symptoms but also simultaneously addressing other aspects of life that are significantly impacted by depression. This highlights the need for interventions not solely focused on a small subset of the many constraints and disadvantage imposed by depression. Similarly, the results may serve as a wakeup call for policy makers to treat depression or mental illness broadly as a human development issue and act to design and implement policies that aim to address the problem thereby creating an environment for human flourishing. Furthermore, the results highlight the need for a more comprehensive approach to mental health policy.

Notwithstanding its contributions, the study is not without limitations. The analysis can be improved with better instrumental variables to account for the endogeneity of depression and estimate the causal impact of depression on capabilities. Future works that can improve on this include having more data and a mental health professional diagnosis of depression to construct alternative instrumental variables based on the variations of the professional assessment and measures of depression with patient health questionnaires. In addition, beyond highlighting the impact of depression, the study did not venture into the mechanisms at work, and future research can further explore the pathways through which depression impacts well-being.

Chapter 6. Thesis Summary and Conclusion

Summary of Findings

The goal of this thesis has been to assess the burden of depression on quality of life in Ethiopia. Despite being ranked among the top causes of disability in Ethiopia and in spite of the growing number of studies on mental health and depression in the country, there is still a considerable gap of evidence on the impact of depression that the thesis aimed to contribute. Below, I will offer concluding remarks highlighting some of the key results, discussing limitations in the study and outlining some potential future research directions to further build on this work.

The results of the first empirical analysis in Chapter 3 showed how depression is negatively associated with health-related quality of life, self-assessed health and subjective well-being. Measuring health-related quality of life using health state utility values estimated by applying the EQ-5D value sets for Ethiopian population to a national health survey data, the study showed people experiencing depression have lower health utilities compared to the healthy group. Depression was also associated with lower self-assessed health and lower satisfaction in health. These associations were robust to accounting for additional covariates, including physical illnesses and socio-demographic and economic covariates. While generic preference-based outcome measures have wide applications in research and resource allocation decisions, their application in the Ethiopian health sector research or practice is still lacking. This thesis demonstrated the use of EQ-5D measures of quality of life in Ethiopia and hoped to contribute towards filling this gap in evidence in the application of preference-based outcome measures. Furthermore, using propensity score matching method to compare outcomes between depressed and matched control group of non-depressed participants, the thesis also highlighted the potential impact of depression that goes beyond association.

The results also highlighted, while depression on its own exerts a negative impact on quality of life, its impact is pronounced when it is comorbid with other physical illnesses. Depression comorbid with other chronic illnesses appears to have a substantial impact on health outcomes compared to experiencing only depression or chronic illnesses. Depression is often comorbid with other chronic illnesses, and the results suggest the need to acknowledge the interrelation between depression and physical illnesses and the importance of examination, treatment and management of depression among people with physical illnesses.

Although generic preference-based quality of life measures tends to be the lingua franca of outcome

measures in health economic evaluations, it is also understandable that they can lack the breadth to capture the multidimensional impact of depression. For instance, the EQ-5D five domains mobility, self-care, usual activities, pain/discomfort and anxiety/depression are physical or mental health-focused areas of outcome. Recognising the limitations, the thesis further expanded on ways to assess the broader impact of depression on well-being using the capability approach. In this respect, the thesis reported two related studies (Chapter 4 and Chapter 5). The first was the development and validation multidimensional quality of life measure using the capability approach by building on Nussbaum's core capabilities, previous capability instruments that attempt to operationalise them and complementary qualitative data collected from participants from the study area. The instrument was found to be a valid and reliable measure for use in the Ethiopia context. Second, the association of depression and well-being was explored by collecting survey data with the newly developed capability instrument. The results highlighted how depression affects various dimensions and aspects of well-being. The capabilities significantly impacted by depression include the being able to have good health and being able to live to the end of human life of normal length, being able to move freely without fear of assault, having the opportunities to use one's imagination and reason, the freedom to express and share one's ideas and thoughts. Furthermore, it has a negative impact on being able to make social interactions and lasting friendships, enjoy affiliations and being able to laugh, play and enjoy recreational activities. The results showed the broader burden of depression on people's opportunities and freedoms that goes beyond the impact of depression on health-related quality of life or subjective well-being.

The results suggest that given these multidimensional aspects of life affected by depression, outcome measures that focus on certain dimensions such as health, disability or symptoms can have the potential to miss out these broader impacts. And conversely, when narrowly defined measures are applied in economic or other evaluations of interventions, they can miss out on potential broader benefits that can accrue from the interventions. The thesis hopes to have highlighted the importance such multidimensional well-being measures and promote future design and implementation of such measures in Ethiopia to assess the burden of mental illnesses or assess how outcomes could improve with interventions or treatments.

The studies in this thesis have highlighted the extent of the burden of depression and aimed to draw attention to the critical importance of addressing this issue through interventions and policies that will improve detection, treatment gap and health service provision. Ethiopia has piloted and expanded the integration of priority mental health conditions, depression among them, into

primary care. However, detection of depression in primary care has been shown to be low (Fekadu et al., 2017), with the implication of missing out a significant proportion of people who otherwise should have been diagnosed and provided with treatment. The burden of depression coupled with such gaps in the health system calls for approaches, in tandem, to improve recognition, help-seeking, service provision and treatment.

Contributions

One area where the thesis has made contributions is to the generation of evidence on the burden of depression in Ethiopia, which will also have a significant implication for policy. Depression is one of the leading causes of disability in Ethiopia. However, it remains one of the least researched areas where the focus of mental health research and interventions has largely been on sever mental illnesses. As the reviews in Chapter 1 and 3 have highlighted, most of the existing research on depression largely focused on epidemiology such as prevalence or disability and to a limited extent on economic burden. This work adds to and broaden the existing limited evidence base on the impact of depression and can contribute to our knowledge and understanding of the burden of depression in Ethiopia. More importantly, by moving beyond the conventional outcome measures of narrower scope to a multidimensional approach to well-being, the results will not be a simple addition to existing evidence but will have added value by bringing attention to the broader impact of depression. The results suggest that given the multidimensional aspects of life affected by depression, outcome measures that focus on certain dimensions such as health, disability or symptoms can have the potential to miss out these broader impacts. And conversely, when narrowly defined measures are applied in economic or other evaluations of interventions, they can miss out on potential broader benefits that can accrue from the interventions. The thesis hopes to have highlighted the importance such multidimensional well-being measures and promote future design and implementation of such measures in Ethiopia and beyond to assess the burden of mental health problems or assess how outcomes could improve with interventions or treatments.

Ethiopia has piloted and expanded the integration of priority mental health conditions, depression among them, into primary care. However, detection of depression in primary care has been shown to be low (Fekadu et al., 2017), with the implication of missing out a significant proportion of people who otherwise would have been diagnosed and provided with treatment. The burden of depression coupled with such gaps in the health system calls for approaches, in tandem, to improve recognition, help-seeking, service provision and treatment. The studies in this thesis have highlighted the extent of the burden of depression and aimed to draw attention to the critical

importance of addressing this issue through interventions and policies that will improve detection, treatment gap and health service provision. The thesis hopes to capture the attention of policy makers and encourage them to facilitate more evidence generation as well as spur policy actions.

The thesis has employed diverse outcome measures to assess the impact of depression. The outcomes ranged from a widely applied measures in health economics such as a preference based generic measure of HRQoL as well as self-rated health and subjective well-being measures to a novel measure of well-being drawing from the capability approach. One of the strengths of the thesis is its pragmatic approach and seamlessly bringing these measures from different but related traditions to demonstrate the burden of depression. Beyond that, however, the thesis can also contribute to broader areas of outcome assessment in health economics and the capability literature as described further in the following paragraphs.

Outcomes in health economic evaluation tend to be measured in natural units such as symptoms in a cost-effectiveness analysis, with a generic, utility-based measures such as QALY in a cost-utility analysis, or, to a limited extent, in monetary values in a cost-benefit analysis. Decision making in the health sector is largely guided by the use of utility-based measures such as QALY as they are considered generic to be applied across different health conditions and to capture preferences of the population (Drummond et al., 2015). However, these measures are not without limitations as discussed in Chapter 1, which includes a narrow focus on health gains or utility maximisation while ignoring other important non-utility dimensions of well-being (Coast et al., 2008). Limitations of the conventional and dominant measures is particularly pronounced when the evaluation moves from clinical trials or interventions to broader public health interventions that often target populations or communities and tend to have broader dimensions of impact and benefits (Weatherlya et al., 2009; Greco et al., 2016). The capability approach has been proposed as alternative framework to accommodate broader notion of well-being or outcomes (Anand, 2005; Coast et al., 2008; Lorgelly et al., 2010; Lorgelly, 2015; among others). However, most of these efforts of applying the capability approach to outcome assessment are concentrated in high income country contexts (Greco et al., 2016). This thesis will be a valuable addition that demonstrates the application of the capability approach with results from a low-income country context and contribute to this growing literature of the application of the capability approach to health and outcome assessment. Furthermore, the issue of operationalisation has been cited as one of the challenges to widely apply the capability approach (Comim, 2008). The thesis demonstrates the feasibility of operationalisation and

contributes the growing efforts and literature of operationalising and applying the capability approach broadly and in a low-income country context specifically.

Finally, another area the thesis has made a beneficial contribution is to the broader global mental health research, implementation and policy. There is evidence on the effective treatments available for most common mental health problems and there has been calls for integration of mental health services into primary care (WHO, 2008; WHO & Wonca, 2008; WHO & Calouste Gulbenkian Foundation, 2014). There is also a growing evidence about the effectiveness of mental health treatments and interventions that can be delivered in low-resource settings with non-specialist, primary-level health care workers (van Ginneken et al., 2021). However, available evidence is often not matched by action and there is still significant treatment gap (Patel et al., 2013). Some have argued the lack of action could be partly attributed to "failure to prove" the costs of inaction, where the human cost of the impact of mental health problems on well-being is considered the ultimate cost (Jack et al., 2014). This thesis took the mantle and examined how depression impacts the broader well-being or quality of life of people. It provides empirical evidence on the various valuable aspects of life impacted by depression. It demonstrates the barriers imposed by mental health problem on the opportunities and freedoms people can enjoy and on their potential to flourish and develop. Therefore, the thesis will contribute to the evidence on the multidimensional impact of mental health problems and the importance of viewing the interconnection between mental health and human development. Although I believe there are evidence on the health, economic and social burden of depression for policy makers to take action, more evidence as shown in this thesis that demonstrate a multifaceted burden of depression and conversely highlight the human costs of inaction may contribute to growing evidence to convince policy makers to act.

Furthermore, some of the calls in the global mental health community that the community has yet to heed is related to social interventions. These calls acknowledge the dominance of psychological and pharmacological interventions (Johnson, 2017) and aim to promote the development and evaluation of social interventions and social pathways as alternative approaches to address observed treatment gaps (Johnson, 2017; Burgess et al., 2020). However, there is still limited evidence on the contributions of social interventions and therefore programmes which include social interventions are lacking. One critical ingredient to support the research agenda, promote social interventions as well as facilitate their design and evaluation will be to have appropriate outcome measures and metrics that can be employed to assess and document the contribution of the interventions. There has been a recommendation for mental health interventions to include

"robust, locally relevant, and multidimensional outcome measures of economic status" (Lund et al., 2011). I would argue this extends to social interventions and more importantly to multidimensional outcome measures of well-being. Given the wide ranging potential targets and outcomes for social interventions (Johnson, 2017), the measures ought to be broader and multidimensional in nature. Therefore, the design, implementation and evaluation of social interventions to address mental health problems can potentially benefit from capability well-being measures that, as demonstrated in this thesis, can capture broader well-being impact of mental health problems and used to assess how interventions improve on these outcomes. While I highlight the contribution of the work in this regard, I will also concede the results in this thesis derive from a single country and acknowledge importance of contextualisation to ensure such measures are contextually relevant. In addition to providing potential metrics to evaluate social interventions, it is imperative to highlight the capability approach is well aligned with the principles that aim to guide actions that promote social interventions in global mental health. For instance, the importance of empowerment and people-centred systems has been outlined in the promotion of social interventions (Burgess et al., 2020). The capability approach places central role on people asking not only what a person is able to do or to be but also whether he or she enjoys real opportunities or freedoms to do various things he or she has reason to value doing or being in life. The approach is praised as people-centred and it emphasises agency and empowerment. Therefore, the capability approach and multidimensional well-being measures that are grounded on the approach, as shown in this thesis, can contribute to the design and use of outcome measures for social interventions that are aligned with the core features of such interventions.

Limitations and Future Research

While the results can help highlight the burden of depression, the importance of multidimensional outcome measures in Ethiopia, on reflection, there are still notable gaps that future research may venture to address. The findings in this thesis were based on data from cross-sectional surveys, a nationally representative health survey and a health-facility based survey in rural Ethiopia, that are not particularly well suited to deal with potential endogeneity bias or unobserved heterogeneity and shade light on the causal impact of depression on our outcome variables of interest. The studies in this thesis applied different techniques such as propensity score matching and instrumental variables to estimate causal impacts of depression, which is one of the contributions made by these works. However, further research with longitudinal data can help confirm and establish the consistency of the findings.

Another area of future research can try to establish not only the impact of depression on quality of life but also the mechanisms and channels of impact. This can help in identifying meaningful areas of intervention and policy designs.

Examining the relationships between capabilities and functionings with depression would also be another area of future research. This would include expanding the analysis to explore not only how depression may impact the freedoms and opportunities but also if and how variations in actual achievements may be impacted by depression.

In relation to this and on a more conceptual level, the issue of agency would be a future research avenue worth exploring. One of the arguments about mental illnesses, particularly severe and debilitating types, is that it affects people's sense of self and agency and phenomenological studies have emerged highlighting how depression affects the sense of self, agency and ability to act (Ratcliffe & Stephan, 2014; Ratcliffe, 2015). Agency is an important concept in the capability approach and specifying an account of agency in the applications of the capability approach is generally suggested (Robeyns, 2017, pp. 63–64). In this thesis account of agency was not explicitly stated but rather implicitly assumed that people have a sufficient level of agency. However, future research can explicitly tackle the issue of the interplay between agency and depression and how it might affect one's capabilities and functionings, both at a theoretical and empirical level.

On a practical level, some further research can help with translating the capability assessment to practical use in economic evaluations. This includes further investigating the issue of aggregation and capability index construction. While in this thesis, a capability summary score was constructed with a simple aggregation assuming equal weights across dimensions and other data-driven approaches such as latent variable methodology, the utility of other normative methods can be explored and compared. In addition, while the development and validation of the capability instrument were based on data from a rural Ethiopia, further exploratory work may be warranted to ensure the applicability and reliability of the measure in other regions and settings.

Finally, on a broader level, it is worth highlighting that while in this thesis the capability space, dimensions and lists were based on Nussbaum's list of central capabilities and qualitative research was conducted to ensure its validity in the local context, the decision to start with these measures was in part influenced by constraints of time and logistics. Whether a wholly bottom-up and participatory approach in identifying and selecting relevant capabilities is warranted would be worth contemplating as a future research avenue.

Appendices

Appendix 2A. Participant Information Sheet and Consent Forms

I. Participant Information Sheet: Focus Group Discussion

Dear Participant,

Welcome and I would like to thank you for coming to this session of focus group discussion. My name is Esubalew Assefa. I am a PhD student at the Open University, UK. I am conducting this research to write a thesis that will lead to the award of a PhD degree. I am also expecting the research to be an original work contributing to our understanding of the extent of the problem of depression, the experiences and needs of people with depression and the improvement of health systems to address the issue of depression in Ethiopia.

I am developing a new instrument for wellbeing assessment and I am conducting this focus group discussion to help me with that effort and this discussion will provide me a critical input. Participation is voluntary. If you agree to take part, you will participate in a group discussion with other participants. The discussion will last approximately 1½ hours and themes and questions will focus on issues (beings and doings) that people would have a reason to value and consider important to lead a fulfilling life.

The group discussion will be audio-recorded in order to accurately capture what is said. you can request that the recording be paused at any time. Audio-recordings of the discussion groups will be kept on a password-protected computer and will be destroyed after discussion is transcribed. You may choose how much or how little you want to speak during the discussions. You may also choose to leave the focus group at any time.

Please be assured that the information you will share with us will be kept completely confidential. Data collected from the discussion will be confidential, anonymous and used for academic purposes only. Participants will be asked not to use any names during the focus group discussion. Please be advised that although the researchers will take every precaution to maintain confidentiality of the data, the nature of focus groups prevents the researchers from guaranteeing confidentiality. The researchers would like to remind participants to respect the privacy of your fellow participants and not repeat what is said in the focus group to others.

Data will also be coded appropriately and reporting of results will be anonymous. Likely outputs include thesis, academic publications and dissemination of findings for the purposes of education, mental health promotion and public policy. However, reports of study findings will not include any identifying information.

Before the start of the focus group discussion you will be asked to complete a consent to confirm your understanding and voluntary participation. You will also be asked to complete a brief background information form. The background information is simple form about yourself such as age, gender and will only be used to provide summarised information about all participants in the discussion. If you have any questions about this research after discussion, please feel free to contact me by phone: (*mobile phone removed in this document for privacy reasons, but it was provided for participants*) or email me at esubalew.assefa@open.ac.uk.

Once again, thank you for participating in this research.

II. Consent form: Focus Group Discussion

- I agree to participate in the group discussion.

- I am fully aware that my participation is voluntary and I am not obliged to answer any question.

- I have read the information sheet or being read to me in full and understood and I have had the opportunity to ask questions for clarification.

- I am aware of the topics to be discussed in the focus group.

- I am aware that I will remain anonymous and that I have the right to leave the focus group at any point.

- I understand that data collected will be kept anonymous and confidential by the researcher.

- I agree to have the focus group audio recorded, so it can be transcribed after the discussion is held.

- I agree to quotes or other results arising from my participation in the discussion being anonymously included in any reports about the study.

_____   _____   _____

Name of Participant   Date   Signature

_____   _____   _____

Name of Researcher   Date   Signature

Background Information: Focus Group Discussion

Age: _____   Gender: 1. Female   2. Male

Marital status: _____   Occupation: _____

III. Participant Information Sheet: Individual Interview

Dear Participant,

Welcome and I would like to thank you for coming to this interview session. My name is Esubalew Assefa. I am a PhD student at the Open University, UK. I am conducting this research to write a thesis that will lead to the award of a PhD degree. I am also expecting the research to be an original work contributing to our understanding of the extent of the problem of depression, the experiences and needs of people with depression and the improvement of health systems to address the issue of depression in Ethiopia.

I am developing a new instrument for wellbeing assessment. The questions I am going to ask you are designed for that purpose and aims to understand and capture issues (beings and doings) that people would have a reason to value and consider important to lead a fulfilling life. I will ask you the questions first and we will have follow up discussion about the questions and your response. This will be very important input to the development of the instrument.

The interview and discussion will last approximately 45 minutes to 1 hour. Please be assured that data collected from the discussion will be confidential, anonymous and used for the intended academic purposes only.

Before the start of the interview you will be asked to complete a consent to confirm your understanding and voluntary participation. You will also be asked to complete a brief background information form. The background information is simple form about yourself such as age, gender and will only be used to provide summarised information about all participants in the interview. If you have any questions about this research after the interview, please feel free to contact me by phone: (*mobile phone removed in this document for privacy reasons, but it was provided for participants*) or email me at esubalew.assefa@open.ac.uk.

Once again, thank you for participating in this research.

IV. Consent form: Individual Interview

- I have read the information sheet or being read to me in full related to aims of the project and I have had the opportunity to ask questions.

- I am fully aware that my participation is voluntary and I am not obliged to answer any question.

- I am fully aware that I will remain anonymous and that I have the right to stop the interview at any point.

- I understand that data collected will be kept anonymous and confidential by the researcher.

- I agree to have the interview audio recorded, so it can be transcribed after the discussion is held.

- I agree to quotes or other results arising from my participation in the discussion being anonymously included in any reports about the study.

- I agree to participate in the study and take part in this interview today.

_____   _____   _____

Name of Participant   Date   Signature

_____   _____   _____

Name of Researcher   Date   Signature

Background Information: Focus Group Discussion

Age: _____   Gender: 1. Female   2. Male

Marital status: _____   Occupation: _____

V. Participant Information Sheet: Survey Data Collection

Dear Participant,

My name is Esubalew Assefa. I am a PhD student at the Open University, UK and I am conducting a survey about health and other topics in Sodo District. The information I collect will help to understand important issues related to health problems in the district and in the country and help to plan better health services. If you agree to take part, I would like to ask you some questions about yourself, your health issues as well as related issues about your experiences and quality of life. The interview is expected to last for 35 to 40 minutes and I greatly appreciate your time. Please be assured that data collected from the discussion will be confidential, anonymous and used for the intended academic purposes only. All the answers you provide will be confidential and will not be shared with anyone other than members of our research team. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time. If you have any questions about this research after the interview, please feel free to contact me by phone: (*mobile phone removed in this document for privacy reasons, but it was provided for participants*) or email me at esubalew.assefa@open.ac.uk.

Once again, thank you for participating in this research.

VI. Consent form: Survey Data Collection

- I have read the information sheet or being read to me in full related to aims of the project and I have had the opportunity to ask questions.

- I am fully aware that my participation is voluntary and I am not obliged to answer any question.

- I am fully aware that I will remain anonymous and that I have the right to stop the interview at any point.

- I understand that data collected will be kept anonymous and confidential by the researcher.

- I agree to participate in the study and take part in this interview today.

_____   _____   _____

Name of Participant   Date   Signature

_____   _____   _____

Name of Researcher   Date   Signature

Appendix 2B. Survey Instruments

I. Secondary Data Questionnaire (*Health Survey Data*)

The health survey questionnaires can be accessed from the following sources.

A. Individual Module: https://www.who.int/healthinfo/survey/whslongindividuala.pdf

B. Household Module: https://www.who.int/healthinfo/survey/whslonghouseholdlow.pdf

II. Primary Data Questionnaire (*Own Survey Data*)

Interview Details

001	Ethiopian calendar Interview date (E.C.)	[ ][ ]/[ ][ ]/[ ][ ][ ][ ][ ]		
002	European Calendar Interview date (G.C.)	[ ][ ]/[ ][ ]/[ ][ ][ ][ ][ ]		
003	Health center code			
004	Interviewer ID	[ ][ ]		
005	Participant ID	[ ][ ][ ][ ]		
006	Interview start time	[ ][ ]:[ ][ ]		
007	Interview end time	[ ][ ]:[ ][ ]		

Section 1. Background Information

Socio-demographic Information

101	Age *(how old are you?)*			
102	Gender (*record as observed*)	Male	0	
		Female	1	
103	Place of residence (*where do you live, in urban or rural kebele?*)	Urban	0	
		Rural	1	
104	What is your religion?	Christian	1	
		Muslim	2	
		Other (Specify)	77	
105	What best describes your level of education?	cannot read or write	1	
		can read and write but has never	2	

		attended formal education		
		Attended formal education (→Q105a)	3	
105a	If you attended formal education, what level did you attend to?	Primary school	1	
		High school	2	
		Certificate/diploma (post-secondary school)	3	
		Bachelor's degree (including MD, DVM)	4	
		Above bachelor's (MA, MSc, PhD etc)	5	
106	What is your current marital status?	married or living together(→Q107)	1	
		divorced/separated(→Q107)	2	
		widowed(→Q107)	3	
		never married(→Q1088)	4	
107	Do you have children?	No (→Q108)	0	
		Yes (→Q107b)	1	
107a	How many children do you have?			
107b	How old is your youngest child?			
108	What is your religion?	Christian	1	
		Muslim	2	
		Other (Specify)	77	
109	What do you primarily spend your time on, in a typical day?	Paid work	1	
		Private work	2	
		Farming	3	
		Housewife (Homework and Childcare)	4	
		Study	5	
		Unemployed	6	
		Other (specify)	77	
110	What is your primary source of income?	Agricultural work	1	
		Government employee	2	
		Private organization employee	3	
		Self-employed	4	
		Pensioner	5	

		Daily labourer	6	
		Family support	7	
		Other (specify)	77	
111	How often do you usually earn?	Per day	1	
		Per week	2	
		Per month	3	
		Per year	4	
112	How much do you usually earn per day/week/month/year (before taxes and other deductions)?			
113	When you compare yourself with people in your village, how would you express your family's current income or life?	Very low	1	
		Lower	2	
		Middle	3	
		Higher	4	
		Very high	5	

Current visit

Now, I am going to ask you few questions with regard to your visit today.

115	What is the main reason for your visit today?	Check up or other preventive care (not linked to pregnancy)	1	
		prenatal check-up	2	
		giving birth	3	
		follow up appointment for earlier chronic illness	4	
		follow up appointment for earlier accident	5	
		new or acute illness	6	
		new injury	7	
		other (specify)	77	

116	What have you been diagnosed with/treated for today?	Malaria	1	
		Diarrhoea	2	
		injury	3	
		upper respiratory infection	4	
		tuberculosis	5	
		Other (specify)	77	
117	Have you spent money on treatment and services on your visit today(such as consulting fee and any expenses for other items including drugs and tests)?	No (→Q118)	0	
		Yes (→Q117a)	1	
117a	How much money was spent on treatment and services?			
118	Have you spent money on other non-medical items on your visit today (such as travel, meal, accommodation)?	No (→Q119)	0	
		Yes (→Q118a)	1	
118a	How much money was spent on other non-medical expenses?			
119	Are you accompanied by someone?	No (→ Section 2)	0	
		Yes (→Q119a & Q119b)	1	
119a	How many individuals came with you?			
119b	What is your relationship/kinship with the individual? (fill out the relationship/kinship code for up to three individuals who came with the participant)	#1_____ #2_____ #3_____	[_] [_] [_]	
		Spouse	1	
		Child	2	
		Siblings	3	
		Parent	4	
		Other relatives	5	
		Other (specify)	77	
119c	What would they be doing instead if they didn't come with you?			

