Prevalence of mental disorders in Uganda

Thesis by publication

Masters of Clinical Science

John Nelson Opio

JBI, School of Public Health

Faculty of Health and Medical Sciences

The University of Adelaide

Adelaide, South Australia

Australia

October 2020

List of publications

This thesis includes the following articles about mental disorders in Uganda and appropriate systematic review methodology.

I. Opio JN, Tufanaru C, Aromataris E. Prevalence of mental disorders in Uganda: a systematic review protocol. JBI Database System Rev Implement Rep. 2018;16(8):1613-20.

II. Opio JN, Munn Z, Aromataris E. Prevalence of mental disorders in Uganda: a systematic review and meta-analysis (submitted to Annals of Epidemiology)

Table of contents

List of figures

List of tables

Abstract

Introduction: Mental disorders encompass a wide range of mental and behavioural conditions with a varying degree of symptom severity (mild, moderate and severe), onset, course (episodic, clusters of attack and chronic), and impact on afflicted individuals. Mental disorders affect about one in five people worldwide at any one point in their life. The aim of the research presented in this thesis was to establish estimates of the prevalence of mental disorders in Uganda and differentiate prevalence in both children and adults.

Methods: The methods presented in this thesis adhere to JBI methodology and international standards for the conduct of a systematic review. Chapter 2 presents the *a priori* protocol for the conduct of the systematic review; Chapter 3 presents the final systematic review with meta-analysis of prevalence. A comprehensive search for studies conducted in the last 10 years was performed across five electronic databases and grey literature sources. All eligible studies were critically appraised and relevant data extracted. Prevalence estimates from included studies for the overall population, children and adults were pooled statistically. Certainty of the findings of the review was assessed using the Grading of Recommendation, Assessment, Development and Evaluation approach.

Results: The search returned a total of 632 records, of which 26 articles published from 24 unique studies conducted in Uganda, involving 3,803 child and 14,091 adult participants were included in the review. Most studies assessed mental disorders mapped to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV), using valid instruments. Overall and with moderate level of certainty, the prevalence estimate of any mental disorders in Uganda was 22.9% in children and 24.2% in adults. The most prevalent disorder was depressive disorders, including major depressive disorders (22.2% in children and 21.2% in adults), followed by anxiety disorders (14.4% in children and 20.2% in adults), including predominantly posttraumatic stress disorder and generalised anxiety disorder. Eating disorder and psychotic syndrome disorder were also reported.

Conclusion: Despite expected, significant heterogeneity, the results of this research show that about one in four persons in Uganda experience mental disorders. The findings also reveal the paucity of epidemiological studies investigating range of mental disorders in Uganda. Further countrywide epidemiological studies of mental disorders are required to explore prevalence of other mental disorders and its associated factors not captured by the present research, with increased sample sizes among children. The findings also highlight important health policy and practice applications to address the impact of mental disorders among the Ugandan population.

Thesis declaration

I, John Nelson Opio, certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any University or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any University or other tertiary institution without the prior approval of the University of Adelaide.

I acknowledge that copyright of published works contained within this thesis resides with the copyright holder(s) of those works.

I also give permission for the digital version of my thesis to be made available on the web, via the University's digital research repository, the Library search and also through web search engines, unless permission has been granted by the University to restrict access for a period of time.

I acknowledge the support I have received for my research through the provision of an Australian Government Research Training Program Scholarship

John Nelson Opio

October 2020

The Graduate Centre

The University of Adelaide

Acknowledgements

This thesis reflects the incredible support and encouragement from several individuals and institutions. In particular, I would extend my sincere appreciation to:

Associate Professor Edoardo Aromataris, my principal supervisor, for your long, sincere and enduring support and encouragement from the very beginning to the completion of this thesis. Thank you for your unwavering patience throughout this academic journey.

Associate Professor Mukdarut Bangpan, my co-supervisor, who graciously accepted to join my supervisory panel, your timely feedback and your inspiring support within the short timeframe.

Associate Professor Zachary Munn, for your constructive guidance, capacity building in systematic reviews and assistance with software for meta-analysis and assessing certainty in evidence.

Associate Professor Craig Lockwood, Postgraduate Coordinator, for your support that went beyond the confines of academia.

Dr Catalin Tufanaru, my former co-supervisor, who played an instrumental role in shaping the theoretical framework that unpinned access to research in health services.

Alex Migone, Higher Degree by Research Program Coordinator, for ensuring that all my communication and documentation required by The Graduate Centre were processed in a timely manner. The teams within JBI in ensuring my articles met journal requirements, particularly, Sarah Silver and Effie Minnema, for being there whenever I was stuck in one way or the other.

The Women's and Children's Hospital management and staff working at Michael Rice Ward, for the care and support for my son, in particular, Dr Monika Pal, Dr Sharon, Dr Malaika, Dr Michael and Consultant Nurse Anne Jackson.

The Ugandan Community of South Australia, for giving the mandate and support to exercise my leadership skills; Regency Park Rotary Club, for your gracious support and engagement; Housing Choices for providing me with affordable accommodation; and David King, my neighbour, for your company and for simply being there.

Siew Siang Tay, who undertook professional copyediting of this thesis in accordance with the Australian Standards for Editing Practice (specifically Chapter 1 and Chapter 4) in a timely manner.

Finally, my family for your love, patience and support.

List of abbreviations

ADF	Allied Democratic Front
ADHD	Attention Deficit Hyperactive Disorder
AIDS	Acquired Immune Deficiency Syndrome
ART	Antiretroviral therapy
BDI	Beck Depression Inventory
C$	Canadian Dollar
C.I	Confidence interval
CDDG	ICD-10 Clinical Descriptions and Diagnostic Guidelines
CDI	Children's Depression Inventory
CES-D	Centre for Epidemiologic Studies Depression Scale
CHD	Coronary heart disease
DALYs	Disability- adjusted life years
DHSCL-25	Hopkins Symptom Checklist, depression module (15 items)
DPC	Depression pain comorbidity
DSM	Diagnostic and Statistical Manual of Mental Disorders
DSM-5	Diagnostic and Statistical Manual of Mental Disorders fifth edition
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders fourth edition
EPDS	Edinburgh Postpartum Depression Scale
GAD	Generalised anxiety disorder
GAD-Q-IV	Generalised Anxiety Disorder Questionnaire for DSM IV
GBD	Global Burden of Disease study
HIV	Human Immunodeficiency Virus
HSCL-25	Hopkins Symptom Checklist 25 items for anxiety and depression
HTQ	Harvard Trauma Questionnaire
I^2	Heterogeneity statistic
ICD-10	International Classification of Disease and Related Health Problems 10th revision

ICD-11	International Classification of Diseases 11th revision
ICD-TQ	ICD-11 Trauma Questionnaire
IDP	Internally displaced persons
JBI	The Joanna Briggs Institute
LMIC	Low- and Middle-Income Countries
MDD	Major depressive disorder
MFQ-C	Short Mood and Feelings Questionnaire-Child Self Report
MINI Kid	Mini International Neuropsychiatric Interview for children and adolescents
MINI	Mini International Neuropsychiatric Interview
PDS	Posttraumatic Diagnostic Scale
PHQ	Patient Health Questionnaire
PHQ-9	Patient Health Questionnaire
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PTSD	Post-traumatic stress disorder
SCARED	5-item version of the Screen for Child Anxiety Related Disorders
SCID	Structured Clinical Interview for DSM-IV
TSCC	Trauma Symptoms Checklist for Children
UNICEF	United Nation Children's Fund
UPID	University of California at Los Angeles PTSD Reaction Index for DSM-IV
VSLA	Village Savings and Loan Associations
WHO	The World Health Organization
YLD	Years lived with disability
YLL	Years of life lost

Chapter 1 Introduction and background

1.1 Introduction

Uganda faces dual epidemiological challenges of communicable and non-communicable diseases. Considering the burden of disease, the morbidity due to non-communicable diseases like mental disorders is rapidly overtaking common communicable diseases, such as malaria and human immunodeficiency virus/acquired immunodeficiency disease syndromes (HIV/AIDS) as well as common childhood illnesses such as diarrhoea.[1,2] The burden of mental disorders in Uganda and countries in Sub-Saharan Africa is projected to grow exponentially as a result of demographic changes, economic development, changing natural environments and human displacement, among others.[3] Yet, mental disorders appear to be a neglected public health priority, as evidenced by the scarce and inequitable distribution of resources such as funding and lack of health professional workforce proportionate to its burden.[4] The diverse and evolving nature of this dual disease burden necessitates a shift in current healthcare responses. To address this need, research evidence is required to underpin policy and practice decisions in order to tackle mental disorders as well as physiological ailments. Evidence such as the prevalence of mental disorders and use of mental health services in Uganda is currently lacking or fragmented. The conceptualisation of this thesis was an attempt to address such gaps through a systematic review of research quantifying mental disorders in the Ugandan context.

This chapter provides the context for this thesis on the broad subject of mental disorders. It provides: the definition and classification of mental disorders; specific diagnostic criteria and prevalence of some commonly diagnosed mental disorders; the health, social and economic impact of mental disorders; and the cause, risk factors and research context of mental disorders in Uganda. This chapter concludes with the objectives, research questions and introduction to the research methodology used: the systematic review. To facilitate the reading of this thesis, a glossary of abbreviations or acronym is provided at the beginning.

1.2 Health, mental health and mental disorders

The World Health Organization (WHO) in its 1946 constitution (Amendments adopted in 2006) defined health as a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.[5] 'Mental health' and 'mental disorders' are frequently used terms and often used interchangeably to infer emotional or cognitive problems, however their meaning is far from being universally accepted.[6] Empirical evidence indicates that mental health and mental disorders are not opposite ends of a single continuum, and the absence of mental disorders does not equal the presence of mental health.[7] According to the WHO, mental health is defined as a state of wellbeing in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively

and fruitfully, and is able to make a contribution to his or her community.[8] Mental health is therefore a fundamental aspect of an individual's wellbeing.[5] However, for some individuals, the desired state of mental health can be disrupted at some point in their lives.[9] The remainder of this introductory chapter explores the existing literature on what is known about mental disorders globally, regionally and in Uganda to set the scene for the chapters that follow (see Chapter 2 and Chapter 3).

Traditionally, people with disrupted mental health or behaviours have been labelled using a variety of terms, for example, mad, possessed, insane, lunatic and crazy.[10,11] In Uganda, and perhaps in many other cultures, deviations from a normal state of mental health are described differently, for instance, the Baganda ethnic group use *eddalu* to describe representation of a violent madness or *akazoole* to describe schizophrenia.[12] These labels convey negative connotations that may trigger or increase stigma and social isolation for the individual affected.[11] Similarly, in clinical disciplines and research, a variety of terms are used to broadly describe mental health problems, such as mental illness, mental disorders, psychiatric conditions and psychopathology, which are often used interchangeably to accommodate perspectives of people with different theoretical views about the aetiology of mental health conditions.[13] Differences in terminology highlight current complexities in the diagnosis of mental disorders and the perceived need or preference for some types of management and treatment to improve for mental health. The breadth and depth of lay and professional views, and the bases for labelling of mental health problems are beyond the scope of this thesis. Therefore, throughout this thesis, the term mental disorders will be used in its broadest sense.

The term mental disorders have been used by mental health experts to imply the existence of a syndrome characterised by clinically significant disturbance in an individual's cognition, emotion regulation or behaviour that reflects a dysfunction in the psychological, biological or developmental processes underlying mental functioning.[14,15] Mental disorders are usually associated with significant distress or disability affecting individual, social, occupational or other important activities. The functional impairment or significant distress or disability due to mental disorders refers to the amount of disruptions it causes to individual, social (such as getting along with people, domestic life), occupational (education, employment, community and civic life), or other important activities (including self-care and communication).[16] This definition provides a general framework for the important aspects of diagnosing a mental disorder, namely, the level of disturbance experienced by an individual should be significant enough to disrupt their ability to cope with stressors and, work or to relate effectively with others.[17] It also provides the basis for which distress or behaviours can be excluded from a mental disorder diagnosis. For instance, expected behaviours or culturally appropriate responses to a common stressor such as the death of a loved one, or loss, are not mental disorders.[15] A further exclusion is socially deviant behaviours such as those instigated by political, religious or sexual motives, and conflicts that are primarily between the individual

and society, unless such deviance or conflict occurs due to a dysfunction in an individual.[14,15] However, the lack of precision provided by the definition of mental disorders has fuelled further debate, both for clinical practice and research. For example, the concept of 'dysfunction', though universally used, has been a contested parameter for which to assess mental disorders as 'dysfunction' and needs to be better defined.[18]

1.3 Burden of mental disorders

It is now widely recognised that individuals with mental disorders can experience a high level of disability for prolonged periods and are likely to die prematurely.[9,19] To quantify the burden attributable to a specific disease in a population, disability adjusted life years (DALYs) is a frequently used health metric.[20] The DALYs was first introduced as a summary measure of state of health of a population in the Global Burden of Disease study (GBD).[20] Disability adjusted life years are defined as the sum of years of life lost (YLL) and years lived with disability (YLDs) due to a disease or health condition.[20,21] One DALY represents one lost year of healthy life.[22]

The GBD 2010 was the largest systematic assessment of the descriptive epidemiology of diseases and injuries.[23] Analysis of the GBD 2010 data consistently highlights that mental disorders are a major contributor to DALYs and the leading cause of YLDs globally. According to the GBD 2010, mental, behavioural and substance use disorders contributed 183.9 million (7.4%) of DALYs from all the 291 diseases and injuries evaluated.[24] These DALYs comprise 8.6 million YLLs (about 232 thousand deaths) and were the leading cause of non-fatal burden of disease, accounting for 175.3 million (22.9%) YLDs.[24,25] Of the 20 specific mental disorders that were assessed,[24] depressive disorders were the leading cause of DALYs, accounting for 74.3 million (40.5%) DALYs;[24] this was followed by anxiety disorders (26.8 million: 14.6%), schizophrenia (13 million: 7.4%), bipolar disorder (12.9 million: 7.0%), pervasive developmental disorders (7.7 million: 4.2%), childhood behavioural disorders (6.2 million: 3.4%) and eating disorders (2 million: 1.2%).[24]

However, the burden of mental disorders based on the GBD 2010 has been criticised for its methodological limitations.[26] Critics argue that the arbitrary separation of psychiatric and neurological disorders, the differentiation of suicide and intentional self-harm as a separate category from mental disorders, the exclusion of personality disorders from the analysis, the allocation of somatoform syndromes in total to musculoskeletal disorders, and inadequate consideration of the contribution of severe mental disorders to the other causes of mortality all represent significant constraints on the accuracy of estimation provided by this study.[26] Other authors suggest that the disease burden attributable to mental disorders is much higher than the global burden of mental disorders reported in 2013,[24] suggesting the true burden of mental disorders from the GBD 2010 data was 233.7 million (13.0%) DALYs and 32.4% YLDs.[26]

Evidence suggests that the burden of mental, neurological and substance use disorders also varies by type of disorder, geography, age and gender.[19] It has been reported that mental disorders are the largest contributor to DALYs due to mental, neurological and substance use disorders.[25] Mental disorder's share of DALYs due to combined mental, neurological, and substance use disorders was 56.7%, followed by neurological disorders (28.6%) and substance use disorders (14.7%).[25] The burden of mental disorders also varies by world region, disproportionately affecting people living in low- and middle-income countries (LMICs, as classified by the World Bank[27]).[19,28] According to the WHO global estimates of burden and prevalence of depressive, anxiety and other common mental disorders (2017), an estimated 80% of the burden of mental disorders experienced globally occurs in people living in LMICs.[19] In Sub-Saharan Africa (SSA), the DALYs due to mental and substance use disorders are estimated at 21.5 million and are predicted to grow by 130% to 45 million YLDs between 2010 and 2050, driven by population growth and ageing.[3] The greatest burden of mental disorders is said to occur among young people under 30 years of age [24] and in women.[25]

In Uganda, it was estimated that 10.5% (332,539) of total YLDs were attributable to depressive disorders and another 3.1% (99,558) YLDs were due to anxiety disorders in 2015.[19] This makes Uganda the country most affected by the burden of mental disorders in the WHO African region,[19] although it must be noted that these estimates are based on very limited data from LMICs.[29,30]

Although mental disorders are frequently not considered a direct cause of death, research invariably suggests that they cause a considerable impact to individuals, families and society.[28] These impacts may vary for individuals but in general they are related to individual health, and social and economic status which are not included in DALYs that focus on loss of health.[23] Therefore, the implications of GBD findings by policy makers in mental health can be enhanced by understanding the impact of mental disorders on the family, society, economy and social services.

1.4 Impact of mental disorders

The distress, dysfunction and disability engendered by mental disorders do not only affect the individual with the affliction, but also their family, the society in which they live, and economic productivity in general.[28]

1.4.1 Health impact of mental disorders

Researchers have invariably reported that people with mental disorders have poorer health outcomes than the general population, attributable to shorter life expectancy due to unnatural causes, suicides and disability that lead to poor quality of life.[31-33] Research from high income countries shows that people with mental disorders are likely to die 10 to 20 years earlier than the general population [31] and higher rate have been reported in countries in SSA.[33] The most common causes of these deaths are attributable to

untreated or under treatment of physical ailments such as HIV, coronary heart disease (CHD), cancer and diabetes.[31-33] Mental disorders have also been reported to lead to suicide.[28] Mental disorders such as anxiety and depressive disorders also affect the incidence of other chronic conditions as they increase risky behaviours such as smoking and addictive substance use.[28,34]

1.4.2 Social impact of mental disorders

The early age of the onset of mental disorders has the potential to affect an individual's education and future career. Research shows that young adulthood is a particularly important period as it is a period when an individual's discovery of identity and self occurs.[35] It is also a period during which they are undergoing an education, starting a family (marriages), or commencing employment.[36] Individual aspirations and developmental changes during adolescence can be adversely affected by mental disorders.

A systematic review of social impact of severe mental illness from LMICs (including Uganda, Nigeria and Thailand) identified poor physical health and increased psychological problem among family members, that affected their quality of life.[37] The same review also reported higher divorce rates, fewer marriages, poor family cohesion and strained family environment as direct impact of a mental disorder.[37] In addition, the review also shows that children of parents affected by mental disorders are more likely to develop psychiatric problems, poorer school performance and level of functioning.[37]

Poor school performance and failure to complete high school education by young people has also been reported by a national comorbidity survey in the United States.[38],The authors specifically reported that anxiety disorders, depressive disorders and bipolar disorders are the common disorders associated with the reasons young people fail to complete high school education.[38] These findings suggest a considerable contribution of mental disorders to diminished educational attainment occurring at a young age.

Mental disorders have also been shown to reduce the individual's self-esteem, their capacity to communicate effectively and their ability to maintain social relationships.[28,39] Research shows that major depressive, bipolar, anxiety and substance use disorders have been associated with relationship instability and is a major cause of divorce and separation.[40] Moreover, mental disorders manifesting as lack of affection, inconsistent enforcement of rules and also bad parenting have been shown to negatively impact on a child's cognitive and emotional development.[41]

1.4.3 Economic impact of mental disorders

A considerable body of literature assessing the economic burden of mental disorders exists. Economic impacts range from loss of productivity at an individual level due to impaired functioning to healthcare costs which transfer cumulatively to a societal level.[42,43] For example, a survey of adolescents concluded that young adults who had high-stable trajectories of mental disorders from the age of 11 to 19 were at

risk of poor employment outcomes.[44] The study showed that people who had mental disorders during that age period (11-19) were likely to work without basic education, have left school, not be employed or not undertaking training by the age of 19 years.[44] Furthermore, findings from the National Comorbidity Survey (NCS) in the United States indicated that people who had mental disorders such as major depressive, bipolar or anxiety disorders were more likely to be laid off from employment or remain unemployed.[45]

A study conducted in Europe estimated the cost of depression at 118 billion Euro, or 253 Euro per person in 2004.[46] Of these, direct costs for drugs and hospitalisation accounted for 42 billion Euro and indirect costs 76 billion Euro.[46] Another study conducted in Canada found that the healthcare cost for a person with mental disorders was C$31,611, compared to C$23,681 for those without mental disorders.[47] Research also shows that people most affected with economic burden, skewed toward those who are younger, live in poorer neighbourhoods and have different patterns of health care utilisation.[47]

In LMICs, a systematic review identified economic consequence of mental disorders including financial strain, increase costs related to care, loss of productivity, cost of treatment of side effects and reduced ability of family members to perform regular activities (time to give care to the patient).[37] The same review also documented the long-term economic drift and food insecurity as an effect of mental disorders.[37] Another review revealed that mental disorders such as anxiety and depression impact on decision making and risk taking that indirectly affect individual economic changes.[48]

1.5 Classification of mental disorders

Research suggests that mental disorders and the clinical features that a clinician could reasonably expect to encounter in all cases are included in two major classification systems of mental disorders.[49] Understanding the case definition of a specific mental disorder is important for its diagnosis and measurement of prevalence. A brief description of the two-classification framework of mental disorders is included in this section.