119d	Did you spend money on them for their trip with you today?	No	0	
		Yes (→Q119e)	1	
119e	How much money was spent on the individual(s) who accompanied you today (on expenses such as travel, meal, accommodation)?			

Section 2. Mental Health Assessment Instrument (PHQ-9)

Note: Explain to the interviewee that occasionally means (2-6 days), several days means (7-11 days), Nearly every day means (12-14 days) and use and hold the flashcard as you ask each question.

Over the <u>last 2 weeks</u>, how often have you been bothered by any of the following problems?

		Not at all	Occasionally	Several days	Nearly every day
		0	1	2	3
201	Little interest or pleasure in doing things				
202	Feeling down, depressed, or hopeless				
203	Trouble falling or staying asleep, or sleeping too much				
204	Feeling tired or having little energy				
205	Poor appetite or overeating				
206	Feeling bad about yourself — or that you are a failure or have let yourself or your family down				
207	Trouble concentrating on things, such as conversing with people, listening radio, watching television.				
208	Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual				
209	Thoughts that you would be better off dead or of hurting yourself in some way				
210	Noise intolerance				
211	Irritability				
	Total Raw Score (201-209):				

Section 3. Somatic Symptoms (PHQ-15)

During the past 7 days, how much have you been bothered by any of the following problems?

		Not bothered at all	Bothered a little	Bothered a lot
		0	1	2
301	Stomach pain			
302	Back pain			
303	Pain in your arms, legs, or joints (knees, hips, etc.)			
304	Menstrual cramps or other problems with your periods *WOMEN ONLY*			
305	Headaches			
306	Chest pain			
307	Dizziness			
308	Fainting spells			
309	Feeling your heart pound or race			
310	Shortness of breath			
311	Pain or problems during sexual intercourse			
312	Constipation, loose bowels, or diarrhoea			
313	Nausea, gas, or indigestion			
314	Feeling tired or having low energy			
315	Trouble sleeping			
	Total Raw Score:			

Section 4. WHO (Five) Well-Being Index

Which is closet to how you have been feeling over the past two weeks?

		None of the time	Some of the time	Less than half of the time	More than half of the time	Most of the time	All of time
		0	1	2	3	4	5
401	I have felt cheerful and in good spirits						
402	I have felt calm and relaxed						
403	I have felt active and vigorous						
404	I woke up feeling fresh and rested						
405	My daily life has been filled with things that interest me						
	Total raw score:						

Note to the interviewer: when you ask the next question hand the happiness flashcard to respondent

406. In general, how satisfied are you with your life?

0	1	2	3	4	5	6	7	8	9	10

Section 5: Suicidal Ideation and Action (CIDI)

501	Have you experienced any accident (including injury and an assault) in the past one month?	No	0	
		Yes	1	
502	During one of those periods in the past one month, **did you think a lot about death?**	No	0	
		Yes	1	
503	Have you **thought of taking your life** in the past one month?	No	0	
		Yes	1	
504	Did you ever **make a plan for taking your own life** at any time in the past one month?	No	0	
		Yes	1	

505	Have you **attempted to take your own life** in the past one month?	No	0	
		Yes	1	
	If the response for questions 503, 504 and 505 is 'no', skip to the next section (Q601)			
506	If you have attempted to take your own life in the past one month, how many times have you attempted?			
507	Did you receive any treatment for thinking about or attempting to take your own life? **Note**: If the response is no and the interviewee still has thought of suicide, refer them to THE PROJECT COORDINATOR FOR CLINICAL REVIEW	No	0	
		Yes	1	
508	What treatment did you receive?			

Section 6. Social Support (*Oslo-3 Social Support Scale: OSS-3*)

601	How easy is it to get practical help from neighbours if you should need it?	Very difficult	1	
		Difficult	2	
		Possible	3	
		Easy	4	
		Very easy	5	
602	How many people are so close to you that you can count on them if you have serious personal problems (choose one option)?	None	1	
		1 or 2	2	
		3 to 5	3	
		6 or more	4	
603	How much concern do people show in what you are doing (choose one option)?	No concern and interest	1	
		Little concern and interest	2	
		Uncertain	3	
		Some concern and interest	4	
		A lot of concern and interest	5	

Section 7: Generalized Anxiety Disorder Scale (GAD-7)

Over the last 2 weeks, how often have you been bothered by the following problems?

		Not at all	Several days	More than half the days	Nearly every day
		0	1	2	3
701	Feeling nervous, anxious or on edge?				
702	Not being able to stop or control worrying?				
703	Worrying too much about different things?				
704	Trouble relaxing?				
705	Being so restless that it is hard to sit				

	still?				
706	Becoming easily annoyed or irritable?				
707	Feeling afraid as if something awful might happen?				

Section 8. Life threatening events

801	In the last 6 months, have you yourself suffered a serious illness, injury or an assault?	No	0	
		Yes	1	
802	In the last 6 months has a serious illness, injury or assault happened to a close relative?	No	0	
		Yes	1	
		Don't Know	8	
803	In the last 6 months has your spouse, parent or child died?	No	0	
		Yes	1	
804	In the last 6 months has a close family friend or another relative died?	No	0	
		Yes	1	
805	In the last 6 months have you had a separation due to marital difficulties? (ask only if the participant is married or his spouse is alive)	No	0	
		Yes	1	
		Not applicable	9	
806	In the last 6 months have you broken off a steady friendship or relationship?	No	0	
		Yes	1	
807	In the last 6 months have you had a serious problem with a close friend, neighbour or relative?	No	0	
		Yes	1	
808	In the last 6 months have you been unemployed for more than one month or not been unable to got a job for more than a month?	No	0	
		Yes	1	
809	In the last 6 months have you been sacked from job?	No	0	
		Yes	1	
810	In the last 6 months have you had a major financial crisis (serious money worries)?	No	0	
		Yes	1	

811	In the last 6 months have you lost or had anything stolen which mattered a lot to you?	No	0	
		Yes	1	
812	In the last 6 months have you had any problems with the police or courts?	No	0	
		Yes	1	

Section 9. Capabilities

		Disagree Strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
		1	2	3	4	5
901	Given my family history, lifestyle and health status, I expect to lead a long and healthy life.					
902	Given my age, I feel I am in good health.					
903	I am able to have adequate accommodation to my needs.					
904	I am able to move from place to place (in my neighbourhood) without fearing for my safety.					
905	I feel I am secure against violent assault (such as sexual assault, domestic or other violence).					
906	I am free to decide or have a say on issues of reproductive health (eg. family planning, contraception or other reproductive health issues).					
907	I have enough opportunities to use my imagination and my reason.					
908	I am free to express and share my ideas and thoughts.					
909	I am free to practice my religion as I want to.					
910	I am able to make friendships with people which last.					
911	I find it easy to enjoy the love, care and support of my family and friends.					
912	I am able to reflect on my life.					
913	I am free to decide on and plan for myself on a life which I consider good.					
914	I respect, value and appreciate people					

	around me.					
915	I feel people around me respect, value and appreciate me.					
916	I am able to meet socially with relatives and friends.					
917	I am able to join community activities as I want to (eg. festivities, religious or other activities).					
918	I am able to appreciate and value plants, animals and the world of nature.					
919	I am able to have and enjoy activities other than my usual day-to-day activities.					
920	I am free to own assets if I want to.					
921	I feel I am a valuable member of my family and society and other see me as such.					
922	I am free to express my political views.					

Section 10. Functioning and Disability (WHODAS 2.0)

		None	Mild	Moderate	Severe	Extreme or cannot do
	In the past 30 days, how much difficulty did you have in:	1	2	3	4	5
1001	Standing for long periods such as 30 minutes?					
1002	Taking care of your household responsibilities?					
1003	Learning a new task, for example, learning how to get to a new place?					
1004	How much of a problem did you have in joining in community activities (for example, festivities, religious or other activities) in the same way as anyone else can?					
1005	How much have you been emotionally affected by your health condition?					
1006	Concentrating on doing something for ten minutes?					
1007	Walking a long distance such as a kilometre [or equivalent]?					
1008	Washing your whole body?					
1009	Getting dressed?					
1010	Dealing with people you do not know?					
1011	Maintaining a friendship?					
1012	Your day-to-day work/school?					

1013	Overall, in the past 30 days, how many days were these difficulties present? (*Record number of days*)	____
1014	In the past 30 days, for how many days were you totally unable to carry out your usual activities or work because of any health condition? (*Record number of days*)	____
1015	In the past 30 days, not counting the days that you were totally unable, for how many days did you cut back or reduce your usual activities or work because of any health condition? (*Record number of days*)	____

Section 11. Use of Health Facilities and Expenditures

Outpatient Care and Expenditures

Now I would like to ask you some questions about the health care you received without staying overnight.

1101	Excluding today's, did you receive care from a health provider, a pharmacy, or a traditional healer without staying overnight at a health facility in the last three months?	No (→Q1113)	0	
		Yes (→ Q1102)	1	
1102	Whom did you consult during your visit?	traditional healer / spiritualist / herbalist	1	
		community health worker	2	
		nurse / midwife	3	
		pharmacist	4	
		General doctor	5	
		Specialist doctor	6	
		Other (specify)	77	
1103	Where did it take place?	your own home	1	
		traditional healer's place	2	
		local health centre	3	
		private clinic	4	
		public hospital outpatient	5	
		private hospital	6	
		other (specify)	77	
1104	What was the main reason for the visit?	Infectious disease (e.g. malaria)	1	
		acute condition (e.g. fever, flu, cough)	2	
		diarrhoea	3	
		HIV/AIDS/STD	4	
		Other illness (specify)	5	
		Accident/Injury	6	

174

		pregnancy/delivery	7	
		Check-up/preventive care	8	
		Other (specify)	77	
1105	What were the main feature of the visit?	only diagnosis	1	
		diagnosis and treatment	2	
		follow-up visit	3	
		prayer/holy water/*dua*	4	
		other (specify)	77	
1106	How much money was spent on treatment and services you received? (*Please include the consulting fee and any expenses for other items including drugs and tests.*) (in Birr)			
1107	How much money did you spend on other non-medical expenses? (*please include items such as travel, meal, accommodation*) (in Birr)			
1108	How many days were you absent from usual activity due to this illness/injury and associated visit?			
1109	During your most recent visit were you accompanied by someone (family member, relative, and friend)?	No (→Q1111)	0	
		Yes (→Q1110)	1	
1110	Relationship/kinship?	Spouse	1	
		Child	2	
		Siblings	3	
		Parent	4	
		Other relatives	5	
		Other (specify)	77	
1110a	What would he/she be doing instead if he/she didn't come with you?			
1111	Excluding your visit today and the one you told me about now, did you get care another time in the last three months from a health provider, a pharmacy, or a traditional healer, without staying overnight?	No (→Q1113)	0	

		Yes (→Q1112)	1	
1112	How many other times did you get care in the last three months?			

Inpatient Care and Expenditures

Now I would like to ask you some questions about the inpatient care you received staying overnight.

			response	remark
1113	In the last 12 months, have you been admitted overnight to stay at a health facility?)	No (→ Section 12)	0	
		Yes (→Q1114)	1	
1114	Where did your most recently stay overnight for health care?	Government hospital	1	
		government health centre	2	
		government health post	3	
		private hospital	4	
		private clinic	5	
		charity hospital	6	
		traditional healer	7	
		other (specify)	77	
1115	What was the main reason for you to seek care this most recent time?	Illness	1	
		Accident/Injury (specify)	2	
		Pregnancy/Delivery	3	
		Other (specify)	77	
1116	How long did you stay? (*# days*)			
	How much money was spent on treatment and services you received during the most recent overnight stay? (*Please include all the costs for the stay, including any charges for laboratory tests, drugs, or other items.*)			
1117	How were the costs covered?	paid from my savings	1	
		paid by family members	2	
		borrowing from family members or relatives	3	
		borrowing from banks	4	
		borrowing money lenders	5	
		borrowing from microfinance institutions	6	

		borrowing from employer	7	
		selling of livestock/land/house/other assets	8	
		paid by charity	9	
		paid by Insurance (→ Q1117a)	10	
		other (specify)	77	
1117a	What is the main type of insurance?	Community-based health insurance	1	
		Health insurance through employer	2	
		Oher community/social self-help groups	3	
		Other (specify)	77	
1118	Did someone has to attend and care for you?	No (→Q1119)	0	
		Yes (→Q1118a)	1	
1118a	Relationship/kinship	Spouse	1	
		Child	2	
		Siblings	3	
		Parent	4	
		Other relatives	5	
		Other (specify)	77	
1118b	How long did the carer spend providing support? (# days)			
1118c	What else would he/she have been doing?			
1119	Did you stay overnight another time in the last 12 months, other than the one you just told me about?	No (→ Section 12)	0	
		Yes (→Q1120)	1	
1120	How many times were you admitted for overnight stay?			

Section 12. Household economic information

I want to ask you a few questions about the characteristics of your home.

1201	What is the main source of drinking water for you and members of your household?	Piped water	1	
		tube well or borehole	2	
		protected well	3	
		unprotected well	4	
		protected spring	5	
		unprotected spring	6	
		cart with small tank	7	
		tanker truck	8	
		Surface water (river/dam/lake/ponds/stream/canal/irrigation channels)	9	
		other (specify)	77	
1202	What kind of toilet facility do you and members of your household usually use?	flush toilet	1	
		pit latrine, ventilated vip	2	
		pit latrine, with slab	3	
		pit latrine, without slab	4	
		composting toilet	5	
		no facility/ field /forest (→1204)	6	
		others(specify)	77	
1203	Do you share this toilet facility with other households? (*ask only if the interviewee uses toilet facility*)	No	0	
		Yes	1	
1204	Does your household have electricity?	No	0	
		Yes	1	
1205	Does your household have a radio?	No	0	
		Yes	1	

1206	Does your household have a television?	No	0	
		Yes	1	
1207	Does anybody in your household have a mobile telephone?	No	0	
		Yes	1	
1208	Does your household have a refrigerator?	No	0	
		Yes	1	
1209	What type of fuel does your household mainly use for cooking?	fire wood	1	
		Charcoal	2	
		crop residue /leaves	3	
		dung/ manure	4	
		saw dust	5	
		Kerosene	6	
		butane gas	7	
		Electricity	8	
		solar energy	9	
		Biogas	10	
		None, no food cooked in household	11	
		other (specify)	77	
1210	Do you have a separate room which is used as a kitchen?	No	0	
		Yes	1	
1211	Does this household own any livestock, herds, other farm animals, or poultry?	No	0	
		Yes (→Q1212)	1	
1212	How many of the following animals does this household own? (*Note: write 0 if they don't have the animals. If they say they have, write their number*)	Milk cows or bulls?		
		Other cattle?		

		Horses, donkeys, or mules?		
		Sheep?		
		Goats?		
		Chickens or other poultry?		
		Other (specify)		
1213	What is the floor your house is made of?	mud/dung	1	
		bamboo /reed	2	
		wood planks	3	
		parquet or polished wood	4	
		cement screed	5	
		plastic tiles	6	
		cement tiles	7	
		brick tiles	8	
		ceramic/marble tiles	9	
		other (specify)	77	

Appendix 3A. Details of Additional Explanatory Variables

Table A1. Description of Variables

Variable	Description
Age	A categorical variable for age was used to capture potential cohort effect and nonlinear association between age and depression. The age groups were: 18-24, 25-34, 35-44, 45-64 and 65+ years of age.
Sex	A binary variable of sex indicator was used for male (=0) and female (=1) respondents.
Marital status	Categorical variable with four groups to indicate different marital status was used. The categories were: never married, currently married or cohabiting, separated or divorced and widowed.
Education	Categorical variable to indicate different levels of education: no formal schooling, some primary school, primary school complete, High school or above complete.
Employment status	Categorical variables to indicate employment status: employee (public or private sector), self-employed and not working for pay.
Place of residence	A binary variable to indicate urban or rural residence
Asset Index	A composite indicator of wealth was constructed from 16 items on household durables and access to resources. The items are: access to electricity, ownership of items for transportation (bicycle), household durable (washing machine for clothes, washing machine for dishes, refrigerator, Sofa set, computer), items for communication (fixed line telephone, mobile/cellular telephone), entertainment (television, Radio casette) and other items (clock, bucket, kitchen cupboard, cupboard, electric stove). Assessment of commonality of the variables indicates they have a lot in common to warrant a factor analysis (overall Kaiser–Meyer–Olkin (KMO) measure of 0.93 that ranges between 0.67 and 0.96). The choice of retaining one factor was justified by having a factor with a high eigenvalue (5·17). A largest percentage (95%) of commutative variance was explained by this first factor. The principal component method was used for factor extraction and the regression scoring method to obtain the factor scores. The factor score was transformed

to a 0 to 1 scale, with 0 indicating lowest wealth and 1 indicating highest wealth.

Chronic illnesses	A binary variable to indicate the presence or absence of one or more of the following chronic illnesses: asthma, diabetes, angina, back pain, arthritis and TB. The following algorithms were used to determine the presence or absence of these illnesses.

Asthma. Two main indicators were used to identify asthma cases. These are self-reported wheezing symptoms (WS) and diagnosed asthma (DA) WS was defined as a positive response to any of the following questions: 'During the past 12 months, have you experienced any of the following: (1) attacks of wheezing or whistling breathing or (2) attack of wheezing that came on after you stopped exercising or some other physical activity?'. DA was defined as an affirmative response to the question: 'Have you (ever) been: (1) diagnosed with asthma (an allergic respiratory diseases) or (2) treated for it or (3) taking any medications or other treatment for it during the past 2 weeks?'. (Patra et al., 2016)

The reference group are participants who answered at least one of the questions above but did not report a positive response to any of them. Those who did not answer any of the questions above were excluded from the analysis.

Diabetes. Diabetes was defined as those individuals who reported affirmatively to either of two questions: 'Have you ever been diagnosed with diabetes (high blood sugar)?' and 'Have you ever had any treatment or medications or attended a program for diabetes?' (Mommersteeg et al., 2013; Patra et al., 2014)

Angina. Angina or angina pectoris cases were identified if respondents reported that there were diagnosed with, treated for or have been taking medications or other treatment in the past two weeks. In addition, the WHO's Rose criteria for the diagnosis of angina pectoris was used to define cases of angina. Particularly, cases respondents were included as angina cases if they report experiencing any pain or discomfort in their chest when they walk

uphill or hurry or when walking at an ordinary pace on the level, the pain site included either upper or middle chest, lower anterior chest or left arm, stop or slow down when they get the pain or discomfort and the pain or discomfort is relieved if they stand still. (Cook et al., 1989; Lampe et al., 2001; Loerbroks et al., 2014)

Back pain. Defining backpain cases involved self-reported back pain problem with affirmatively answering the question 'Have you experienced back pain (including disc problems) during the last 30 days?'.

Arthritis. Inflammatory arthritis was defined based on three items included in the WHS, addressing diagnosis and treatment of arthritis and symptoms suggestive of arthritis. These are: (1) self-reported diagnosis of arthritis ("Have you ever been diagnosed with arthritis (a disease of the joints)?"), (2) self-reported treatment of arthritis ("Have you ever been treated for it?") and (3) self-reported morning stiffness ("During the last 12months, have you experienced any of the following: Stiffness in the joint in the morning after getting up from bed, or after a long rest of the joint without movement?" in combination with "How long does this stiffness last? (about 30 minutes or less/more than 30 min)"). Inflammatory arthritis was defined if (a) either a diagnosis or treatment of arthritis and (b) morning stiffness for 30 minutes or more was reported. (Apfelbacher et al., 2017)

Tuberculosis (TB). TB cases were defined by affirmative answers to the questions Affirmative answers to either of the following questions 'During the last 12 months, have you experienced any of the following: Cough that lasted for 3 weeks or longer? and Have you had blood in your phlegm or have you coughed blood?'. (Patra et al., 2014)

Appendix 3B. Covariate Balance

Table B1. Mean Standardised Differences across All Covariates before and after Matching on the Propensity Score for HRQoL Outcome Model

Variable	Unmatched (total sample)	Nearest Neighbour matched sample	Radius Matched sample	Kernel matched sample
Chronic Illness	1.009	0.017	0.010	0.022
Sex				
Female	0.026	0.018	0.028	0.021
Age group				
25-34	0.042	0.047	0.008	0.017
35-44	0.004	0.043	0.026	0.062
45-64	0.149	0.015	0.042	0.013
65+	0.200	0.007	0.008	0.068
Marital status				
Currently Married or Cohabiting	0.130	0.047	0.026	0.117
Separated or Divorced	0.122	0.015	0.094	0.076
Widowed	0.275	0.038	0.031	0.101
Education				
Some primary school	0.060	0.037	0.002	0.008
Primary school complete	0.111	0.082	0.006	0.015
High school complete or above	0.216	0.081	0.062	0.015
Employment status				
Self-employed	0.080	0.014	0.023	0.035
Not working for pay	0.049	0.000	0.006	0.030
Place of residence				
Rural	0.025	0.067	0.033	0.050
Asset Index	0.230	0.154	0.008	0.007

Table B2. Mean Standardised Differences across All Covariates before and after Matching on the Propensity Score for Self-rated Health Outcome Model

Variable	Unmatched	Nearest Neighbour matched sample	Radius Matched sample	Kernel matched sample
Chronic Illness	1.017	0.022	0.010	0.022
Sex				
Female	0.032	0.013	0.033	0.018
Age group				
25-34	0.041	0.036	0.001	0.017
35-44	0.002	0.022	0.032	0.062
45-64	0.151	0.030	0.040	0.010
65+	0.197	0.053	0.009	0.063
Marital status				
Currently Married or Cohabiting	0.123	0.075	0.031	0.110
Separated or Divorced	0.114	0.047	0.091	0.069
Widowed	0.274	0.000	0.031	0.102
Education				
Some primary school	0.066	0.076	0.004	0.000
Primary school complete	0.100	0.023	0.008	0.005
High school complete or above	0.220	0.039	0.062	0.018
Employment status				
Self-employed	0.077	0.013	0.021	0.031
Not working for pay	0.045	0.000	0.007	0.026
Place of residence				
Rural	0.030	0.013	0.032	0.045
Asset Index	0.233	0.126	0.006	0.011

Table B3. Mean Standardised Differences across All Covariates before and after Matching on the Propensity Score for Health Satisfaction Outcome Model

Variable	Unmatched	Nearest Neighbour matched sample	Radius Matched sample	Kernel matched sample
Chronic Illness	1.021	0.006	0.010	0.022
Sex				
Female	0.026	0.009	0.033	0.022
Age group				
25-34	0.057	0.016	0.003	0.003
35-44	0.005	0.022	0.032	0.059
45-64	0.160	0.000	0.041	0.004
65+	0.206	0.020	0.008	0.076
Marital status				
Currently Married or Cohabiting	0.124	0.014	0.031	0.111
Separated or Divorced	0.121	0.016	0.099	0.078
Widowed	0.276	0.012	0.033	0.103
Education				
Some primary school	0.071	0.068	0.002	0.006
Primary school complete	0.107	0.000	0.006	0.013
High school complete or above	0.224	0.060	0.067	0.020
Employment status				
Self-employed	0.080	0.027	0.022	0.033
Not working for pay	0.050	0.018	0.007	0.030
Place of residence				
Rural	0.039	0.119	0.039	0.037
Asset Index	0.232	0.117	0.009	0.009

Appendix 3C. Sensitivity Analysis for the Effect of Unobserved Confounder

Table C1. Treatment Effect Estimates for HRQoL under Different Simulation Settings

Settings							
p11	p10	p01	p00	ATT	SE	Outcome Effect	Selection Effect
0	0	0	0	-0.225***	0.021	-	-
0.5	0.5	0.5	0.5	-0.222***	0.023	0.995	1.026
0.6	0.6	0.5	0.4	-0.227***	0.023	1.506	1.741
0.6	0.6	0.9	0.3	-0.204***	0.023	21.426	0.661
0.8	0.8	0.3	0.2	-0.247***	0.026	1.724	11.595
0.8	0.8	0.7	0.1	-0.301***	0.023	21.81	4.451

*** p<0.01

Table C2. Treatment Effect Estimates for Self-rated Health under Different Simulation Settings

Settings							
p11	p10	p01	p00	ATT	SE	Outcome Effect	Selection Effect
0	0	0	0	-0.22***	0.029	-	-
0.5	0.5	0.5	0.5	-0.203***	0.032	1.003	0.998
0.6	0.6	0.5	0.4	-0.215***	0.034	1.5	1.72
0.6	0.6	0.9	0.3	-0.159***	0.037	21.289	0.648
0.8	0.8	0.3	0.2	-0.262***	0.039	1.736	11.604
0.8	0.8	0.7	0.1	-0.371***	0.034	21.439	4.241

*** p<0.01

Table C3. Treatment Effect Estimates for Health Satisfaction under Different Simulation Settings

Settings							
p11	p10	p01	p00	ATT	SE	Outcome Effect	Selection Effect
0	0	0	0	-0.076***	0.026	-	-
0.5	0.5	0.5	0.5	-0.077***	0.029	1.003	1.004
0.6	0.6	0.5	0.4	-0.086***	0.031	1.522	2.025
0.6	0.6	0.9	0.3	-0.134***	0.034	21.417	1.682
0.8	0.8	0.3	0.2	-0.136***	0.041	1.737	14.036
0.8	0.8	0.7	0.1	-0.373***	0.041	21.464	11.431

*** p<0.01

Appendix 3D. Sensitivity Analysis with Common Support Trimming

Table D1. Treatment Effect Estimates for HRQoL Outcome Variable

Matching	Trim	ATT	SE	Obs. (treated/control)
radius	Baseline	-0.213***	0.02	379/2324
	1%	-0.219***	0.02	378/2323
	5%	-0.214***	0.02	361/2287
	10%	-0.219***	0.02	339/2207
	15%	-0.227***	0.02	305/2123
Kernel	Baseline	-0.239***	0.02	441/4268
	1%	-0.240***	0.02	438/4281
	5%	-0.231***	0.02	420/4108
	10%	-0.230***	0.02	400/3892
	15%	-0.229***	0.02	376/3677

*** p<0.01

Table D2. Treatment Effect Estimates for Self-rated Health Outcome Variable

Matching	Trim	ATT	SE	Obs. (treated/control)
Radius	Baseline	-0.20***	0.03	387/2353
	1%	-0.209***	0.03	386/2352
	5%	-0.201***	0.03	368/2310
	10%	-0.210***	0.03	346/2229
	15%	-0.214***	0.03	316/2156
Kernel	Baseline	-0.227***	0.03	448/4309
	1%	-0.233***	0.03	445/4322
	5%	-0.235***	0.03	427/4147
	10%	-0.235***	0.03	407/3929
	15%	-0.228***	0.03	387/3713

*** p<0.01

Table D3. Treatment Effect Estimates for Health Satisfaction Outcome Variable

Matching	Trim	ATT	SE	Obs. (treated/control)
Radius	Baseline	-0.074***	0.03	384/2327
	1%	-0.071***	0.03	383/2326
	5%	-0.071***	0.03	365/2284
	10%	-0.079***	0.03	343/2205
	15%	-0.081***	0.03	312/2132
Kernel	Baseline	-0.081***	0.02	443/4276
	1%	-0.083***	0.02	440/4288
	5%	-0.085***	0.02	422/4116
	10%	-0.086***	0.02	403/3898
	15%	-0.081***	0.02	380/3682

*** p<0.01

Appendix 4A. Topic Guide for Group Discussions and Interviews

Introduction

Welcome and thank you.

Introducing the researcher to participants.

Explain the aim of the study, distribute information sheet, read consent form and complete

consent forms.

Outline and explain the rules of participation and discussions.

Guiding questions

Read out a capability item from the questionnaire.

What do you understand by the question? /What does the question mean to you?

Do you feel this to be valuable aspect of quality of life?

Is the statement clear and understandable?

Is there something you consider relevant to you but was not asked here?

Additional guiding questions for interviews

Ask what their response would be for a capability item.

Ask how they choose that response.

Was the question worded in a way that made sense to you?

Was the question in anyway offensive or objectionable to you?

Was the question about something which is important or relevant to you?

Appendix 4B. Initial Item Drafting and Comparison with OCAP, OCAP-18 and OxCAP-MH Instruments

Core capabilities	Brief description of core capabilities	OCAP [1]	OCAP-18 [2]	OxCAP-MH [3]	Version 1
Life	Being able to live to the end of a human life of normal length; not dying prematurely, or before one's life is so reduced as to be not worth living.	Given your family history, dietary habits, lifestyle and health status until what age do you expect to live?	Until what age do you expect to live, given your family history, dietary habits, lifestyle and health status?		1. How healthy do you feel compared to other people your age? [more healthy, equally healthy, less healthy]
Bodily Health	Being able to have good health, including reproductive health; to be adequately nourished; to have adequate shelter.	Does your health in any way limit your daily activities compared with most people of your age? Are you able to have children? Do you eat fresh meat, chicken or fish at least twice a week? Is your current accommodation adequate or inadequate for your current needs? Are you prevented from moving home for any reason?	Does your health in any way limit your daily activities, compared to most people of your age? How suitable or unsuitable is your accommodation for your current needs?	1. Does your health in any way limit your daily activities, compared to most people of your age? [Always, Most of the time, Some of the time, Hardly ever, Never] 5. How suitable or unsuitable is your accommodation for your current needs? [Very suitable, Fairly suitable, Neither suitable nor unsuitable, Fairly unsuitable, Very unsuitable]	2. Does your health in any way limit your daily activities, compared to other people your age? [Yes, No] 3. Are you able to have children? [Yes, No] [If No: Reasons – age, health problems, infertility (natural), infertility treatment (hysterectomy/vasectomy), I don't want to have children, other (specify)] 4a. Which of these apply to housing condition/situation? [I own the house I live in, rent from private/individuals, rent from

					government (council/kebele), other (specify)]
					4b. How suitable or unsuitable is your accommodation for your current needs? [very suitable, suitable, neither suitable nor unsuitable, unsuitable, very unsuitable] 4c. Are you able to make changes to (repair, maintain, modify) or move if you want to? [Yes, No] [if No: 3d. Which of the following reasons prevent you from making changes or moving? [Lack of money/finances, other family responsibilities, difficulty of getting permit to make changes, no desire to move or make changes, other reasons (specify)]
Bodily Integrity	Being able to move freely from place to place; to be secure against violent assault including sexual assault and domestic	How safe you feel walking alone in the area near your home DURING THE DAY time?	How safe do you feel walking alone in the area near your home?	6. Please indicate how safe you feel walking alone in the area near your home:	5a. How safe you feel walking alone in your neighbourhood during the day time?

192

	violence; having opportunities for sexual satisfaction and for choice in matters of reproduction.	How safe you feel walking alone in the area near your home AFTER DARK? Have you ever been the victim of some other form of violent assault or attack — i.e. an assault other than sexual or domestic? How likely do you think it is that you will be a victim of violent assault or attack in the future? Have you ever been a victim of sexual assault? How vulnerable you feel to sexual assault or attack? Have you ever been a victim of domestic violence? How vulnerable you feel to domestic violence in the future?	How likely do you believe it to be that you will be assaulted in the future (including sexual and domestic assault)?	[Very safe, Fairly safe, Neither safe nor unsafe, Fairly unsafe, Very unsafe] 7. Please indicate how likely you believe it to be that you will be assaulted in the future (including sexual and domestic assault): [Very likely, Fairly likely, Neither likely nor unlikely, Fairly unlikely, Very unlikely] 8a. How likely do you think it is that you will experience discrimination? [Very likely (Go to Q8a), Fairly likely (Go to Q8a), Neither likely nor unlikely (Go to Q9), Fairly unlikely (Go to Q9), Very unlikely (Go to Q9)]	[very safe, safe, neither safe nor unsafe, unsafe, very unsafe] 5b. How safe you feel walking alone in your neighbourhood after dark? [very safe, safe, neither safe nor unsafe, unsafe, very unsafe] 6a. Have you ever been the victim of assault (including sexual and domestic assault)? [Yes, No] 6b. How likely you believe it to be that you will be assaulted in the future (including sexual and domestic assault) [Very likely, likely, neither likely nor unlikely, unlikely, very unlikely] 7. Even if you don't need or have never needed any of the following, are you prohibited from using any of the following for any reason (e.g. religious beliefs, family pressure)?

		Do you have sufficient opportunities to satisfy your sexual needs and desires? Even if you don't need or have never needed any of the following, are you prohibited from using any of the following for any reason (e.g. religious beliefs, family pressure)? Contraception, Abortion, Infertility treatment, I am not prohibited from using any of the above		8b. On what grounds do you think it is likely that you will be discriminated against? (Please complete only if your answer to question 8A is 'Very likely' or 'Fairly likely.) [Race/ethnicity, Gender, Religion, Sexual orientation, Age, Health or disability (including mental health)]	[Contraception, Abortion, Infertility treatment, I am not prohibited from using any of the above]
Senses, Imagination, and Thought	Being able to use the senses, to imagine, think, and reason — and to do these things in a 'truly human' way, a way informed and cultivated by an adequate education, including, but by no means limited to, literacy and basic mathematical and scientific training. Being able to use imagination and thought in connection with experiencing and producing	Educated to A-level and above, Others How often do you use your imagination and or reasoning in your day to day life? I am free to express my political views. I am free to practice my religion as I want to.	I am able to express my views, including political and religious views. I am free to use my imagination and to express myself creatively (e.g. through art, literature, music etc).	9b. I am free to express my views, including political and religious views. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree] 9g. I am free to use my imagination and to express myself creatively	8. I am free to express my political views. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree] 9. I am free to practice my religion as I want to. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]

194

	works and events of one's own choice, religious, literary, musical, and so forth; Being able to use one's mind in ways protected by guarantees of freedom of expression with respect to both political and artistic speech, and freedom of religious exercise. Being able to have pleasurable experiences and to avoid non-beneficial pain.	Have you recently been able to enjoy your normal day-to-day activities?		(e.g. through art, literature, music, etc.). [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	10. I am free to use my imagination and to express myself creatively (e.g. through art, literature, music etc) [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]
Emotions	Being able to have attachments to things and people outside ourselves; to love those who love and care for us; to grieve at their absence; in general, to love, to grieve, to experience longing, gratitude, and justified anger. Not having one's emotional development blighted by fear and anxiety.	How difficult do you find it to make friendships which last with people outside work? At present how easy or difficult do you find it to enjoy the love care and support of your immediate family? Do you find it easy or difficult to express feelings of love, grief, longing, gratitude, and anger compared with most people of your age?	At present how easy or difficult do you find it to enjoy the love, care and support of your family and friends? In the past 4 weeks, how often have you lost sleep over worry?	3. In the past 4 weeks, how often have you lost sleep over worry? [Always, Most of the time, Some of the time, Hardly ever, Never] 9e. I find it easy to enjoy the love, care and support of my family and friends. [strongly agree, agree, neither agree nor	11. How easy or difficult do you find it to make friendships with people which last? [very easy, easy, neither easy nor difficult, difficult, very difficult] 12. At present are you able to feel loved and supported by your immediate family? [Yes, No] 13. How easy or difficult do you find it to enjoy the love care and support of your immediate family?

		Have you recently lost much sleep over worry? Have you recently felt constantly under strain?		disagree, disagree, strongly disagree]	[very easy, easy, neither easy nor difficult, difficult, very difficult] 14. Do you find it easy or difficult to express feelings of love, grief, longing, gratitude, and anger compared with other people of your age? [very easy, easy, neither easy nor difficult, difficult, very difficult] 15. Have you recently lost much sleep over worry? [Never, hardly ever, some of the time, most of the time, always] 16. Have you recently felt constantly under strain? [Never, hardly ever, some of the time, most of the time, always]
Practical Reason	Being able to form a conception of the good and to engage in critical reflection about the planning of one's own life. (This entails protection for liberty of conscience.)	My idea of a good life is based on my own judgement. 'I have a clear plan of how I would like my life to be'. How often, if at all, do you evaluate how you lead your life and where you are going in life?	I am free to decide for myself how to live my life.	9f. I am free to decide for myself how to live my life. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	17. I am free to decide for myself how to live my life. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]

		Outside work, have you recently felt that you were playing a useful part in things?			
Affiliation	Being able to live with and toward others, to recognise and show concern for other human beings, to engage in various forms of social interaction; to be able to imagine the situation of another. Having the social bases of self-respect and non-humiliation; being able to be treated as a dignified being whose worth is equal to that of others This entails provisions of non-discrimination on the basis of race, sex, sexual orientation, ethnicity, caste, religion, and national origin.	I respect, value and appreciate other people. Do you normally have at least a week's (seven days) annual holiday away from home? Do you normally meet up with friends or family for a drink or a meal at least once a month? Do you tend to find it easy or difficult to imagine the situation of other people? (i.e. 'to put yourself in others' shoes'). Have you recently been thinking of yourself as a worthless person? Outside any employment or work situation, have you ever experienced discrimination because of your; race, sexual orientation, gender, religion, age? Outside any work or employment situation how likely do you think it is that in the future you will be	I am able to respect, value and appreciate people around me. Are you able to meet socially with friends, relatives or work colleagues? Outside of any employment, in your everyday life, how likely do you think it is that you will experience discrimination?	9d. I respect, value and appreciate people around me. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree] 2. Are you able to meet socially with friends or relatives? [Always, Most of the time, Some of the time, Hardly ever, Never]	18. I respect, value and appreciate other people. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree] 19. Are you able to meet socially with friends or relatives? [Yes, No] 20. Are you able to join community activities (e.g., festivities, religious or other activities)? [Yes, No] 21. Do you tend to find it easy or difficult to imagine the situation of other people? [very easy, easy, neither easy nor difficulty, difficult, very difficult] 22. I respect, value and appreciate myself.

		discriminated against because of your; race, sexual orientation, gender, religion, age?			[strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]
Other Species	Being able to live with concern for and in relation to animals, plants, and the world of nature.	I appreciate and value plants, animals and the world of nature?	I am able to appreciate and value plants, animals and the world of nature	9c. I am able to appreciate and value plants, animals and the world of nature. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	23. I am able to appreciate and value plants, animals and the world of nature. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Play	Being able to laugh, to play, to enjoy recreational activities	Have you recently been enjoying your recreational activities?	In the past 4 weeks, how often have you been able to enjoy your recreational activities?	4. In the past 4 weeks, how often have you been able to enjoy your recreational activities? [Always, Most of the time, Some of the time, Hardly ever, Never]	24. In the past 4 weeks have you been able to undertake some recreational activities? [Yes, No]
Control Over One's Environment	Political — being able to participate effectively in political choices that govern one's life; having the right of political participation, protection of free speech and association. Material — being able to hold property (both land and movable	I am able to participate in the political activities that affect my life if I want to. For which of the following reasons, if any, have you not bought your home?	I am able to influence decisions affecting my local area. Which of these applies to your home? For which of the following reasons, if any, have you	9a. I am able to influence decisions affecting my local area. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	25. I am able to participate in the political activities that affect my life if I want to. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]

goods), and having property rights on an equal basis with others; having the right to seek employment on an equal basis with others, having the freedom from unwarranted search and seizure. In work, being able to work as a human being, exercising practical reason and entering into meaningful relationships of mutual recognition with other workers	When seeking employment in the past, have you ever experienced discrimination because of your; race, sexual orientation, gender, religion, age? Do you intend seeking work in the future? When seeking work in the future how likely do you think it is that you will experience discrimination because of your; race, sexual orientation, gender, religion, age? How likely do you think it is that within the next 12 months you will be stopped and searched by the police when it is not warranted? To what extent does your work make use of your skills and talents? At work, have you recently felt that you were playing a useful part in things? Do you tend to find it easy or difficult to relate to your colleagues at work?	NOT bought your home? In your current or future employment, how likely do you think it is that you will experience discrimination?	9h. I have access to interesting forms of activity (or employment). [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	

		At work are you treated with respect?			

Sources: [1] Anand *et al.*, 2009; [2] Lorgelly *et al.*, 2015; [3] Simon *et al.*, 2013

Appendix 4C. Items Revision and Development of the Capability Instrument

Core capabilities	Version 1	Version 2	Version 3
Life	1. How healthy do you feel compared to other people your age? [more healthy, equally healthy, less healthy]	1. Given my family history, lifestyle and health status, I expect to lead a long and health life. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]	1. Given my family history, lifestyle and health status, I expect to lead a long and health life. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Bodily Health	2. Does your health in any way limit your daily activities, compared to other people your age? [Yes, No] 3. Are you able to have children? [Yes, No] [If No: Reasons – age, health problems, infertility (natural), infertility treatment (hysterectomy/vasectomy), I don't want to have children, other (specify)] 4a. Which of these apply to housing condition/situation? [I own the house I live in, rent from private/individuals, rent from government (council/kebele), other (specify)] 4b. How suitable or unsuitable is your accommodation for your current needs? [very suitable, suitable, neither suitable nor unsuitable, unsuitable, very unsuitable]	2. Given my age, I feel I am in good health. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 3a. Which of these apply to housing condition/situation? [I own the house I live in, rent from private/individuals, rent from government (council/kebele), other (specify)] 3b. How adequate or inadequate is your accommodation for your current needs? [very adequate, adequate, neither adequate nor inadequate, inadequate, very inadequate] 3c. Are you able to make changes to (repair, maintain, modify) or move if you want to? [Yes, No]	2. Given my age, I feel I am in good health. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 3. I am able to have adequate accommodation to my needs. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]

	4c. Are you able to make changes to (repair, maintain, modify) or move if you want to? [Yes, No] [if No: 3d. Which of the following reasons prevent you from making changes or moving? [Lack of money/finances, other family responsibilities, difficulty of getting permit to make changes, no desire to move or make changes, other reasons (specify)]	[if No: 3d. Which of the following reasons prevent you from making changes or moving? [Lack of money/finances, other family responsibilities, difficulty of getting permit to make changes, no desire to move or make changes, other reasons (specify)]]	
Bodily Integrity	5a. How safe you feel walking alone in your neighbourhood during the day time? [very safe, safe, neither safe nor unsafe, unsafe, very unsafe] 5b. How safe you feel walking alone in your neighbourhood after dark? [very safe, safe, neither safe nor unsafe, unsafe, very unsafe] 6a. Have you ever been the victim of assault (including sexual and domestic assault)? [Yes, No] 6b. How likely you believe it to be that you will be assaulted in the future (including sexual and domestic assault) [Very likely, likely, neither likely nor unlikely, unlikely, very unlikely] 7. Even if you don't need or have never needed any of the following, are you prohibited from using any of the following for any reason (e.g. religious beliefs, family pressure)?	4. I am able to move from place to place (in my neighbourhood) without fearing for my safety. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 5. Have you ever been physically coerced into doing something you didn't consent to (including physical or sexual violence)? [Yes, No] [if Yes: 5a. Is the person who committed the act of coercion: [a stranger?/ someone you live or have lived with?/ someone else you know?/ Don't know] 5b. How concerned are you about experiencing something similar in future? [extremely concerned, moderately concerned, somewhat concerned, slightly concerned, not at all concerned]] 6. I am free to decide or have a say on issues of reproductive	4. I am able to move from place to place (in my neighbourhood) without fearing for my safety. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 5. I feel I am secure against violent assault (such as sexual assault, domestic or other violence). [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 6. I am free to decide or have a say on issues of reproductive health (eg. family planning, contraception or other reproductive health issues). [agree strongly, agree, neither agree nor

	[Contraception, Abortion, Infertility treatment, I am not prohibited from using any of the above]	health (eg. contraception, abortion, infertility treatment). [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]	disagree, disagree, disagree strongly]
Senses, Imagination, and Thought	8. I am free to express my political views. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree] 9. I am free to practice my religion as I want to. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree] 10. I am free to use my imagination and to express myself creatively (e.g. through art, literature, music etc) [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	7a. I have enough opportunities to use my imagination and my reason. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 7b. I am free to express and share my ideas and thoughts. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 8. I am free to practice my religion as I want to. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]	7. I have enough opportunities to use my imagination and my reason. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 8. I am free to express and share my ideas and thoughts. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 9. I am free to practice my religion as I want to. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Emotions	11. How easy or difficult do you find it to make friendships with people which last? [very easy, easy, neither easy nor difficult, difficult, very difficult] 12. At present are you able to feel loved and supported by your immediate family? [Yes, No]	9a. I am able to make friendships with people which last. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 9b. I find it easy to enjoy the love care and support of my family.	10. I am able to make friendships with people which last. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 11. I find it easy to enjoy the love care and support of my family.

	13. How easy or difficult do you find it to enjoy the love care and support of your immediate family? [very easy, easy, neither easy nor difficult, difficult, very difficult] 14. Do you find it easy or difficult to express feelings of love, grief, longing, gratitude, and anger compared with other people of your age? [very easy, easy, neither easy nor difficult, difficult, very difficult] 15. Have you recently lost much sleep over worry? [Never, hardly ever, some of the time, most of the time, always] 16. Have you recently felt constantly under strain? [Never, hardly ever, some of the time, most of the time, always]	[agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 10a. Have you recently lost much sleep over worry? [Never, hardly ever, some of the time, most of the time, always] 10b. Have you felt constantly under strain? [Never, hardly ever, some of the time, most of the time, always]	[agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Practical Reason	17. I am free to decide for myself how to live my life. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	11a. I am able to reflect on my life. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 11b. I am free to decide/plan for myself on a life which I consider good. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]	12. I am able to reflect on my life. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 13. I am free to decide on and plan for myself on a life which I consider good. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Affiliation	18. I respect, value and appreciate other people.	12a. I respect, value and appreciate other people.	14. I respect, value and appreciate other people. [agree strongly, agree, neither agree nor

	[strongly agree, agree, neither agree nor disagree, disagree, strongly disagree] 19. Are you able to meet socially with friends or relatives? [Yes, No] 20. Are you able to join community activities (e.g., festivities, religious or other activities)? [Yes, No] 21. Do you tend to find it easy or difficult to imagine the situation of other people? [very easy, easy, neither easy nor difficulty, difficult, very difficult] 22. I respect, value and appreciate myself. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	[agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 12b. I feel others respect, value and appreciate me. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 12c. I respect, value and appreciate myself. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 13a. I am able to meet socially with relatives and friends. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 13b. I am able to join community activities (e.g., festivities, religious or other activities) as I want to. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]	disagree, disagree, disagree strongly] 15. I feel others respect, value and appreciate me. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 16. I am able to meet socially with relatives and friends. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 17. I am able to join community activities as I want to (e.g., festivities, religious or other activities). [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Other Species	23. I am able to appreciate and value plants, animals and the world of nature. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]	14. I am able to appreciate and value plants, animals and the world of nature. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]	18. I am able to appreciate and value plants, animals and the world of nature. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Play	24. In the past 4 weeks have you been able to undertake some recreational activities? [Yes, No]	15. I am able to have and enjoy other activities than my usual day-to-day activities.	19. I am able to have and enjoy other activities than my usual day-to-day activities.

		[agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]	[agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Control Over One's Environment	25. I am able to participate in the political activities that affect my life if I want to. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	16. I am able to participate in the political activities that affect my life if I want to. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 17. I am free to express my political views. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 18. I am free to own assets if I want to. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 19. I feel I am a valuable member of my family and society and other see me as such. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]	20. I am free to own assets if I want to. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 21. I feel I am a valuable member of my family and society and other see me as such. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 22. I am free to express my political views. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]

Appendix 4D. Comparison with the OxCAP-MH Capability Questionnaire

Core capabilities	OxCAP-MH Questionnaire	Version 3
Life		1. Given my family history, lifestyle and health status, I expect to lead a long and health life. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Bodily Health	1. Does your health in any way limit your daily activities, compared to most people of your age? [Always, Most of the time, Some of the time, Hardly ever, Never] 5. How suitable or unsuitable is your accommodation for your current needs? [Very suitable, Fairly suitable, Neither suitable nor unsuitable, Fairly unsuitable, Very unsuitable]	2. Given my age, I feel I am in good health. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 3. I am able to have adequate accommodation to my needs. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Bodily Integrity	6. Please indicate how safe you feel walking alone in the area near your home: [Very safe, Fairly safe, Neither safe nor unsafe, Fairly unsafe, Very unsafe] 7. Please indicate how likely you believe it to be that you will be assaulted in the future (including sexual and domestic assault): [Very likely, Fairly likely, Neither likely nor unlikely, Fairly unlikely, Very unlikely] 8a. How likely do you think it is that you will experience discrimination? [Very likely (Go to Q8a), Fairly likely (Go to Q8a), Neither likely nor unlikely (Go to Q9), Fairly unlikely (Go to Q9), Very unlikely (Go to Q9)] 8b. On what grounds do you think it is likely that you will be discriminated against? (Please complete only if your answer to question 8A is 'Very likely' or 'Fairly likely.)	4. I am able to move from place to place (in my neighbourhood) without fearing for my safety. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 5. I feel I am secure against violent assault (such as sexual assault, domestic or other violence). [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 6. I am free to decide or have a say on issues of reproductive health (eg. family planning, contraception or other reproductive health issues). [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]

	[Race/ethnicity, Gender, Religion, Sexual orientation, Age, Health or disability (including mental health)]	
Senses, Imagination, and Thought	9b. I am free to express my views, including political and religious views. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree] 9g. I am free to use my imagination and to express myself creatively (e.g. through art, literature, music, etc.). [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	7. I have enough opportunities to use my imagination and my reason. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 8. I am free to express and share my ideas and thoughts. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 9. I am free to practice my religion as I want to. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Emotions	3. In the past 4 weeks, how often have you lost sleep over worry? [Always, Most of the time, Some of the time, Hardly ever, Never] 9e. I find it easy to enjoy the love, care and support of my family and friends. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	10. I am able to make friendships with people which last. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 11. I find it easy to enjoy the love care and support of my family. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Practical Reason	9f. I am free to decide for myself how to live my life. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	12. I am able to reflect on my life. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 13. I am free to decide on and plan for myself on a life which I consider good. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Affiliation	9d. I respect, value and appreciate people around me. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree] 2. Are you able to meet socially with friends or relatives?	14. I respect, value and appreciate other people. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 15. I feel others respect, value and appreciate me.