The current major classification systems of mental disorders, the International Classification of Diseases and Related Health Problems (ICD) published by the WHO,[14] and the Diagnostic and Statistical Manual of Mental Disorders (DSM) published by the American Psychiatric Association (APA),[15] have evolved from years of expert opinion and research.[50] The purpose of the standardised classification of mental disorders is to enable clinicians to achieve better diagnostic agreement and improve communication, including statistical reporting and decisions to provide treatment and assessment of outcomes.[14,15]

1.5.1 ICD-10 classification of mental and behavioural disorders: clinical descriptions and diagnostic guidelines

Chapter V(F) of ICD-10, Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines (CDDG), contains codes of up to six characters long to classify a wide variety of signs, symptoms and abnormal feelings of social circumstances.[14] According to this classification system, mental disorders are clustered into ten blocks (F00-F99) on the basis of their common features.[14] The blocks F00 to F99 and list of mental disorders are presented in Table 1.1 below. It is worth noting here that the number of specific disorders within each block in ICD-10 are numerous; only a few of the most commonly diagnosed disorders are examined further in the thesis and therefore have been included in Table 1.1 as examples.

Table 1.1: List of mental disorders according to ICD-10 classification

F00-F09 Organic mental disorders: dementia in Alzheimer's disease, delirium not induced by alcohol, and personality disorders due to brain damage, and others
F10-F19 Mental and behavioural disorders due to psychoactive substance use: disorders from use of alcohol, opioids, cannabinoids, sedatives, multi-drugs, volatile substances and others
F20-F29 Schizophrenia, schizotypal and delusion disorders: psychotic disorders, whether acute or transient, schizophrenia and others
F30-F39 Mood or affective disorders: manic episodes, bipolar affective disorder, depressive episodes, dysthymia, recurrent depressive disorders and others
F40-F48 Neurotic, stress and somatoform disorders: phobic anxiety disorder, other anxiety disorders, obsessive compulsive disorder, post-traumatic stress disorder (PTSD), adjustment disorder, somatoform and others
F50-F59 Behavioural syndrome associated with physiological disturbance and physical factors: eating disorders, non-organic sleep disorders, sexual dysfunction not caused by organic disorders and others
F60-F69 Disorders of adult personality and behaviours: specific personality disorders (paranoid personality disorder, emotionally unstable personality disorder), mixed personality disorder and others
F70-F79 Mental retardation and others: mild, moderate, severe, profound and other unspecified mental retardation
F80-F89 Disorders of psychological development: developmental disorders of speech and language, disorders of scholastic skills, motor function disorder, pervasive developmental disorder and others
F90-F98 Behavioural and emotional disorders with onsets usually occurring in childhood and adolescence: conduct disorder, separation anxiety disorder, social anxiety disorder, disturbance of activity and attention, tic disorder and others.
F99 Unspecified mental disorders: This is a reserved for mental disorders not otherwise specified and cannot be coded to category F00-F98.

Source: Adapted from Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines , the World Health Organization 1992[14]

1.5.2 Diagnostic and Statistical Manual of Mental Disorders

The Diagnostic and Statistical Manual of Mental Disorders (DSM), first published in 1952 (DSM-I), is another classification framework for mental disorders used in the United States and many countries around the world by psychiatrists and other clinicians, health insurance companies, psychiatric drug regulatory agencies, policy makers and researchers for mental health services and academic researchers.[51] Authors of DSM-5 argue that any diagnosis of mental disorders should help clinicians to determine the prognosis, treatment plan and potential treatment outcome.[15] A list of categories of mental disorders in DSM-5 [15] are presented in Table 1.2

Table 1.2: List of mental disorders categories according to DSM-5 classifications

Neurodevelopmental disorders: intellectual disabilities, communication disorders (language disorders, speech disorders, childhood onset fluency disorder), attention deficit hyperactive disorder, motor disorders and others
Schizophrenia spectrum and other psychotic disorders: schizotypal disorder, brief psychotic disorder, schizophreniform disorder, delusional disorder and others
Catatonia: Catatonia associated with another mental disorder and others
Bipolar and related disorders: bipolar I disorder, bipolar II disorder and others
Depressive disorders: major depressive disorder, persistent depressive disorder (dysthymia) and premenstrual dysphoric disorder, disruptive mood dysregulation disorder and others
Anxiety disorders: separation disorder, selective mutism, specific phobia, social anxiety disorder, panic disorder, agoraphobia, generalised anxiety disorder and adjustment disorder and others
Obsessive-compulsive and related disorders: obsessive-compulsive disorder, body dysmorphic disorder, hoarding disorder and others
Trauma and stressor related disorders: reactive attachment disorder, post-traumatic stress disorder, adjustment disorder and others
Dissociative disorders: dissociative identity disorder, dissociative amnesia, depersonalisation /derealisation disorder and others
Somatic symptom and related disorders: somatic symptom disorder, illness anxiety disorder, factitious disorder and conversion disorder and others
Feeding and eating disorders: pica, anorexia nervosa, bulimia nervosa, binge eating and others.
Elimination disorders: enuresis, encopresis and others
Sleep-wake disorders: insomnia disorder, breathing related sleep disorder and parasomnia and others.
Sexual dysfunctions: delay in ejaculation, erectile disorder, female orgasmic disorder and others
Gender dysphoria: gender dysphoria and other specified or unspecified gender dysphoria
Disruptive, impulse-control and conduct disorders: oppositional defiant disorder, intermittent explosive disorder, pyromania, kleptomania, antisocial personality disorder and conduct disorder with onsets in childhood and adolescence and others

Substance related and addictive disorders: alcohol related disorders, cannabis related disorders, inhalant related disorders, opioids related disorders, stimulant related disorders and non-substance related disorders (gambling) and others
Neurocognitive disorders: delirium, major and mild neurocognitive disorders and others
Personality disorders: Cluster A personality disorders (paranoid personality disorder, schizoid personality disorder, schizotypal personality disorder) cluster B personality disorders (borderline personality disorder antisocial personality disorder), Cluster C personality disorders (avoidant personality disorder and dependent personality disorder) and others
Paraphilic disorders: exhibitionistic disorder, voyeuristic disorder, paedophilic disorder, frotteuristic disorder and others
Other mental disorders: unspecified mental disorders due to other medical conditions and others

Source: Adapted from the Diagnostic and Statistical Manual of Mental Disorders DSM-5, American Psychiatric Association 2013[15]

1.5.3 Critique of the classification systems of mental disorders

Although the operationalised diagnostic criteria in ICD and DSM reflect agreement in case definition, the lists of disorders in Table 1.1 and Table 1.2 reveal distinctive structural differences in the classification of mental disorders. One classic example is post-traumatic stress disorder (PTSD) which is grouped in F40-F49 in ICD-10, along with anxiety disorders,[52] whereas PTSD is in a separate block related to trauma in the DSM-5.[15] Research has also identified differences in the formulation of disability in ICD and DSM; particularly notable is clinical significance not being a major requirement in ICD as it is in DSM.[16] Therefore it has been suggested that the DSM has a strong influence in both research and clinical practice because of its stricter symptom criteria than ICD-10.[16]

Although the ICD and DSM have provided a necessary shared language for health professionals and research, they are not without limitations. Four main areas of criticism have been documented.[53] These include the construct of categories and dimensions of disorders, symptom thresholds, and the aetiology (cause) and comorbidity of mental disorders as a complex concept in the understanding of diagnostic criteria or guidelines.[53] The construct of categories and thresholds is briefly presented below. Comorbidity and cause will be addressed in Sections 1.8 and 1.9, respectively.

1.5.4 Categories and dimensions

Critics of DSM-5 note that the number of diagnosable mental disorders has increased substantially from 128 when DSM was first created in 1952 to 541 in 2013 (DSM-5),[51] hence posing difficulties for health providers to remember the diagnostic criteria for each disorder.[51,54] It also highlights the lack of consistency in diagnostic criteria for mental disorders.[53] Likewise, disorders are divided into a continuum of arbitrary categories, not singular distinct entities.[55] However, the dimensionality of mental disorders presents problems in another respect, both conceptually and in practice. Critics argue that mental disorders are not distinct disorders but complex combinations of psychological problems, which themselves are dimensional. Clearly, reconciling the complex multidimensional nature of mental disorders

with the structure of these classification systems is a major challenge.[53] Notwithstanding the questionable conceptual validity of current diagnostic categorisation, it has been shown to have high utility by virtue of their guidance on outcomes, treatment response and aetiology.[55]

1.5.5 Thresholds

Research suggests that the diagnosis of mental disorders can be a complex process of understanding symptoms, duration, exclusion criteria and clinical significance.[56] However, it has been argued that clinical significance is key to assisting in the diagnosis of disorders as being "non-existent", "mild", "moderate" or "severe", and in predicting the course of the disorders.[56] A retrospective study that reviewed records of patients admitted due to episodes of depression in Denmark over a six-year period concluded that ICD-10 grading of severity and use of symptom thresholds are clinically useful.[57] The same study found that classifying the severity of depressive disorders as "mild" or "moderate" does not imply a diagnosis is not a serious condition.[57]

Despite the lack of a clear distinction between specific mental disorders within a category and the emphasis on thresholds of clinical significance for symptoms in the ICD and DSM mentioned above, these manuals are widely accepted internationally by researchers and health professionals. They are known to provide a standard nomenclature for specific mental disorders and symptom clusters that are vital for clinical diagnosis, service provision and research application. For example, a survey of diagnostic criteria used to assess mental disorders by mental health professionals from 44 countries reported that 70% of respondents used ICD-10 and 23% solely used DSM-IV.[58] However, evidence from a systematic review showed that most English-speaking countries tend to use DSM criteria for research.[59]

1.6 Diagnosing mental disorders

Assessment of mental disorders is based on recording accurate descriptions of an individual presentation of symptoms that have been experienced or are being experienced at the time of assessment, and observable behaviours. The operationalisation of diagnostic criteria has led to the development of assessment instruments with an improved reliability and validity to assess for specific mental disorders.[17,60] Instruments to assess mental disorders fall under two main categories: diagnostic instruments and screening instruments.[61] They can be administered by clinicians and, lay interviewers, or be self-administered by the individuals being assessed.[61]

Diagnostic instruments, the use of which is also known as a schedule or examination, are designed to provide precise diagnosis of mental disorders based on specific symptoms described by diagnostic criteria (DSM or ICD) and are useful for clinical decision making.[61] Diagnostic instruments can be fully structured, demanding the investigator or clinician to adhere to the specificity of the questions, or semi-structured, allowing the investigator to probe for additional information.[61] Diagnostic instruments are

designed to allow non-clinicians to conduct a fully- or semi-structured interview that is equivalent to psychiatric diagnoses.[61] There are a number of diagnostic instruments validated for use in different settings. The Mini-International Neuropsychiatric Interview (MINI), a brief structured modular diagnostic interview used for the assessment of mental disorders, based on ICD-10, DSM-IV and DSM-5 criteria, is one example of a diagnostic instrument.[62] MINI was developed by psychiatrists for the assessment of multiple mental disorders and has three different versions: MINI plus, MINI Screen and MINI for children and adolescents (MINI Kid).[62] Other diagnostic instruments include the Structured Clinical Interview for DSM-IV (SCID), [63] and the WHO Composite International Diagnostic Interview (WHO-CIDI).[61]

Screening instruments or symptom inventories (also known as dimensional instruments) are used to assess a wide range of specific mental disorders, usually by eliciting information about the presence or absence of symptoms, and the frequency and severity of symptoms during a specified timeframe.[61] Evidence indicates that most screening instruments are designed to measure only one or two specific disorders.[61] Unlike diagnostic instruments, where diagnosis is discrete as 'case' or 'no case', screening instruments score symptoms on a continuum with a cut-off point to define cases or no cases.[61] A further distinction is that screening instruments are only used to assess for current mental disorders.[61] To maximise the applicability of screening instruments across cultures, validity needs to be assessed against a gold standard diagnostic interview conducted by a qualified mental health professional, preferably in a setting in which it is used.[64]

As with diagnostic instruments, there are several instruments in this category. The nine-item Patient Health Questionnaire (PHQ-9),[65] 25-item Hopkins Symptom Checklist (HSCL-25),[66] Centre for Epidemiologic Studies Depression Scale (CES-D)[67] and Beck Depression Inventory (BDI)[68] are some examples of screening instruments. A number of them have been assessed for appropriateness screening mental disorders, like depression and anxiety disorders, in low resource settings.[69] These include the PHQ-9,[65] with a cut-off score of 10 and above, which has been reported to provide acceptable discriminatory power to diagnose depression in adults.[70,71] Another instrument used to assess both anxiety and depression disorders is the HSCL-25 Part I, which consists of 10 items to assess for anxiety disorders and Part II, a depression module consisting of 15 items (a cut-off score ≥1.75 is deemed to detect current major depressive disorders).[66] A systematic review reported that there are several free, easily accessible, brief and validated instruments to assess a range of mental disorders in low-resource settings.[78] These include multiple instruments to assess anxiety disorders, depression, disruptive behaviour disorders, eating disorders, mania, overall mental health, personality disorders, suicidality, and trauma in both adults and young people.[69]

Research conducted in non-western cultures indicated that the diagnostic system[72] and survey instruments[73] can influence the estimation of prevalence across cultures.[74] Literature indicates that most

of the instruments developed to assess mental disorders are based on a western-psychiatric context and suffer from different interpretations in different cultures.[75] Research shows that a person's response to a particular item in the assessment instrument is a direct reflection of their beliefs about mental disorders, their knowledge and social factors.[61] For example, a systematic review that assessed cross-cultural validity of screening instruments in SSA reported that the manifestation and expression of symptoms of depression and anxiety disorders in African culture were inconsistent with the questions in the instrument developed in western cultures.[76] The author concluded that any assessment of mental disorders should ensure the respondent understands the questions in the instrument in the intended way.[76] It has been argued that the reliability of the assessment technique should take into consideration the study context, in addition to the diagnostic criteria, symptom thresholds, functioning and duration.[77]

Previous research suggests that for a psychometric scale to be reliable and valid, it has to fulfil linguistic, content, conceptual, technical and criteria equivalence.[78] Linguistic equivalence means that there is confidence in the translation of an instrument and that it retains meaning across multiple cultures, using back translation techniques.[78] Content equivalence proposes that the items in a psychometric scale correspond to phenomena present across cultures. The conceptual equivalence means that the same underlying construct is being measured across cultures.[78] Technical equivalence aims to ensure that the method of administration of the instrument is the same across cultures to eliminate instrument bias.[78] Criterion equivalence refers to a similar interpretation of the results across cultures in relation to the norm of each culture.[78] This suggests the need for adapting instruments to the context of the research to ensure it is reliable and the results are valid.[75] Nevertheless, it has been suggested that assessment of mental disorders, whether they take the form of interviews or symptom checklist questionnaires, can generate reliable prevalence estimates in a general population.[15,61,79]

1.7 Diagnosis and prevalence of mental disorders

As previously mentioned in Section 1.3, accurate prevalence data is needed to calculate the burden of disease and determine the needs of health services.[80] Prevalence of mental disorders measures the proportion of individuals who manifest a specific mental disorder at a specified time or period.[80] It is usually calculated by dividing the number of individuals who manifest a disorder as a numerator by the total population assessed, including those who manifest a disorder as a denominator, and is expressed as a percentage or number of people per 1,000 population.[80] Typically, mental disorders are estimated through surveys using self-reported symptoms up to the time of assessment; this can be in the past weeks, the past three months (point or current prevalence) or six months or 12 months preceding assessment (period prevalence). Sometimes the estimate is for the individual lifetime prior to assessment time.[81] Point prevalence is defined as the proportion of individuals who manifest a disorder at a given point in time. Period prevalence is defined as the proportion of individuals who manifest a disorder over

a specific period, while lifetime prevalence is the proportion of individuals in the population who have ever manifested a disorder and who are alive on a given day of the survey. Empirical evidence suggests that prevalence varies depending on the timeframe for which the prevalence is measured (point, period or lifetime), year of study, age, gender, location and the specific disorder.[72,82] However, for lifetime prevalence of mental disorders, research has shown that estimates in a retrospective survey may be subject to recall bias in the measurement.[83]

1.7.1 Prevalence of any mental disorders

In 2001, the WHO published a seminal report entitled 'Mental health: new understanding, new hope' that revealed a shocking number of about 450 million people who have experienced a mental disorder worldwide.[9] More recently, the GBD 2017 estimated that about 970.8 million people worldwide have experienced a mental and substance use disorder.[84] Other neurological disorders including Alzheimer's disease in dementia (about 45 million people) and epilepsy (27.2 million people) were also reported worldwide.[84]

Among hundreds of mental disorders listed in ICD or DSM, anxiety disorders, attention deficit hyperactive disorder (ADHD), autism spectrum disorder, bipolar disorder, conduct disorder, depressive disorders, eating disorders, idiopathic developmental (intellectual disability), schizophrenia and substance use disorder have been extensively studied or reported.[9,84,85]

In children, the prevalence of mental disorders has been estimated to range between 10% and 20% worldwide.[86] For example, a systematic review of global prevalence of mental disorders in children and adolescents reported a prevalence of 12% in 2005.[79] A recent systematic review reported that the prevalence of any mental disorders in children was 13.4%.[87] The most common mental disorders among children include anxiety disorders, depressive disorder, ADHD and disruptive disorders.[86,87] Other disorders such as eating disorders and psychosis have also been documented.[86]

Mental disorders with a high prevalence, other than neurological and substance use disorders, are assumed to be relevant to the Uganda population profile (as will be described in Section 1.10 below) [88] and are the central focus of this thesis. Case definition or diagnostic criteria, preferably based on ICD-10 or DSM-IV and the existing prevalence of the most common mental disorders, are described below.

1.7.2 Anxiety disorders

Anxiety disorders including PTSD are categorised in ICD-10 under F40-F48 (see Table 1.1).[14] Research shows that the age-of-onset of anxiety disorders is usually early in life, with a median age of 11 years,[89] but may begin to occur at any age up to 75 years.[90] Anxiety disorders are characterised by excessive fear that originates from psychological or autonomic causes/threats that causes distress, and impairment in social and other areas of functioning. Recurrent excessive distress, persistent worries about losing

major attachments, difficulties in concentrating, refusal to go out, reluctance to be alone, repeated nightmares, and repeated complaints of physical symptoms (headache, stomachache) are also common.[14] According to ICD-10, these symptoms and diagnostic criteria vary by anxiety disorder subtype. For example, in separation anxiety disorder, fear, anxiety and avoidance need to be persistent for at least four weeks in children and six months or more in adults for diagnosis to be made. Anxiety disorders related place of occurrence (for example, crowds, public places, away from home) manifest as avoidance, apprehension, restlessness, fidgeting, tension headache, trembling, dry mouth and epigastric discomfort.

Posttraumatic stress disorders (F43.1) usually arise from threat of injury or death from natural or man-made causes,[14] for example, exposure to war, serious accident, torture, witnessing death and rape. According to ICD-10, PTSD is characterised by the presence of three distinct but co-occurring clusters of symptoms: i) re-experiencing spontaneous often uncontrollable intrusions of the traumatic memory in the form of images or nightmares that are accompanied by intense physiological distress; ii) avoidance symptoms that involve restricting thoughts and distancing oneself from reminders of the event, as well as more generalised emotional and social withdrawal; iii) physiological manifestations, such as insomnia, irritability, impaired concentration, hypervigilance and increased startle responses. These symptoms must be severe enough to impair social, occupational or interpersonal function and co-occur for at least one month.