	[Always, Most of the time, Some of the time, Hardly ever, Never]	[agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 16. I am able to meet socially with relatives and friends. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 17. I am able to join community activities as I want to (e.g., festivities, religious or other activities). [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Other Species	9c. I am able to appreciate and value plants, animals and the world of nature. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	18. I am able to appreciate and value plants, animals and the world of nature. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Play	4. In the past 4 weeks, how often have you been able to enjoy your recreational activities? [Always, Most of the time, Some of the time, Hardly ever, Never]	19. I am able to have and enjoy other activities than my usual day-to-day activities. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]
Control Over One's Environment	9a. I am able to influence decisions affecting my local area. [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree] 9h. I have access to interesting forms of activity (or employment). [strongly agree, agree, neither agree nor disagree, disagree, strongly disagree]	20. I am free to own assets if I want to. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 21. I feel I am a valuable member of my family and society and other see me as such. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly] 22. I am free to express my political views. [agree strongly, agree, neither agree nor disagree, disagree, disagree strongly]

Appendix 5A. Deprivation Score Calculation

A deprivation score is estimated and assigned to each participant according to her or her household's deprivations in each of the seven component indicators of the dimensions of education and standard of living. These indicators cover most of the ones that are included in the MPI calculation. Only three indicators were excluded for practical reasons and lack of data. These are one indicator with regard to children school attendance in education dimension and two indicators that are related to nutrition and child mortality in the health dimension.

The dimensions and indicators considered are as follows:

Education:

(1) Schooling

Living standards:

(2) Electricity:

(3) Drinking water

(4) Sanitation

(5) Cooking fuel

(6) Housing

(7) Assets

The maximum deprivation score is 100 percent where participants have deprivation in all indicators. Each indicator is assigned equal weights and they will each worth 100/7 or 14.28 percent. This is slightly different weighting from the MPI calculation. In the MPI calculation each three dimensions are assigned an equal 1/3 weight and the weight of each indicator will depend on the number of indicators it consists of. For instance, with education and health having two indictors, each indicator is worth of 33.3/2 or 16.7 percent. on the other hand, the standard of living indicators has six indicators and each indicator is worth of 33.3/6 or 5.6 percent. Following the same approach for our data, the education indicator will be worth of 50 percent and the living standard indicators will each be worth of 8.3. Given only one variable in the education dimension and given the area is dominantly rural giving it 50 percent weight may unduly skew the deprivation scores. In addition, our data lacks detailed information on years of schooling and the education deprivation was calculated from general information on whether the respondents have completed primary education or not. For these reasons, the education indicator was given equal weight as the other standard of living indicators.

According to the deprivation criteria for each indicator, participants were assigned a deprivation indicator with a value of 0 or 1 indicating whether they satisfy the criteria for each indicator or not. An aggregated weighted deprivation score for each participant was then calculated as follows:

$$c_i = \sum_{j=1}^{7} d_{ij} * w_j$$

where c_i is the deprivation score of individual i, d_{ij} is deprivation indicator of indicator j for individual i and w_j is the weight assigned to indicator j.

The table below summarises the domains, dimensions and deprivation criteria used and weights.

Dimension	indicator	deprivation criteria	weight
Education	Schooling	not completing at least six years of schooling	1/7
Living standard	Electricity	No access to electricity	1/7
	Drinking water	No access to clean an improved source of drinking water (according to Sustainable Development Goal guidelines), or safe drinking water is at least a 30-minute walk from home, roundtrip. A participant is considered to have access to an improved source of drinking water if the source is piped water, a public tap, a borehole or pump, a protected well, a protected spring or rainwater.	1/7
	Sanitation	No access to improved sanitation (according to Sustainable Development Goal guidelines), or it is improved but shared with other households. A household is considered to have access to improved sanitation if it has some type of flush toilet or latrine or ventilated improved pit or composting toilet that is not shared.	1/7
	Cooking fuel	using "dirty" cooking fuel (dung, wood, charcoal or coal)	1/7
	Housing	dwelling elements such as floor is made of inadequate materials; The floor is made of natural materials such as mud, clay, earth, sand or dung.	1/7
	Assets	not having at least one asset related to access to information (radio, television or telephone) or at least one	1/7

		asset related to information but not having at least one asset related to livelihood (refrigerator, arable land or livestock).	

Appendix 5B. Multivariate regression results of capability indicators on depression

Table 5B.1. OLS Regression Results (continuous depression variable of PHQ-9 score)

		c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11
Depression		-0.0343***	-0.0567***	-0.0192**	-0.0166*	-0.0187**	-0.00430	-0.0149**	-0.0181**	-0.00664	-0.0194***	-0.0220***
Gender		(0.00710)	(0.00922)	(0.00838)	(0.00875)	(0.00789)	(0.00574)	(0.00673)	(0.00715)	(0.00485)	(0.00695)	(0.00727)
	Female	-0.0500	0.0410	-0.0609	-0.198**	-0.388***	0.00720	-0.177**	-0.184***	0.0208	-0.170**	-0.0439
Age		(0.0752)	(0.0981)	(0.0998)	(0.0950)	(0.0875)	(0.0759)	(0.0765)	(0.0624)	(0.0554)	(0.0743)	(0.0858)
	25 – 34	0.101	0.102	0.0183	0.258*	0.0814	-0.0148	-0.0563	0.0804	0.0511	-0.217*	0.0228
		(0.101)	(0.137)	(0.131)	(0.132)	(0.125)	(0.115)	(0.124)	(0.0973)	(0.0759)	(0.121)	(0.117)
	35 – 44	-0.0307	0.0753	0.187	0.207	0.0496	0.00179	-0.0120	0.0974	0.148	-0.0965	0.230*
		(0.124)	(0.175)	(0.151)	(0.156)	(0.151)	(0.131)	(0.145)	(0.118)	(0.0910)	(0.130)	(0.131)
	45 – 64	-0.168	-0.0742	-0.0206	0.222	0.0231	-0.0284	-0.0188	0.149	0.146	-0.0943	0.186
		(0.142)	(0.177)	(0.178)	(0.171)	(0.153)	(0.138)	(0.146)	(0.120)	(0.0967)	(0.139)	(0.144)
	65+	-0.0730	0.284	0.109	0.560***	0.174	-0.146	0.0149	0.198	0.297**	0.204	0.536***
Education		(0.204)	(0.241)	(0.251)	(0.203)	(0.211)	(0.160)	(0.180)	(0.160)	(0.135)	(0.221)	(0.190)
	read/write, no formal education	-0.0768	0.0875	-0.0872	0.0408	-0.223*	-0.00281	-0.187*	-0.220**	-0.117	-0.302**	-0.257**
		(0.109)	(0.140)	(0.162)	(0.140)	(0.124)	(0.0955)	(0.0964)	(0.0891)	(0.0779)	(0.130)	(0.125)
	primary school	-0.114	-0.0502	-0.0299	-0.0176	-0.305***	0.00639	-0.104	-0.0592	0.0463	-0.0688	-0.0410
		(0.109)	(0.142)	(0.131)	(0.125)	(0.117)	(0.100)	(0.101)	(0.0956)	(0.0697)	(0.0860)	(0.108)
	high school or above	-0.182	-0.0506	-0.177	-0.224	-0.400**	-0.0305	-0.00449	-0.0378	0.0303	-0.0748	-0.110
Marital status		(0.132)	(0.179)	(0.159)	(0.166)	(0.159)	(0.127)	(0.120)	(0.113)	(0.0954)	(0.124)	(0.155)
	Married	0.0302	0.0525	0.0314	-0.0993	-0.0684	0.671***	0.254*	0.0932	0.00920	0.289**	-0.0771
		(0.103)	(0.143)	(0.138)	(0.143)	(0.129)	(0.126)	(0.130)	(0.0960)	(0.0877)	(0.134)	(0.128)
	divorced	-0.195	-0.339	0.00347	-0.0216	0.157	0.665***	0.385**	0.112	-0.0582	0.422**	0.0112
		(0.171)	(0.297)	(0.293)	(0.319)	(0.299)	(0.181)	(0.182)	(0.148)	(0.171)	(0.211)	(0.229)
	widowed	0.332*	0.378	0.177	-0.200	0.0935	0.603***	-0.0554	-0.103	-0.268	-0.0105	-0.228
		(0.191)	(0.239)	(0.273)	(0.271)	(0.216)	(0.184)	(0.251)	(0.273)	(0.193)	(0.293)	(0.313)
Multidimensional deprivation		-0.308	-0.348	-0.714***	-0.377	-0.299	-0.304*	0.195	0.105	-0.0731	-0.159	-0.221
Social support		(0.196)	(0.263)	(0.240)	(0.259)	(0.260)	(0.184)	(0.185)	(0.169)	(0.145)	(0.218)	(0.259)
	intermediate support	0.0450	-0.124	0.0233	0.371***	0.326***	0.0798	0.118	0.0862	0.0771	0.124	0.315***
		(0.103)	(0.131)	(0.135)	(0.134)	(0.124)	(0.0797)	(0.105)	(0.0841)	(0.0726)	(0.103)	(0.114)
	strong support	0.200*	-0.0105	0.201	0.590***	0.521***	0.229***	0.257**	0.234**	0.131*	0.378***	0.637***
Stressful life events		(0.107)	(0.131)	(0.135)	(0.142)	(0.128)	(0.0845)	(0.115)	(0.0912)	(0.0759)	(0.0994)	(0.108)
	one	0.0155	-0.0395	0.0729	-0.0343	-0.0603	0.00464	-0.0696	-0.130*	-0.0414	-0.147*	-0.159*
		(0.0825)	(0.103)	(0.114)	(0.0906)	(0.0867)	(0.0814)	(0.0786)	(0.0734)	(0.0582)	(0.0841)	(0.0861)
	two or more	-0.200**	-0.363***	-0.134	-0.428***	-0.386***	-0.211***	-0.306***	-0.268***	-0.0848	-0.236***	-0.284***
		(0.0882)	(0.101)	(0.117)	(0.103)	(0.0994)	(0.0793)	(0.0748)	(0.0652)	(0.0571)	(0.0862)	(0.0877)

Observations		408	408	408	408	408	408	408	408	408	408	408
(*continued*)		c12	c13	c14	c15	c16	c17	c18	c19	c20	c21	c22
Depression Gender		-0.0134***	-0.00945*	-0.0121**	-0.0168**	-0.00866*	-0.0192***	-0.00174	-0.0284***	-0.0150**	-0.0157**	-0.00206
		(0.00502)	(0.00505)	(0.00567)	(0.00721)	(0.00524)	(0.00646)	(0.00503)	(0.00789)	(0.00718)	(0.00692)	(0.00797)
	Female	-0.113*	-0.183***	-0.0512	-0.145*	-0.109	-0.0844	-0.0610	-0.110	-0.146**	-0.179**	-0.366***
Age		(0.0622)	(0.0649)	(0.0733)	(0.0849)	(0.0672)	(0.0750)	(0.0580)	(0.0822)	(0.0687)	(0.0768)	(0.105)
	25 – 34	0.154*	-0.00536	0.110	0.111	0.314***	0.288***	-0.000973	0.153	0.220**	0.198*	0.241
		(0.0807)	(0.0866)	(0.0859)	(0.105)	(0.0842)	(0.101)	(0.0826)	(0.119)	(0.101)	(0.103)	(0.168)
	35 – 44	0.173*	0.131	0.0948	0.228*	0.325***	0.317**	0.158	0.181	0.279**	0.161	0.259
		(0.0979)	(0.0989)	(0.0990)	(0.124)	(0.105)	(0.126)	(0.100)	(0.145)	(0.114)	(0.121)	(0.197)
	45 – 64	0.181	0.136	0.197*	0.217	0.271**	0.181	0.101	0.123	0.199	0.303**	0.162
		(0.110)	(0.106)	(0.110)	(0.141)	(0.114)	(0.131)	(0.106)	(0.148)	(0.125)	(0.123)	(0.205)
	65+	0.248	0.173	0.170	0.341*	0.00968	0.0109	0.00502	-0.104	0.0826	0.114	0.160
Education		(0.156)	(0.143)	(0.152)	(0.203)	(0.202)	(0.202)	(0.152)	(0.212)	(0.173)	(0.230)	(0.281)
	read/write, no formal education	-0.0767	-0.00176	-0.0878	-0.255**	0.113	0.316***	0.000117	-0.207*	-0.0219	-0.0113	0.0120
		(0.0841)	(0.0861)	(0.105)	(0.130)	(0.0905)	(0.115)	(0.0873)	(0.115)	(0.0877)	(0.0989)	(0.147)
	primary school	-0.0629	0.0165	0.0100	-0.117	-0.00993	0.0700	0.0286	-0.143	-0.0587	-0.135	-0.0897
		(0.0744)	(0.0817)	(0.0960)	(0.109)	(0.0860)	(0.101)	(0.0758)	(0.100)	(0.0843)	(0.0980)	(0.136)
	high school or above	0.0372	0.0560	-0.00952	-0.114	0.0723	0.0886	0.237**	-0.106	-0.0573	0.00956	0.0542
Marital status		(0.0879)	(0.101)	(0.110)	(0.133)	(0.101)	(0.122)	(0.0974)	(0.130)	(0.109)	(0.117)	(0.177)
	Married	-0.0188	0.0443	-0.0978	0.0137	0.0191	-0.0230	0.0619	0.0349	0.0494	-0.114	0.101
		(0.0868)	(0.0913)	(0.107)	(0.118)	(0.0891)	(0.112)	(0.0873)	(0.125)	(0.106)	(0.114)	(0.183)
	divorced	-0.0292	0.160	0.0389	0.140	0.00686	-0.0478	-0.154	0.220	0.222	0.0838	0.573**
		(0.168)	(0.165)	(0.195)	(0.213)	(0.137)	(0.152)	(0.158)	(0.203)	(0.187)	(0.187)	(0.266)
	widowed	-0.0347	0.141	-0.103	0.00199	-0.0609	-0.0125	-0.0425	-0.0810	0.157	-0.204	0.444*
		(0.173)	(0.172)	(0.188)	(0.228)	(0.187)	(0.188)	(0.179)	(0.313)	(0.167)	(0.152)	(0.241)
Multidimensional deprivation		0.0415	-0.256	-0.0222	-0.209	-0.112	-0.0642	-0.0387	-0.415*	-0.319*	-0.189	0.0791
Social support		(0.131)	(0.167)	(0.179)	(0.212)	(0.153)	(0.190)	(0.144)	(0.230)	(0.170)	(0.186)	(0.292)
	intermediate support	0.114*	0.125	0.169*	0.510***	0.180**	0.208**	0.0599	0.241**	0.0747	0.125	0.161
		(0.0661)	(0.0868)	(0.0922)	(0.115)	(0.0742)	(0.101)	(0.0684)	(0.110)	(0.0915)	(0.101)	(0.134)
	strong support	0.302***	0.247***	0.331***	0.740***	0.323***	0.307***	0.196***	0.374***	0.235**	0.350***	0.375***
Stressful life events		(0.0706)	(0.0871)	(0.0957)	(0.115)	(0.0762)	(0.106)	(0.0732)	(0.111)	(0.0928)	(0.103)	(0.135)
	one	-0.0475	-0.103	-0.0833	-0.169*	-0.112	-0.0272	0.0465	-0.0202	-0.0888	-0.154*	-0.185*
		(0.0649)	(0.0685)	(0.0709)	(0.0883)	(0.0699)	(0.0711)	(0.0655)	(0.0801)	(0.0755)	(0.0787)	(0.110)
	two or more	-0.223***	-0.270***	-0.160**	-0.229**	-0.296***	-0.303***	-0.0147	-0.224***	-0.323***	-0.180**	-0.344***
		(0.0619)	(0.0669)	(0.0687)	(0.0963)	(0.0648)	(0.0729)	(0.0636)	(0.0813)	(0.0682)	(0.0780)	(0.111)

| Observations | 408 | 408 | 408 | 408 | 408 | 408 | 408 | 408 | 408 | 408 | 408 |

Reference group: male, 24 years of age or younger, can't read/write, never married, with poor social support, no recent stressful life events; robust standard errors in parenthesis; *, ** and *** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively.

Table 5B.2. OLS Regression Results (binary depression variable at PHQ-9 cut-off score of 5)

		c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11
Depression		-0.319***	-0.635***	-0.202**	-0.154*	-0.141	-0.0556	-0.0717	-0.0913	-0.0593	-0.0685	-0.111
Gender		(0.0707)	(0.0936)	(0.0888)	(0.0875)	(0.0855)	(0.0685)	(0.0644)	(0.0595)	(0.0522)	(0.0704)	(0.0713)
	Female	-0.0533	0.0399	-0.0619	-0.199**	-0.391***	0.00743	-0.182**	-0.189***	0.0200	-0.176**	-0.0500
Age		(0.0750)	(0.0981)	(0.100)	(0.0953)	(0.0882)	(0.0757)	(0.0769)	(0.0631)	(0.0556)	(0.0767)	(0.0878)
	25 – 34	0.0894	0.0830	0.0118	0.253*	0.0755	-0.0163	-0.0608	0.0749	0.0490	-0.223*	0.0163
		(0.101)	(0.136)	(0.130)	(0.131)	(0.125)	(0.115)	(0.125)	(0.0978)	(0.0757)	(0.122)	(0.118)
	35 – 44	-0.0537	0.0355	0.174	0.196	0.0376	-0.00134	-0.0209	0.0864	0.143	-0.108	0.216
		(0.127)	(0.177)	(0.151)	(0.155)	(0.151)	(0.130)	(0.146)	(0.119)	(0.0906)	(0.131)	(0.132)
	45 – 64	-0.158	-0.0445	-0.0121	0.227	0.0245	-0.0252	-0.0226	0.145	0.148	-0.102	0.181
		(0.143)	(0.181)	(0.177)	(0.170)	(0.154)	(0.137)	(0.148)	(0.120)	(0.0964)	(0.142)	(0.147)
	65+	-0.0423	0.359	0.131	0.575***	0.184	-0.139	0.0131	0.197	0.302**	0.196	0.534***
Education		(0.205)	(0.247)	(0.249)	(0.204)	(0.215)	(0.161)	(0.182)	(0.161)	(0.135)	(0.226)	(0.192)
	read/write, no formal education	-0.0603	0.0921	-0.0828	0.0489	-0.206*	-0.00405	-0.165*	-0.195**	-0.114	-0.268**	-0.227*
		(0.109)	(0.139)	(0.161)	(0.142)	(0.123)	(0.0958)	(0.0970)	(0.0873)	(0.0778)	(0.131)	(0.126)
	primary school	-0.0896	-0.00839	-0.0160	-0.00581	-0.292**	0.00967	-0.0948	-0.0475	0.0510	-0.0567	-0.0268
		(0.108)	(0.141)	(0.129)	(0.125)	(0.116)	(0.1000)	(0.101)	(0.0955)	(0.0700)	(0.0887)	(0.111)
	high school or above	-0.160	-0.00759	-0.163	-0.214	-0.390**	-0.0268	0.00124	-0.0306	0.0345	-0.0688	-0.102
Marital status		(0.132)	(0.177)	(0.158)	(0.165)	(0.158)	(0.127)	(0.119)	(0.111)	(0.0955)	(0.125)	(0.155)
	Married	0.0365	0.0602	0.0344	-0.0962	-0.0641	0.672***	0.258**	0.0986	0.0105	0.295**	-0.0706
		(0.104)	(0.142)	(0.138)	(0.142)	(0.130)	(0.125)	(0.130)	(0.0947)	(0.0878)	(0.135)	(0.129)
	divorced	-0.145	-0.301	0.0219	0.00252	0.198	0.665***	0.434**	0.170	-0.0476	0.496**	0.0814
		(0.170)	(0.303)	(0.296)	(0.316)	(0.299)	(0.179)	(0.175)	(0.140)	(0.169)	(0.216)	(0.233)
	widowed	0.370*	0.446*	0.200	-0.182	0.113	0.608***	-0.0421	-0.0865	-0.261	0.00571	-0.208
		(0.199)	(0.261)	(0.272)	(0.276)	(0.219)	(0.185)	(0.250)	(0.273)	(0.194)	(0.292)	(0.319)
Multidimensional deprivation		-0.315	-0.314	-0.709***	-0.380	-0.317	-0.298	0.163	0.0676	-0.0756	-0.211	-0.266
Social support		(0.191)	(0.261)	(0.241)	(0.257)	(0.261)	(0.186)	(0.188)	(0.171)	(0.146)	(0.223)	(0.258)
	intermediate support	0.0986	-0.0517	0.0500	0.397***	0.360***	0.0842	0.151	0.126	0.0878	0.171	0.364***
		(0.105)	(0.127)	(0.137)	(0.134)	(0.127)	(0.0799)	(0.110)	(0.0862)	(0.0726)	(0.107)	(0.118)
	strong support	0.269**	0.0851	0.235*	0.623***	0.565***	0.235***	0.299**	0.284***	0.145*	0.437***	0.698***
Stressful life events		(0.109)	(0.127)	(0.138)	(0.139)	(0.130)	(0.0847)	(0.119)	(0.0927)	(0.0751)	(0.104)	(0.112)
	one	0.0198	-0.0147	0.0791	-0.0323	-0.0635	0.00775	-0.0788	-0.140*	-0.0410	-0.163*	-0.172**
		(0.0837)	(0.104)	(0.116)	(0.0917)	(0.0871)	(0.0810)	(0.0785)	(0.0736)	(0.0587)	(0.0849)	(0.0868)
	two or more	-0.216**	-0.346***	-0.134	-0.436***	-0.409***	-0.207***	-0.341***	-0.308***	-0.0890	-0.291***	-0.333***
		(0.0887)	(0.103)	(0.115)	(0.103)	(0.0997)	(0.0787)	(0.0755)	(0.0669)	(0.0583)	(0.0850)	(0.0865)
Observations		408	408	408	408	408	408	408	408	408	408	408

(*continued*)		c12	c13	c14	c15	c16	c17	c18	c19	c20	c21	c22
Depression		-0.0400	-0.0641	-0.0950	-0.130	-0.0242	-0.175***	0.00512	-0.228***	-0.0312	-0.107	0.0772
Gender		(0.0521)	(0.0581)	(0.0598)	(0.0802)	(0.0545)	(0.0663)	(0.0547)	(0.0760)	(0.0656)	(0.0657)	(0.0932)
	Female	-0.118*	-0.185***	-0.0532	-0.147*	-0.112	-0.0865	-0.0620	-0.114	-0.152**	-0.182**	-0.370***
Age		(0.0631)	(0.0651)	(0.0733)	(0.0850)	(0.0679)	(0.0756)	(0.0580)	(0.0824)	(0.0688)	(0.0776)	(0.106)
	25 – 34	0.150*	-0.00831	0.106	0.105	0.311***	0.282***	-0.00140	0.144	0.216**	0.193*	0.241
		(0.0822)	(0.0870)	(0.0855)	(0.105)	(0.0840)	(0.0999)	(0.0823)	(0.122)	(0.103)	(0.103)	(0.167)
	35 – 44	0.165*	0.125	0.0869	0.217*	0.320***	0.304**	0.157	0.162	0.270**	0.151	0.259
		(0.0991)	(0.0990)	(0.0991)	(0.124)	(0.105)	(0.125)	(0.100)	(0.148)	(0.114)	(0.122)	(0.195)
	45 – 64	0.175	0.136	0.198*	0.218	0.267**	0.186	0.0987	0.127	0.190	0.303**	0.150
		(0.112)	(0.107)	(0.109)	(0.141)	(0.115)	(0.130)	(0.105)	(0.152)	(0.126)	(0.124)	(0.204)
	65+	0.241	0.176	0.177	0.350*	0.00463	0.0272	0.00173	-0.0865	0.0715	0.119	0.140
Education		(0.158)	(0.145)	(0.152)	(0.205)	(0.202)	(0.200)	(0.152)	(0.215)	(0.173)	(0.232)	(0.283)
	read/write, no formal education	-0.0522	0.00789	-0.0781	-0.241*	0.130	0.326***	0.00550	-0.185	0.00840	0.00479	0.0335
		(0.0849)	(0.0857)	(0.106)	(0.130)	(0.0891)	(0.114)	(0.0870)	(0.118)	(0.0884)	(0.0986)	(0.147)
	primary school	-0.0546	0.0229	0.0184	-0.106	-0.00461	0.0836	0.0295	-0.123	-0.0497	-0.124	-0.0896
		(0.0749)	(0.0816)	(0.0960)	(0.109)	(0.0862)	(0.100)	(0.0757)	(0.101)	(0.0848)	(0.0978)	(0.135)
	high school or above	0.0409	0.0607	-0.00271	-0.104	0.0746	0.101	0.237**	-0.0893	-0.0539	0.0174	0.0499
Marital status		(0.0876)	(0.100)	(0.110)	(0.134)	(0.101)	(0.121)	(0.0974)	(0.133)	(0.109)	(0.118)	(0.176)
	Married	-0.0141	0.0466	-0.0951	0.0175	0.0222	-0.0193	0.0628	0.0411	0.0551	-0.110	0.104
		(0.0881)	(0.0911)	(0.107)	(0.118)	(0.0891)	(0.111)	(0.0871)	(0.126)	(0.108)	(0.115)	(0.182)
	divorced	0.0249	0.183	0.0639	0.175	0.0425	-0.0182	-0.143	0.275	0.288	0.123	0.615**
		(0.168)	(0.165)	(0.194)	(0.215)	(0.137)	(0.158)	(0.157)	(0.210)	(0.188)	(0.190)	(0.266)
	widowed	-0.0238	0.150	-0.0903	0.0194	-0.0540	0.00864	-0.0415	-0.0513	0.168	-0.189	0.442*
		(0.174)	(0.173)	(0.189)	(0.229)	(0.188)	(0.192)	(0.178)	(0.317)	(0.162)	(0.154)	(0.239)
Multidimensional deprivation		0.00222	-0.268	-0.0326	-0.223	-0.138	-0.0702	-0.0482	-0.436*	-0.369**	-0.210	0.0375
Social support		(0.134)	(0.168)	(0.179)	(0.211)	(0.155)	(0.188)	(0.144)	(0.234)	(0.176)	(0.190)	(0.292)
	intermediate support	0.147**	0.144*	0.191**	0.540***	0.202***	0.238**	0.0658	0.291***	0.114	0.156	0.178
		(0.0671)	(0.0842)	(0.0919)	(0.117)	(0.0758)	(0.103)	(0.0671)	(0.111)	(0.0950)	(0.104)	(0.135)
	strong support	0.344***	0.270***	0.358***	0.779***	0.351***	0.346***	0.203***	0.437***	0.284***	0.389***	0.396***
Stressful life events		(0.0708)	(0.0845)	(0.0943)	(0.117)	(0.0779)	(0.107)	(0.0708)	(0.111)	(0.0961)	(0.106)	(0.136)
	one	-0.0599	-0.106	-0.0848	-0.172*	-0.120*	-0.0255	0.0432	-0.0226	-0.105	-0.158**	-0.201*
		(0.0648)	(0.0680)	(0.0704)	(0.0892)	(0.0697)	(0.0715)	(0.0657)	(0.0798)	(0.0754)	(0.0787)	(0.110)
	two or more	-0.264***	-0.284***	-0.173**	-0.248**	-0.323***	-0.314***	-0.0242	-0.252***	-0.374***	-0.204**	-0.384***
		(0.0632)	(0.0678)	(0.0686)	(0.0975)	(0.0650)	(0.0719)	(0.0640)	(0.0835)	(0.0697)	(0.0789)	(0.112)
Observations		408	408	408	408	408	408	408	408	408	408	408

Reference group: male, 24 years of age or younger, can't read/write, never married, with poor social support, no recent stressful life events; robust standard errors in parenthesis; *, ** and *** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively.