1.7.2.1 Prevalence of anxiety disorders

Research suggests that anxiety disorders are the most prevalent type of mental disorders in the population.[59] Worldwide, the GBD 2017 estimated the prevalence of anxiety disorders at 3.8%, putting in perspective an absolute number of about 284 million people.[84] A systematic review reported a pooled global current prevalence of anxiety disorders from 87 studies (published from 1980 to 2009) from 44 countries of 7.3%.[59] Among children, the prevalence of anxiety disorders is equally high. A systematic review reported a current global prevalence of anxiety disorders of 7.2% in children aged three to 17 years.[59] Another systematic review also reported a prevalence of 6.5% among children and adolescents globally.[87]

It seems clear from previous studies that the prevalence of anxiety disorders is also influenced by the assessment period (current, period or lifetime). A systematic review of global lifetime prevalence of common mental disorders found that the lifetime prevalence of anxiety disorders (12.9%) was more than double the pooled 12-month prevalence estimate (6.7%).[72] However it is worth noting that in this review, more studies (122 from 56 countries) investigated the period prevalence compared with the lifetime prevalence (70 studies from 39 countries).[72]

The GBD 2017 findings revealed a marked variation across countries, ranging from 2.07% in Vietnam and 8.54% in New Zealand.[84] In addition, the finding of the GBD 2017 suggested that populations living in high-income countries, according to the World Bank income classification of countries,[27] experienced higher rates of anxiety disorders compared with LMICs.[84] Similarly, previous systematic reviews found that low-income countries had the lowest rate (5.4%), followed by developed countries (7.6%), and that the highest rate was found in upper middle-income countries (emerging economy), at 8.6%.[59] Further to economic status of a country, culture was found to play a role in the pattern of prevalence of anxiety disorders.[59] A systematic review found that the global prevalence of anxiety disorders was higher (10.4%) in European and Anglo cultures (Western Europe, North America, Australasia) and lower (5.3%) among African cultures.[59] In Africa, the lowest rate of anxiety disorders was recorded in West Africa with the highest prevalence in North Africa, led by Algeria, which had a prevalence of 5.07%,[84] while the prevalence of anxiety disorders in Uganda was closer (3.53%) to the global average.[84]

Evidence from existing literature revealed a variation in prevalence of anxiety disorders between women and men. The GBD 2017 report showed that anxiety disorders were more prevalent among women (4.7%) than men (2.8%).[84] Another review reported that the pooled current prevalence of anxiety disorders was 9.9% among women and 4.7% among men.[59] A similar pattern was found in another systematic review, reporting a pooled period prevalence of anxiety of 8.7% among women and 4.3% among men.[72] The lifetime prevalence of anxiety disorders follows a similar pattern, with women presenting with higher rates (18.2%) than men (10.1%).[72] However, a study conducted after two decades of armed conflict in northern Uganda revealed a lower prevalence of anxiety disorders (26.6%), with rates higher in women (29.7%) than in men (23.1%).[91] Regardless of geographical region, place of residence or time frame of anxiety disorders affect more women than men.

Another factor observed in variations in the geographical distribution of the prevalence of anxiety disorders was place of residence. Research has found that within countries, the prevalence of anxiety disorders was much higher among people living in rural (16.9%) than urban (8.4%) settings.[59] Similarly, the prevalence of anxiety disorders was found to be high among political conflict affected populations (9.0%) than non-conflict affected population (5.6%).[59] The figures reported above are based on pooled prevalence of anxiety disorders across many countries.

The findings of surveys conducted in Uganda, many of which have not been included in the systematic reviews discussed above, are fragmented, and varied between 18% and 67.4% by year of study, settings, and gender of included participants.[92,93] For example, a survey conducted in political conflict affected districts of Northern Uganda using the Harvard Trauma Questionnaire reported the PTSD prevalence estimate at 54.3%, with higher rates in women (60.1%) than in men (45.6%).[92] Another survey that examined PTSD amongst refugees and host communities in West Nile demonstrated that Sudanese

refugeed who experienced the highest number of traumatic events had the highest rates of PTSD (48%) than the host communities (18%).[93] Another study conducted in 2005 among people formerly abducted by the Lord Resistance Army (LRA) reported 49% had PTSD and 59% had anxiety disorders.[94]

1.7.3 Depressive disorders

According to ICD-10, depressive disorders, consisting of major depressive disorders or episodic, are categorised among mood or affective disorders (Table 1.1; F30-F39).[14] Depressive disorders occur in many forms (episodic [F32], recurrent [F33], or persistent [F34.1]) with varying degrees of symptom severity (mild, moderate or severe).[14] Empirical evidence suggests that the median age-of-onset for disorders in this category is 30 years, although it varies, usually occurring up to 65 years, with a later age of onset associated with comorbidity.[89,90]

Diagnostic criteria are based on an individual manifesting the primary symptom that includes changes in mood (e.g. feeling sad, empty, hopeless and irritable in children and adolescents or appearing tearful in adults), decrease in energy levels, decreased activity, and loss of interest and pleasure that cannot be explained by any other medical condition.[14] Impaired thinking ability, reduced concentration and marked tiredness after activities that use minimal effort are common, including also disturbed sleep, waking several hours early and lack of or reduced appetite. Other symptoms are changes in weight (significant weight loss of more than 5% in a month), loss of self-esteem and self-confidence, feelings of guilt or unworthiness, and suicidal ideation. These symptoms may be accompanied by somatic pain or symptoms.[14] It is suggested that having five or more of the nine groups of symptoms in ICD-10 or DSM-IV or DSM-5 consistently, for at least two weeks, causing distress and impairment in social and daily activities or important areas of functioning, are often regarded as severe depression.[14,15] Although the above signs and symptoms are common, particularly in negative life events, it has been suggested that diagnosis should consider symptom duration and severity thresholds.[14,15]

According to ICD-10, bipolar disorder is characterised by repeated episodes in which mood and activity levels are significantly disturbed. The disturbance consists of elevation of mood, increased energy and activity (mania or hypomania), or lowering of mood, energy and activities (depression). Recovery between episodes is often complete. Family history, premorbid personality, age of onset and long-term prognosis should be considered while making a diagnosis of this disorder.[14]

1.7.3.1 Prevalence of depressive disorders

Depressive disorders are common and associated with considerable impairment of functioning.[95] It has been documented that some people may have only a single episode of depressive disorder but in others, it will be recurrent.[14,15] According to the findings of GBD 2017, an estimated 3.4% (264 million) people in the world have experienced depressive disorders.[84] The most common types of depression were: major

depressive disorder (MDD) accountings for 223.4 million people, bipolar disorder, 46 million people, and dysthymia, 33.3 million people.[84] A previous systematic review found that the global point prevalence of MDD from 116 studies estimated current prevalence at 4.7%.[82] Similarly, the review found higher rates of MDD in women (5.9%) than in men (3.8%). Similar patterns were observed in a 12-month prevalence of 3.7% with a nearly double prevalence rate 7.2% in women compared with 3.9% in men.[82]

According to GBD 2017 findings, the prevalence of depression varies between countries, ranging from 2% in Colombia to over 6% in Iceland.[84] Of the 264 million people affected, about 19.2 million were from SSA, that includes Uganda.[84] The findings showed that the prevalence of depression in Uganda (4.96%) is comparable with that seen in high-income countries (Australia, Finland, Sweden and the United States) and ranks amongst the top five countries in the world with the highest prevalence, after Iran, Algeria and Iceland.[84] The point prevalence of depressive disorders also varies between world regions and countries, ranging from 6.6% combined prevalence for Africa and Middle East region,[82] with prevalence varying between 0.05% in Japan and 73% in Afghanistan.[82] The prevalence of bipolar disorders worldwide however is comparatively low, ranging from 0.35 to 1.2%, by country.

The prevalence of depression in Uganda follows a consistent pattern reported globally and in other countries, with variations across settings and genders, although the results are largely inconsistent with higher prevalence rates of depressive disorders, compared to the combined global prevalence. A survey using BDI in two districts that differed in culture and social setting estimated that 17.4% of respondents had probable depression.[96] This survey revealed a significant variation across the two districts: 26.3% in Northern Uganda which had experienced armed conflict and 6% in South-Eastern Uganda, a relatively peaceful district.[96] Consistent with the international prevalence pattern reported by systematic reviews, depression was more prevalent among women (24.5%) compared to men (13.9%).[96]

Another survey conducted in 2006 using HSCL-25 estimated that 67% of adult populations living in internally displaced person (IDP) camps in Northern Uganda had symptoms of depression.[92] The same survey also found a higher rate of depression among women (78%) than in men (51.4%).[92] A similar study conducted in 2005 in Northern Uganda reported that 70% of formerly abducted persons aged 17 years and older living in IDP and receptions centres had experienced depression symptoms.[94] In contrast, a cluster community-based survey in 2013 in post-conflict northern Uganda using the MINI-Plus estimated 24.7% of adult respondents had major depressive disorders.[97] The authors reported that current major depressive disorders were higher in females (29.2%) than in males (17.0%).[97] A cross-sectional survey in 2010 of HIV positive clients attending special clinics using the MINI Plus psychiatric interview estimated that 8.1% of the respondents had major depressive disorders,[98] with higher rates in women (9.6%) than in men (4.1%). Furthermore, the findings of this survey suggest that the prevalence of MDD correlated with distance to health facilities. These authors reported that MDD prevalence was 7.8% in people who

lived more than five kilometres, 10.2% in people who lived between three and five kilometres, and only 5.1% in people who resided within three kilometres of the health facility.[98]

Similar to anxiety disorders, the prevalence of depressive disorders shows variations, by world region, country, prevalence period (current, period or lifetime), gender, year of study, depression subtype and survey instrument.[82]

1.7.4 Eating disorders

Eating disorders are categorised under behavioural syndromes associated with physiological disturbance and physical factors F50-F59 by ICD-10. Eating disorders involve abnormal eating behaviour that is not explained by a health condition and are not developmentally appropriate or culturally sanctioned.[14,15]

Eating disorders include preoccupation with food as well as body weight, shape and image. Two commonly reported types in research literature are: i) Anorexia nervosa, common among younger women and adolescent girls. It is characterised by significantly low body weight for the individual's height, age and developmental stage, induced and sustained at least 15% below the expected weight by the individual. A principle sign is a body mass index (BMI) of 17.5 kg/m^2 or less, failure to gain expected weight that is not due to a health condition or unavailability of food. This is frequently accompanied by reduced energy intake (restricted eating), purging behaviours (such as self-induced vomiting, misuse of laxatives), and excessive exercise to prevent perceived weight gain. Low body weight or shape is central to the person's self-evaluation or is inaccurately perceived to be normal or even excessive.[14,15] ii) Bulimia nervosa is characterised by persistent preoccupation with eating and craving for food, frequent, recurrent episodes of overeating, accompanied by repeated behaviours such as self-induced vomiting, misuse of laxatives, periods of starvation, and strenuous exercise to prevent weight gain. The individual is not significantly underweight and therefore does not meet the diagnostic requirements of anorexia nervosa.

1.7.4.1 Prevalence of eating disorders

According to the GBD 2017, the global prevalence of eating disorder was estimated at 0.2% (15.8 million) people in 2017. The most common was bulimia affecting around 12.5 million people, compared with anorexia, affecting 3.3 million people.[84] The prevalence was much higher among women (0.29%) compared to men (0.13%).[84] A review reported that the prevalence of eating disorders is generally very low in African settings.[99]

1.7.5 Schizophrenia

Schizophrenia is categorised in the ICD-10 block F20-F29: schizophrenia, schizotypal and delusional disorders. Research suggests that the median age for the onset of disorders in this category is rarely before the age of 14, but gradually occurs between the age of 15 and 17 years, with the interquartile range of 15-35 years for schizophrenia.[90]

Schizophrenia and other primary psychotic disorders are characterised by significant impairments in perception, thinking and alterations in behaviour.[13,14] Schizophrenia manifests as persistent delusions or hallucinations, and disorganised thinking (typically manifesting as disorganised speech) and behaviours. The affected person experiences passivity and control, negative symptoms such as blunted or flat affect and volition, and psychomotor disturbances. The course of schizophrenic disorders can be continuous and episodic, with progressive or stable deficit and may have complete or incomplete symptoms and social recovery. To diagnose schizophrenia, at least one very clear or two or more symptoms that occurs are required. These symptoms must occur most of the time for at least one month.[14,15]

1.7.5.1 Prevalence of schizophrenia

According to the GBD 2017 analysis of prevalence of 354 diseases and injuries, the prevalence estimate of schizophrenia is 0.3% (about 19.8 million) people worldwide.[84] This finding is consistent with the finding of a systematic review that pooled 132 studies from 46 countries.[81] The authors estimated that the point prevalence of schizophrenia was 4.6 per 1,000 persons, the period prevalence was 3.3 per 1,000 persons and the lifetime prevalence was 4.0 per 1,000 persons.[81] Another systematic review concluded that the prevalence of schizophrenia varied between four to seven per 1,000 persons.[100]

The GBD 2017 also indicated that prevalence varies between countries, ranging from 0.15% in Central African Republic in the Africa region to 0.36% in Australia.[84] The GBD 2017 findings however showed a distribution pattern of schizophrenia consistent with the previous systematic review, suggesting that this disorder is less common in lower income countries.[100]

Compared with anxiety and depression disorders as mentioned earlier, the difference in prevalence that takes into account gender is less apparent (0.26% in men and 0.25% in women).[84] This finding is consistent with the pattern reported by an earlier systematic review that revealed insignificant differences between genders, although with a slightly lower proportion of women than men affected.[100]

1.8 Comorbidity

Research suggests that a person with co-occurring diseases or disorders may experience more severe poor health compared to having a single disease or disorder.[101] Comorbidities among mental disorder individuals is common. A national comorbidity survey conducted in the United States revealed that 79% of all people who had a mental disorder had three or more disorders.[101] Previous research involving clinical samples found that 59% of patients diagnosed with anxiety as the principal DSM-IV diagnosis or a mood disorder had a lifetime history of comorbid depression, and 60% of patients with principal anxiety disorders had lifetime mood disorders.[102] Similar results have been reported in other research.[103,104] Research suggests that substance use disorders are another common comorbid condition coexisting with mental disorders, for example, anxiety disorder with depressive disorder, documented particularly in

young adults.[105] Mental disorders are also recognised to coexist with a range of other diseases, including diabetes, cancer, infectious diseases and cardiovascular diseases.[106] The presence of co-occurring mental disorders and physical illness exacerbates the clinical and social consequences of the existing condition and makes it more challenging to manage the affected person.[105]

1.9 Factors associated with mental disorders

As noted previously, understanding the cause of mental disorders is challenging.[53] Traditionally, the cause of mental disorders is believed to be mystical.[107,108] Nowadays, mental disorders are known to be associated with multiple factors and include biological, psychological, socio-economic and environmental factors.[109] Biological factors such as genetics, age and gender are the most common non-modifiable factors associated with mental disorders in literature.[110,111] The focus of this thesis is on modifiable risk factors associated with the occurrence or triggers of mental disorders.

1.9.1 Non-modifiable factors

The biological influence of mental disorders includes chemical and neurophysiological factors that have been linked to schizophrenia,[112] while panic disorder, generalised anxiety disorder and obsessive compulsive disorder have been associated with family aggression.[113] Another systematic review also found that MDD were common among first degree relatives.[111] In contrast, a study of biological risk of developing PTSD among twins suggested life history and exposure to environmental factors influenced the onset of mental disorders.[114] It can therefore be assumed that biological factors increase vulnerability to mental disorders, which may be triggered by social, economic and environmental factors that the individual is exposed to across their lifetime.[42]

Age is one of the most important determinants of mental disorders. As previously mentioned (see Section 1.7), research indicates that most cases of lifetime mental disorders have an earlier onset, with 50% starting to occur before the age of 15 years and up and 75% occurring by the age of 24 years,[79,89,90,115] although other disorders, such as dementia, usually start to occur after the age of 60 years.[14] In addition, research suggests that occurrence of mental disorders in advancing age is linked to comorbidities.[89]

Gender is another important factor in the prevalence of mental disorders. With the exception of substance use disorders,[84] research has consistently reported that women experience a higher rate of disorders than men.[82,84,91] However, a systematic review that examined the genetic association with MDD did not find important differences in inheritability between men and women.[111] Therefore the focus of this thesis is on modifiable factors that trigger initial occurrence or relapse of mental disorders.

1.9.2 Modifiable factors

Understanding the underlying determinant of mental disorders can be used to target health service interventions such as preventative activities.[109] Several epidemiological studies of mental disorders have

attempted to identify the determinants of mental disorders by examining their prevalence and correlations.[80,110] Existing evidence published by WHO has clustered the determinants of mental disorders into individual, socio-economic and environmental factors.[42] According to WHO, these determinants of mental health can be adverse or protective in nature.[42] Furthermore, WHO indicates that the determinants or risk factors of mental disorders are not universal, but vary for an individual across their life course.[42]

1.9.2.1 Individual factors

These factors relate to inherent or learned abilities of a person to cope with their feelings and social environment as well as an individual's physical health.[42] The adverse factors include low self-esteem, cognitive or emotional immaturity, difficulties in communicating, medical illness or substance use.[42] However, according to the WHO, self-confidence or self-esteem, problem solving, the ability of an individual to manage stress or adversity, communication skills, being physically fit and healthy are said to be protective from development of mental disorders.[42,116] The onset of mental disorders in adulthood has been associated with comorbid health conditions.[89] In contrast, other studies have reported that living with chronic physical illness (such as HIV), CHD, cancer and diabetes is associated with the risk of developing depressive and anxiety disorders.[28]

Risk of developing a mental disorder has been documented to occur across the different stages of life (pre-conception, prenatal, early childhood, school age, adolescent, early adult and old age).[42] Research suggests that unwanted pregnancy or family conditions at childhood may increase the chances of harmful behaviours of mothers during pregnancy.[117] Such harmful behaviours may include poor nutrition that cause nutrient deficiency, tobacco use, and alcohol and drugs use that potentially increase child vulnerability to mental disorders in later life.[28] At infancy or early childhood, evidence suggests that separation of a child from the parent, particularly the mother, is said to affect their communication and social interaction at an early age and render their continuing life challenging.[118] Negative life experiences at home or outside home, for example, experiencing bullying during childhood and later life, have been reported to affect cognitive and emotional skills.[109] While at the adolescent stage of life risk to mental disorders is linked to physical ill-health, use of psychoactive substance (alcohol or drugs) influenced by peer or media and violence in the family or neighbourhood.[42] In adulthood, the earlier trends in life may compound social, economic and environmental factors discussed later.[109]

1.9.2.2 Social and economic factors

Social and economic factors relate to the individual's ability to thrive, influenced by their immediate social surroundings (family, community, friends and colleagues). Research has shown that living arrangements, such as overcrowding, a high number of people living in the household, poor housing quality,[119] low income and assets,[119-122] unemployment and under-employment,[119,123] or occupation (work related

stress, e.g. army) increases risk of developing a mental disorder. Research also suggests that perceived or actual low social support, life changes (death of loved one, relationship challenges) are associated with higher rates of mental disorders in some individuals.[124] Other factors include residency (rural or urban), forced displacement, marital status (broken family), culture and low educational or failure.[119,123-126] Experiencing loneliness,[123] loss of a loved one,[123] family conflict, exposure to abuse or violence, and unemployment have also been documented as being factors.[42]

1.9.2.3 Education

Restricted or lack of opportunity to gain education and income were advanced by WHO as being pertinent factors for economic viability.[42] A low level of education has been associated with mental disorders (depression).[119,123] Low levels of education have also been reported by a systematic review as a risk factor for dementia in both high-income countries and LMICs.[127]

1.9.2.4 Societal and environmental factors

According to WHO, sociocultural and geopolitical factors, including existence of mental disorders among household member(s), availability of basic services, cultural beliefs, attitudes and practices, have a bearing on the onset of mental disorders.[42] These include poor access to basic services, discrimination, social gender inequalities, exposure to war or violence, which have been associated with higher rates of depression and anxiety disorders.[94,128] Other studies have reported that food insecurity (not having enough food) are also associated with higher rates of depression and PTSD.[97,129] In addition, widowhood, being an orphan and abject poverty have also been documented as determinants of mental disorders.[119,123,126]

Worldwide, a systematic review of the prevalence of severe mental disorders among prisoners found a higher incidence among this sub-population when compared with the general population.[130] This finding was supported by another survey using full diagnostic interviews among persons detained in police facilities in Australia,[131] which found that 33% of detainees had mood disorders (30% in men and 48% in women) and 15% had anxiety disorders (14% in men and 21% in women).[131] Other disorders found across both genders include ADHD and behavioural disorders, substance use disorders, schizophrenia and other psychotic disorders, sleep disorders and learning disorders.[131] The same study also indicated that 72% of respondents had a history of mental disorders.[131]

A survey in Uganda involving young people affected (whether abducted or not) by LRA rebellion demonstrated that being in captivity was associated with higher risks of developing mental disorders.[94] Similar war related trauma was observed in Rwanda 1994 genocide survivors.[132,133] Generally, people living in camps for IDP were found to have higher rates of war related mental disorders compared with those living in their own residence.[94] Also people whose family members had been killed in the war or who experienced a higher number of traumatic events had greater odds of developing disorders.[94] Other

research also reported that those people who were threatened with death or physically injured were more likely to be diagnosed with depression.[134] Other forms of violence, including rape, and physical and verbal assaults, have also been associated with PTSD, anxiety and depressive disorders.[135,136] Although the severity of trauma and individual characteristics play a major role in the development of PTSD,[137] research suggests that prior knowledge of, and preparedness for, torture, strong commitment to a cause, repeated exposure, and strong social supports have protective against the effects of PTSD.[138] Since the risk factors for mental disorders discussed above may vary in individuals and across different settings, it is essential to understand how they may relate to the Ugandan context.

1.10 Uganda

Uganda, located in Eastern SSA, is bordered in the north by South Sudan, in the east by Kenya, in the south by Tanzania, in the south west by Rwanda and in the west by the Democratic Republic of Congo. The majority of people (about 80%) reside in rural areas, with scattered (isolated) patterns of settlement across 134 districts (as of June 2019).[139,140]

According to the national population and housing census (2014) projection in 2018, Uganda has about 40 million people.[88,139] The population consists of 55% children (person below the age of 18 years), 8% orphans, 23% persons aged 18 to 29 years,[88,139] and 4.1% persons aged 60 years or older.[141] In addition, the population is made up of diverse cultures and entrenched religious beliefs, predominantly Christians and Muslims.[88]

Uganda is a low-income country, according to the World Bank classification of countries.[27] The majority of the Ugandan population relies on subsistence agriculture as the main source of livelihood or employment.[88] For over two decades, some parts of Uganda were exposed to significant social and economic disruptions including complex emergencies such as the LRA armed conflict in the northern and north eastern regions between 1986 and 2007.[142,143] The LRA conflict resulted in an unprecedented exodus of the population from their homes to IDPs and migration to urban centres. These people witnessed brutality, violence, death and damages to property and infrastructure, and most importantly, their way of life.[142,143] Similar disruptions also occurred in the western region of Uganda caused by the Allied Democratic Front (ADF), affecting the greater districts of Bundibugyo, Kabarole and Kasese.[144] Other experiences include floods and droughts, followed by subsequently increased food insecurity and economic loss, particularly for the 80% of the population who depend on subsistence agriculture.[88] Concurrently, Uganda has continued to see emergence in chronic illness including cardiovascular diseases, high blood pressure, diabetes and cancer, besides major communicable diseases such as HIV/AIDS, malaria and tuberculosis.[1,145]

These factors are known to be associated with the occurrence of mental disorders as previously noted and as a result there is a need to estimate the Ugandan specific prevalence of mental disorders. Since the risk factors listed above may vary across different settings, the prevalence of mental disorders is likely to also vary.

1.11 Need for further evidence specific to Uganda

The burden of and prevalence data for mental disorders are frequently used by international bodies like WHO and national governments to guide planning of mental health services. Currently, the GBD study is the most influential source of evidence that provides a comprehensive estimate of the prevalence and burden of mental disorders for all countries, including Uganda.[2,22,23]

As stated previously, limited availability of epidemiological data for mental disorders from LMICs like Uganda in the GBD has been documented.[29,30,146] Research shows that most (94%) of the published epidemiological studies of mental disorders comes from high-income countries, predominantly the United States, Western Europe, Australia and Canada.[30] This finding is supported by other systematic reviews that have informed the GBD analysis of the burden of mental disorders.[24] For example, a systematic review of the global prevalence of anxiety disorders included 87 studies from 44 countries in their analysis, only seven studies were from Africa and none were from Uganda.[59] Similarly, a systematic review addressing the prevalence of major depressive disorders observed similar patterns in the availability of studies, with only one included study from Uganda.[82] It is worth noting that for these two reviews, [59,82] only three electronic databases, MEDLINE, PsycINFO and Embase, were searched for eligible studies published between 1980 and 2009. Furthermore, the observation of data sources used in the GBD burden of mental disorders 2013 shows that only two small studies from Uganda published in 2004 and 2005 were included in the GBD 2010 study.[24] Similarly, population specific disparities have been reported regarding the proportion of children included in the global prevalence of mental disorders.[85]

Against the background of paucity of data and to enhance reporting, GBD methodology applies data modelling techniques to compute prevalence for countries without data.[84] In this approach, the input data is obtained from a neighbouring country or countries from surrounding region(s) on the basis of similar socio-economic status.[24,84] This is particularly critical, given the influence of culture and environmental factors contributing to mental disorders, as discussed in Section 1.9. above. The differences in risk factors that may exist between countries or regions necessitate country specific data.

This epidemiological information is also adopted internationally to guide initiatives towards strengthening mental health services, including, for example, internationally the development of Mental Health Gap Action Programme 2008 (mhGAP),[147] and the Mental Health Action Plan 2013-2020.[148] At the country level, epidemiological data from GBD and mhGAP influence the inclusion of mental health among the

minimum health care package in the Ugandan national health sector plan.[149] Data from the WHO mental health atlas 2017 indicates that mental health services remain underutilised and under resourced in many LMICs, in Uganda in particular.[150] Therefore, local evidence such as the proportion of people with mental disorders could help inform and guide government in the allocation of resources and monitoring of the progress of implementation.[80] In addition, lack of data from Uganda can severely restrict the utility of GBD.

While a substantial number of epidemiological studies of mental disorders in Uganda appear to be available, the results are highly fragmented and the reported prevalence appears to vary considerably.[91,94,96,97] This variability presents challenges in using it as a basis for evidence. As such, there is need to identify and synthesise all relevant data to generate prevalence estimates of mental disorders in Uganda.

1.12 Methodological approach

Prevalence refers to the proportion of a population with certain condition (in the context of this thesis, mental disorder) at a specific point in time.[80] The accurate measurement of the prevalence of a disease or condition among a population is essential for key health decisions such as development of guideline, defining priority interventions and investment, delivery and the use of health services and also for monitoring changes in population health.[80] Prevalence studies are typically observational study designs, most often cross-sectional surveys, that may involve taking a sample of participants from a specified restricted area (for example clinical population or a geographical area or specific gender or age groups) or may cover an entire country.[80] A systematic review of these types of studies can provide reliable evidence to decision makers and is therefore preferred method for this thesis.

1.12.1 Systematic review of prevalence studies

A systematic review is a synthesis of primary research investigating a clearly formulated question(s), using systematic, explicit and reproducible methods.[151] Historically, systematic reviews have been largely conducted to respond to questions about the effectiveness of health interventions including randomised control trails.[152] Questions suited for this type of review are formulated with the population, intervention, comparator and outcome (PICO) mnemonic, which may not fit with other research designs.[152] Over the years, systematic review methodology has evolved and adapted to fit in with the range of questions that may arise in the healthcare and study designs.[153] For example, for a question addressing prevalence, it is crucial to described the geographical distribution of a condition of interest and the variation between subgroups using a cross-sectional study design. Prevalence reviews adhere to systematic review principles, however the review question is formulated with focus on the condition of interest, context and populations (CoCoPop) framework, to guide study eligibility.[154]

A systematic review of prevalence aims to systematically identify, critically appraise, collect and statistically meta-analyse data from all relevant observational studies (mainly cross-sectional studies) that match the predefined inclusion criteria.[154] Existing evidence demonstrates a sharp increase in the number of published systematic reviews of prevalence globally between 2008-2018 inclusive.[155,156] These encompass systematic reviews of prevalence estimates for a range of diseases and conditions, including mental disorders.[155] Unfortunately there remains a considerable inconsistency among the published systematic reviews of prevalence in the way they are conducted, risk of bias or methodological quality is assessed, and data synthesised and reported.[155,156] Up-to-date, high quality systematic reviews of prevalence information can provide a better evidence needed to make crucial healthcare decisions.

1.12.2 Methodological quality assessment of prevalence studies

Several methodological issues of observational studies may bias the results of prevalence estimates.[154] For example, previous systematic reviews of prevalence of mental disorders demonstrate that non-random sampling, small sample size and mode of administration (self-report questionnaire) were associated with higher reported rates of mental disorders from surveys.[128] Similar methodological challenges as well as the type of prevalence estimate (point, period or lifetime) was reported by a systematic review addressing the global prevalence of anxiety disorders.[59] These findings suggest that studies reporting prevalence estimates should provide sufficient information about the population and settings, measurement and analysis for readers to make independent judgement about the validity of the results.[157]

Details pertinent to the population and settings requires accurate descriptions of the characteristics of the target population and the methods used to identify potential participants and to ensure each eligible participant has a known chance of selection. Details regarding measurement of condition (mental disorder) are briefly discussed in Section 1.6 . Importantly, studies reporting prevalence data should be assessed if a standardised, reliable and valid, data collection instrument was used. Information addressing statistics or data analysis, should ensure that the statistical approach is appropriate to obtain estimates that are unbiased and associated with the correct statistical precision, exhibited by reporting response rate and confidence intervals for the estimates.[157] A comprehensive list of items relating to each of these three major information domains have been summarised by a recent review. [157]

A recent systematic review identified 30 appraisal tools, only eight of which are specifically developed to assess methodological quality of prevalence studies.[157] However, this review finding shows lack of consensus about the domains to assess in prevalence studies, introducing variability among the tools.[156,157] The authors noted that some tools were inappropriately applied to conduct critical appraisal. [156,157]

1.12.3 Synthesis of prevalence data

Another important element of a systematic review of prevalence studies is the approach adopted for synthesis, either as a qualitative narrative synthesis or statistical meta-analysis where possible.[156,158] Different statistical meta-analytic approaches are available.[156] Methods used to transform prevalence estimates also vary, including arcsine square root, Freeman-Tukey Double Arcsine Transformation, and logit transformation among others.[156]

1.12.4 Reporting of a systematic review of prevalence studies

A systematic review of prevalence studies should be reported fully and transparently to allow readers to evaluate the strengths and weakness of the overall results and the conclusions.[158,159] The recent review that evaluated how systematic reviews of prevalence are conducted found three commonly used guides for the reporting.[156] These are Preferred Reporting Items for Systematic Review and Meta-analysis (PRISMA),[159] Meta-analysis Of Observation Studies in Epidemiology (MOOSE)[160] and Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER)[161].[156] The majority (68.5%) of the published systematic reviews of prevalence studies employed the PRISMA reporting guideline.[156]

Detail of the approach for the conduct of the systematic review of prevalence estimates in this thesis is presented in Chapter 2, highlighting the *a priori* decisions regarding location and identification of studies, determination of their eligibility, quality assessment and data collection and statistical analysis.

1.13 Summary and significance of this study

In this chapter, literature regarding mental disorders has been examined. It is now recognised that mental disorders occur in all countries worldwide, some of which are highly prevalent and debilitating.[1,9,19,24,25,162] Because mental disorders lead to significant health, social and economic consequences to individuals, family and society (Sections 1.3 and 1.4), ascertaining their prevalence is important. The prevalence of mental disorders, like any other disease or health conditions, represents a common starting point for health services improvement planning, resource allocation and policy development.[80] Evidence informed policy and planning may be achieved through the adoption of synthesised results as input. This acknowledgement has led to a growing interest in improving access to health care for people with mental disorders worldwide, particularly those in LMICs.[147,148] Prevalence is an important input for measuring disease burden,[22-25,95] planning and monitoring effectiveness of interventions to reduce the incidence and impact of mental disorders.[80,109] However, research invariably shows that evidence on mental disorders, particularly in LMICs, is conspicuously lacking,[29,30,82,85,146] The lack of nationally available prevalence data for Uganda may hamper the planning and implementation of interventions related to mental disorders. Therefore, Uganda specific studies are needed to inform future decisions for the provision of health services. This research may assist with the provision of evidence to support mental health services

planning, policy adoption and implementation to improve access to health care for people with mental disorders in Uganda.

1.14 Objective and review questions

The objective of this thesis was to determine prevalence estimates of mental disorders in Uganda.

Specific questions addressed by this thesis were:

1.1. What is the prevalence of mental disorders among children in Uganda?

1.2. What is the prevalence of mental disorders among adults in Uganda?

1.3. What are the common mental disorders among children and adults in Uganda?

1.15 Organisation of this thesis

The remainder of this thesis comprises three chapters. Chapter 2 presents the published systematic review protocol prepared according to the JBI methodology for conducting a systematic review of prevalence studies.[163] Chapter 3 presents the final systematic review of prevalence of mental disorders in Uganda submitted for publication, and Chapter 4 further discusses the findings of the review in the context of existing literature and in light of information presented in this introductory chapter. Chapter 4 also presents the implications for policy, practice and future research as well as concluding remarks.

Due to the nature of this thesis, by publication and abiding to the guidelines of the systematic review methodology, the need for repetition of some information, for example, introduction and methods sections in Chapters 1, 2 and 3, is unavoidable. In addition, the framing material (Chapters 1 and 4) for this thesis is written in Australian English, Chapters 2 and 3 are presented in their respective and required publication formats and are therefore prepared in the United States English style to conform to journal requirements.

Chapter 2 Prevalence of mental disorders in Uganda: a systematic review protocol

John Nelson Opio[1]

Catalin Tufanaru[1]

Edoardo Aromataris[1]

1. The Joanna Briggs Institute, Health and Medical Sciences, The University of Adelaide.

Keywords: Epidemiology; mental disorders; population; prevalence; Uganda

JBI Database System Rev Implement Rep 2018; 16(8): 1613-1620 DOI: 10.11124/JBISRIR-2017-003626

Statement of Authorship

Title of Paper	Prevalence of mental disorders in Uganda: a systematic review protocol.
Publication Status	☑ Published ☐ Accepted for Publication ☐ Submitted for Publication ☐ Unpublished and Unsubmitted work written in manuscript style
Publication Details	Published in the JBI Database Systematic Review and Implementation Report. 2018;16:1613-20. https://doi.org/10.11124/JBISRIR-2017-003626.

Principal Author

Name of Principal Author (Candidate)	John Nelson Oplo		
Contribution to the Paper	Conceptualised the study, prepared the first draft, read and finalised the final manuscript.		
Overall percentage (%)			
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.		
Signature		Date	29.09.2020

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate in include the publication in the thesis; and

iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Catalin Tufanaru		
Contribution to the Paper	Conceived the study, read, and approve all version of the manuscript		
Signature		Date	29/09/2020

Name of Co-Author	Edoardo Aromataris		
Contribution to the Paper	Conceived the study, read, and approve all version of the manuscript		
Signature		Date	28/9/20

Please cut and paste additional co-author panels here as required.

2.1 Introduction

Mental disorders account for a substantial proportion of health burden. They contributed to approximately 10% of global burden of disease as measured by disability-adjusted life years (DALYs) in 2010.[1] The DALY is a quantitative health measure that combined the non-fatal component of the disease or injury as years live with disability (YLDs) and the fatal component as years of life lost (YLLs) or premature death.[2] The Global Burden of Disease (GBD) studies 2016 reported mental disorders as the leading cause of YLDs in 2016 affecting an estimated 1.1 billion people globally.[3] Despite the existence of a wide range of mental, neurological and substance use disorders,[4,5] depression and anxiety disorders are among the top ten causes of ill health in nearly all countries globally.[1,3] Importantly, the World Health Organization (WHO) 2017 report on the burden of mental disorders indicates that globally, 80% of people with mental disorders are living in countries classified by the World Bank[6] as low- and middle-income countries (LMIC) like Uganda.[7]

Diagnosis of mental disorders is consistently increasing. Previous studies have shown that the number of cases of mental disorders increased by 41% globally between 1990 and 2010.[1] Conversely, other authors have forecast that the prevalence of mental disorders in Sub-Saharan Africa (SSA) is likely to increase by 130% by 2050 due to epidemiological and demographic transitions.[8] Uganda is part of SSA. Demographic factors, particularly age, appear to have a strong association with the burden attributable to mental disorders in a population. Empirical evidence suggests that a substantial proportion of all lifetime cases of mental disorders begins to occur early in life (nearly half by the age of 14 and three-quarters by the age of 24).[9] These age groups constitute an estimated 80% (50.3% are under 15 years and 30.6% are 15 to 24 years) of the Ugandan population.[10] The age distribution and the age of onset of mental disorders can explain the empirical evidence that indicates that the higher burden of these conditions among people aged 15 to 49 years.[1,11,12] The demographic attribute of mental disorders suggests that Uganda, with about 95% of the population below 60 years, is likely to be disproportionately affected,[13] highlighting the need to evaluate the prevalence of mental disorders across all age groups.

The cause of mental disorders was once believed to be mystical.[14,15] Nowadays, research indicates that there is a relationship between biological (infection, brain damage and genetics), psychological (fear, failure and anger) and social (education, social class, self-esteem, loss of a relationship and societal expectation) factors that triggers mental disorders.[4,7,16,17] In addition, mental disorders are associated with chronic physical illnesses such as human immunodeficiency virus (HIV), coronary heart disease, cancer and diabetes.[18] In developed countries, research shows that people with mental disorders die 15 to 20 years earlier due to chronic physical illness.[19] These factors present challenges and opportunities for policy-makers and health service planners to improve the mental health of about 40 million people in

Uganda. Despite the existence of factors that trigger mental disorders, the prevalence of mental disorders in Uganda remains poorly understood.[1,20]

The successful planning and implementation of interventions to improve health services for people with mental disorders in any country like Uganda require reliable prevalence data on the mental disorders that are confronting its populations.[21,22] Accordingly, in response to the global burden of mental disorders,[23] the WHO developed the Mental Health Gap Action Programme (mhGAP) in 2008[24] and the mental health action plan 2013-2020[25] in 2013 to guide efforts to improve access to health services for people with mental disorders. Improving access to health services is dependent on interactions between multiple factors within health service delivery systems.[22,26,27] These factors include demographic profiles (age, sex and others), social structures and health beliefs of individuals as well as resources available to the individual or family, health information and services. Lastly, the individual or population health needs (perceived or evaluated health status) will also influence access to health services.[22,27] For example, studies of behavior of people with mental disorders or their family suggest that their willingness to seek help or utilize health services is driven by their self-perceived health status.[28-30] This highlights the importance of prevalence data on mental disorders for each country as one of the stimuli to increase awareness and redirect efforts to improve access to health services by people with mental disorders.

A preliminary search for previous systematic reviews on the prevalence of mental disorders in Uganda was conducted in PROSPERO and PubMed. The search found no specific previous systematic reviews on the prevalence of mental disorders in Uganda.

2.2 Review questions

The questions to be addressed by this systematic review are:

i. What is the prevalence of mental disorders in children under 18 years in Uganda?

ii. What is the prevalence of mental disorders in adults 18 years and over in Uganda?

iii. What are the common mental disorders among children and adults in Uganda?

2.3 Inclusion criteria

2.3.1 Participants

This review will consider studies that include children below 18 years and/or adults 18 years and over with or without co-existing physical health problems and without restriction on gender. The participants are representative of the general population (representativeness will be determined by participant recruitment or sampling methods).

2.3.2 Condition

This review will include studies that investigate the prevalence of mental disorders defined according to diagnostic criteria in the Tenth Revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) or the Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV or DSM-5.[4,5] Included studies must use validated diagnostic instruments. Eligible studies must identify/report on one or more specific mental disorders such as depressive disorders, anxiety disorders, bipolar disorder, and schizophrenia, and conduct disorder. Eligible studies will report current (one week or one month), period (six month or 12 months) or lifetime estimates of the prevalence of mental disorders. The review will exclude studies that focus on the prevalence of substance use and neurological disorders such as alcohol use disorders, drugs use disorders, dementia, migraine, epilepsy and others. Furthermore, studies will be excluded if diagnosis of mental disorders reported is not based on validated instruments.