Table 5B.3. OLS Regression Results (binary depression variable at PHQ-9 cut-off score of 10)

		c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11
Depression		-0.412***	-0.635***	-0.303***	-0.258***	-0.280***	-0.00218	-0.228***	-0.176**	-0.0168	-0.169**	-0.235***
Gender		(0.0920)	(0.115)	(0.110)	(0.0974)	(0.0975)	(0.0766)	(0.0797)	(0.0790)	(0.0579)	(0.0817)	(0.0891)
	Female	-0.0351	0.0621	-0.0471	-0.186*	-0.376***	0.00527	-0.167**	-0.179***	0.0188	-0.166**	-0.0366
Age		(0.0743)	(0.0999)	(0.0982)	(0.0955)	(0.0879)	(0.0761)	(0.0771)	(0.0631)	(0.0556)	(0.0754)	(0.0864)
	25 – 34	0.110	0.116	0.0268	0.266**	0.0891	-0.0158	-0.0500	0.0835	0.0501	-0.215*	0.0276
		(0.101)	(0.140)	(0.131)	(0.132)	(0.124)	(0.115)	(0.124)	(0.0975)	(0.0762)	(0.121)	(0.117)
	35 – 44	-0.0389	0.0606	0.184	0.205	0.0465	-0.000419	-0.0143	0.0920	0.145	-0.103	0.224*
		(0.125)	(0.178)	(0.151)	(0.156)	(0.151)	(0.131)	(0.145)	(0.118)	(0.0912)	(0.130)	(0.132)
	45 – 64	-0.176	-0.0897	-0.0213	0.221	0.0216	-0.0319	-0.0197	0.143	0.142	-0.102	0.179
		(0.143)	(0.179)	(0.176)	(0.170)	(0.152)	(0.137)	(0.145)	(0.120)	(0.0968)	(0.140)	(0.145)
	65+	-0.0867	0.258	0.106	0.558***	0.171	-0.151	0.0123	0.188	0.290**	0.192	0.525***
Education		(0.207)	(0.243)	(0.252)	(0.202)	(0.208)	(0.160)	(0.180)	(0.162)	(0.135)	(0.221)	(0.192)
	read/write, no formal education	-0.0429	0.149	-0.0770	0.0500	-0.211*	0.00752	-0.178*	-0.197**	-0.103	-0.275**	-0.232*
		(0.109)	(0.138)	(0.163)	(0.139)	(0.123)	(0.0950)	(0.0966)	(0.0886)	(0.0774)	(0.130)	(0.127)
	primary school	-0.109	-0.0397	-0.0294	-0.0170	-0.304***	0.00878	-0.104	-0.0549	0.0496	-0.0636	-0.0366
		(0.108)	(0.142)	(0.129)	(0.124)	(0.117)	(0.0999)	(0.101)	(0.0963)	(0.0703)	(0.0878)	(0.111)
	high school or above	-0.193	-0.0662	-0.185	-0.231	-0.408**	-0.0302	-0.0107	-0.0419	0.0304	-0.0785	-0.116
Marital status		(0.132)	(0.181)	(0.157)	(0.165)	(0.159)	(0.127)	(0.121)	(0.113)	(0.0952)	(0.123)	(0.156)
	Married	0.0481	0.0818	0.0420	-0.0901	-0.0582	0.673***	0.262**	0.102	0.0122	0.298**	-0.0659
		(0.104)	(0.148)	(0.137)	(0.143)	(0.128)	(0.125)	(0.129)	(0.0955)	(0.0879)	(0.133)	(0.127)
	divorced	-0.182	-0.299	-0.0186	-0.0392	0.142	0.687***	0.370**	0.136	-0.0302	0.456**	0.0314
		(0.169)	(0.291)	(0.295)	(0.316)	(0.292)	(0.180)	(0.178)	(0.143)	(0.173)	(0.211)	(0.232)
	widowed	0.313*	0.351	0.159	-0.215	0.0772	0.606***	-0.0690	-0.109	-0.265	-0.0149	-0.238
		(0.184)	(0.235)	(0.280)	(0.260)	(0.207)	(0.183)	(0.256)	(0.274)	(0.191)	(0.296)	(0.315)
Multidimensional deprivation		-0.390**	-0.491*	-0.749***	-0.407	-0.335	-0.322*	0.167	0.0550	-0.0984	-0.215	-0.279
Social support		(0.197)	(0.272)	(0.237)	(0.256)	(0.257)	(0.183)	(0.190)	(0.171)	(0.144)	(0.216)	(0.259)
	intermediate support	0.0791	-0.0603	0.0308	0.378***	0.336***	0.0922	0.125	0.111	0.0939	0.154	0.342***
		(0.104)	(0.133)	(0.134)	(0.131)	(0.122)	(0.0793)	(0.106)	(0.0836)	(0.0728)	(0.105)	(0.116)
	strong support	0.235**	0.0578	0.204	0.594***	0.528***	0.244***	0.261**	0.262***	0.152**	0.412***	0.666***
Stressful life events		(0.108)	(0.133)	(0.134)	(0.137)	(0.126)	(0.0857)	(0.115)	(0.0905)	(0.0755)	(0.102)	(0.111)
	one	-0.00552	-0.0774	0.0659	-0.0405	-0.0681	-0.00131	-0.0754	-0.143*	-0.0497	-0.163*	-0.175**
		(0.0813)	(0.106)	(0.113)	(0.0899)	(0.0877)	(0.0813)	(0.0780)	(0.0731)	(0.0579)	(0.0834)	(0.0859)
	two or more	-0.248***	-0.454***	-0.144	-0.437***	-0.400***	-0.229***	-0.315***	-0.304***	-0.109*	-0.278***	-0.322***
		(0.0859)	(0.0978)	(0.114)	(0.0992)	(0.0938)	(0.0769)	(0.0720)	(0.0648)	(0.0556)	(0.0810)	(0.0850)
Observations		408	408	408	408	408	408	408	408	408	408	408

(continued)		c12	c13	c14	c15	c16	c17	c18	c19	c20	c21	c22
Depression		-0.165***	-0.142**	-0.118	-0.241**	-0.109	-0.209**	-0.0427	-0.363***	-0.195**	-0.126	-0.111
Gender		(0.0612)	(0.0649)	(0.0739)	(0.0937)	(0.0701)	(0.0841)	(0.0623)	(0.0965)	(0.0783)	(0.0815)	(0.100)
	Female	-0.107*	-0.176***	-0.0481	-0.134	-0.105	-0.0778	-0.0585	-0.0960	-0.138**	-0.177**	-0.358***
Age		(0.0623)	(0.0645)	(0.0729)	(0.0843)	(0.0674)	(0.0754)	(0.0579)	(0.0823)	(0.0689)	(0.0768)	(0.105)
	25 – 34	0.158*	-0.00147	0.112	0.117	0.316***	0.293***	0.000481	0.162	0.225**	0.200*	0.246
		(0.0812)	(0.0862)	(0.0860)	(0.105)	(0.0841)	(0.101)	(0.0829)	(0.118)	(0.101)	(0.103)	(0.168)
	35 – 44	0.169*	0.130	0.0912	0.225*	0.323***	0.312**	0.158	0.175	0.275**	0.156	0.261
		(0.0980)	(0.0988)	(0.0994)	(0.123)	(0.105)	(0.125)	(0.100)	(0.144)	(0.113)	(0.121)	(0.197)
	45 – 64	0.178	0.136	0.193*	0.215	0.269**	0.175	0.101	0.118	0.196	0.297**	0.166
		(0.111)	(0.106)	(0.110)	(0.141)	(0.114)	(0.132)	(0.106)	(0.146)	(0.124)	(0.124)	(0.205)
	65+	0.243	0.171	0.164	0.337*	0.00651	0.00171	0.00580	-0.114	0.0776	0.104	0.165
Education		(0.158)	(0.142)	(0.154)	(0.200)	(0.202)	(0.201)	(0.152)	(0.211)	(0.174)	(0.230)	(0.281)
	read/write, no formal education	-0.0639	0.00405	-0.0724	-0.243*	0.122	0.338***	-0.000834	-0.181	-0.00885	0.0119	0.00339
		(0.0850)	(0.0871)	(0.106)	(0.129)	(0.0899)	(0.114)	(0.0871)	(0.115)	(0.0876)	(0.0991)	(0.145)
	primary school	-0.0609	0.0170	0.0129	-0.116	-0.00872	0.0738	0.0281	-0.139	-0.0569	-0.130	-0.0924
		(0.0747)	(0.0825)	(0.0965)	(0.109)	(0.0857)	(0.100)	(0.0758)	(0.0995)	(0.0846)	(0.0986)	(0.135)
	high school or above	0.0330	0.0522	-0.0123	-0.120	0.0696	0.0835	0.236**	-0.115	-0.0623	0.00690	0.0507
Marital status		(0.0883)	(0.101)	(0.110)	(0.133)	(0.100)	(0.122)	(0.0974)	(0.128)	(0.109)	(0.117)	(0.177)
	Married	-0.0118	0.0494	-0.0916	0.0228	0.0236	-0.0131	0.0630	0.0499	0.0574	-0.106	0.103
		(0.0870)	(0.0907)	(0.107)	(0.118)	(0.0894)	(0.113)	(0.0874)	(0.123)	(0.106)	(0.114)	(0.184)
	divorced	-0.0256	0.152	0.0547	0.130	0.00831	-0.0314	-0.162	0.222	0.222	0.115	0.538**
		(0.169)	(0.165)	(0.197)	(0.214)	(0.140)	(0.153)	(0.158)	(0.201)	(0.186)	(0.188)	(0.267)
	widowed	-0.0427	0.132	-0.107	-0.0116	-0.0663	-0.0211	-0.0457	-0.0993	0.147	-0.207	0.434*
		(0.170)	(0.170)	(0.184)	(0.226)	(0.185)	(0.183)	(0.179)	(0.320)	(0.164)	(0.153)	(0.243)
Multidimensional deprivation		0.00981	-0.274	-0.0555	-0.243	-0.132	-0.114	-0.0396	-0.479**	-0.353**	-0.236	0.0871
Social support		(0.133)	(0.167)	(0.179)	(0.207)	(0.152)	(0.191)	(0.143)	(0.225)	(0.168)	(0.187)	(0.291)
	intermediate support	0.126*	0.130	0.186**	0.520***	0.188**	0.230**	0.0581	0.266**	0.0872	0.151	0.148
		(0.0655)	(0.0868)	(0.0944)	(0.115)	(0.0757)	(0.102)	(0.0672)	(0.108)	(0.0926)	(0.103)	(0.133)
	strong support	0.315***	0.251***	0.349***	0.749***	0.331***	0.332***	0.193***	0.398***	0.247***	0.380***	0.358***
Stressful life events		(0.0691)	(0.0881)	(0.0980)	(0.115)	(0.0779)	(0.107)	(0.0717)	(0.109)	(0.0936)	(0.105)	(0.133)
	one	-0.0555	-0.107	-0.0926	-0.177**	-0.117*	-0.0405	0.0469	-0.0361	-0.0970	-0.168**	-0.180
		(0.0646)	(0.0687)	(0.0709)	(0.0875)	(0.0690)	(0.0706)	(0.0651)	(0.0790)	(0.0747)	(0.0784)	(0.110)
	two or more	-0.241***	-0.276***	-0.184***	-0.244***	-0.307***	-0.336***	-0.0119	-0.259***	-0.340***	-0.217***	-0.326***
		(0.0608)	(0.0652)	(0.0675)	(0.0918)	(0.0634)	(0.0717)	(0.0618)	(0.0787)	(0.0657)	(0.0756)	(0.107)
Observations		408	408	408	408	408	408	408	408	408	408	408

Reference group: male, 24 years of age or younger, can't read/write, never married, with poor social support, no recent stressful life events; robust standard errors in parenthesis; *, ** and *** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively.

Table 5B.4. Ordered Logistic Regression Results (binary depression variable at PHQ-9 cut-off score of 5)

		c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11
Depression		-1.052***	-1.615***	-0.516**	-0.485**	-0.415*	-0.158	-0.245	-0.270	-0.285	-0.254	-0.357
Gender		(0.248)	(0.239)	(0.212)	(0.222)	(0.236)	(0.225)	(0.238)	(0.238)	(0.261)	(0.241)	(0.226)
	Female	-0.309	-0.0200	-0.183	-0.665***	-1.110***	0.127	-0.676**	-0.804***	0.132	-0.565**	-0.222
Age		(0.256)	(0.239)	(0.233)	(0.240)	(0.246)	(0.253)	(0.266)	(0.257)	(0.280)	(0.256)	(0.258)
	25 – 34	0.277	0.113	0.106	0.640*	0.209	0.116	-0.150	0.282	0.237	-0.481	0.173
		(0.346)	(0.345)	(0.326)	(0.353)	(0.345)	(0.371)	(0.378)	(0.363)	(0.375)	(0.372)	(0.356)
	35 – 44	-0.197	-0.0850	0.546	0.640	0.267	0.149	0.0801	0.398	0.767	-0.0901	0.702*
		(0.407)	(0.447)	(0.374)	(0.426)	(0.425)	(0.433)	(0.432)	(0.430)	(0.483)	(0.427)	(0.403)
	45 – 64	-0.534	-0.270	0.150	0.552	0.101	0.144	-0.0575	0.527	0.787	-0.0959	0.531
		(0.450)	(0.440)	(0.426)	(0.441)	(0.419)	(0.449)	(0.447)	(0.459)	(0.504)	(0.460)	(0.440)
	65+	-0.142	0.609	0.435	1.545**	0.847	-0.413	0.0839	0.776	1.770**	1.276*	1.697***
Education		(0.669)	(0.625)	(0.556)	(0.620)	(0.679)	(0.557)	(0.631)	(0.663)	(0.872)	(0.767)	(0.646)
	read/write, no formal education	-0.277	0.121	-0.273	0.0738	-0.730**	-0.191	-0.670*	-0.854**	-0.596	-0.823*	-0.657*
		(0.351)	(0.351)	(0.346)	(0.352)	(0.353)	(0.350)	(0.362)	(0.377)	(0.375)	(0.447)	(0.356)
	primary school	-0.347	-0.0844	0.0129	-0.0782	-0.829***	-0.0105	-0.148	0.00220	0.304	-0.254	-0.177
		(0.339)	(0.353)	(0.306)	(0.311)	(0.315)	(0.329)	(0.352)	(0.345)	(0.374)	(0.308)	(0.345)
	high school or above	-0.694	0.00157	-0.260	-0.670	-1.077**	-0.227	0.180	-0.00558	0.193	-0.215	-0.363
Marital status		(0.445)	(0.450)	(0.377)	(0.422)	(0.421)	(0.420)	(0.444)	(0.431)	(0.502)	(0.425)	(0.467)
	Married	0.223	0.369	0.231	-0.174	-0.180	2.221***	1.046***	0.541	0.00362	0.685*	-0.260
		(0.365)	(0.361)	(0.340)	(0.369)	(0.357)	(0.434)	(0.388)	(0.381)	(0.425)	(0.405)	(0.369)
	divorced	-0.485	-0.693	-0.0172	0.233	0.714	2.038***	1.438**	0.706	-0.274	1.253*	0.0103
		(0.539)	(0.662)	(0.744)	(0.742)	(0.754)	(0.614)	(0.586)	(0.589)	(0.809)	(0.696)	(0.677)
	widowed	1.265*	1.374**	0.559	-0.466	0.118	1.773***	0.0653	0.195	-1.290	-0.195	-0.336
		(0.700)	(0.673)	(0.612)	(0.667)	(0.642)	(0.643)	(0.745)	(0.972)	(0.850)	(0.884)	(0.882)
Multidimensional deprivation		-1.280**	-0.588	-1.298**	-0.912	-0.833	-1.110*	0.919	0.423	-0.344	-0.580	-0.760
Social support		(0.628)	(0.654)	(0.549)	(0.642)	(0.688)	(0.616)	(0.670)	(0.686)	(0.742)	(0.746)	(0.759)
	intermediate support	0.253	-0.121	0.0412	0.998***	0.997***	0.395	0.229	0.446	0.393	0.505	0.984***
		(0.316)	(0.300)	(0.314)	(0.322)	(0.328)	(0.274)	(0.349)	(0.309)	(0.322)	(0.352)	(0.328)
	strong support	0.878***	0.232	0.514	1.856***	1.716***	1.006***	0.882**	1.133***	0.761**	1.470***	2.070***
Stressful life events		(0.339)	(0.310)	(0.327)	(0.359)	(0.357)	(0.300)	(0.380)	(0.328)	(0.358)	(0.351)	(0.334)
	one	-0.0638	0.0639	0.0260	-0.161	-0.274	0.0953	-0.301	-0.546*	-0.265	-0.599**	-0.604**
		(0.288)	(0.295)	(0.297)	(0.272)	(0.268)	(0.284)	(0.281)	(0.282)	(0.344)	(0.302)	(0.291)
	two or more	-0.830***	-0.862***	-0.461*	-1.143***	-1.131***	-0.628**	-1.254***	-1.243***	-0.478	-1.097***	-1.046***
		(0.301)	(0.273)	(0.280)	(0.273)	(0.281)	(0.265)	(0.283)	(0.281)	(0.317)	(0.295)	(0.276)
Observations		408	408	408	408	408	408	408	408	408	408	408

(continued)		c12	c13	c14	c15	c16	c17	c18	c19	c20	c21	c22
Depression		-0.162	-0.255	-0.294	-0.249	-0.0325	-0.485**	0.0183	-0.528*	-0.115	-0.330	0.127
Gender		(0.255)	(0.255)	(0.227)	(0.230)	(0.251)	(0.235)	(0.239)	(0.274)	(0.246)	(0.250)	(0.221)
	Female	-0.628**	-0.861***	-0.303	-0.478*	-0.513*	-0.309	-0.261	-0.485*	-0.588**	-0.717**	-0.885***
Age		(0.303)	(0.281)	(0.270)	(0.248)	(0.291)	(0.263)	(0.255)	(0.275)	(0.251)	(0.281)	(0.249)
	25 – 34	0.604*	0.00134	0.449	0.367	1.414***	0.969***	-0.0218	0.486	0.793**	0.767**	0.470
		(0.363)	(0.381)	(0.342)	(0.313)	(0.354)	(0.354)	(0.358)	(0.397)	(0.382)	(0.337)	(0.393)
	35 – 44	0.680	0.544	0.480	0.775**	1.388***	1.083**	0.696	0.732	0.998**	0.707*	0.556
		(0.444)	(0.447)	(0.389)	(0.366)	(0.414)	(0.425)	(0.438)	(0.475)	(0.422)	(0.414)	(0.457)
	45 – 64	0.742	0.566	0.793*	0.656	1.155**	0.537	0.448	0.430	0.709	1.180***	0.355
		(0.488)	(0.466)	(0.435)	(0.411)	(0.466)	(0.450)	(0.461)	(0.489)	(0.463)	(0.447)	(0.470)
	65+	0.954	0.661	0.601	1.072	0.0789	0.00312	0.0273	-0.334	0.176	0.744	0.287
Education		(0.734)	(0.643)	(0.604)	(0.670)	(0.919)	(0.683)	(0.689)	(0.646)	(0.675)	(0.851)	(0.653)
	read/write, no formal education	-0.370	-0.0821	-0.354	-0.599	0.502	1.277***	0.0331	-0.631	-0.0223	-0.0626	0.101
		(0.406)	(0.376)	(0.408)	(0.378)	(0.401)	(0.415)	(0.376)	(0.386)	(0.353)	(0.380)	(0.360)
	primary school	-0.317	0.00563	-0.0523	-0.335	-0.0467	0.236	0.146	-0.378	-0.0969	-0.400	-0.265
		(0.363)	(0.347)	(0.344)	(0.317)	(0.359)	(0.333)	(0.338)	(0.333)	(0.309)	(0.340)	(0.312)
	high school or above	0.180	0.262	-0.159	-0.411	0.144	0.170	1.037**	-0.251	-0.195	0.0469	0.0153
Marital status		(0.422)	(0.437)	(0.412)	(0.396)	(0.429)	(0.415)	(0.437)	(0.439)	(0.417)	(0.422)	(0.414)
	Married	0.0946	0.229	-0.455	-0.0116	0.110	-0.128	0.259	0.111	0.116	-0.615*	0.171
		(0.400)	(0.413)	(0.410)	(0.346)	(0.370)	(0.383)	(0.383)	(0.397)	(0.387)	(0.362)	(0.415)
	divorced	0.213	0.721	0.113	0.436	0.117	-0.264	-0.748	0.862	0.966	0.173	1.271*
		(0.874)	(0.745)	(0.798)	(0.629)	(0.598)	(0.543)	(0.829)	(0.734)	(0.736)	(0.668)	(0.704)
	widowed	0.0617	0.639	-0.535	-0.0576	-0.362	-0.147	-0.211	-0.0273	0.504	-1.014*	0.727
		(0.794)	(0.773)	(0.752)	(0.685)	(0.874)	(0.701)	(0.823)	(1.048)	(0.619)	(0.526)	(0.573)
Multidimensional deprivation		0.189	-0.967	-0.0212	-0.771	-0.698	-0.284	-0.207	-1.708**	-1.247*	-0.821	-0.138
Social support		(0.646)	(0.709)	(0.660)	(0.578)	(0.687)	(0.655)	(0.648)	(0.751)	(0.649)	(0.697)	(0.688)
	intermediate support	0.788**	0.648*	0.683*	1.461***	0.928***	0.704**	0.310	0.946***	0.406	0.444	0.411
		(0.365)	(0.371)	(0.359)	(0.305)	(0.327)	(0.339)	(0.317)	(0.338)	(0.354)	(0.360)	(0.288)
	strong support	1.664***	1.186***	1.347***	2.199***	1.665***	1.304***	0.906***	1.607***	1.145***	1.333***	0.980***
Stressful life events		(0.376)	(0.375)	(0.362)	(0.318)	(0.339)	(0.367)	(0.323)	(0.362)	(0.366)	(0.373)	(0.299)
	one	-0.270	-0.409	-0.328	-0.632**	-0.483*	-0.100	0.196	-0.258	-0.383	-0.689**	-0.459*
		(0.282)	(0.282)	(0.270)	(0.262)	(0.286)	(0.269)	(0.280)	(0.287)	(0.282)	(0.289)	(0.269)
	two or more	-1.207***	-1.219***	-0.699***	-0.856***	-1.395***	-1.040***	-0.0928	-1.077***	-1.412***	-0.789***	-0.877***
		(0.298)	(0.297)	(0.265)	(0.279)	(0.299)	(0.267)	(0.281)	(0.318)	(0.273)	(0.300)	(0.282)
Observations		408	408	408	408	408	408	408	408	408	408	408

Reference group: male, 24 years of age or younger, can't read/write, never married, with poor social support, no recent stressful life events; robust standard errors in parenthesis; *, ** and *** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively.