2.3.3 Context

This review will include studies that report on prevalence of mental disorders conducted in the community, schools, general hospitals/health facilities/primary healthcare located in Uganda. It will exclude studies in which participants are drawn from prisons or mental health clinics whereby prevalence of mental disorders is not representative of the general population.

2.3.4 Types of studies

This review will consider observational study designs: population based cross sectional studies and cohort studies. Other study designs that provide indications of prevalence of mental disorders including randomized control trails will be considered for inclusion.

Studies published after the development of the mhGAP-Intervention Guide 2010 will be included to capture recent trends in the prevalence of mental disorders in Uganda. No restriction to language of publication or sample size will be set.

2.4 Methods

This review will follow the Joanna Briggs Institute (JBI) guidelines for conducting and reporting a review of prevalence and incidence, and preferred reporting items for systematic reviews and meta-analyses (PRISMA).[21,31,32]

2.4.1 Search strategy

A three-step search strategy will be used to locate both published and unpublished studies of the prevalence of mental disorders in Uganda.[33] An initial limited search of PubMed and PsycINFO has been undertaken followed by analysis of the text words contained in the title and abstract, and of the index terms used to describe the article.[34] This informed the development of a search strategy tailored for each

information source. Search strings were generated in consultation with a research librarian. A full search strategy for the PubMed electronic database is detailed in Appendix 2-I. Searching for additional studies from gray literature (not commercially owned or published) from government departments, International agencies and academics institution repository or websites will be conducted using similar keywords from the search strings. Hand searching in grey literature including technical evaluation reports and websites (from Uganda government departments/Ministry of Health and WHO-iris and AfroLib).[35] The reference list of all eligible studies will be screened for additional studies.

2.4.2 Information sources

The databases to be searched include: PubMed, Scopus, Google Scholar, PsycInfo, Embase, African Index Medicus (*African Journal of Psychiatry*, African Health Observatory), Web of Science, program survey reports, conference papers, African local journals, dissertations, bulletins and factsheets.

The trial registers to be searched include: Cochrane Central Register of Controlled Trials The search for unpublished studies will include: survey reports and program evaluation reports. The following are websites that will be searched in addition to the Uganda Ministry of Health/government websites: worldwidescience.org https://worldwidescience.org/, WHO Institutional Repository for Information Sharing (WHO-IRIS): http://apps.who.int/iris, AfroLib http://afrolib.afro.who.int, World Bank group: https://openknowledge.worldbank.org/discover?rpp,

2.4.3 Study selection

Following the search, all identified citations will be uploaded into Endnote V8 (Clarivate Analytics, PA, USA) and duplicate citations removed. Two independent reviewers will initially pilot and then screen titles and abstracts against the inclusion criteria. Studies that meet or may potentially meet the inclusion criteria will be retrieved in full, and their details imported into JBI System for Unified Management, Assessment and Review Information (JBI SUMARI) software. The full text of selected studies or reports will be retrieved and assessed in detail against the inclusion criteria using JBI-SUMARI. Full text studies that do not meet the inclusion criteria will be excluded and reasons for exclusion will be provided in an appendix in the final systematic review report. Included studies will undergo critical appraisal. The result of the search will be reported in full in the final report and presented in a PRISMA flow diagram. Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer (EA) to determine the final inclusion.

2.4.4 Assessment of methodological quality

Eligible studies will be critically appraised for methodological quality by two independent reviewers using the standardized critical appraisal instrument for prevalence studies in JBI SUMARI.[36] Prior to embarking on a full review of all selected papers, an initial piloting of the critical appraisal tool in a subset of the

selected papers will be performed by two independent reviewers. Any disagreements or uncertainties that arise during methodological quality assessment will be resolved through discussion or with a third reviewer (EA). The results of critical appraisal will be reported in narrative and tabular formats. All studies that meet the inclusion criteria, regardless of the results of their methodological quality, will undergo data extraction and synthesis (where possible).

2.4.5 Data extraction

Data will be extracted using the standardized data extraction tool for prevalence and incidence.[37] Appendix 2-II presents a modified version of the data extraction tool for this review. Prior to extraction, two reviewers will independently pilot the data extraction tool customized in JBI SUMARI with a subset of the selected studies and meet to review the consistency. After piloting, JO will extract the data. The data extracted will include specific details about the participants, condition and other characteristics including:

i) *general information*: author(s) name, study title and aim, year of study and country of study, publication type or source of data (journal or report), socioeconomic data, especially income level, where available;

ii) *study characteristics*: study design, characteristic of the study population (age and gender), sample size, diagnostic instrument used and sampling methods (in studies investigating mental disorders of children, this will include characteristics of the person providing the information. e.g. parent or caregiver or teacher or child);

iii) *outcome information*: proportion of people reported with either current or period or lifetime prevalence of mental disorders, or outcome data to allow an estimation of the effect size such as statistical test and author's conclusion (in cohort study designs that measure prevalence of mental disorders and where data is taken multiple times, only data from the last point will be extracted).

Any disagreements that arise between the reviewers at piloting or where the reviewer is uncertain on particular study details to extract, will be resolved through discussion or with the other reviewers (EA). If required, the author(s) of the paper (s) will be contacted to request for missing or additional data.

2.4.6 Data synthesis

Prevalence data extracted from the included studies will, where possible (e.g. studies using uniform case definitions, the same measures of outcome, context and approaches), be pooled in a statistical meta-analysis using Metafor (Free Software Foundation, Inc., Boston, USA).[38] Prevalence data from the included studies will be transformed using a Logit transformation to calculate the weighted summary of proportion under a random effect model. The effect size will be expressed as a proportion with 95% confidence intervals around the summary estimate.

Heterogeneity will be assessed using the Chi-squared, Tau-squared and I-squared tests.[39,40] To explore potential sources of heterogeneity from the included studies, characteristics likely to modify prevalence estimates will be considered for subgroup analyses. The following subgroups will be analyzed, where possible: age (under 18 years and 18 years and over), diagnostic instruments used, specific diagnosis (e.g. depression, anxiety, etc.), socio-economic status and study design. Sensitivity analyses will be performed to explore the impact of individual studies on the overall calculated prevalence estimates. This will be performed by investigating whether dropping or adding primary studies with (say) slightly non-standard disease definitions will make a difference.

Where statistical pooling in a meta-analysis is not possible due to heterogeneity, the findings will be presented in narrative form including tables and figures to aid in data presentation. Sources of heterogeneity and reason for which it is determined to be inappropriate to pool data will be specified in the systematic review report.

Conflicts of interest

Co-author EA is the Editor-In-Chief of the *JBI Database of Systematic Reviews and Implementation Reports* and is not involved in the editorial processing of the manuscript. JO and CT had no conflict of interest to declare.

Acknowledgements

This review will be conducted towards the award of PhD degree for JO. We acknowledge assistance from University of Adelaide Research Librarian Ms. Maureen Bell in the development of the search strategy.

Funding

JO is supported by an Australian Government Research Training Program Scholarship. The funders had no role in study design, data collection and analysis, decision to publish or preparation of the manuscript.

References

1. Whiteford HA, Ferrari AJ, Degenhardt L, Feigin V and Vos T. The global burden of mental, neurological and substance use disorders: an analysis from the Global Burden of Disease Study 2010. PLoS One 2015; 10(2): e0116820.

2. Murray CJ. Quantifying the burden of disease: the technical basis for disability-adjusted life years. Bull World Health Organ 1994; 72(3): 429-445.

3. Vos T, Abajobir AA, Abate KH, Abbafati C, Abbas KM, Abd-Allah F, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016 Lancet 2017; 390(10100): 1211-1259.

4. American Psychiatric Association. American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. American Psychiatric Association; 2013. p. 991.

5. WHO. The ICD-10 Classification of Mental and Behavioural Disorders: Clinical descriptions and diagnostic guidelines. World Health Organization; 1993. p. 267.

6. Fantom NS, Umar. The World Bank's Classification of Countries by Income. Policy Research Working Paper;No. 7528. Policy Research Working Paper. Washington, DC: World Bank; 2016. pp. 1-52.

7. WHO. Depression and other common mental disorders Global: health estimates. World Health Organization. Geneva2017. pp. 1-24.

8. Charlson FJ, Diminic S, Lund C, Degenhardt L and Whiteford HA. Mental and substance use disorders in Sub-Saharan Africa: predictions of epidemiological changes and mental health workforce requirements for the next 40 years. PLoS One 2014; 9(10): e110208.

9. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR and Walters EE. Lifetime prevalence and age-of-onset distributions of dsm-iv disorders in the national comorbidity survey replication. Arch Gen Psychiatry 2005; 62(6): 593-602.

10. Uganda Bureau of Statistics. National Population and Housing Census 2014, Main Report. Uganda Bureau of Statistics; 2016.

11. Whiteford HA, Degenhardt L, Rehm J, Baxter AJ, Ferrari AJ, Erskine HE, et al. Global burden of disease attributable to mental and substance use disorders: findings from the Global Burden of Disease Study 2010. Lancet 2013; 382(9904): 1575-1586.

12. Vos T, Allen C, Arora M, Barber RMRM, Bhutta ZA, Brown A, et al. 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. The Lancet 2016; 388(10053): 1545-1602.

13. United Nations Department of Economic and Social Affairs Population Division. World Population Prospects the 2017 revision: key findings and advance tables. Working Paper No. ESA/P/WP/248. NewYork: United Nations Department of Economics and Social Affairs; 2017. p. 53.

14. Porter R. Madness: a brief history. New York: Oxford University Press; 2002. p. 250.

15. Foerschner AM. The History of Mental Illness: From Skull Drills to Happy Pills. Inquiries Journal 2010; 2(09): 1-4

16. Prince M, Patel V, Saxena S, Maj M, Maselko J, Phillips MR, et al. No health without mental health. Lancet 2007; 370: 859-877.

17. Lund C, Breen A, Flisher AJ, Kakuma R, Corrigall J, Joska JA, et al. Poverty and common mental disorders in low and middle income countries: A systematic review. Soc Sci Med 2010; 71(3): 517-528.

18. Gelband H, Sankaranarayanan R, Gauvreau CL, Horton S, Anderson BO, Bray F, et al. Costs, affordability, and feasibility of an essential package of cancer control interventions in low-income and middle-income countries: key messages from Disease Control Priorities, 3rd edition. Lancet (London, England) 2015; 387(10033): 2133-2144.

19. Thornicroft G, Newman SC, Bland RC, Wahlbeck K, Westman J, Nordentoft M, et al. Physical health disparities and mental illness: the scandal of premature mortality. Br J Psychiatry 2011; 199(6): 441--442.

20. Baxter AJ, Patton G, Scott KM, Degenhardt L and Whiteford HA. Global Epidemiology of Mental Disorders: What Are We Missing? PLoS One 2013; 8(6): e65514.

21. Munn Z, Moola S, Lisy K, Riitano D, Tufanaru C. Chapter 5: Systematic reviews of prevalence and incidence. In: Aromataris E, Munn Z (Editors). *Joanna Briggs Institute Reviewer's Manual.* The Joanna Briggs Institute, 2017. Available from https://reviewersmanual.joannabriggs.org/

22. Andersen RM and Aday LA. Access to Medical Care in the U . S .: Realized and Potential. Med Care 2008; 16(7): 533-546.

23. WHO. The World Health Report 2001: mental health : new understanding, new hope. Geneva: World Health Organization; 2001.

24. WHO. Mental Health Gap Action Programme - Scaling up care for mental, neurological, and substance use disorders. 2008. p. 44.

25. WHO. Mental Health Action Plan (2013-2020). Geneva: World Health Organization; 2013. p. 50.

26. Aday LA and Andersen R. A Framework for the Study of Access to Medical Care. Health Serv Res 1974; 9(3): 208-220.

27. Andersen RM. Revisiting the Behavioral Model and Access to Medical Care: Does it Matter? J Health Soc Behav 1995; 36(1): 1-10.

28. Byers AL, Lai AX, Nelson C and Yaffe K. Predictors of Mental Health Services Use Across the Life Course among Racially–Ethnically Diverse Adults. Am J Geriatr Psychiatry 2017; 25(11):1213-1222

29. Li W, Denson LA and Dorstyn DS. Help-Seeking Intentions and Behaviors among Mainland Chinese College Students: Integrating the Theory of Planned Behavior and Behavioral Model of Health Services Use. International Journal for the Advancement of Counselling 2017; 39(2): 125-148.

30. Li W, Dorstyn DS and Denson LA. Predictors of Mental Health Service Use by Young Adults: A Systematic Review. Psychiatr Serv 2016; 67(9): 946-956.

31. Stroup DF, Berlin JA, Morton SC and et al. Meta-analysis of observational studies in epidemiology: A proposal for reporting. JAMA 2000; 283(15): 2008-2012.

32. Munn Z, Moola S, Lisy K, Riitano D and Tufanaru C. Methodological guidance for systematic reviews of observational epidemiological studies reporting prevalence and cumulative incidence data. Int J Evid Based Healthc 2015; 13(3): 147-153.

33. The Joanna Briggs Institute. The Joanna Briggs Institute Reviewers' Manual: 2017 edition. Adelaide: The Joanna Briggs Institute; 2017. Available from https://reviewersmanual.joannabriggs.org/.

34. Wilczynski NL, Haynes RB and Team H. Optimal search strategies for identifying mental health content in MEDLINE: an analytic survey. Annals of General Psychiatry 2006; 5: 4-4.

35. Olsan TH, Bianchi C, White P, Glessner T and Mapstone PL. Finding electronic information for health policy advocacy: a guide to improving search results. J Am Acad Nurse Pract 2011; 23(12): 648-658.

36. Munn Z, Moola S, Riitano D and Lisy K. The development of a critical appraisal tool for use in systematic reviews addressing questions of prevalence. Int J Health Policy Manag 2014; 3(33): 123-128.

37. Munn Z, Tufanaru C and Aromataris E. Data extraction and synthesis. Am J Nurs 2014; 114(7): 49-54.

38. Viechtbauer W. Conducting Meta-Analyses in R with the metafor Package. Journal of Statistical Software 2010; 36(3): 1-48.

39. Higgins JPT, Thompson SG, Deeks JJ and Altman DG. Measuring inconsistency in meta-analyses. Br Med J 2003; 327(7414): 557--560.

40. Higgins J, Thompson S, Deeks J and Altman D. Statistical heterogeneity in systematic reviews of clinical trials: a critical appraisal of guidelines and practice. J Health Serv Res Policy 2002; 7(1): 51-61.

Appendix 2-I: Search terms and strategy

Search terms in PubMed

1. “Mental disorders”[*MeSH Terms*]
2. Mental disorders[textword]
3. “Mentally ill persons”[*MeSH Terms*]
4. Mentally ill person*[textword]
5. “Psychopathology”[*MeSH Terms*]
6. Psychopathology[textword]
7. “Psychiatric”[*MeSH Terms*]
8. Psychiatric[textword]
9. “Child psychiatry”[MeSH terms]
10. “child psychology” [MeSH terms]
11. "diagnostic and statistical manual of mental disorders"[MeSH Terms]
12. “Prevalence”[*MeSH Terms*]
13. Prevalence[textword]
14. Epidemiology[textword]
15. “Uganda”[*MeSH Terms*]
16. Uganda[textword]

Search strategy in PubMed

17. Search 1: #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11
18. Search 2: #12 OR #13 OR #14
19. Search 3: #15 OR #16
20. Search 4: #17 AND #18 AND #19
21. Search limited to: #20 AND Limit 2010 to 2017

Appendix 2-II: Data extraction (Munn et al.,37)

Study details

1. Reviewers 1……2……
2. Study ID ……
3. Date……
4. Study title……..
5. Authors……..……..…...
6. Country of study……...….
7. Year of study ……. publication year/date……..…….
8. Journal/source name……
9. Aims of the study…….....

Study methods

10. Setting…….....
11. Study design…….....
12. Characteristic of the study population (age and gender): M……f……age…..…
13. Socio-economic status (if data available) ……...……..…
14. Study sample size……. sampling methods used…….....
15. Mental disorders diagnostic instrument used……..
16. Person providing the information (Respondent in case of a child: parent or caregiver or teacher or child), age group and gender if specified
17. Methods of data analysis……
18. Ethical approval……

Results

19. Diagnosis (mental disorders) ……
20. Prevalence: current……, period (6 month…or 12 month…..) or life time……..

    Proportion: : $\frac{n}{N} \times 100$ (%) and the 95% confidence interval……
21. Study……

Authors comments……

Reviewers comments……

Chapter 3 Prevalence of mental disorders in Uganda: a systematic review and meta-analysis

John Nelson Opio[a]

Zachary Munn[a]

Edoardo C Aromataris[a]

a. JBI, Faculty of Health and Medical Sciences, The University of Adelaide, Adelaide, Australia

This chapter presents the systematic review manuscript currently submitted to *Annals of Epidemiology* for publication. For consistency with other chapters, where possible, numbering of appendices, figures and tables has been modified to include the chapter number.

An additional appendix (Appendix 3.II) has been included at the end of this chapter. This appendix includes peer review feedback received and author responses provided, following initial submission of this manuscript to the *Journal of Affective Disorders*. Inclusion of these acknowledges the changes made and the peer reviewers' contributions to this chapter. The editor of the *Journal of Affective Disorders* did not consider the manuscript further due to content suitability for the journal, and rather than any deficit in quality identified by the peer review reports provided.

Statement of Authorship

Title of Paper	Prevalence of mental disorders in Uganda: a systematic review and meta-analysis.
Publication Status	☐ Published ☐ Accepted for Publication ☑ Submitted for Publication ☐ Unpublished and Unsubmitted w ork w ritten in manuscript style
Publication Details	Submitted to Annal of Epidemiology Journal, Manuscript Number: AEP-D-20-00391. The manuscript was first submitted to the Journal of Affective Disorders, peer review, but was recommended for transfer to alternative journal stating out of journal scope as the reason. Comments from peer reviewers are presented in the Appendix 3-II.

Principal Author

Name of Principal Author (Candidate)	John Nelson Opio		
Contribution to the Paper	Conceived the study aims and design, completed database searching, study selection, study appraisal, data extraction and statistical analysis and drafted the initial manuscript. Assessed certainty of the evidence, contributed to interpretation of results, revised drafts of the manuscript based on comments from co-authors, read and approved the final manuscript.		
Overall percentage (%)			
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.		
Signature		Date	28.9.2020

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate in include the publication in the thesis; and

iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Zachary Munn		
Contribution to the Paper	Assessed certainty of the evidence, read and approved the final manuscript.		
Signature		Date	2/10/20

Name of Co-Author	Edoardo Aromataris		
Contribution to the Paper	Conceived the study aims and design, confirmed study inclusion and exclusion and performed duplicate extraction of prevalence estimates, contributed to interpretation of results, revised, and commented on all drafts of the manuscript, read and approved the final manuscript.		
Signature		Date	28/9/20.

Please cut and paste additional co-author panels here as required.

Abstract

Background

Mental disorders account for a substantial proportion of health burden globally, but little is known about its true prevalence in Uganda. This systematic review was conducted to determine the prevalence of mental disorders among children and adults in Uganda.

Methods

A comprehensive systematic search was conducted in PubMed, Embase, PsycINFO, Scopus, Web of Science databases and grey literature sources for studies reporting prevalence of mental disorders in Uganda from January 2010 to April 2018 inclusive. The included studies had to assess mental disorders using internationally accepted diagnostic criteria and validated instruments. Identified studies were critically appraised by two independent reviewers and prevalence pooled using the random-effects model. Certainty in the pooled prevalence estimates was evaluated using the Grading of Recommendation, Assessment, Development and Evaluation approach.

Results

Twenty-four studies were included in the review. The prevalence of any mental disorder was 22.9% (95% C.I 11.0%-34.9%) among children and 24.2% (95% C.I 19.8%-28.6%) among adults. Prevalence of anxiety disorders was 14.4% (95% C.I 4.9%-24.0%) and 20.2% (95% C.I 14.5%-25.9%) among children and adults, respectively. Prevalence of current depressive disorders in children was 22.2% (95% C.I 9.2%-35.2%) and 21.2% (95% C.I 16.8%-25.6%) in adults.

Limitations

Substantial heterogeneity (*I-square statistic* >90%) was observed across analyses that was not explained by subgroup analysis. The included studies were limited to various geographic regions of Uganda with none conducted countrywide.

Conclusions

Anxiety disorders and depression affect one in four Ugandans. Health services decision-makers should consider such prevalence in planning. Further population-based studies are required to address the lack of information regarding other mental disorders.

Key words

Mental disorders; depression disorder; anxiety disorders; prevalence; child; adult; Uganda

3.1 Background

Mental disorders encompass health conditions commonly characterised by unexpected disturbance in a person's cognition, emotion and behavioural control, preventing them from functioning effectively [1, 2]. Severe mental disorders have also been shown to reduce life expectancy by approximately 20 years [3-5]. According to the Global Burden of Disease Study (GBD) 2016, an estimated 1.1 billion people globally were affected by mental disorders [6], with depression and anxiety disorders ranked among the top ten causes of years lived with disability (YLDs) in nearly all countries [6, 7]. Empirical evidence also suggests that 10-20% of children and adolescents globally experience mental disorders [8, 9]. Strikingly, the World Health Organization (WHO) World Health Report 2017 indicated that 80% of people with mental disorders are from low- and middle-income countries (LMICs) [10]. As a cause for greater concern, the prevalence of mental disorders in Sub-Saharan Africa (SSA), including Uganda, is predicted to increase by 130% from 2010 to 2050 [11]. Despite this, reliable epidemiological studies of mental disorders in LMICs, including Uganda, appear sparse [12-15].

Research indicates that there is a relationship between biological (age, infection, nutrition and genetics), psychological (fear, failure and anger) and social (education, family function and structures, neighbourhood, social class, self-esteem, loss of a relationship and societal expectations) factors that trigger mental disorders [16, 17]. People living in LMICs exhibit and are exposed to many of these factors known to fuel mental disorders. For example, previous studies show that people with HIV, coronary heart disease, cancer and diabetes are more likely to develop anxiety disorders and depression [18, 19]. Similarly, populations in conflict zones including South Asia, the Middle East, the Balkans and Sub-Saharan Africa exhibit increased prevalence of mental disorders [20-22]. In addition, up to 75% of cases of mental disorders in adulthood start before the age of 24 years [23, 24], with people 10-29 years old experiencing the greatest burden [7, 15, 25].

These scenarios are all relevant to the Ugandan context. Uganda has a population of approximately 39 million people (June 2018) living across 122 districts [26, 27]. Approximately 55% of the population are children under 18 years of age and 23% are 18-29 years old who predominantly live in rural areas and are subsistence farmers [27, 28]. Eight percent are orphans [26, 28]; there is high prevalence of human immunodeficiency virus (HIV) and malaria, as well as a rising burden of non-communicable chronic diseases, including cardiovascular disease, cancer, and diabetes [25, 29]. These are all factors that may influence the prevalence of mental disorders in Uganda. In addition, the country has a recent history of over two decades (1986-2007) of armed conflicts in the northern and north-eastern regions [30, 31]; exposure to war may influence social, economic and health and the prevalence of mental disorders. Although studies have reported prevalence of mental disorders in different populations, there has been no attempt to consolidate prevalence studies derived from Uganda.

Reliable prevalence data regarding mental disorders is required to inform prioritisation and investment in strategies to improve access to and delivery of health services in Uganda [32, 33]. At an international level, the enormous burden of mental disorders has guided the development of the WHO Mental Health Gap Action Programme (mhGAP) [34] and the WHO Mental Health Action Plan 2013-2020 [35]. To translate these plans into action, each country is required to customise the plan to their health service context. The objective of this systematic review was to determine the recent prevalence of mental disorders in children and adults in Uganda, so as to better inform future planning and delivery of health services for people with mental disorders. To date, no systematic review has been conducted investigating the prevalence of mental disorders in children and adults in Uganda.

3.2 Methods

This systematic review adhered to the Joanna Briggs Institute (JBI) methodology for conducting and reporting systematic reviews of prevalence and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [32, 36, 37]. The protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO, registration number CRD42018101986) and published *a priori* [38].

3.2.1 Inclusion and exclusion criteria

Studies were considered eligible if they: i) examined the prevalence of mental disorders in participants of any age (children <18 years and adults ≥18 years); ii) used diagnostic criteria for mental disorders from the 10th revision of the International Classification of Diseases and Related Health Problems (ICD-10) or the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV or DSM-5) [1, 2]; iii) used a validated instrument to assess a mental disorder (studies of neurological and substance use disorders were excluded); iv) studies were conducted in Uganda and participants were sampled from the community or institutions including hospital or clinic settings (studies conducted in psychiatric hospitals/clinics or prisons were excluded); v) studies were observational study designs (cross-sectional, cohort and case-control studies) conducted and published in 2010 or later (until 30 April 2018). Inclusion was limited to studies conducted post-2010 to provide a clearer picture of current estimates in Uganda [38]. If studies were published after 2010 and the date of study was not provided, these studies were included.

3.2.2 Literature search

A three-step approach [38] to comprehensively search for studies was conducted between 1st and 6th May 2018. The following citation databases were searched: PubMed, Embase, PsycINFO, Scopus and Web of Science. Google Scholar, ProQuest (Dissertations and Theses), and websites, the Republic of Uganda Ministry of Health Knowledge Management Portal and the WHO Institutional Repository for Information Sharing (WHO IRIS), were also searched. The combination of search terms used was

developed in PubMed and adapted for each database searched using database-specific indexing terms for 'mental disorders', 'prevalence' and 'Uganda'. The full search strategy for each information source is available in Appendix 3.I. The search was supplemented by hand searches of reference lists of included studies. To correspond with the review eligibility criteria (see above), searching of all sources was restricted to studies published from January 2010.

3.2.3 Selection of studies

All records retrieved from the search were uploaded into Endnote X8 (Clarivate Analytics, PA, USA) and duplicates removed. One reviewer (JO) screened titles and abstracts to determine study eligibility. Citation details of potentially relevant studies were imported into the JBI System for Unified Management, Assessment and Review Information (JBI SUMARI) software [39]. The full texts of these studies were retrieved and assessed in detail by a single reviewer (JO) against the inclusion criteria. Reasons for exclusion of retrieved studies were recorded. Where necessary, decisions regarding inclusion and exclusion of studies were confirmed via discussion with the second reviewer (EA).

3.2.4 Methodological quality assessment

Methodological quality of the included studies was assessed independently by two reviewers (JO and SM) using the JBI standardized critical appraisal instrument for prevalence studies [40]. The instrument has nine items to assess for risk of bias in sampling, analysis and measurement in primary studies. The total score ranges from 0 to 9 for individual studies. Only criteria with a 'yes' score was considered to have no risk of bias in that criteria and was given one point. Disagreement was resolved by consensus or with a third reviewer (EA).

3.2.5 Data extraction

For each included study, descriptive details, including participant characteristics, setting/district and methodological details were extracted, as well as prevalence data using the JBI data extraction form for prevalence studies [32]. Full data extraction was initially piloted with six studies. Prevalence data from each study was extracted independently and in duplicate by two reviewers (JO and EA). Discrepancies in prevalence data extracted from one study [41] were resolved via discussion (JO and EA). In addition, two studies (three articles) were included where the overlap with the reported age strata (14-19) [42, 43] and 15-24 [44] violated the cut-off point (<18 years for children or ≥18 years for adults) predetermined for this review [38]. Corresponding authors of ten studies [45-54] were contacted for additional information. Six of these studies were excluded because the required information was not provided [45, 46, 48, 49, 51-53].

3.2.6 Data analysis

Pooled prevalence estimates of any mental disorder, anxiety and depression in children and adults were calculated using DerSimonian and Laird random effects meta-analysis [55] set to a logit transformation model [56] in OpenMeta-Analyst software [57]. Analyses were undertaken by year of publication to observe period patterns in the data, where possible. I-squared (I^2) statistic and Chi-squared (χ^2) test (Cochran's Q) were used to assess heterogeneity across studies [58, 59]. Potential sources of heterogeneity were investigated, where possible, with subgroup analyses based on type of instruments used (in at least three or more studies) to assess mental disorders, location from which participants were sampled (health facility or community) and sample size (<300, 300-500 and ≥501).

To avoid multiple counting of respondents in circumstances where: i) a single study reported more than one mental disorder [50, 60-63]; or ii) two or more articles published results from the same study and data collection period [42, 43, 60, 61]; only results reporting the highest number of cases were used in the analysis of the overall pooled prevalence of mental disorders but were pooled for specific disorder estimates. This analysis of the highest number of cases was not specified in advance [38]. The certainty of the pooled prevalence estimates was determined using the Grading of Recommendation, Assessment, Development and Evaluation (GRADE) approach for systematic reviews of prognosis [64].

3.3 Results

3.3.1 Identification of studies

The literature search identified 632 records, from which 24 studies (26 articles) with 17,893 participants were included. Figure 3.1 illustrates the process of study selection and inclusion. Of the 632 records, 202 were excluded as they were duplicate records and 339 were excluded after screening titles and abstracts for their relevance. A total of 91 records were potentially eligible for full-text retrieval for detailed assessment. Of these, 65 (two conference abstracts [48, 51] and 63 full text articles) were excluded and the reasons for exclusion are presented in Figure 3.1. The remaining 26 publications from 24 studies were included in the review [41-45, 50, 54, 60-63, 65-79].

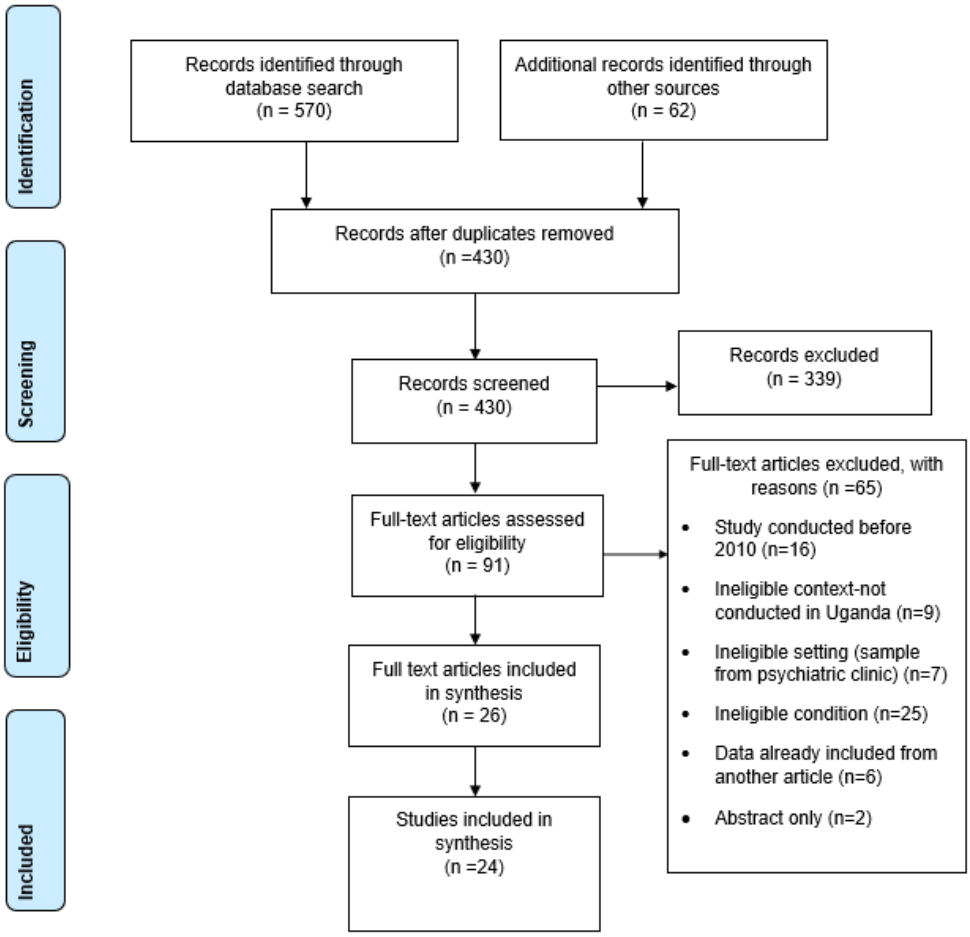


Figure 3.1 Flow diagram of the process of study identification and inclusion

3.3.2 Characteristics of included studies

The key characteristics of the included studies are presented in Table 3.1. Five studies (six publications) were conducted on 3803 children [42, 43, 50, 62, 63, 69] and 19 studies on 14,091 adults [41, 44, 45, 50, 54, 60-62, 65-68, 70, 72-75, 77-79]; two of the latter [50, 62] also assessed prevalence in children. Two of the included studies were conducted in 2010, three in 2011, three in 2012, three in 2013 and four in 2014. Seven studies did not report year of data collection.

In children, five studies reported prevalence of anxiety disorders (including post-traumatic stress disorder [PTSD], generalized anxiety disorder [GAD], specific phobias and separation anxiety disorder) [42, 50, 62, 63, 69], while four studies reported prevalence of depressive disorders (major depressive disorder [MDD] and dysthymia) (Table 3.1) [43, 50, 62, 63]. One study reported the prevalence of psychotic disorder syndromes and eating disorders among children [42, 43]. In adults, five studies provided prevalence data on anxiety disorders (PTSD and GAD) [50, 54, 61, 62, 67] and 19 studies provided prevalence data on depressive disorders (MDD and bipolar disorder) [41, 44, 45, 50, 60, 62, 65, 66, 68, 70, 72-79]. All 24 included studies reported point prevalence, although two of the studies also reported lifetime prevalence [76, 77] of mental disorders.

Seventeen studies used Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) criteria, [41-43, 54, 60-62, 65-67, 71, 72, 74-79], one study used DSM-III [68], five studies did not explicitly specify whether the International Classification of Diseases (ICD) or DSM was used [44, 45, 50, 63,70]. All included studies used ICD or DSM criteria for diagnosis and 14 different validated instruments to assess mental disorders in children and adults (see Table 3.1). To assess anxiety in children, instruments employed were the Mini-International Neuropsychiatric Interview for Children and Adolescents (MINI Kid) [42, 43], the University of California at Los Angeles Post-traumatic Stress Disorder Reaction Index for DSM-IV) for children [62], parts I and IV of the Harvard Trauma Questionnaire (HTQ) with a cut-off score ≥2.0 to screen PTSD [50], and the five-item version of the Screen for Child Anxiety Related Disorders (SCARED) with a cut off score of ≥4 [63]. In adults, the five studies that assessed anxiety disorders (PTSD and GAD) employed the MINI-Plus [61], the Generalized Anxiety Disorder Questionnaire for DSM-IV (GAD-Q-IV) [54], the Posttraumatic Diagnostic Scale (PDS) [62], parts I and IV of the HTQ with a cut-off score ≥2.0 to screen positive for PTSD [50], and the ICD-11 Trauma Questionnaire (ICD-TQ) for PTSD and Complex PTSD [67].

Depression in children was assessed using MINI Kid [43], the Children's Depression Inventory (CDI) with a score cut-off ≥3 [62], the Hopkins Symptom Checklist-25 (HSCL-25) with a cut-off score ≥1.75 [50], and the Short Mood and Feelings Questionnaire – Child self-report (MFQ-C) with a cut-off score ≥10 [63]. In adults (Table 3.1), 11 included studies used the Mini-International Neuropsychiatric Interview (MINI) [41, 45, 60, 65, 66, 71, 72, 74, 76-78], three used the Patient Health Questionnaire (PHQ-9) with a cut-off score of ≥ 10 [68, 75, 79], four used the Hopkins Symptom Checklist-25 (HSCL-25) depression module that consist of 15-items with a cut-off score ≥1.65 and ≥1.75 [44, 50, 62, 73] and one used the Edinburgh Postnatal Depression Scale (EPDS) with a cut-off score ≥10 [70].

The included studies were from 19 districts (Table 3.1) across the four (Central, Eastern, Northern and Western) regions of Uganda. Four studies (five articles) were exclusively from the Northern region [50, 60-62, 67], one from the Eastern region [44], four from the Western region [66, 69, 70, 73] and 11 from the Central region [41, 54, 65, 68, 71, 74, 76-79]. Four studies encompassed more than one region; one study was conducted across the Northern, Central and Western regions [45], one from the Northern and Western regions [63], one from the Central and Eastern regions [75] and one study (two articles) from the Northern and Eastern regions of Uganda [42, 43]. Of the included studies that investigated mental disorders in children, all the participants were sampled from community settings [42, 43, 50, 62, 63, 69], while for those studies informing prevalence of mental disorders in adults, nine sampled participants from community settings [44, 50, 54, 60-62, 67, 72, 73, 79] and 12 from health facility settings [41, 45, 65, 66, 68, 70, 71, 74-78].

Table 3.1: Characteristics of included studies reporting prevalence of mental disorders in children and adults in Uganda

First author, publication year	*Ugandan district*	*Setting*	*Study design*	*Participants*	*Mental disorders assessed*	*Instrument used to detect disorder*	*Sample size*	*Cases*	*Proportion (95% C.I.)*
Irvine, 2012 [69]	Rukungiri	Households in the community	Cross-sectional	AIDS, orphaned, non-AIDS, orphaned and non-orphaned	PTSD	TSCC	726	56	7.7% (95% C.I 5.8-9.7%)
Abbo et al., 2013[42]	Gulu Lira Kaberamaido Tororo	Households in the community	Cross-sectional	Children aged 3-19 years in UNICEF child protection project	Anxiety disorders* Psychosis Eating disorders	MINI Kid	1587	423* 24 11	26.7% (95% C.I 24.5-28.8%) 1.5% (95% C.I 1.0-2.2%) 0.7% (95% C.I 0.4-1.2%)
Kinyanda et al., 2013[43]	Gulu Lira Kaberamaido Tororo	Households in the community	Cross-sectional	Children aged 3-19 years in UNICEF child protection project	MDD	MINI Kid	1587	136	8.6% (95% C.I 7.2-10.1%)
Malamba et al.,2016[50]	Amuru Gulu Nwoya	Households in the community	Cross-sectional baseline study	Post-conflict population living in displaced area, transient or permanent homes: Aged 13-17 years Aged 18-49 years.	PTSD MDD PTSD MDD	HTQ DHSCL-25 cut-off score ≥1.75 HTQ ≥2.0 15-item HSCL ≥1.75	514 1874	25 34 254 326	4.9% (95% C.I 3.0-6.7%) 6.6% (95% C.I 4.5-8.8%) 13.6% (95% C.I 12.0-15.1%) 17.4% (95% C.I 15.7-19.1%)

Saile et al., 2016[62]	Gulu Nwoya	Households in the community	Cross-sectional	Community in post-war area: children aged 6-13 years	PTSD	UPID	513513	17	3.3% (95% C.I 1.8-4.9%)
					Depression	CDI cut-off score ≥3		196	38.2% (95% C.I 34.0-42.4%)
				Adults aged 18-80 years	PTSD Depression	PDS DHSCL-25 (≥1.65)	513	51	9.9% (95% C.I 7.4-12.5%)
								74	14.4% (95% C.I 11.4-17.5%)
Meyer et al., 2017[63]	Adjumani Kiryandongo	Households in refugee camps	Cross-sectional	South Sudanese refugee adolescents aged 13-17 years	Depression Anxiety disorders	MFQ-C cut-off score ≥10 SCARED cut-off score ≥4	463	167	36.1% (95% C.I 31.7-40.4%)
								140	30.2% (95% C.I 26.1-34.4%)
Wagner et al., 2011[75]	Jinja Kampala	HIV clinic	Cohort baseline	HIV positive clients new to the clinic	Depression	PHQ-9	602	77	12.8% (95% C.I 10.1-15.5%)
Kinyanda et al., 2011[71]	Wakiso (Entebbe Municipality)	HIV clinic in Kigungu HC III and Entebbe Hospital	Cross-sectional	People living with HIV enrolled for care	MDD	MINI-Plus	618	50	8.1% (95% C.I 5.9-10.2%)
Nakimuli-Mpungu et al., 2011[76]	Mityana	Mityana Hospital	Not reported	People living with HIV/AIDS on ART	MDD and bipolar	MINI depression and mania module	500	67 Current	13.4% (95% C.I=10.4-16.4%)
								76 lifetime	28.6% (95% C.I=24.6-32.6%)
Akena et al., 2012[65]	Kampala	HIV clinic	Cross-sectional	People living with HIV/AIDS	MDD	MINI-Plus	368	64	17.4% (95% C.I 13.5-21.6%)
Kakyo et al., 2012[70]	Kabarole	Postnatal clinic	Cross-sectional	Postnatal mothers with baby ≤ 12 weeks attending young child clinic	Postnatal depression symptoms	EPDS Cut-off score ≥ 10	202	87	43.1% (95% C.I 36.4-50.0%)