Table 5B.5. Ordered Logistic Regression Results (binary depression variable at PHQ-9 cut-off score of 10)

		c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11
Depression		-1.282***	-1.471***	-0.750***	-0.739***	-0.767***	0.0223	-0.781***	-0.577*	-0.0388	-0.523*	-0.685**
Gender		(0.282)	(0.250)	(0.245)	(0.237)	(0.258)	(0.253)	(0.279)	(0.313)	(0.278)	(0.281)	(0.275)
	Female	-0.257	0.0448	-0.157	-0.624**	-1.078***	0.121	-0.634**	-0.781***	0.126	-0.548**	-0.186
Age		(0.258)	(0.240)	(0.228)	(0.244)	(0.248)	(0.252)	(0.271)	(0.259)	(0.280)	(0.255)	(0.256)
	25 – 34	0.370	0.231	0.145	0.688*	0.241	0.112	-0.114	0.308	0.239	-0.471	0.218
		(0.351)	(0.353)	(0.333)	(0.359)	(0.341)	(0.374)	(0.383)	(0.365)	(0.374)	(0.370)	(0.358)
	35 – 44	-0.125	0.0250	0.573	0.679	0.294	0.149	0.106	0.416	0.775	-0.0856	0.734*
		(0.413)	(0.444)	(0.380)	(0.434)	(0.425)	(0.434)	(0.441)	(0.432)	(0.482)	(0.428)	(0.408)
	45 – 64	-0.553	-0.345	0.102	0.545	0.0791	0.125	-0.0378	0.528	0.765	-0.114	0.531
		(0.460)	(0.435)	(0.435)	(0.448)	(0.417)	(0.450)	(0.449)	(0.461)	(0.505)	(0.457)	(0.442)
	65+	-0.283	0.426	0.366	1.505**	0.799	-0.448	0.0972	0.754	1.703*	1.234	1.684**
Education		(0.716)	(0.601)	(0.554)	(0.618)	(0.653)	(0.557)	(0.633)	(0.670)	(0.870)	(0.768)	(0.657)
	read/write, no formal education	-0.211	0.307	-0.268	0.0921	-0.748**	-0.156	-0.710*	-0.869**	-0.539	-0.839*	-0.667*
		(0.364)	(0.341)	(0.353)	(0.351)	(0.356)	(0.347)	(0.363)	(0.384)	(0.372)	(0.449)	(0.364)
	primary school	-0.349	-0.147	-0.0308	-0.0990	-0.871***	-0.0127	-0.175	-0.0169	0.300	-0.272	-0.190
		(0.337)	(0.350)	(0.307)	(0.313)	(0.320)	(0.329)	(0.358)	(0.349)	(0.375)	(0.308)	(0.351)
	high school or above	-0.729	-0.124	-0.328	-0.729*	-1.167***	-0.231	0.139	-0.0278	0.168	-0.241	-0.410
Marital status		(0.445)	(0.444)	(0.377)	(0.424)	(0.435)	(0.420)	(0.453)	(0.438)	(0.497)	(0.425)	(0.479)
	Married	0.293	0.406	0.254	-0.161	-0.173	2.227***	1.055***	0.567	0.00330	0.708*	-0.250
		(0.372)	(0.364)	(0.346)	(0.374)	(0.353)	(0.436)	(0.391)	(0.388)	(0.421)	(0.401)	(0.365)
	divorced	-0.617	-0.687	-0.173	0.0838	0.557	2.112***	1.253**	0.625	-0.185	1.172*	-0.144
		(0.556)	(0.594)	(0.756)	(0.760)	(0.739)	(0.621)	(0.612)	(0.606)	(0.825)	(0.692)	(0.694)
	widowed	1.149*	1.101*	0.507	-0.550	0.0351	1.769***	-0.0202	0.167	-1.310	-0.245	-0.402
		(0.649)	(0.580)	(0.622)	(0.624)	(0.609)	(0.640)	(0.762)	(0.967)	(0.837)	(0.923)	(0.858)
Multidimensional deprivation		-1.436**	-1.061	-1.414***	-1.010	-0.933	-1.175*	0.903	0.390	-0.470	-0.603	-0.824
Social support		(0.650)	(0.667)	(0.545)	(0.639)	(0.689)	(0.611)	(0.683)	(0.688)	(0.727)	(0.728)	(0.769)
	intermediate support	0.201	-0.151	0.000578	0.966***	0.956***	0.422	0.170	0.399	0.428	0.467	0.947***
		(0.319)	(0.311)	(0.312)	(0.316)	(0.315)	(0.274)	(0.346)	(0.307)	(0.322)	(0.347)	(0.324)
	strong support	0.772**	0.163	0.448	1.787***	1.644***	1.037***	0.784**	1.065***	0.803**	1.417***	2.003***
Stressful life events		(0.346)	(0.320)	(0.322)	(0.358)	(0.347)	(0.303)	(0.380)	(0.332)	(0.357)	(0.346)	(0.332)
	one	-0.149	-0.0689	-0.0189	-0.191	-0.290	0.0686	-0.296	-0.560**	-0.307	-0.609**	-0.617**
		(0.287)	(0.294)	(0.291)	(0.269)	(0.270)	(0.282)	(0.282)	(0.282)	(0.339)	(0.299)	(0.291)
	two or more	-0.947***	-1.139***	-0.478*	-1.165***	-1.136***	-0.696***	-1.196***	-1.237***	-0.583*	-1.080***	-1.034***
		(0.298)	(0.253)	(0.279)	(0.266)	(0.271)	(0.259)	(0.279)	(0.276)	(0.306)	(0.286)	(0.278)
Observations		408	408	408	408	408	408	408	408	408	408	408

(continued)		c12	c13	c14	c15	c16	c17	c18	c19	c20	c21	c22
Depression		-0.803**	-0.730**	-0.433	-0.613**	-0.417	-0.627**	-0.189	-1.064***	-0.695**	-0.372	-0.285
Gender		(0.322)	(0.298)	(0.279)	(0.259)	(0.312)	(0.287)	(0.282)	(0.319)	(0.297)	(0.297)	(0.224)
	Female	-0.599*	-0.845***	-0.289	-0.450*	-0.491*	-0.281	-0.247	-0.439	-0.553**	-0.712**	-0.856***
Age		(0.306)	(0.284)	(0.271)	(0.247)	(0.290)	(0.263)	(0.255)	(0.281)	(0.253)	(0.279)	(0.248)
	25 – 34	0.649*	0.0313	0.469	0.384	1.434***	1.003***	-0.0114	0.560	0.825**	0.783**	0.487
		(0.363)	(0.379)	(0.344)	(0.315)	(0.355)	(0.359)	(0.362)	(0.394)	(0.378)	(0.337)	(0.397)
	35 – 44	0.725	0.578	0.494	0.780**	1.412***	1.109***	0.703	0.769	1.024**	0.716*	0.567
		(0.448)	(0.448)	(0.392)	(0.367)	(0.417)	(0.428)	(0.441)	(0.476)	(0.423)	(0.413)	(0.461)
	45 – 64	0.777	0.570	0.775*	0.634	1.182**	0.533	0.462	0.408	0.733	1.147**	0.379
		(0.496)	(0.467)	(0.440)	(0.415)	(0.467)	(0.459)	(0.464)	(0.487)	(0.459)	(0.448)	(0.472)
	65+	0.993	0.644	0.561	1.049	0.0883	-0.0242	0.0439	-0.386	0.182	0.662	0.316
Education		(0.756)	(0.630)	(0.612)	(0.659)	(0.930)	(0.680)	(0.690)	(0.644)	(0.681)	(0.849)	(0.655)
	read/write, no formal education	-0.428	-0.118	-0.338	-0.628*	0.455	1.281***	0.00887	-0.634	-0.0761	-0.0404	0.0372
		(0.412)	(0.382)	(0.406)	(0.375)	(0.409)	(0.417)	(0.377)	(0.389)	(0.350)	(0.381)	(0.355)
	primary school	-0.347	-0.0239	-0.0726	-0.354	-0.0585	0.211	0.139	-0.408	-0.118	-0.423	-0.284
		(0.368)	(0.351)	(0.346)	(0.318)	(0.359)	(0.334)	(0.339)	(0.333)	(0.310)	(0.342)	(0.313)
	high school or above	0.169	0.237	-0.187	-0.442	0.139	0.130	1.033**	-0.291	-0.219	0.0119	0.00660
Marital status		(0.432)	(0.443)	(0.412)	(0.397)	(0.428)	(0.423)	(0.438)	(0.431)	(0.422)	(0.419)	(0.419)
	Married	0.110	0.252	-0.442	-0.000839	0.114	-0.102	0.262	0.134	0.138	-0.597*	0.160
		(0.400)	(0.415)	(0.413)	(0.348)	(0.371)	(0.392)	(0.385)	(0.398)	(0.384)	(0.363)	(0.421)
	divorced	0.0240	0.582	0.0717	0.288	-0.0266	-0.311	-0.823	0.694	0.780	0.170	1.086
		(0.886)	(0.762)	(0.808)	(0.639)	(0.615)	(0.539)	(0.832)	(0.746)	(0.731)	(0.668)	(0.712)
	widowed	-0.0165	0.576	-0.590	-0.0910	-0.400	-0.231	-0.231	-0.112	0.449	-1.056**	0.691
Multidimensional deprivation		(0.787)	(0.766)	(0.740)	(0.677)	(0.853)	(0.665)	(0.829)	(1.088)	(0.626)	(0.524)	(0.584)
		0.195	-0.989	-0.0885	-0.759	-0.655	-0.383	-0.178	-1.752**	-1.222*	-0.907	-0.0388
Social support		(0.651)	(0.706)	(0.660)	(0.571)	(0.678)	(0.665)	(0.644)	(0.717)	(0.625)	(0.678)	(0.677)
	intermediate support	0.716**	0.579	0.656*	1.404***	0.873***	0.697**	0.276	0.885***	0.337	0.443	0.348
		(0.364)	(0.371)	(0.363)	(0.305)	(0.324)	(0.336)	(0.319)	(0.332)	(0.347)	(0.351)	(0.284)
	strong support	1.560***	1.090***	1.305***	2.123***	1.593***	1.270***	0.861***	1.500***	1.049***	1.317***	0.899***
Stressful life events		(0.376)	(0.377)	(0.368)	(0.316)	(0.337)	(0.367)	(0.327)	(0.364)	(0.360)	(0.364)	(0.296)
	one	-0.253	-0.408	-0.348	-0.628**	-0.467	-0.142	0.210	-0.267	-0.366	-0.716**	-0.422
		(0.284)	(0.285)	(0.270)	(0.261)	(0.284)	(0.266)	(0.276)	(0.286)	(0.283)	(0.287)	(0.270)
	two or more	-1.117***	-1.176***	-0.720***	-0.819***	-1.320***	-1.089***	-0.0451	-1.066***	-1.323***	-0.836***	-0.758***
		(0.291)	(0.290)	(0.264)	(0.268)	(0.293)	(0.262)	(0.269)	(0.301)	(0.265)	(0.288)	(0.272)
Observations		408	408	408	408	408	408	408	408	408	408	408

Reference group: male, 24 years of age or younger, can't read/write, never married, with poor social support, no recent stressful life events; robust standard errors in parenthesis; *, ** and

*** denote statistical significance at 0.1, 0.05 and 0.01 level, respectively.

References

Adraro, W., Kerebih, H., Tesema, W., Abamecha, F., & Hailesilassie, H. (2019). Nearly three in every

   five prisoners experience common mental disorders (CMDs) in Jimma correctional

   institution; south-West Ethiopia. *BMC Public Health*, *19*(1), 1559.

   https://doi.org/10.1186/s12889-019-7879-6

Alemayehu, F., Ambaw, F., & Gutema, H. (2019). Depression and associated factors among

   prisoners in Bahir Dar Prison, Ethiopia. *BMC Psychiatry*, *19*(1), 88.

   https://doi.org/10.1186/s12888-019-2071-1

Alemayehu, M., Deyessa, N., Medihin, G., & Fekadu, A. (2018). A descriptive analysis of depression

   and pain complaints among patients with cancer in a low income country. *PLoS ONE*,

   13(3). https://doi.org/10.1371/journal.pone.0193713

Al-Janabi, H., Coast, J., & Flynn, T. N. (2012). Development of a self-report measure of capability

   wellbeing for adults: The ICECAP-A. *Quality of Life Research*, *21*, 167–176.

Al-Janabi, H., Peters, T. J., Brazier, J., Bryan, S., Flynn, T. N., Clemens, S., Moody, A., & Coast, J.

   (2013). An investigation of the construct validity of the ICECAP-A capability measure.

   Quality of Life Research, *22*, 1831–1840.

Alkire, S. (2005). Why the capability approach? *Journal of Human Development*, *6*(1), 115–133.

Ambaw, F., Mayston, R., Hanlon, C., & Alem, A. (2017). Burden and presentation of depression

   among newly diagnosed individuals with TB in primary care settings in Ethiopia. *BMC

   Psychiatry*, *17*(1), 57. https://doi.org/10.1186/s12888-017-1231-4

Ambaw, F., Mayston, R., Hanlon, C., Medhin, G., & Alem, A. (2018). Untreated depression and

   tuberculosis treatment outcomes, quality of life and disability, Ethiopia. *Bulletin of the

   World Health Organization*, *96*(4), 243–255. https://doi.org/10.2471/BLT.17.192658

Anand, P. (2005). Capabilities and health. *Journal of Medical Ethics*, *31*(5), 299–303.

   https://doi.org/10.1136/jme.2004.008706

226

Anand, P. (2016). *Happiness Explained: What human flourishing is and what we can do to promote it*. Oxford University Press.

Anand, P., Hunter, G., Carter, I., Dowding, K., Guala, F., & Hees, M. V. (2009). The development of capability indicators. *Journal of Human Development and Capabilities*, *10*(1), 125–152.

Anand, P., Krishnakumar, J., & Tran, N. B. (2011). Measuring welfare: Latent variable models for happiness and capabilities in the presence of unobservable heterogeneity. *Journal of Public Economics*, *95*, 205–215.

Anand, P., Santos, C., & Smith, R. (2008). The measurement of capabilities. In K. Basu & R. Kanbur (Eds.), *Arguments for a better world: Essays in honor of Amartya Sen: Vol. I: Ethics, Welfare, and Measurement*. Oxford University Press.

Andrade, L., Caraveo-anduaga, J. J., Berglund, P., Bijl, R. V., Graaf, R. D., Vollebergh, W., Dragomirecka, E., Kohn, R., Keller, M., Kessler, R. C., Kawakami, N., Kiliç, C., Offord, D., Ustun, T. B., & Wittchen, H.-U. (2003). The epidemiology of major depressive episodes: Results from the International Consortium of Psychiatric Epidemiology (ICPE) Surveys. *International Journal of Methods in Psychiatric Research*, *12*(1), 3–21.

APA. (2013). *Diagnostic and statistical manual of mental disorders, fifth edition*. Arlington, VA: American Psychiatric Association.

Apfelbacher, C., Brandstetter, S., Herr, R., Ehrenstein, B., & Loerbroks, A. (2017). Depression and inflammatory arthritis are associated in both Western and Non-Western countries: Findings from the World Health Survey 2002. *Journal of Psychosomatic Research*, *92*, 49–54. https://doi.org/10.1016/j.jpsychores.2016.11.011

Austin, P. C. (2011). An introduction to propensity score methods for reducing the effects of confounding in observational studies. *Multivariate Behavioral Research*, *46*(3), 399–424.

Bartlett, J., Deribe, K., Tamiru, A., Amberbir, T., Medhin, G., Malik, M., Hanlon, C., & Davey, G. (2016). Depression and disability in people with podoconiosis: A comparative cross-

sectional study in rural Northern Ethiopia. *International Health*, *8*(2), 124–131.

https://doi.org/10.1093/inthealth/ihv037

Bartolucci, F., Bacci, S., & Gnaldi, M. (2016). *Statistical Analysis of Questionnaires: A Unified Approach Based on R and Stata*. CRC Press, Taylor & Francis Group LLC.

Bisetegn, T. A., Mihretie, G., & Muche, T. (2016). Prevalence and Predictors of Depression among Pregnant Women in Debretabor Town, Northwest Ethiopia. *PLOS ONE*, *11*(9), e0161108. https://doi.org/10.1371/journal.pone.0161108

Bitew, T., Hanlon, C., Kebede, E., Honikman, S., & Fekadu, A. (2017). Antenatal depressive symptoms and perinatal complications: A prospective study in rural Ethiopia. *BMC Psychiatry*, *17*(1), 301. https://doi.org/10.1186/s12888-017-1462-4

Bloom, D. E., Cafiero, E., Jané-Llopis, E., Abrahams-Gessel, S., Bloom, L. R., Fathima, S., Feigl, A. B., Gaziano, T., Hamandi, A., Mowafi, M., Pandya, A., Prettner, K., Rosenberg, L., Seligman, B., Stein, A. Z., & Weinstein, C. (2011). *The global economic burden of noncommunicable diseases*. Geneva: World Economic Forum.

Braun, V., & Clarke, V. (2013). *Successful Qualitative Research: A Practical Guide for Beginners*. Sage publications Ltd.

Brazier, J. (2010). Is the EQ–5D fit for purpose in mental health? *The British Journal of Psychiatry*, *197*(5), 348–349.

Brazier, J., Connell, J., Papaioannou, D., Mukuria, C., Mulhern, B., Peasgood, T., Lloyd Jones, M., Paisley, S., O'Cathain, A., Barkham, M., Knapp, M., Byford, S., Gilbody, S., & Parry, G. (2014). A systematic review, psychometric analysis and qualitative assessment of Generic Preference-Based Measures of Health in Mental Health Populations and the estimation of mapping functions from widely used specific measures. *Health Technology Assessment*, *18*(34). https://doi.org/10.3310/hta18340

Brazier, J., Ratcliffe, J., Saloman, J., & Tsuchiya, A. (2017). *Measuring and valuing health benefits for economic evaluation* (2nd ed.). Oxford University Press.

Bromberger, J. T., & di Scalea, T. L. (2009). Longitudinal associations between depression and functioning in midlife women. *Maturitas*, *64*(3), 145–159.

Bromet, E., Andrade, L. H., Hwang, I., Sampson, N. A., Alonso, J., de Girolamo, G., de Graaf, R., Demyttenaere, K., Hu, C., Iwata, N., Karam, A. N., Kaur, J., Kostyuchenko, S., Lépine, J.-P., Levinson, D., Matschinger, H., Mora, M. E. M., Browne, M. O., Posada-Villa, J., … Kessler, R. C. (2011). Cross-national epidemiology of DSM-IV major depressive episode. *BMC Medicine*, *9*, 90.

Brouwer, W. B. F., Culyer, A. J., van Exel, N. J. A., & Rutten, F. F. H. (2008). Welfarism vs. Extra-welfarism. *Journal of Health Economics*, *27*(2), 325–338. https://doi.org/10.1016/j.jhealeco.2007.07.003

Bruni, L., Comim, F., & Pugno, M. (2008). Introduction. In L. Bruni, F. Comim, & M. Pugno (Eds.), *Capabilities and Happiness*. Oxford University Press.

Bruni, L., & Porta, P. L. (2007). Introduction. In L. Bruni & P. L. Porta (Eds.), *Handbook on the Economics of Happiness*. Edward Elgar Publishing Limited.

Burchardt, T. (2004). Capabilities and disability: The capabilities framework and the social model of disability. *Disability & Society*, *19*(7), 735–751. https://doi.org/10.1080/0968759042000284213

Bureau of Finance and Economic Development. (2016). *Southern Nations, Nationalities and Peoples Regional State Annual Statistical Abstract 2007 E.C. (2014/2015).* SNNPR Bureau of Finance and Economic Development.

Burgess, R. A., Jain, S., Petersen, I., & Lund, C. (2020). Social interventions: A new era for global mental health? *The Lancet Psychiatry*, *7*(2), 118–119. https://doi.org/10.1016/S2215-0366(19)30397-9

Cameron, A. C., & Trivedi, P. K. (2009). *Microeconometrics Using Stata, Revised Edition*. Stata Press.

Camfield, L. (2006). The Why and How of Understanding 'Subjective' Wellbeing: Exploratory work

by the WeD group in four developing countries. In *WeD working paper 26*. ESRC Research

Group on Wellbeing in Developing Countries (WeD), University of Bath.

Cappelleri, J. C., Zou, K. H., Bushmakin, A. G., Alvir, J. Ma. J., Alemayehu, D., & Symonds, T. (2014).

Patient-reported outcomes: Measurement, implementation and interpretation. Boca Raton,

FL: CRC Press, Taylor & Francis Group.

Cassano, P., & Fava, M. (2002). Depression and public health: An overview. *Journal of*

Psychosomatic Research, *53*(4), 849–857.

Chaka, A., Awoke, T., Yohannis, Z., Ayano, G., Tareke, M., Abate, A., & Nega, M. (2018). Determinants

of depression among people with epilepsy in Central Ethiopia. *Annals of General*

Psychiatry, *17*(1), 27. https://doi.org/10.1186/s12991-018-0197-z

Chávez, L. M., & Canino, G. (2005). *Toolkit on translating and adapting instruments*. Cambridge, MA:

The Evaluation Center: Human Services Research Institute.

Chiappero-Martinetti, E., & Sabadash, A. (2014). Integrating human capital and human capabilities

in understanding the value of education. In S. Ibrahim & M. Tiwari (Eds.), *The capability*

approach: From theory to practice. UK, Palgrave Macmillan.

Chisholm, D., Garman, E., Breuer, E., Fekadu, A., Hanlon, C., Jordans, M., Kathree, T., Kigozi, F.,

Luitel, N., Medhin, G., Murhar, V., Petersen, I., Rathod, S. D., Shidhaye, R., Ssebunnya, J.,

Patel, V., & Lund, C. (2020). Health service costs and their association with functional

impairment among adults receiving integrated mental health care in five low- and middle-

income countries: The PRIME cohort study. *Health Policy and Planning*, *35*(5), 567–576.

https://doi.org/10.1093/heapol/czz182

Coast, J., Kinghorn, P., & Mitchell, P. (2015). The development of capability measures in health economics: Opportunities, challenges and progress. *Patient-Patient Centered Outcomes Research*, *8*, 119–126.

Coast, J., Mitchell, P., & Goranitis, I. (2017). Ethics and Values in Welfarism and Extra-Welfarism. In D. Razzouk (Ed.), *Mental Health Economics: The Costs and Benefits of Psychiatric Care* (pp. 163–178). Springer International Publishing. https://doi.org/10.1007/978-3-319-55266-8_9

Coast, J., Smith, R. D., & Lorgelly, P. (2008). Welfarism, extra-welfarism and capability: The spread of ideas in health economics. *Social Science & Medicine*, *67*(7), 1190–1198. https://doi.org/10.1016/j.socscimed.2008.06.027

Coast, J., Smith, R., & Lorgelly, P. (2008). Should the Capability Approach be Applied in Health Economics? *Health Economics*, *17*, 667–670. https://doi.org/10.1002/hec.1359

Comim, F. (2008). Capabilities and Happiness: Overcoming the Informational Apartheid in the Assessment of Human Well-Being. In L. Bruni, F. Comim, & M. Pugno (Eds.), *Capabilities and Happiness*. Oxford University Press.

Comim, F. (2008). Measuring capabilities. In F. Comim, M. Qizilbash, & S. Alkire (Eds.), *The Capability Approach: Concepts, Measures and Applications* (pp. 157–200). Cambridge University Press.

Connell, J., Brazier, J., O'Cathain, A., Lloyd-Jones, M., & Paisley, S. (2012). Quality of life of people with mental health problems: A synthesis of qualitative research. *Health and Quality of Life Outcomes*, *10*, 138.

Cook, D. G., Shaper, A. G., & MacFarlane, P. W. (1989). Using the WHO (Rose) angina questionnaire in cardiovascular epidemiology. *International Journal of Epidemiology*, *18*(3), 607–613. https://doi.org/10.1093/ije/18.3.607

Copestake, J., & Camfield, L. (2009). Measuring subjective wellbeing in Bangladesh, Ethiopia, Peru and Thailand using a personal life goal satisfaction approach. In *WeD working paper 09/45*. ESRC Research Group on Wellbeing in Developing Countries (WeD), University of Bath.

Crossley, T. F., & Kennedy, S. (2002). The reliability of self-assessed health status. *Journal of Health Economics, 21*(4), 643.

Cuijpers, P., & Schoevers, R. A. (2004). Increased mortality in depressive disorders: A review. *Current Psychiatry Reports*, *6*(6), 430–437. https://doi.org/10.1007/s11920-004-0007-y

Cuijpers, P., & Smit, F. (2002). Excess mortality in depression: A meta-analysis of community studies. *Journal of Affective Disorders*, *72*(3), 227–236. https://doi.org/10.1016/S0165-0327(01)00413-X

Cummins, R. A. (2013). Measuring Happiness and Subjective Well-being. In lona Boniwell, S. A. David, & A. C. Ayers (Eds.), *Oxford Handbook of Happiness* (pp. 185–200). Oxford University Press.

Dalziel, P., Saunders, C., & Saunders, J. (2018). From Economic Growth to Wellbeing Economics. In P. Dalziel, C. Saunders, & J. Saunders (Eds.), *Wellbeing Economics* (pp. 1–21). Springer Nature Switzerland.

Decancq, K., & Lugo, M. A. (2013). Weights in Multidimensional Indices of Wellbeing: An Overview. *Econometric Reviews*, *32*(1), 7–34. https://doi.org/10.1080/07474938.2012.690641

Dhami, S. (2016). *The Foundations of Behavioral Economic Analysis*. Oxford University Press.

Diener, E. (1984). Subjective well-being. *Psychological Bulletin*, *95*(3), 542–575.

Dohrenwend, B. P., Levav, I., Shrout, P. E., Schwartz, S., Naveh, G., Link, B. G., Skodol, A. E., & Stueve, A. (1992). Socioeconomic status and psychiatric disorders: The causation-selection issue. *Science*, *255*(5047), 946–952. https://doi.org/10.1126/science.1546291

Donohue, J. M., & Pincus, H. A. (2007). Reducing the societal burden of depression: A review of economic costs, quality of care and effects of treatment. *Pharmacoeconomics*, *25*(1), 7–24.

Drummond, M. F., Sculpher, M. J., Claxton, K., Stoddart, G. L., & Torrance, G. W. (2015). *Methods for the economic evaluation of health care programmes* (4th ed.). Oxford university press.

Easterlin, R. A. (1974). Does Economic Growth Improve the Human Lot? Some Empirical Evidence. In P. A. David & M. W. Reder (Eds.), *Nations and Households in Economic Growth* (pp. 89–125). Academic Press.

Fekadu, A., & Alem, A. (2020). The need for a radical transformation of the healthcare system in Ethiopia: Examples from mental health research. *Ethiopian Medical Journal*, *58*(2), 103–104.

Fekadu, A., Alem, A., Medhin, G., Shibre, T., Cleare, A., Prince, M., & Kebede, D. (2007). Utility of the concept of minor depressive disorder: Evidence from a large rural community sample in a developing country setting. *Journal of Affective Disorder*, *104*(1–3), 111–118.

Fekadu, A., Medhin, G., Kebede, D., Alem, A., Cleare, A. J., Prince, M., Hanlon, C., & Shibre, T. (2015). Excess mortality in severe mental illness: 10-year population-based cohort study in rural Ethiopia. *The British Journal of Psychiatry*, *206*(4), 289–296.

Fekadu, A., Medhin, G., Selamu, M., Hailemariam, M., Alem, A., Giorgis, T. W., Breuer, E., Lund, C., Prince, M., & Hanlon, C. (2014). Population level mental distress in rural Ethiopia. *BMC Psychiatry*, *14*, 194.

Fekadu, A., Medhin, G., Selamu, M., W.Giorgis, T., Lund, C., Alem, A., Prince, M., & Hanlon, C. (2017). Recognition of depression by primary care clinicians in rural Ethiopia. *BMC Family Practice*, *18*, 56.

Fernandez, A., Saameno, J. A. B., Pinto-Meza, A., Luciano, J. V., Autonell, J., Palao, D., Salvador-Carulla, L., Campayo, J. G., Haro, J. M., Serrano, A., & others. (2010). Burden of chronic physical conditions and mental disorders in primary care. *The British Journal of Psychiatry*, *196*(4), 302–309.

Ferrari, A. J., Charlson, F. J., Norman, R. E., Patten, S. B., Freedman, G., Murray, C. J. L., Vos, T., &
Whiteford, H. A. (2013). Burden of depressive disorders by country, sex, age, and year:
Findings from the global burden of disease study 2010. *PLOS Medicine*, *10*(11), e1001547.

Flynn, T. N., Huynh, E., Peters, T. J., Al-Janabi, H., Clemens, S., Moody, A., & Coast, J. (2015).
Scoring the Icecap-a Capability Instrument. Estimation of a UK General Population Tariff.
Health Economics, *24*(3), 258–269. https://doi.org/10.1002/hec.3014

Frey, B. S., & Stutzer, A. (2002). *Happiness and Economics: How the Economy and Institutions Affect
Human Well-Being*. Princeton University Press.

Frey, B. S., & Stutzer, A. (2002). What Can Economists Learn from Happiness Research? *Journal of
Economic Literature*, *40*(2), 402–435. https://doi.org/10.1257/002205102320161320

Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method
for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical
Research Methodology*, *13*, 117.

Gandjour, A. (2008). Mutual dependency between capabilities and functionings in Amartya Sen's
capability approach. *Social Choice and Welfare*, *31*, 345–350.

Garrido, M. M., Kelley, A. S., Paris, J., Roza, K., Meier, D. E., Morrison, R. S., & Aldridge, M. D. (2014).
Methods for constructing and assessing propensity scores. *Health Services Research*, *49*(5),
1701–1720. https://doi.org/10.1111/1475-6773.12182

Gasper, D. (2007). Human Well-being: Concepts and Conceptualizations. In M. McGillivray (Ed.),
Human Well-Being: Concept and Measurement. Palgrave Macmillan UK.

Gaziano, C. (2008). Kish Selection Method. In P. J. Lavrakas (Ed.), *Encyclopedia of Survey Research
Methods*. Sage Publications, Inc. http://methods.sagepub.com/reference/encyclopedia-of-
survey-research-methods/n262.xml

GBD 2015 Disease and Injury Incidence and Prevalence Collaborators. (2016). Global, regional, and
national incidence, prevalence, and years lived with disability for 310 diseases and

injuries, 1990–2015: A systematic analysis for the Global Burden of Disease Study 2015. *Lancet*, *388*, 1545–1602.

Gelaye, B., A.Williams, M., Lemma, S., Deyessa, N., Bahretibeb, Y., Shibre, T., Wondimagegn, D., Lemenhe, A., R.Fann, J., Stoep, A. V., & Zhou, X.-H. A. (2013). Validity of the patient health questionnaire-9 for depression screening and diagnosis in east africa. *Psychiatry Research*, *210*(2), 653–661.

Gertler, P. J., Martinez, S., Premand, P., Rawlings, L. B., & Vermeersch, C. M. J. (2016). *Impact evaluation in practice, second edition*. Washington, DC: Inter-American Development Bank and World Bank.

Gilman, S. E., Sucha, E., Kingsbury, M., Horton, N. J., Murphy, J. M., & Colman, I. (2017). Depression and mortality in a longitudinal study: 1952–2011. *CMAJ*, *189*(42), E1304–E1310. https://doi.org/10.1503/cmaj.170125

Goar, S. G., Obembe, A., Audu, M. D., & Agbir, M. T. (2012). Utilization of health care services by depressed patients attending the general out-patients department of the Jos University Teaching Hospital, Jos, Nigeria. *Nigerian Journal of Clinical Practice*, *15*, 59–62.

Goldman, N. (1994). Social Factors and Health: The Causation-Selection Issue Revisited. *Proceedings of the National Academy of Sciences of the United States of America*, *91*(4), 1251–1255.

Gray, A. M., Clarke, P. M., Wolstenholme, J. L., & Wordsworth, S. (2011). *Applied methods of cost-effectiveness analysis in healthcare*. Oxford University Press.

Greco, G., Lorgelly, P., & Yamabhai, I. (2016). Outcomes in Economic Evaluations of Public Health Interventions in Low- and Middle-Income Countries: Health, Capabilities and Subjective Wellbeing. *Health Economics*, *25*(S1), 83–94. https://doi.org/10.1002/hec.3302

Grewala, I., Lewisa, J., Flynnb, T., Brownc, J., Bondd, J., & Coast, J. (2006). Developing attributes for a generic quality of life measure for older people: Preferences or capabilities? *Social Science & Medicine*, *62*, 1891–1901.

Guillemin, F., Bombardier, C., & Beaton, D. (1993). Cross-cultural adaptation of health-related quality of life measures: Literature review and proposed guidelines. *Journal of Clinical Epidemiology*, *46*(12), 1417–1432.

Guo, S., & Fraser, M. W. (2015). *Propensity score analysis: Statistical methods and applications* (2nd ed.). SAGE Publications, Inc.

Gusi, N., Olivares, P. R., & Rajendram, R. (2010). The EQ-5D Health-Related Quality of Life Questionnaire. In V. R. Preedy & R. R. Watson (Eds.), *Handbook of Disease Burdens and Quality of Life Measures*. Springer-Verlag New York.

Habtamu, K., Alem, A., Medhin, G., Fekadu, A., Dewey, M., Prince, M., & Hanlon, C. (2017). Validation of the World Health Organization Disability Assessment Schedule in people with severe mental disorders rural Ethiopia. *Health and Quality of Life Outcomes*, *15*, 64.

Habtamu, K., Medhin, G., Selamu, M., Tirfessa, K., Hanlon, C., & Fekadu, A. (2019). Functional impairment among people diagnosed with depression in primary healthcare in rural Ethiopia: A comparative cross-sectional study. *International Journal of Mental Health Systems*, *13:50*.

Habtewold, T. D., Alemu, S. M., & Haile, Y. G. (2016). Sociodemographic, clinical, and psychosocial factors associated with depression among type 2 diabetic outpatients in Black Lion General Specialized Hospital, Addis Ababa, Ethiopia: A cross-sectional study. *BMC Psychiatry*, *16*(1), 103. https://doi.org/10.1186/s12888-016-0809-6

Habtewold, T. D., Islam, Md. A., Radie, Y. T., & Tegegne, B. S. (2016). Comorbidity of depression and diabetes: An application of biopsychosocial model. *International Journal of Mental Health Systems*, *10*(1), 74. https://doi.org/10.1186/s13033-016-0106-2

Hailemariam, S., Tessema, F., Asefa, M., Tadesse, H., & Tenkolu, G. (2012). The prevalence of depression and associated factors in Ethiopia: Findings from the National Health Survey. *International Journal of Mental Health Systems*, *6:23*, 1–11.

Hailemichael, Y., Hanlon, C., Tirfessa, K., Docrat, S., Alem, A., Medhin, G., Fekadu, A., Lund, C., Chisholm, D., & Hailemariam, D. (2019). Mental health problems and socioeconomic disadvantage: A controlled household study in rural Ethiopia. *International Journal for Equity in Health*, *18*(1), 121.

Hanlon, C., Medhin, G., Selamu, M., Breuer, E., Worku, B., Hailemariam, M., Lund, C., Prince, M., & Fekadu, A. (2015). Validity of brief screening questionnaires to detect depression in primary care in Ethiopia. *Journal of Affective Disorders*, *186*, 32–39.

Helter, T. M., Coast, J., Łaszewska, A., Stamm, T., & Simon, J. (2019). Capability instruments in economic evaluations of health-related interventions: A comparative review of the literature. *Quality of Life Research*. https://doi.org/10.1007/s11136-019-02393-5

Herdman, M., Fox-Rushby, J., & Badia, X. (1998). A model of equivalence in the cultural adaptation of HRQoL instruments: The universalist approach. *Quality of Life Research*, *7*, 323–335.

Hirschfeld, R. M. A. (2001). The comorbidity of major depression and anxiety disorders: Recognition and management in primary care. *Primary Care Companion Journal of Clinical Psychiatry*, *3*(6), 244–254.

Huynh, E., Coast, J., Rose, J., Kinghorn, P., & Flynn, T. (2017). Values for the ICECAP-Supportive Care Measure (ICECAP-SCM) for use in economic evaluation at end of life. *Social Science & Medicine*, *189*, 114–128. https://doi.org/10.1016/j.socscimed.2017.07.012

Ichino, A., Mealli, F., & Nannicini, T. (2008). From temporary help jobs to permanent employment: What can we learn from matching estimators and their sensitivity? *Journal of Applied Econometrics*, *23*(3), 305–327. https://doi.org/10.1002/jae.998

IHME. (2016). *Ethiopia: Global burden of disease country profile*.

http://www.healthdata.org/ethiopia

IHME. (2016). *Rethinking development and health: Findings from the global burden of disease study*.

Institute for Health Metrics and Evaluation (IHME).

IHME. (2018). *Ethiopia profile*. http://www.healthdata.org/ethiopia

Imbens, G. W., & Wooldridge, J. M. (2009). Recent developments in the econometrics of program

evaluation. *Journal of Economic Literature*, *47*(1), 5–86. https://doi.org/10.1257/jel.47.1.5

IsHak, W. W., Greenberg, J. M., Balayan, K., Kapitanski, N., Jeffrey, J., Fathy, H., Fakhry, H., &

Rapaport, M. H. (2011). Quality of life: The ultimate outcome measure of interventions in

major depressive disorder. *Harvard Review of Psychiatry*, *19*(5), 229–239.

IsHak, W. W., Greenberg, J. M., Balayan, K., Kapitanski, N., Jeffrey, J., Fathy, H., Fakhry, H., &

Rapaport, M. H. (2011). Quality of Life: The Ultimate Outcome Measure of Interventions in

Major Depressive Disorder. *Harvard Review of Psychiatry*, *19*(5), 229–239.

https://doi.org/10.3109/10673229.2011.614099

IsHak, W. W., Greenberg, J. M., Saah, T., Mobaraki, S., Fakhry, H., Wu, Q. (Vicky), Ngor, E., Yu, F., &

Cohen, R. M. (2013). Development and validation of the individual burden of illness index

for major depressive disorder (IBI-D). *Administration and Policy in Mental Health*, *40*, 76–86.

Jack, H., Stein, A., Newton, C. R., & Hofman, K. J. (2014). Expanding access to mental health care: A

missing ingredient. *The Lancet Global Health*, *2*(4), e183–e184.

https://doi.org/10.1016/S2214-109X(14)70029-4

Jaeger, J., Berns, S., Uzelac, S., & Davis-Conway, S. (2006). Neurocognitive deficits and disability in

major depressive disorder. *Psychiatry Research*, *145*, 39–48.

Jiang, J., Tang, Z., Futatsuka, M., & Zhang, K. (2004). Exploring the influence of depressive

symptoms on physical disability: A cohort study of elderly in Beijing, China. *Quality of Life*

Research, *13*, 1337–1346.

Johnson, S. (2017). Social interventions in mental health: A call to action. *Social Psychiatry and Psychiatric Epidemiology*, *52*(3), 245–247. https://doi.org/10.1007/s00127-017-1360-6

Jürges, H., Avendano, M., & Mackenbach, J. P. (2008). Are different measures of self-rated health comparable? An assessment in five European countries. *European Journal of Epidemiology*, *23*(12), 773–781. https://doi.org/10.1007/s10654-008-9287-6

Jylhä, M. (2009). What is self-rated health and why does it predict mortality? Towards a unified conceptual model. *Social Science & Medicine*, *69*(3), 307–316. https://doi.org/10.1016/j.socscimed.2009.05.013

Kahneman, D., & Krueger, A. B. (2006). Developments in the Measurement of Subjective Well-Being. *Journal of Economic Perspectives*, *20*(1), 3–24. https://doi.org/10.1257/089533006776526030

Kang, H.-J., Hee-Ju, Kim, S.-Y., Bae, K.-Y., Kim, S.-W. an, Shin, I.-S., Yoon, J.-S., & Kim, J.-M. (2015). Comorbidity of depression with physical disorders: Research and clinical implications. *Chonnam Medical Journal*, *51*, 8–18.

Karimi, M., & Brazier, J. (2016). Health, Health-Related Quality of Life, and Quality of Life: What is the Difference? *PharmacoEconomics*, *34*(7), 645–649. https://doi.org/10.1007/s40273-016-0389-9

Kauder, E. (1965). *A History of Marginal Utility Theory*. Princeton University Press.

Kessler, R. C. (2012). The costs of depression. *Psychiatric Clinics of North America*, *35*(1), 1–14.

Kessler, R. C., & Bromet, E. J. (2013). The epidemiology of depression across cultures. *Annual Review of Public Health*, *34*, 119–138.

Kessler, R. C., Sampson, N. A., Berglund, P., Gruber, M. J., Al-Hamzawi, A., Andrade, L., Bunting, B., Demyttenaere, K., Florescu, S., Girolamo, G. de, Gureje, O., He, Y., Hu, C., Huang, Y., Karam, E., Kovess-Masfety, V., Lee, S., Levinson, D., Mora, M. E. M., … Wilcox, M. A. (2015). Anxious and non-anxious major depressive disorder in the World Health Organization World Mental

Health Surveys. *Epidemiology and Psychiatric Sciences*, *24*(3), 210–226.

https://doi.org/10.1017/S2045796015000189

Kessler, R. C., & Ustün, T. B. (2004). The world mental health (WMH) survey initiative version of the

world health organization (WHO) composite international diagnostic interview (CIDI).

International Journal of Methods in Psychiatric Research, *13*(2), 93–121.

https://doi.org/10.1002/mpr.168

Keyes, C. L. M. (1998). Social Well-Being. *Social Psychology Quarterly*, *61*(2), 121–140.

https://doi.org/10.2307/2787065

Keyes, C. L. M. (2002). The Mental Health Continuum: From Languishing to Flourishing in Life.

Journal of Health and Social Behavior, *43*(2), 207–222. https://doi.org/10.2307/3090197

Keyes, C. L. M. (2005). Mental Illness and/or Mental Health? Investigating Axioms of the Complete

State Model of Health. *Journal of Consulting and Clinical Psychology*, *73*(3), 539–548.

https://doi.org/10.1037/0022-006X.73.3.539

Keyes, C. L. M., & Lopez, S. J. (2002). Toward a Science of Mental Health: Positive Directions in

Diagnosis and Interventions. In C. R. Snyder & S. J. Lopez (Eds.), *The Oxford Handbook of

Positive Psychology*. Oxford University Press.

Keyes, C. L. M., Shmotkin, D., & Ryff, C. D. (2002). Optimizing well-being: The empirical encounter

of two traditions. *Journal of Personality and Social Psychology*, *82*(6), 1007–1022.

Kind, P., Brooks, R., & Rabin, R. (2005). *EQ-5D concepts and methods: A developmental history*.

Springer.

Kinghorn, P. (2015). Exploring Different Interpretations of the Capability Approach in a Health Care

Context: Where Next? *Journal of Human Development and Capabilities*, *16*(4), 600–616.

https://doi.org/10.1080/19452829.2015.1110567

Knapp, M., & Wong, G. (2020). Economics and mental health: The current scenario. *World

Psychiatry*, *19*(1), 3–14.

Kocalevent, R.-D., Hinz, A., & Brähler, E. (2013). Standardization of a screening instrument (PHQ-15) for somatization syndromes in the general population. *BMC Psychiatry*, *13*, 91. https://doi.org/10.1186/1471-244X-13-91

Kolovos, S., Bosmans, J. E., van Dongen, J. M., van Esveld, B., Magai, D., van Straten, A., van der Feltz-Cornelis, C., van Steenbergen-Weijenburg, K. M., Huijbregts, K. M., van Marwijk, H., Riper, H., & van Tulder, M. W. (2017). Utility scores for different health states related to depression: Individual participant data analysis. *Quality of Life Research*, *26*(7), 1649–1658. https://doi.org/10.1007/s11136-017-1536-2

König, H., König, H.-H., & Konnopka, A. (2019). The excess costs of depression: A systematic review and meta-analysis. *Epidemiology and Psychiatric Sciences*, *29*, e30.

Krabbe, P. F. M. (2017). *The Measurement of Health and Health Status: Concepts, Methods and Applications from a Multidisciplinary Perspective*. Academic Press.

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2002). The PHQ-15: Validity of a new measure for evaluating the severity of somatic symptoms. *Psychosomatic Medicine*, *64*, 258–266.

Kroenke, K., Spitzer, R. L., Williams, J. B. W., & Löwe, B. (2010). The patient health questionnaire somatic, anxiety, and depressive symptom scales: A systematic review. *General Hospital Psychiatry*, *32*(4), 345–359. https://doi.org/10.1016/j.genhosppsych.2010.03.006

Lamers, L. M., Bouwmans, C. A. M., van Straten, A., Donker, M. C. H., & Hakkaart, L. (2006). Comparison of EQ-5D and SF-6D utilities in mental health patients. *Health Economics*, *15*(11), 1229–1236. https://doi.org/10.1002/hec.1125

Lampe, F. C., Whincup, P. H., Shaper, A. G., Wannamethee, S. G., Walker, M., & Ebrahim, S. (2001). Variability of angina symptoms and the risk of major ischemic heart disease events. *American Journal of Epidemiology*, *153*(12), 1173–1182. https://doi.org/10.1093/aje/153.12.1173

Lamu, A. N., Gamst-Klaussen, T., & Olsen, J. A. (2017). Preference weighting of health state values: What difference does it make, and why? *Value in Health*, *20*(3), 451–457.

Law, I., & Widdows, H. (2008). Conceptualising Health: Insights from the Capability Approach. *Health Care Analysis*, *16*(4), 303–314. https://doi.org/10.1007/s10728-007-0070-8

Layard, R. (2010). Measuring subjective well-being. *Science*, *327*, 534–535.

Lehman, A. F. (1996). Measures of quality of life among persons with sever and persistent mental disorders. In G. Thornicroft & M. Tansella (Eds.), *Mental health outcome measures* (pp. 75–92). Heidelberg, Germany: Springer-Verlag Berlin.

Lehtinen, Ville, Ozamiz, A., Underwood, L., & Weiss, M. (2005). The intrinsic value of mental health. In H. Herrman, S. Saxena, & R. Moodie (Eds.), *Promoting mental health: Concepts, emerging evidence, practice*. Geneva, Switzerland: World Health Organization.

Leuven, E., & Sianesi, B. (2003). *PSMATCH2: Stata module to perform full Mahalanobis and propensity score matching, common support graphing, and covariate imbalance testing*.

Levitin, D. J. (2015). *The Organized Mind: Thinking Straight in the Age of Information Overload*. Penguin Group.

Liu, N. H., Daumit, G. L., Dua, T., Aquila, R., Charlson, F., Cuijpers, P., Druss, B., Dudek, K., Freeman, M., Fujii, C., Gaebel, W., Hegerl, U., Levav, I., Laursen, T. M., Ma, H., Maj, M., Medina-Mora, M. E., Nordentoft, M., Prabhakaran, D., … Saxena, S. (2017). Excess mortality in persons with severe mental disorders: A multilevel intervention framework and priorities for clinical practice, policy and research agendas. *World Psychiatry*, *16*, 30–40.

Loerbroks, A., Bosch, J. A., Mommersteeg, P. M. C., Herr, R. M., Angerer, P., & Li, J. (2014). The association of depression and angina pectoris across 47 countries: Findings from the 2002 World Health Survey. *European Journal of Epidemiology*, *29*(7), 507–515.

Long, J. S., & Freese, J. (2014). *Regression Models for Categorical Dependent Variables Using Stata* (3rd ed.). Stata Press.

Lorgelly, P. K. (2015). Choice of outcome measure in an economic evaluation: A potential role for the capability approach. *PharmacoEconomics*, *33*, 849–855.

Lorgelly, P. K., Lawson, K. D., Fenwick, E. A. L., & Briggs, A. H. (2010). Outcome measurement in economic evaluations of public health interventions: A role for the capability approach? *International Journal of Environmental Research and Public Health*, *7*, 2274–2289.

Lorgelly, P. K., Lorimer, K., Fenwick, E. A. L., Briggs, A. H., & Anand, P. (2015). Operationalising the capability approach as an outcome measure in public health: The development of the OCAP-18. *Social Science & Medicine*, *142*, 68–81.

Lund, C., Brooke-Sumner, C., Baingana, F., Baron, E. C., Breuer, E., Chandra, P., Haushofer, J., Herrman, H., Jordans, M., Kieling, C., Medina-Mora, M. E., Morgan, E., Omigbodun, O., Tol, W., Patel, V., & Saxena, S. (2018). Social determinants of mental disorders and the Sustainable Development Goals: A systematic review of reviews. *The Lancet Psychiatry*, *5*(4), 357–369.

Lund, C., & Cois, A. (2018). Simultaneous social causation and social drift: Longitudinal analysis of depression and poverty in South Africa. *Journal of Affective Disorders*, *229*, 396–402. https://doi.org/10.1016/j.jad.2017.12.050

Lund, C., De Silva, M., Plagerson, S., Cooper, S., Chisholm, D., Das, J., Knapp, M., & Patel, V. (2011). Poverty and mental disorders: Breaking the cycle in low-income and middle-income countries. *Lancet*, *378*(9801), 1502–1514. https://doi.org/10.1016/S0140-6736(11)60754-X

Lund, C., Docrat, S., Abdulmalik, J., Alem, A., Fekadu, A., Gureje, O., Gurung, D., Hailemariam, D., Hailemichael, Y., Hanlon, C., & others. (2019). Household economic costs associated with mental, neurological and substance use disorders: A cross-sectional survey in six low-and middle-income countries. *BJPsych Open*, *5*(3), E34.

Lund, C., Tomlinson, M., De Silva, M., Fekadu, A., Shidhaye, R., Jordans, M., Petersen, I., Bhana, A., Kigozi, F., Prince, M., Thornicroft, G., Hanlon, C., Kakuma, R., McDaid, D., Saxena, S.,

Chisholm, D., Raja, S., Kippen-Wood, S., Honikman, S., … Patel, V. (2012). PRIME: A

programme to reduce the treatment gap for mental disorders in five low- and middle-

income countries. *PLOS Medicine*, *9*(12), e1001359.

MacKerron, G. (2012). Happiness Economics from 35 000 Feet. *Journal of Economic Surveys*, *26*(4),

705–735. https://doi.org/10.1111/j.1467-6419.2010.00672.x

Mahanty, A. K. (1980). *Intermediate Microeconomics with Applications*. Academic Press.

Mann, R., Gilbody, S., & Richards, D. (2009). Putting the 'Q' in depression QALYs: A comparison of

utility measurement using EQ-5D and SF-6D health related quality of life measures. *Social

Psychiatry and Psychiatric Epidemiology*, *44*(7), 569–578. https://doi.org/10.1007/s00127-

008-0463-5

Manor, O., Matthews, S., & Power, C. (2000). Dichotomous or categorical response? Analysing self-

rated health and lifetime social class. *International Journal of Epidemiology*, *29*(1), 149–

157. https://doi.org/10.1093/ije/29.1.149

McDowell, I. (2006). *Measuring Health: A Guide to Rating Scales and Questionnaires* (Third Edition).

Oxford University Press.

McIntyre, R. S., Soczynska, J. Z., Woldeyohannes, H. O., Alsuwaidan, M. T., Cha, D. S., Carvalho, A.

F., Jerrell, J. M., Dale, R. M., Gallaugher, L. A., Muzina, D. J., & Kennedy, S. H. (2015). The

impact of cognitive impairment on perceived workforce performance: Results from the

International Mood Disorders Collaborative Project. *Comprehensive Psychiatry*, *56*, 279–

282.

Miao, F. F., Koo, M., & Oishi, S. (2013). Subjective Well-being. In lona Boniwell, S. A. David, & A. C.

Ayers (Eds.), *Oxford Handbook of Happiness* (pp. 174–184). Oxford University Press.

Mirkena, Y., Reta, M. M., Haile, K., Nassir, Z., & Sisay, M. M. (2018). Prevalence of depression and

associated factors among older adults at ambo town, Oromia region, Ethiopia. *BMC

Psychiatry*, *18*(1), 338. https://doi.org/10.1186/s12888-018-1911-8

Mitchell, P. M., Al-Janabi, H., Byford, S., Kuyken, W., Richardson, J., Iezzi, A., & Coast, J. (2017). Assessing the validity of the ICECAP-A capability measure for adults with depression. *BMC Psychiatry*, *17*(46).