Kinyanda et al., 2012[44]	Amuria Katakwi	Community household survey	Cross-sectional	Vulnerable people from war affected districts	MDD	DHSCL-25 cut-off scores ≥1.75	1561	664	42.5% (95% C.I 40.1-45.0%)
Nakimuli-Mpungu et al., 2013[77]	Mityana	Mityana Hospital	Case-control	People living with HIV/AIDS on ART	MDD	MINI depression and mania module	400	49 current 95 lifetime	12.2% (95% C.I 9.0-15.5%) 23.8% (95% C.I 19.8-28.2%)
Akena et al., 2015[45]	Gulu Kampala Mbarara	Diabetic clinic	Cross-sectional	Confirmed diabetic mellitus patients who have attended clinic for at least 2 months	MDD	MINI-Plus	437	152	34.8% (95% C.I 30.3-39.2%)
Ashaba et al., 2015[66]	Mbarara	Hospital wards	Case-control	Mothers of malnourished children under 5 (cases), and other chronic conditions (control)	MDD	MINI-Plus	166	45	27.1% (95% C.I 20.9-34.3%) *42% in cases and 12% in control*
Dokkedah et al., 2015[67]	Gulu	Community at household level in 2014	Cross-sectional	Formerly adducted and never abducted by Lord's Resistance Army, aged 18-25 years	PTSD and complex PTSD	ICD-TQ	314	115	36.6% (95% C.I 31.3-42.0%) 46.3% in formerly abducted and 29.7% in never abducted
Gyagenda et al., 2015[68]	Kampala	Hospital (Mulago and Nsyambya)	Cross-sectional	Post stroke clients with single episode of stroke confirmed with CT scan	MDD	PHQ-9 cut-off score ≥10	73	23	31.5% (95% C.I 22.0-42.9%)
Mugisha et al., 2015a[60]	Amuru Gulu Nwoya	Community household survey	Cross-sectional	Residents of the village, 18 years or older	MDD	MINI-Plus	2361	582	24.7% (95% C.I 22.9-26.4%)

Mugisha et al., 2015b[61]	Amuru Gulu Nwoya	Community household survey	Cross-sectional	Residents of the village, 18 years or older	PTSD GAD	MINI-Plus	2361	280 349	11.8% (95% C.I 10.5-13.1%) 14.8% (95% C.I 13.4-16.3%)
Mwesiga et al., 2015[41]	Wakiso	Mildmay-Lweza (hospital)	Cross-sectional	People living with HIV/AIDS attending clinic	Depression	MINI-Plus	345	34	9.9% (4.9% had DPC) (95% C.I-7.1-13.5%)
Kinyanda et al., 2016[72]	Kalungu (Masaka) Wakiso	Community household survey	Cross-sectional nested in cohort	Older people (50+ with and without HIV/AIDS impact) study cohort	MDD	MINI-Plus	468	43	9.2% (95% C.I 6.7-12.2%)
Perkins, 2016[73]	south western (District not specified)	Community household survey	Cross-sectional	All residents of selected 8 villages, aged 18+	Depression	16-item HSCL-depression	1499	268	17.9% (95% C.I 15.9-19.8%)
Huang et al., 2017[79]	Kampala	Community household survey	Cross-sectional	Parents of children enrolled in pre-school up to primary three	Depression	PHQ-9 Cut-off score ≥10	303	85	28.1% (95% C.I 23.3-33.4%)
Kinyanda et al., 2017[74]	Masaka Wakiso	TASO HIV clinic	Cross-sectional	People living with HIV/AIDS who are ART naïve	MDD	MINI-Plus	899	126	14.0% (95% C.I 11.7-16.3%)
Umeh & Bangirana, 2017[54]	Kampala	Makerere University	Cross-sectional	First year undergraduate	GAD	GAD-Q-IV	387	112	28.9% (95% C.I 24.6-33.7%)
Musinguzi et al., 2018[78]	Masaka Wakiso	TASO HIV clinic	Cross-sectional nested in cohort	People living with HIV/AIDS who are ART naïve	MDD	MINI-Plus	201	62	30.8% (95% C.I 24.8-37.5%)

AIDS=Acquired Immune Deficiency Syndrome; ART=antiretroviral therapy; CDI=Children's Depression Inventory; C.I=confidence interval, DPC=depression pain comorbidity; EPDS=Edinburgh Postpartum Depression Scale; GAD-Q-IV=Generalised Anxiety Disorder Questionnaire for DSM IV;HIV=Human Immunodeficiency Virus; HTQ=Harvard Trauma Questionnaire; 15-items HSCL or DHSCL-25= Depression module of Hopkins Symptom Checklist-25; ICD-TQ=ICD-11 Trauma Questionnaire; MDD=Major Depressive Disorders; MFQ-C=Short Mood and Feelings Questionnaire-Child Self Report; MINI=Mini International Neuropsychiatric Interview; MINI Kid= Mini International Neuropsychiatric Interview for children and adolescents; PDS=Posttraumatic Diagnostic Scale; PHQ-9=Patient Health Questionnaire; PTSD=post-traumatic stress disorder; SCARED= 5-item version of the Screen for Child Anxiety Related Disorders; TSCC=Trauma Symptoms Checklist for Children; UNICEF= United Nation Children's Fund; UPID=University of California at Los Angeles PTSD Reaction Index for DSM-IV.

* The study by Abbo et al. reported multiple specific anxiety disorders including: specific phobia, 15.8% (95% C.I 14.0-17.6); PTSD, 6.6%(95% CI 5.4-8.0); separation anxiety disorder, 5.8% (95% CI 4.7-7.1); social phobia, 5.2% (95% C.I 4.2-6.4); agoraphobia, 3.8% (95% C.I 2.9-4.8); panic disorder, 3.0% (95% C.I 2.2-4.0); GAD 1.4%(95% C.I 0.9-2.1); obsessive compulsive disorder, 0.6% (95% C.I 0.3-1.1); and adjustment disorder 0.5% (0.2-1).

3.3.3 Methodological quality of included studies

Overall, the methodological quality assessment for the included studies was high (Table 3.2). Individually, 10 studies were given high-quality scores (eight to nine 'yes' ratings), 12 studies scored seven 'yes' ratings and only two scored six 'yes' ratings. Of the studies investigating mental disorders in children, all but one sampled the target population appropriately (Table 3.2; Q1 and Q2). Adequacy of the sample size was unclear in two of the studies [62, 63]. Most studies fulfilled criteria aligned with the measurement of prevalence in children; a similar pattern was also observed in studies involving adults. However, in a subset of studies it was 'unclear' if the data collectors were trained or any mechanism to ensure consistency among data collectors was followed (Table 3.2; Q7). The majority of studies used appropriate statistical analyses (Q8) and reported high response rates, generally >90% (Table 3.2; Q9).

Table 3.2 Methodological quality of included studies

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Score
Irvine, 2012[69]	Y	Y	Y	Y	Y	Y	U	Y	Y	8
Abbo et al., 2013[42] Kinyanda et al., 2013[43]	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Malamba et al., 2016[50]*	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Saile et al., 2016[62]*	Y	N	U	Y	Y	Y	Y	Y	Y	7
Meyer et al., 2017[63]	Y	Y	U	Y	Y	Y	Y	U	Y	7
% Score children	100	80	60	100	100	100	80	80	100	
Wagner et al., 2011[75]	Y	Y	N	Y	Y	Y	U	Y	Y	7
Kinyanda et al., 2011[71]	Y	N	U	Y	Y	Y	Y	Y	Y	7
Nakimuli-Mpungu et al., 2011[76]	Y	U	N	Y	Y	Y	Y	Y	Y	7
Akena et al., 2012[65]	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Kakyo et al., 2012[70]	Y	Y	N	Y	Y	Y	U	Y	Y	7
Kinyanda et al., 2012[44]	Y	Y	Y	Y	Y	Y	Y	U	Y	8
Nakimuli-Mpungu et al., 2013[77]	Y	U	N	Y	Y	Y	Y	Y	Y	7
Akena et al., 2015[45]	Y	Y	N	Y	Y	Y	Y	N	Y	7
Ashaba et al., 2015[66]	Y	U	Y	Y	Y	Y	Y	Y	Y	8
Dokkedah et al., 2015[67]	Y	Y	U	Y	Y	Y	U	N	Y	6
Gyagenda et al., 2015[68]	Y	Y	U	Y	Y	Y	U	Y	Y	7
Mugisha et al., 2015a[60]; Mugisha et al., 2015b[61]	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Mwesiga et al., 2015[41]	Y	U	N	Y	Y	Y	Y	Y	Y	7
Perkins, 2016[73]	Y	Y	Y	U	Y	Y	Y	Y	Y	8
Kinyanda et al., 2016[72]	Y	U	U	Y	Y	Y	U	Y	Y	6
Huang et al., 2017[79]	Y	Y	U	Y	Y	Y	Y	U	Y	7
Kinyanda et al., 2017[74]	Y	Y	U	Y	Y	Y	Y	Y	Y	8
Umeh and Bangirana, 2017[54]	Y	Y	Y	Y	Y	Y	U	Y	Y	8
Musinguzi et al., 2018[78]	Y	Y	U	Y	Y	Y	Y	U	Y	7
% Score adults	100	68.4	26.3	94.7	100	100	68.4	73.7	100	
Overall % quality scores	100	70.8	33.3	95.8	100	100	70.8	75.0	100	

Key: Q stands for question/criteria, Q1. Was the sample frame appropriate to address the target population? Q2. Were study participants sampled in an appropriate way? Q3. Was the sample size adequate? Q4. Were the study subjects and settings described in detail? Q5. Was the data analysis conducted with sufficient coverage of the identified sample? Q6. Were valid methods used for the identification of the condition? Q7. Was the condition measured in a standard, reliable way for all participants? Q8. Was there appropriate statistical analysis? Q9. Was the response rate adequate, and if not, was the low response rate managed appropriately? Y – Yes, U – Unclear, N – No. * Study included respondents who were children and adults.

3.3.4 Prevalence of mental disorders among children and adults in Uganda

The pooled prevalence estimate of mental disorders was 22.9% (95% C.I 11.0%-34.9%; I^2= 99.1%; χ^2 p <0.001 Figure 3.2[a]) in 3,803 children and 24.2% (95% C.I 19.8% – 28.6%; I^2 97.8%, χ^2 p<0.001 Figure 3.2[b]) in 14,091 adults assessed. In adults, included studies published from 2012 to 2015 showed a generally higher prevalence compared to the remainder of the included publication period. Specific mental disorders identified and included in these analyses were anxiety disorders and depression.

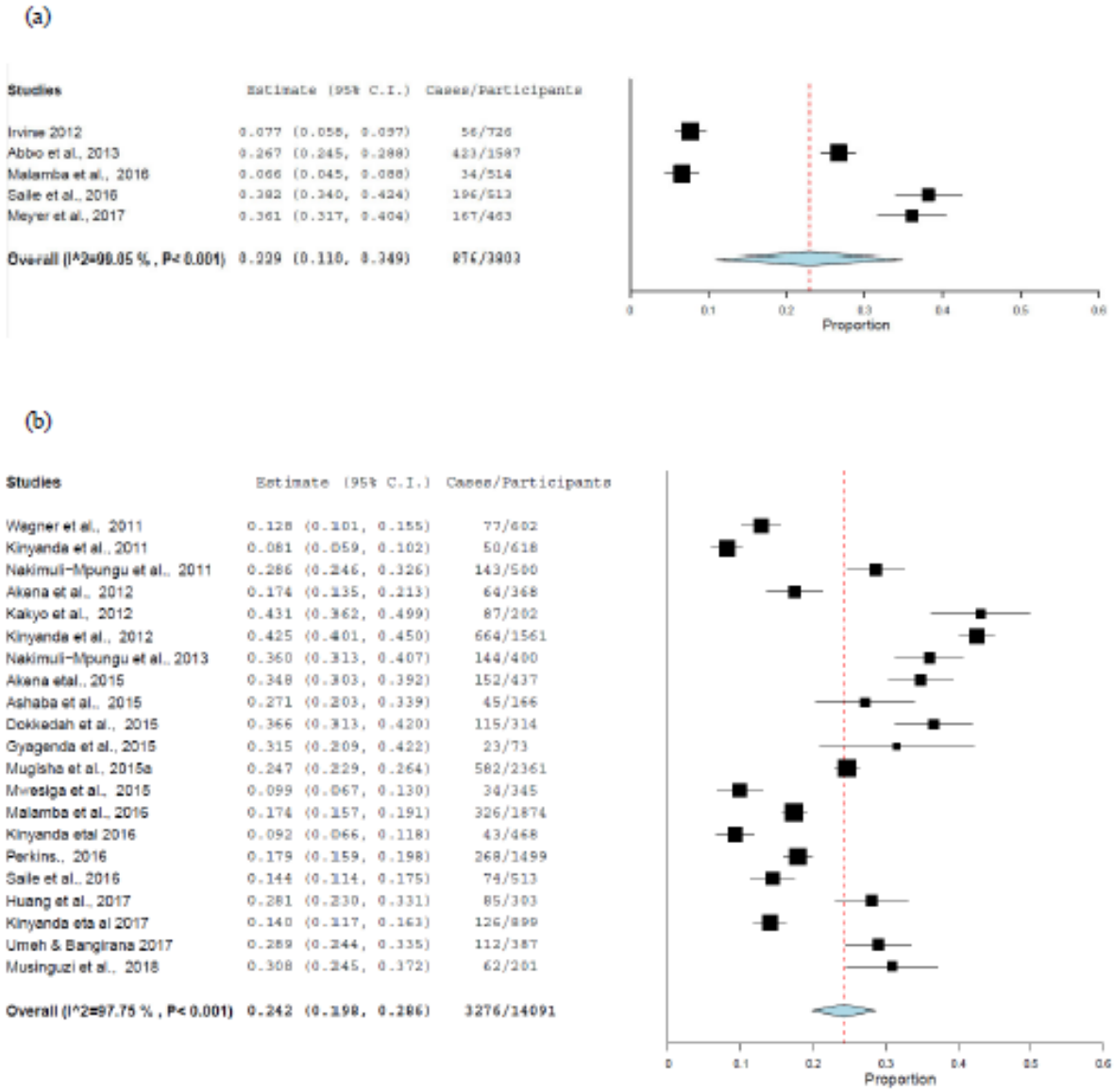


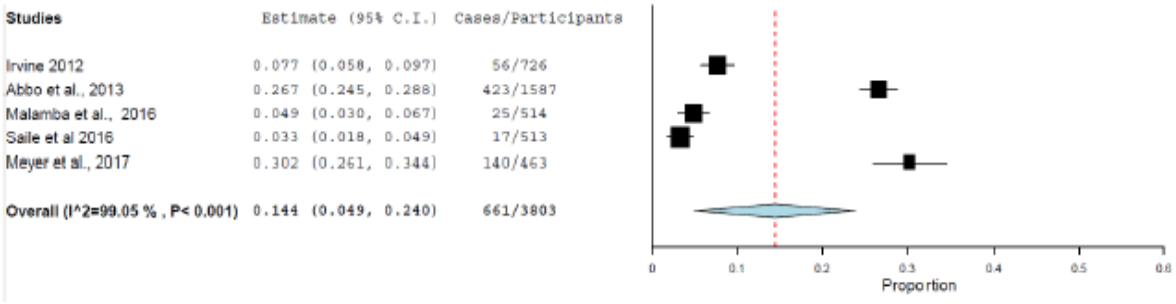
Figure 3.2 Meta-analysis of prevalence estimates of mental disorders in (a) children and (b) adults in Uganda, presented by year of publication. Mental disorders include anxiety disorders (e.g. post-traumatic stress disorder, specific phobia, separation anxiety disorder, generalized anxiety disorder) and depressive disorders (major depressive disorder, dysthymia and bipolar disorder)

3.3.5 Anxiety disorders in children and adults

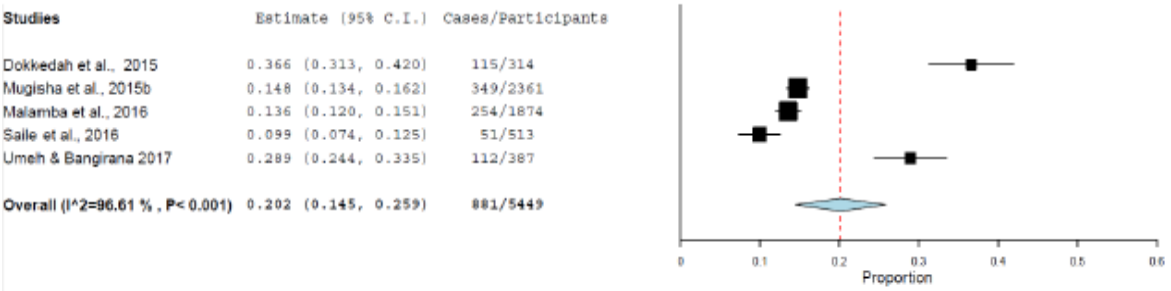
The pooled prevalence estimate of anxiety disorders in children was 14.4% (95% C.I 4.9%-24.0%, I^2 = 99.1%; χ^2 p<0.001; Figure 3.3[a]). Included in these results were the four studies [42, 50, 62, 69] that reported prevalence of PSTD in children and the pooled estimate was 5.6% (95% C.I 3.7%-7.5%; I^2= 81%; χ^2 p <0.001), with one reporting probable anxiety disorders [63]. In addition to PTSD, a single study (n=1587 children)[42] reported specific phobias, 15.8% (95% C.I 14.0%-17.6%); separation anxiety disorder, 5.8% (95% CI 4.7%-7.1%); social phobia, 5.2% (95% C.I 4.2%-6.4%); agoraphobia, 3.8% (95% C.I 2.9%-4.8%); panic disorder, 3.0% (95% C.I 2.2%-4.0%); GAD 1.4% (95% C.I 0.9%-2.1%); obsessive compulsive disorder, 0.6% (95% C.I 0.3%-1.1%); and adjustment disorder 0.5% (0.2%-1.0%).

The pooled prevalence of anxiety disorders (GAD and PTSD) in adults was 20.2% (95% C.I 14.5%-25.9% I^2 = 96.6%; χ^2 p<0.001; Figure 3.3[b]).

(a)



(b)



Key: C.I. = Confidence Interval; I^2 = I-square statistic, P< = Chi-square probability value

Figure 3.3. Meta-analysis of prevalence of anxiety disorders in (a) children and (b) adults in Uganda, presented by year of publication. Anxiety disorders include post-traumatic stress disorder, specific phobia, separation anxiety, generalized anxiety disorder and others reported by Abbo et al., 2013.

3.3.6 Depressive disorders in children and adults

The pooled point prevalence estimate of depressive disorders in children was 22.2% (95% C.I 9.2%-35.2%; I^2 = 99.0%; χ^2 p<0.001; Figure 3.4[a]). In adults, the pooled prevalence of current depressive disorders was 21.2% (95% C.I 16.8%-25.6%; I^2 = 97.7%; χ2 p<0.001 Figure 3.4[b]). In addition to the current prevalence of depressive disorders in adults, two studies, [76, 77] involving 900 participants also provided lifetime prevalence. In these studies, the prevalence estimate of lifetime depressive disorders was 19.4% (95% C.I 11.0%-27.7%; I^2 = 90.3%; χ^2 p=0.001), and the current depressive disorders prevalence was 12.8% [76, 77]. Overall, lifetime prevalence unexpectedly appeared lower than the pooled prevalence of current depressive disorders; this may be due to the inadequate data available for analysis.