Mitchell, P. M., Al-Janabi, H., Richardson, J., Iezzi, A., & Coast, J. (2015). The Relative Impacts of Disease on Health Status and Capability Wellbeing: A Multi-Country Study. *PLOS ONE*, *10*(12), e0143590. https://doi.org/10.1371/journal.pone.0143590

Mitchell, P. M., Roberts, T. E., Barton, P. M., & Coast, J. (2017). Applications of the capability approach in the health field: A literature review. *Social Indicators Research*, *133*, 345–371.

Mitra, S. (2006). The capability approach and disability. *Journal of Disability Policy Studies*, *16*(4), 236–247.

Moffitt, T. E., Harrington, H., Caspi, A., Kim-Cohen, J., Goldberg, D., Gregory, A. M., & Poulton, R. (2007). Depression and Generalized Anxiety Disorder: Cumulative and Sequential Comorbidity in a Birth Cohort Followed Prospectively to Age 32 Years. *Archives of General Psychiatry*, *64*(6), 651–660. https://doi.org/10.1001/archpsyc.64.6.651

Mogga, S., Prince, M., Alem, A., Kebede, D., Stewart, R., Nickglozier, & Hotopf, M. (2006). Outcome of major depression in Ethiopia: Population-based study. *The British Journal of Psychiatry*, *189*, 241–246.

Mokkink, L. B., Terwee, C. B., Patrick, D. L., Alonso, J., Stratforth, P. W., Knol, D. L., Bouter, L. M., & de Vet, H. C. W. (2010). International consensus on taxonomy, terminology, and definitions of measurement properties for health-related patient-reported outcomes: Results of the COSMIN study. *Journal of Clinical Epidemiology*, *63*, 737–745.

Mommersteeg, P. M., Herr, R., Pouwer, F., Holt, R. I., & Loerbroks, A. (2013). The association between diabetes and an episode of depressive symptoms in the 2002 World Health Survey: An analysis of 231 797 individuals from 47 countries. *Diabetic Medicine*, *30*(6), e208–e214.

Morgan, S. L., & Winship, C. (2015). *Counterfactuals and causal inference: Methods and principles for social research* (2nd ed.). New York, USA: Cambridge University Press.

Moriarty, A. S., Gilbody, S., McMillan, D., & Manea, L. (2015). Screening and case finding for major depressive disorder using the patient health questionnaire (PHQ-9): A meta-analysis. *General Hospital Psychiatry*, *37*, 567–576.

Moscati, I. (2018). *Measuring Utility: From the Marginal Revolution to Behavioral Economics*. Oxford University Press.

Moussavi, S., Chatterji, S., Verdes, E., Tandon, A., Patel, V., & Ustun, B. (2007). Depression, chronic diseases, and decrements in health: Results from the World Health Surveys. *Lancet*, *370*(9590), 851–858. https://doi.org/10.1016/S0140-6736(07)61415-9

Murray, C. J. L., & Evans, D. B. (Eds.). (2003). *Health Systems Performance Assessment: Debates, Methods and Empiricism*. World Health Organization.

Murray, C. J. L., & Lopez, A. D. (1996). *The Global Burden of Disease: A comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020*. Cambridge (Massachusetts): Harvard School of Public Health on behalf of the World Health Organization and the World Bank.

Nannicini, T. (2007). Simulation-based sensitivity analysis for matching estimators. *The Stata Journal*, *7*(3), 334–350.

Nussbaum, M. (2000). *Women and human development: The capabilities approach.* Cambridge, UK: Cambridge University Press.

Nussbaum, M. (2006). Poverty and Human Functioning: Capabilities as Fundamental Entitlements. In D. B. Grusky & S. M. R. Kanbur (Eds.), *Poverty and Inequality* (pp. 47–75). Stanford University Press.

Nussbaum, M. (2011). *Creating capabilities: The human development approach*. Cambridge, MA: Harvard University Press.

OECD. (2011). *How's Life?: Measuring well-being*. OECD Publishing.

http://dx.doi.org/10.1787/9789264121164-en

OECD. (2013). *OECD Guidelines on Measuring Subjective Well-being*. OECD Publishing.

https://doi.org/10.1787/9789264191655-en

Oguz, S., Merad, S., & Snape, D. (2013). *Measuring national well-being—What matters most to personal well-being?* Office for National Statistics, UK.

Patel, V. (2003). Cultural issues in measurement and research. In M. Prince, R. Stewart, T. Ford, & M. Hotopf (Eds.), *Practical psychiatric epidemiology* (pp. 43–64). New York, USA: Oxford University Press Inc.

Patel, V., Belkin, G. S., Chockalingam, A., Cooper, J., Saxena, S., & Unützer, J. (2013). Grand Challenges: Integrating Mental Health Services into Priority Health Care Platforms. *PLOS Medicine*, *10*(5), e1001448. https://doi.org/10.1371/journal.pmed.1001448

Patra, J., Jha, P., Rehm, J., & Suraweera, W. (2014). Tobacco smoking, alcohol drinking, diabetes, low body mass index and the risk of self-reported symptoms of active tuberculosis: Individual participant data (IPD) meta-analyses of 72,684 individuals in 14 high tuberculosis burden countries. *PloS One*, *9*(5).

Patra, J., Maher, Y. I., Mishra, S., Bhatia, M., Alam, D., Malini, D. S., Gupta, P. C., & Jha, P. (2016). Effects of body mass index, tobacco smoking, alcohol drinking and solid fuel use on the risk of asthma: Individual Participant Data (IPD) meta-analysis of 175 000 individuals from 51 nationally representative surveys. *BMJ Open Respiratory Research*, *3*(1), e000121. https://doi.org/10.1136/bmjresp-2015-000121

Patten, S. B., Williams, J. V., & Bulloch, A. G. (2019). Major depressive episodes and mortality in the Canadian household population. *Journal of Affective Disorders*, *242*, 165–171. https://doi.org/10.1016/j.jad.2018.08.030

Prince, M. (2003). Measurement in psychiatry. In M. Prince, R. Stewart, T. Ford, & M. Hotopf (Eds.), *Practical psychiatric epidemiology* (pp. 13–41). New York, USA: Oxford University Press Inc.

Rashid, E., Kebede, D., & Alem, A. (1996). Evaluation of an amharic version of the composite international diagnostic interview (CIDI) in ethiopia. *Ethiopian Journal of Health Development*, *10*, 69–77.

Ratcliffe, M. (2015). *Experiences of Depression: A study in phenomenology*. Oxford University Press.

Ratcliffe, M., & Stephan, A. (2014). *Depression, emotion and the self: Philosophical and interdisciplinary perspectives*. Imprint Academic Ltd.

Reed, C., Hong, J., Novick, D., Lenox-Smith, A., & Happich, M. (2013). Health care costs before and after diagnosis of depression in patients with unexplained pain: A retrospective cohort study using the United Kingdom General Practice Research Database. *ClinicoEconomics and Outcomes Research*, *3*(5), 37–47.

Reta, Y., Getachew, R., Bahiru, M., Kale, B., Workie, K., & Gebreegziabhere, Y. (2020). Depressive symptoms and its associated factors among prisoners in Debre Berhan prison, Ethiopia. *PLOS ONE*, *15*(3), e0220267. https://doi.org/10.1371/journal.pone.0220267

Ritchie, J., & Lewis, J. (2003). *Qualitative research practice: A guide for social science students and researchers.* London: Sage Publications Ltd.

Roberts, J., Lenton, P., Keetharuth, A. D., & Brazier, J. (2014). Quality of life impact of mental health conditions in England: Results from the adult psychiatric morbidity surveys. *Health and Quality of Life Outcomes*, *12*(1), 6. https://doi.org/10.1186/1477-7525-12-6

Robeyns, I. (2016). Conceptualising well-being for autistic persons. *Journal of Medical Ethics*, *42*(6), 383–390. https://doi.org/10.1136/medethics-2016-103508

Robeyns, I. (2017). *Wellbeing, freedom and social justice: The capability approach re-examined*. Cambridge, UK: Open Book Publishers.

Robine, J.-M., Jagger, C., & Group, E.-R. E. V. E. S. (2003). Creating a coherent set of indicators to

monitor health across Europe: The Euro-REVES 2 project. *European Journal of Public*

Health, *13*(3 Suppl), 6–14. https://doi.org/10.1093/eurpub/13.suppl_1.6

Rojas, M. (2019). The Relevance of Richard A. Easterlin's Groundbreaking Work. A Historical

Perspective. In M. Rojas (Ed.), *The Economics of Happiness: How the Easterlin Paradox*

Transformed Our Understanding of Well-Being and Progress (pp. 3–24). Springer Nature

Switzerland.

Rosenbaum, P. R. (2001). Observational studies: Overview. In N. J. Smelser & P. B. Baltes (Eds.),

International encyclopedia of the social and behavioral sciences (1st ed., pp. 10808–10815).

Pergamon.

Rosenbaum, P. R., & Rubin, D. B. (1983). The Central Role of the Propensity Score in Observational

Studies for Causal Effects. *Biometrika*, *70*(1), 41–55. JSTOR.

https://doi.org/10.2307/2335942

Roy, T., & Lloyd, C. E. (2012). Epidemiology of depression and diabetes: A systematic review.

Journal of Affective Disorders, *142S1*, S8–S21.

Ruger, J. P. (2009). *Health and social justice*. New York: Oxford University Press Inc.

Ruger, J. P. (2010). Health capability: Conceptualization and operationalization. *American Journal*

of Public Health, *100*(1), 41–49. https://doi.org/10.2105/AJPH.2008.143651

Ryan, R. M., & Deci, E. L. (2001). On Happiness and Human Potentials: A Review of Research on

Hedonic and Eudaimonic Well-Being. *Annual Review of Psychology*, *52*(1), 141–166.

https://doi.org/10.1146/annurev.psych.52.1.141

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological

well-being. *Journal of Personality and Social Psychology*, *57*(6), 1069–1081.

https://doi.org/10.1037/0022-3514.57.6.1069

Ryff, C. D. (1995). Psychological Well-Being in Adult Life. *Current Directions in Psychological Science*, *4*(4), 99–104. https://doi.org/10.1111/1467-8721.ep10772395

Ryff, C. D. (2014). Psychological Well-Being Revisited: Advances in Science and Practice. *Psychotherapy and Psychosomatics*, *83*(1), 10–28. https://doi.org/10.1159/000353263

Ryff, C. D., & Keyes, C. L. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology*, *69*(4), 719–727. https://doi.org/10.1037//0022-3514.69.4.719

Saarni, S. I., Suvisaari, J., Sintonen, H., Pirkola, S., Koskinen, S., Aromaa, A., & Lönnqvist, J. (2007). Impact of psychiatric disorders on health-related quality of life: General population survey. *The British Journal of Psychiatry*, *190*, 326–332. https://doi.org/10.1192/bjp.bp.106.025106

Saarni, S. I., Viertiö, S., Perälä, J., Koskinen, S., Lönnqvist, J., & Suvisaari, J. (2010). Quality of life of people with schizophrenia, bipolar disorder and other psychotic disorders. *The British Journal of Psychiatry*, *197*(5), 386–394. https://doi.org/10.1192/bjp.bp.109.076489

Salvador-Carulla, L. (1996). Assessment instruments in psychiatry: Description and psychometric properties. In G. Thornicroft & M. Tansella (Eds.), *Mental health outcome measures* (pp. 189–206). Heidelberg, Germany: Springer-Verlag Berlin.

Salvatore, D. (2008). *Microeconomics: Theory and Applications* (5th ed.). Oxford University Press.

Sandelowski, M. (1994). Focus on qualitative methods: The use of quotes in qualitative research. *Research in Nursing & Health*, *17*(6), 479–482.

Sen, A. (1985). Well-Being, Agency and Freedom: The Dewey Lectures 1984. *The Journal of Philosophy*, *82*(4), 169–221. https://doi.org/10.2307/2026184

Sen, A. (1987). *The Standard of Living: The Tanner Lectures on Human Values*. Cambridge University Press.

Sen, A. (1993). Capability and Well-Being. In M. Nussbaum & A. Sen (Eds.), *The Quality of Life*. Oxford University Press.

Sen, A. (1999). *Commodities and capabilities*. New Delhi, India: Oxford University Press.

Sen, A. (2008). The Economics of Happiness and Capability. In L. Bruni, F. Comim, & M. Pugno (Eds.), *Capabilities and Happiness*. Oxford University Press.

Sen, A. (2017). *Collective Choice and Social Welfare: An Expanded Edition*. Harvard University Press.

Shahidi, F. V., Muntaner, C., Shankardass, K., Quiñonez, C., & Siddiqi, A. (2019). The effect of unemployment benefits on health: A propensity score analysis. *Social Science & Medicine*, *226*, 198–206. https://doi.org/10.1016/j.socscimed.2019.02.047

Shumye, S., Belayneh, Z., & Mengistu, N. (2019). Health related quality of life and its correlates among people with depression attending outpatient department in Ethiopia: A cross sectional study. *Health and Quality of Life Outcomes*, *17*(1), 169. https://doi.org/10.1186/s12955-019-1233-7

Simon, J., Anand, P., Gray, A., Rugkåsa, J., Yeeles, K., & Burns, T. (2013). Operationalising the capability approach for outcome measurement in mental health research. *Social Science & Medicine*, *98*, 187–196.

Simon, J. G., Boer, J. B. D., Joung, I. M. A., Bosma, H., & Mackenbach, J. P. (2005). How is your health in general? A qualitative study on self-assessed health. *European Journal of Public Health*, *15*(2), 200–208.

Simon, J., Łaszewska, A., Leutner, E., Spiel, G., Churchman, D., & Mayer, S. (2018). Cultural and linguistic transferability of the multi-dimensional OxCAP-MH capability instrument for outcome measurement in mental health: The German language version. *BMC Psychiatry*, *18*(1), 173. https://doi.org/10.1186/s12888-018-1762-3

Sirgy, M. J., Michalos, A. C., Ferriss, A. L., Easterlin, R. A., Patrick, D., & Pavot, W. (2006). The Qualityity-of-Life (QOL) Research Movement: Past, Present, and Future. *Social Indicators Research*, *76*(3), 343–466. https://doi.org/10.1007/s11205-005-2877-8

Skevington, S. M. (2009). Conceptualising dimensions of quality of life in poverty. *Journal of Community & Applied Social Psychology*, *19*, 33–50.

Skevington, S. M., Lotfy, M., & O'Connell, K. A. (2004). The World Health Organization's WHOQOL-BREF quality of life assessment: Psychometric properties and results of the international field trial. A Report from the WHOQOL Group. *Quality of Life Research*, *13*(2), 299–310. https://doi.org/10.1023/B:QURE.0000018486.91360.00

Smith, J., & Firth, J. (2011). Qualitative data analysis: The framework approach. *Nurse Researcher*, *18*(2), 52–62.

Sobocki, P., Ekman, M., Agren, H., Krakau, I., Runeson, B., Mårtensson, B., & Jönsson, B. (2007). Health-related quality of life measured with EQ-5D in patients treated for depression in primary care. *Value in Health*, *10*(2), 153–160. https://doi.org/10.1111/j.1524-4733.2006.00162.x

Speer, D. C. (1988). *Mental health outcome evaluation*. San Diego, California, USA: Academic Press Ltd.

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7. *Archives of Internal Medicine*, *166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

StataCorp. (2019). *Stata statistical software: Release 16*.

StataCorp. (2019). *Stata treatment-effects reference manual: Potential Outcomes/Counterfactual outcomes* (Release 16). Stata Press.

Stoll, L. (2014). A Short History of Wellbeing Research. In D. McDaid & C. L. Cooper (Eds.), *The Economics of Wellbeing* (Vol. 5). John Wiley & Sons Ltd.

Stone, A. A., & Mackie, C. (Eds.). (2013). *Subjective Well-Being: Measuring Happiness, Suffering, and Other Dimensions of Experience*. National Academies Press.

Streiner, D. L., Norman, G. R., & Cairney, J. (2015). *Health measurement scales: A practical guide to their development and use* (5th ed.). New York, USA: Oxford University Press.

Stubbs, B., Vancampfort, D., Veronese, N., Kahl, K. G., Mitchell, A. J., Lin, P.-Y., Tseng, P.-T., Mugisha, J., Solmi, M., Carvalho, A. F., & Koyanagi, A. (2017). Depression and physical health multimorbidity: Primary data and country-wide meta-analysis of population data from 190 593 people across 43 low- and middle-income countries. *Psychological Medicine*, *47*(12), 2107–2117. https://doi.org/10.1017/S0033291717000551

Stutzer, A., & Frey, B. S. (2010). Recent Advances in the Economics of Individual Subjective Well-Being. *Social Research*, *77*(2), 679–714.

Sutton, E. J., & Coast, J. (2014). Development of a supportive care measure for economic evaluation of end-of-life care using qualitative methods. *Palliative Medicine*, *28*(2), 151–157. https://doi.org/10.1177/0269216313489368

Szende, A., Janssen, B., & Cabases, J. (Eds.). (2014). *Self-reported Population Health: An International Perspective based on EQ-5D*. Springer.

Teerawattananon, Y., Yamabhai, I., & Leelahavarong, P. (2011). *Using capability index to determine a value for money of the AIDS Competence Process in Thailand*. Health Intervention and Technology Assessment Program, Ministry of Public Health.

Tengland, P.-A. (2019). Health and capabilities: A conceptual clarification. *Medicine, Health Care, and Philosophy*. https://doi.org/10.1007/s11019-019-09902-w

Thronicroft, G., & Tansella, M. (1996). Introduction. In G. Thronicroft & M. Tansella (Eds.), *Mental health outcome measures* (pp. 1–2). Heidelberg, Germany: Springer-Verlag Berlin.

Topp, C. W., Østergaard, S. D., Søndergaard, S., & Bech, P. (2015). The WHO-5 well-being index: A systematic review of the literature. *Psychotherapy and Psychosomatics*, *84*, 167–176.

Trauer, T. (2010). A review of instruments in outcome measurement. In T. Trauer (Ed.), *Outcome measurement in mental health: Theory and practice*. Cambridge, UK: Cambridge University Press.

Trauer, T. (2010). Outcome measurement: Application and utility. In T. Trauer (Ed.), *Outcome measurement in mental health: Theory and practice*. Cambridge, UK: Cambridge University Press.

UNDP. (2018). *Technical note: Human development indices and indicators 2018 statistical update*. United Nations Development Programme. http://hdr.undp.org/sites/default/files/hdr2018_technical_notes.pdf

Ustun, T. B., Ayuso-Mateos, J. L., Chatterji, S., C.Mathers, & Murray, C. (2004). Global burden of depressive disorders in the year 2000. *British Journal of Psychiatry*, *184*, 386–392.

Ustun, T. B., Chatterji, S., Mechbal, A., Murray, C. J. L., & WHS Collaborating Groups. (2003). The world health surveys. In C. J. L. Murray & D. B. Evans (Eds.), *Health systems performance assessment: Debates, methods and empiricism* (pp. 797–808). World Health Organisation.

Ustun, T. B., Chatterji, S., Villanueva, M., Bendib, L., Celik, C., Sadana, R., Valentine, N. B., Ortiz, J. P., Tandon, A., Salomon, J. A., Cao, Y., Xie, W. J., Ozaltin, E., Mathers, C. D., & Murray, C. J. L. (2003). WHO multi-country survey study on health and responsiveness 2000-2001. In C. J. L. Murray & D. B. Evans (Eds.), *Health systems performance assessment: Debates, methods and empiricism* (pp. 761–796). World Health Organisation.

Ustun, T. B., Kostanjsek, N., Chatterji, S., & Rehm, J. (2010). *Measuring health and disability: Manual for WHO disability assessment schedule (WHODAS 2.0)*. Geneva: World Health Organization.

van Ginneken, N., Chin, W. Y., Lim, Y. C., Ussif, A., Singh, R., Shahmalak, U., Purgato, M., Rojas-García, A., Uphoff, E., McMullen, S., Foss, H. S., Pachya, A. T., Rashidian, L., Borghesani, A., Henschke, N., Chong, L.-Y., & Lewin, S. (2021). Primary-level worker interventions for the care of people living with mental disorders and distress in low- and middle-income

countries. *Cochrane Database of Systematic Reviews*, *8*.
https://doi.org/10.1002/14651858.CD009149.pub3

Venkatapuram, S. (2014). Mental disability, human rights and the capabilities approach: Searching
for the foundations. *International Review of Psychiatry*, *26*(4), 408–414.
https://doi.org/10.3109/09540261.2014.926867

Vergunst, F., Jenkinson, C., Burns, T., Anand, P., Gray, A., Rugkåsa, J., & Simon, J. (2017).
Psychometric validation of a multi-dimensional capability instrument for outcome
measurement in mental health research (OxCAP-MH). *Health and Quality of Life Outcomes*,
15(1), 250. https://doi.org/10.1186/s12955-017-0825-3

Vijaya, R. M., Lahoti, R., & Swaminathan, H. (2014). Moving from the household to the individual:
Multidimensional poverty analysis. *World Development*, *59*, 70–81.

Walker, E. R., McGee, R. E., & Druss, B. G. (2015). Mortality in Mental Disorders and Global Disease
Burden Implications: A Systematic Review and Meta-analysis. *JAMA Psychiatry*, *72*(4), 334–
341. https://doi.org/10.1001/jamapsychiatry.2014.2502

Wang, P. S., Aguilar-Gaxiola, S., Alonso, J., Angermeyer, M. C., Borges, G., Bromet, E. J., Bruffaerts,
R., de Girlolamo, G., de Graaf, R., Gureje, O., Haro, J. M., Karam, E. G., Kessler, R. C., Kovess,
V., Lane, M. C., Lee, S., Levinson, D., Ono, Y., Petukhova, M., … Wells, J. E. (2007).
Worldwide use of mental health services for anxiety, mood, and substance disorders:
Results from 17 countries in the WHO world mental health (WMH) surveys. *Lancet*,
370(9590), 841–850.

Wang, P. S., Simon, G., & Kessler, R. C. (2003). The economic burden of depression and the cost-
effectiveness of treatment. *International Journal of Methods in Psychiatric Research*, *12*(1),
22–33.

Weatherlya, H., Drummond, M., Claxton, K., Cookson, R., Ferguson, B., Godfrey, C., Rice, N.,

Sculpher, M., & Sowden, A. (2009). Methods for assessing the cost-effectiveness of public

health interventions: Key challenges and recommendations. *Health Policy*, *93*, 85–92.

Welie, A. G., Gebretekle, G. B., Stolk, E., Mukuria, C., Krahn, M. D., Enquoselassie, F., & Fenta, T. G.

(2019). Valuing health state: An EQ-5D-5L value set for ethiopians. *Value in Health Regional

Issues*, *22*, 7–14. https://doi.org/10.1016/j.vhri.2019.08.475

White, R. G., Imperiale, M. G., & Perera, E. (2016). The Capabilities Approach: Fostering contexts for

enhancing mental health and wellbeing across the globe. *Globalization and Health*, *12*(16).

WHO. (1997). *The Composite International Diagnostic Interview, version 2.1 (CIDI 2.1)*. World Health

Organization.

WHO. (2008). *mhGAP: Mental Health Gap Action Programme: Scaling up care for mental,

neurological and substance use disorders*. Geneva: World Health Organization.

WHO. (2012). *Ethiopia—World Health Survey 2003—Sampling*.

https://apps.who.int/healthinfo/systems/surveydata/index.php/catalog/37/sampling

WHO. (2013). *Mental health action plan 2013-2020*. Geneva: World Health Organization.

WHO. (2017). *Depression and other common mental disorders: Global health estimates*. Geneva:

World Health Organization.

WHO. (nd). *World Health Survey Results—Report of Ethiopia*.

https://www.who.int/healthinfo/survey/whseth-ethiopia.pdf

WHO, & Calouste Gulbenkian Foundation. (2014). *Integrating the response to mental disorders and

other chronic diseases in health care systems*. Geneva: World Health Organization.

WHO, & Wonca, W. O. of F. D. (2008). *Integrating mental health into primary care: A global

perspective*. Geneva: World Health Organization.

Wild, D., Grove, A., Martin, M., Eremenco, S., McElroy, S., Verjee-Lorenz, A., & Erikson, P. (2005).

Principles of good practice for the translation and cultural adaptation process for patient-

reported outcomes (PRO) measures: Report of the ISPOR task force for translation and cultural adaptation. *Value in Health*, *8*(2), 94–104.

Wondimagegnehu, A., Abebe, W., Abraha, A., & Teferra, S. (2019). Depression and social support among breast cancer patients in Addis Ababa, Ethiopia. *BMC Cancer*, *19*(1), 836. https://doi.org/10.1186/s12885-019-6007-4

Wu, M., Brazier, J. E., Kearns, B., Relton, C., Smith, C., & Cooper, C. L. (2015). Examining the impact of 11 long-standing health conditions on health-related quality of life using the EQ-5D in a general population sample. *The European Journal of Health Economics*, *16*(2), 141–151. https://doi.org/10.1007/s10198-013-0559-z

Wulsin, L. R., Vaillant, G. E., & Wells, V. E. (1999). A Systematic Review of the Mortality of Depression. *Psychosomatic Medicine*, *61*(1), 6–17.

Zweifel, P., Breyer, F., & Kifmann, M. (2009). *Health economics* (2nd ed.). Berlin, Germany: Springer-Verlag Berlin Heidelberg.