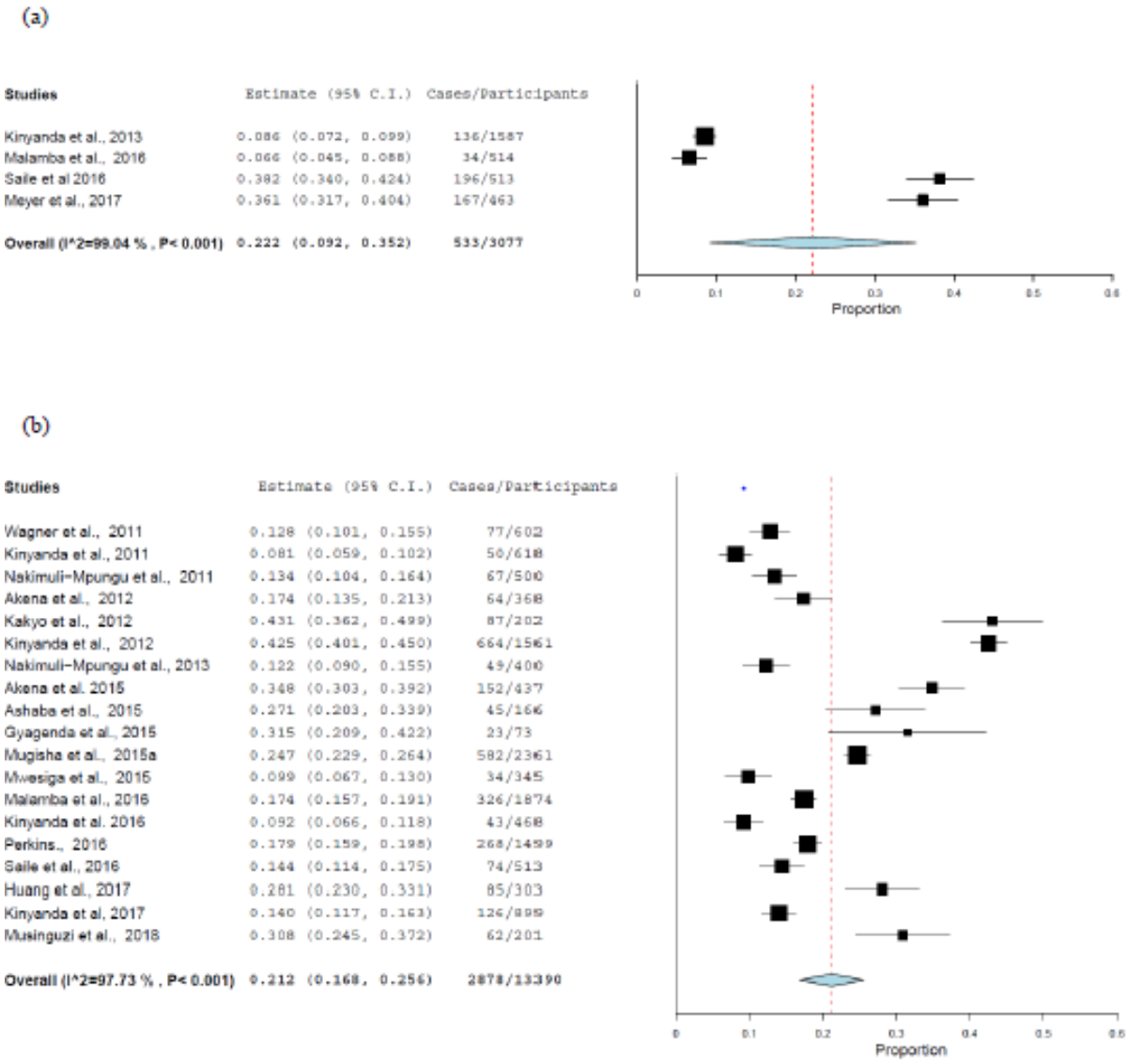


Figure 3.4 Meta-analysis of prevalence of depressive disorders in (a) children and (b) adults in Uganda, presented by year of publication. Depressive disorders include major depressive disorder, dysthymia and bipolar disorder.

3.3.7 Other mental disorders

One study reported psychotic disorder syndrome (n=24) 1.5% (95% C.I 1.0%-2.2%) and eating disorders (n=11) 0.7% (95% C.I 0.4%-1.2%) in 1587 children from four districts in North and Eastern Uganda [42, 43].

3.3.8 Subgroup analysis

I^2 statistic and $\chi 2$ p-value were used to assess the presence and degree of heterogeneity across studies. There was substantial heterogeneity (I^2 > 90% and $\chi 2$ p<0.001) across all the models. It was not possible

to explore heterogeneity in children as all the included studies used different instruments and were all conducted in community settings (Table 3.1).

To explore the substantial statistical heterogeneity observed across all estimates in adults (Figures 3.2 [b] to 3.4 [b]); I^2 =98-99% χ^2 p<0.001), studies were grouped and analyzed according to the instrument used to measure the identified disorders. On this basis, prevalence estimates between groups ranged from 21.6% for the MINI (95% C.I 15.9%-27.4%; I^2 = 97.4%; χ^2 p<0.001; 11 studies, n=6763), 23.1% for the HSCL-25 (95% C.I 11.4%-34.7%; I^2 = 99.1%; χ^2 p<0.001; four studies, n=5446), and 23.5% for the PHQ-9 (95% C.I 10.8%-36.2%); I^2 = 94.3%; χ^2 p<0.001; three studies, n=978). For other instruments (EPDS, GAD-Q-IV, ICD-11), prevalence was 35.9% (95% C.I 28.0%-43.8%); I^2 = 84.0%; χ^2 p=0.002; three studies, n=903).

A further subgroup analysis was performed analyzing prevalence of mental disorders in adults, according to the setting from which they were sampled (Table 3.1). Prevalence in adults from a health facility was 24.1% (95% C.I 18.1%-30.2%; I^2 =96.8%, χ^2 p<0.001; 12 studies, 4811 participants) and 24.3% in the community (95% C.I 17.7%-30.9%; I^2=98.3%, χ^2 p<0.001; nine studies, 9279 participants).

The influence of sample size on the observed heterogeneity was also investigated. Thirteen studies included in the analysis had a sample size ≤500. The pooled prevalence for studies with a sample size <300 was 33.2% (95% C.I 25.9%-40.6%; I^2 = 74.5%; χ^2 p=0.008; four studies, n=642). While the pooled prevalence estimate from studies with a sample size ranging from 300 to 500 was 25.4% (95% C.I 17.7%-31.1%; I^2 = 97.1%; χ^2 p<0.001; nine studies, n=3522) and 19.0% (95% C.I 12.3%-25.7%; I^2 = 98.7%; χ^2 p<0.001; eight studies, n=9927) for studies with a sample size >500.

3.3.9 Summary of findings and certainty of evidence

Table 3.3 presents the GRADE Summary of Findings for the prevalence of mental disorders in Uganda, indicating moderate certainty. For all the outcomes assessed in both children and adults, certainty in estimates was affected by the inconsistency judged by heterogeneity (I^2) and precision (confidence interval) across studies.

Table 3.3. Summary of Findings: prevalence of mental disorders in Uganda using the GRADE approach

Important outcomes		Any mental disorders among children in Uganda	Any mental disorders among adults in Uganda	Anxiety disorders among children in Uganda	Anxiety disorders among adults in Uganda	Depressive disorders among children in Uganda	Depressive disorders among adults in Uganda
Certainty assessment	Number of studies	5	21	5	5	4	19

	Study design	Cross-sectional (2 studies were embedded in cohort study)	Cross-sectional (also as part of case control studies and embedded in cohort study)	Cross-sectional	Cross-sectional	Cross-sectional	Cross-sectional
	Risk of bias	No concerns[1]	No concerns[5]	No concerns[1]	No concerns[5]	No concerns[1]	No concerns[5]
	Inconsistency	Serious concerns[2]	Serious concerns[6]	Serious concerns[2]	Serious concern[6]	Serious concerns[2]	Serious concerns[6]
	Indirectness	No concerns[3]	No concerns[7]	No concerns[3]	No concerns	No concerns	No concerns[7]
	Imprecision	Serious concerns[4]	No concerns	Serious concerns[4]	No concerns	Serious concerns[4]	No concerns
	Other considerations	No concerns	No concerns	No concerns	No concerns	No concerns	No concerns
Number of participants	With condition	876	3276	661	881	533	2878
	Total	3803	14090	3803	5449	3077	13389
Results	Percentage (95% C.I)	22.9% (11%-35%)	24.2% (19.8%-28.6%)	14.4% (4.9%-24.0%)	20.2% (14.5%-25.9%)	22.2% (9.2%-35.2%)	21.2% (16.8%-25.6%)
	Absolute (95% C.I)	229 per 1000 (110 per 1000-349 per 1000)	242 per 1000 (198 per 1000-286 per 1000	144 per 1000 (49 per 1000-240 per 1000	202 per 1000 (145 per 1000-259 per 1000	222 per 1000 (92 per 1000-352 per 1000	212 per 1000 (168 per 1000-256 per 1000
Certainty		Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

GRADE: Grading of Recommendations, Assessment, Development and Evaluations

C.I: confidence interval, I^2: I-squared statistic

[1] Some sampling issues with the Saile et al. 2016 but only one study contributed 19.8% weight to meta-analysis, hence level of certainty was not downgraded

[2] Serious concerns due to considerable heterogeneity (I^2 ≥90%, p<0.001), hence level of certainty was downgraded to moderate for inconsistency.

[3] Inclusion of two studies with participants from refugee and orphan backgrounds; our judgement was that the prevalence did not differ much, and this body of evidence was considered to be representative of the overall population of Uganda. One study also had overlapping age strata 14-19 (that included adults 18 and 19 years) but was considered insignificant and therefore the level of certainty was not downgraded for indirectness.

4 Serious concerns due to wide confidence interval, however level of certainty was not downgraded further; see no. 2 above.

5 Some sampling issues with the Kakyo et al. 2012 and Saile et al. 2016, however, each contributed 4.7% and 5.1% weights, respectively, to meta-analysis, hence level of certainty was not downgraded

6 Serious concerns due to considerable heterogeneity (I^2 ≥90%, p<0.001) in the pooled estimates which could not be explained by the subgroup analysis (sample size, participants from healthcare and community settings, and assessment instruments used). Hence level of certainty was downgraded from high to moderate.

7 One study had an overlapping age stratum 15-24 that included children (under 18 years). However, instruments used were appropriate, and the overlap was insignificant, hence not downgraded for indirectness.

3.4 Discussion

The results of this review reveal that mental disorders affect a substantial proportion of the Ugandan population. Nearly one in four children and adults are affected by mental disorders. Across the general population, this corresponds to approximately nine million Ugandans, of whom 4.9 million are children. Major depressive disorders are the most prevalent condition, followed by anxiety disorders. In both children and adults, the review did not find studies that captured other types of mental disorders, particularly those with onset in childhood [1, 2]. There was no difference in the prevalence of identified disorders among adults, irrespective of where they were sampled from, that is, health facilities or community settings.

Overall, the findings of this review support the notion that mental disorders begin to occur early in life and continue to manifest in adulthood [23, 24]. The prevalence of mental disorders in Uganda in this review is considerably higher than that observed globally. Worldwide, the prevalence estimate of mental disorders is reported to be under 20%, and depression and anxiety disorders are more prevalent among populations under the age of 30 years [7, 15, 25]. These age group comprise the largest proportion (approximately 88%) of Uganda population. [27, 28].

There was variability in the regional coverage of prevalence data across Uganda. In an available review conducted in Uganda, the majority of studies included were from the Central region (including the capital city Kampala) and the Acholi subregion of Northern Uganda [12]. Cultural, social and economic factors that could influence the prevalence of mental disorders are diverse and may differ considerably between regions of Uganda [16, 17, 28]. For example, the Northern region of Uganda has recently emerged from major social and economic disruptions because of prolonged armed conflicts [30, 31], compared with the Central and Western regions. However, the effects of conflict are unclear, as one study showed that participants from Gulu, which has been the most affected by conflict, had a lower prevalence of anxiety than the three districts of Lira, Kaberamaido and Tororo [42]. At face value, this appears inconsistent with research conducted in other settings that suggest people in conflict areas have a higher prevalence of anxiety and depressive disorders [20-22]. This review restricted eligibility of studies to those conducted from 2010 or later, which was three or more years after the Lord's Resistance Army insurgency, which may explain this apparent discrepancy.

On the other hand, most included studies from the Central and Western regions of Uganda involved participants sampled from health facilities, most of whom were outpatient attendees or those with chronic

physical illness, while those from the Northern and Eastern regions were community based samples. The subgroup assessment of the influence of study locations (health facilities and community settings) on the pooled prevalence of any mental disorders showed no differences. Notwithstanding, within the timeframe of the studies informing this review, several factors associated with depression and anxiety disorders in Uganda were documented. These factors included experiencing negative life events (for example, serious illness, violence and abuse) [41-43, 50, 54, 60-63, 67, 69-71] self-perceived lack of social support [41-43, 60-63, 66, 68, 71, 76, 77], and living arrangements (single parents, non-biological parents, having many siblings) [42, 43, 50, 54, 69]. Other factors specific to adults were low socio-economic index (unpaid work such as farming, fishing, micro-enterprise/trading), low level of education [45, 65, 72, 74-76, 78] and food insecurity (especially among women) [60, 61, 71, 73, 79]. These factors were congruent with individual factors (age, physical health and psychological function), contextual factors (social environment) and family profiles documented by previous research [2, 10, 17].

Literature suggests that people with mental disorders experience worse health outcomes, compared to the general population [3-5, 7]. Yet, limited resources are devoted in response to mental health needs [14]. The findings should motivate policy makers and health service planners in Uganda to ensure adequate, safe and supportive services, including diagnostic, preventive, treatment and rehabilitative health services, are made accessible to people with mental disorders. The mental health status of children and adults should be assessed and treated when people are seeking care for other reasons or caring for relatives. The WHO mhGAP and WHO Mental Health Action Plan provide useful information as a starting point [34, 35], and encompass issues of whether to strengthen integration of health care, training of health workers or further research to establish the nature and impact of comorbidity.

3.4.1 Strengths and limitations

This systematic review had strict predefined inclusion criteria and only included studies that assessed clinically relevant symptoms [2] such as those of MDD. There were a number of limitations that must be acknowledged. Firstly, we were aware that some individuals with minor depression were excluded from the analyses undertaken in the review. In addition, most of the studies did not investigate the prevalence estimates for disorders such as psychotic disorders, eating disorders and others. The present review is likely to underestimate the overall true prevalence of mental disorders in Uganda.

Secondly, the meta-analysis identified substantial inter-study heterogeneity across all random effect models reported. Substantial heterogeneity has been reported by a similar review investigating the global

prevalence of mental disorders in children and adolescents [8]. Experts have argued that heterogeneity in observational studies should be expected and investigated [36, 58, 59]. Heterogeneity as measured by I^2 is sensitive to study precision which is often influenced by sample size and the total number of studies included in the model [59]. In the current review, the sample size and number of studies included in the analyses varied substantially. Subgroup analysis failed to explain the observed heterogeneity. However, some relevant factors such as socio-economic status and gender were not analyzed in subgroups as specified *a priori* [38] due to incomplete reporting and non-uniform data in the included studies. In addition, a number of the included studies were conducted on populations with special characteristics to explore associations of mental disorders with other variables, such as HIV, diabetes, child protection interventions and food insecurity applicable across all regions of Uganda. The possibility that the observed heterogeneity may have been due to differences in participant characteristics or other unknown factors cannot be ruled out.

Thirdly, there was wide variability in the geographical coverage of data used to calculate the pooled prevalence estimates of mental disorders in this study. None of the studies included in this systematic review investigated the prevalence of mental disorders countrywide.

These limitations highlight the need for further investigation of prevalence of mental disorders in Uganda, taking into account study methods, measurement procedures and case definitions. Ideally, large scale countrywide studies in Uganda, assessing mental disorders in appropriately sampled populations using consistent methodologies, are required to enable the formulation of any strong conclusion. In addition, future systematic reviews pertinent to Uganda should consider investigating a wider range of mental disorders to include disorders common in childhood (<17 years), and neurological and substance use disorders.

3.4.2 Conclusion

The results of this systematic review and meta-analysis indicate that approximately one in four children and adults in Uganda meet the criteria for clinically relevant symptoms of mental disorders, predominantly depression and anxiety disorders. There is limited evidence regarding the prevalence of other mental disorders in Uganda. Despite a substantial level of heterogeneity in the analyses, the pooled prevalence estimates provide an important addition in mental health epidemiology in Uganda. The findings provide essential insights for health service planning, clinical practice, and future epidemiological research in Uganda.

Contributors

JO and EA conceived the study aims and design. JO completed the analytical components of the work, including database searching, study selection, study appraisal, data extraction and statistical analysis, and drafted the initial manuscript. EA confirmed study inclusion and exclusion, and performed duplicate extraction of prevalence estimates. ZM and JO assessed certainty of the evidence. JO and EA contributed to interpretation of results, and revised and commented on all drafts of the manuscript. JO, ZM and EA read and approved the final manuscript.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors. JO is supported by an Australian Government Research Training Program Scholarship. The funder had no role in the study design, data collection and analysis, and the decision to publish or the preparation of the manuscript.

Declaration

This research contributes towards the award of a higher research degree for JO. The views expressed are those of the author's and should not be understood or quoted as being made on behalf of or reflecting the position of any institution. All other authors declare that they have no competing interests.

Acknowledgements

We acknowledge Dr Catalin Tufanaru for contribution in conceptualisation and design of this research, the assistance of The University of Adelaide Research Librarian, Ms. Maureen Bell in the development of the search strategy, and Dr Sandeep Moola for completing independent critical appraisal of the included studies, and Ms. Sarah Silver for formatting the figures. We thank Dr Stuart Howell for statistical advice.

References

[1] WHO. The ICD-10 Classification of Mental and Behavioural Disorders: Clinical descriptions and diagnostic guidelines. World Health Organization; 1993. p. 267.

[2] American Psychiatric Association. American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. 5th ed: American Psychiatric Association; 2013. p. 991.

[3] Charlson FJ, Baxter AJ, Dua T, Degenhardt L, Whiteford HA, Vos T. Excess mortality from mental, neurological and substance use disorders in the Global Burden of Disease Study 2010. Epidemiol Psychiatr Sci. 2015;24:121-40.

[4] Fekadu A, Medhin G, Kebede D, Alem A, Cleare AJ, Prince M, et al. Excess mortality in severe mental illness: 10-year population-based cohort study in rural Ethiopia. Br J Psychiatry. 2015;206:289-96.

[5] Thornicroft G, Newman SC, Bland RC, Wahlbeck K, Westman J, Nordentoft M, et al. Physical health disparities and mental illness: the scandal of premature mortality. Br J Psychiatry. 2011;199:441--2.

[6] GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet. 2017;390:1211-59.

[7] Whiteford HA, Ferrari AJ, Degenhardt L, Feigin V, Vos T. The global burden of mental, neurological and substance use disorders: an analysis from the Global Burden of Disease Study 2010. PLoS One. 2015;10:e0116820.

[8] Polanczyk GV, Salum GA, Sugaya LS, Caye A, Rohde LA. Annual research review: A meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. J Child Psychol Psychiatry. 2015;56:345-65.

[9] WHO. Adolescent mental health. Geneva: The World Health Organization; 2018.

[10] WHO. Depression and other common mental disorders Global: health estimates. World Health Organization. 2017:1--24.

[11] Charlson FJ, Diminic S, Lund C, Degenhardt L, Whiteford HA. Mental and substance use disorders in Sub-Saharan Africa: predictions of epidemiological changes and mental health workforce requirements for the next 40 years. PLoS One. 2014;9:e110208.

[12] Baxter AJ, Patton G, Scott KM, Degenhardt L, Whiteford HA. Global Epidemiology of Mental Disorders: What Are We Missing? PLoS One. 2013;8:e65514.

[13] Ferrari AJ, Baxter AJ, Whiteford HA. A systematic review of the global distribution and availability of prevalence data for bipolar disorder. J Affect Disord. 2011;134:1-13.

[14] Kigozi F, Ssebunnya J, Kizza D, Cooper S, Ndyanabangi S, the Mental H, et al. An overview of Uganda's mental health care system: results from an assessment using the world health organization's assessment instrument for mental health systems (WHO-AIMS). Int J Ment Health Syst. 2010;4:1.

[15] Whiteford HA, Degenhardt L, Rehm J, Baxter AJ, Ferrari AJ, Erskine HE, et al. Global burden of disease attributable to mental and substance use disorders: findings from the Global Burden of Disease Study 2010. Lancet. 2013;382:1575--86.

[16] Laufer N, Zilber N, Jecsmien P, Maoz B, Grupper D, Hermesh H, et al. Mental disorders in primary care in Israel: prevalence and risk factors. Soc Psychiatry Psychiatr Epidemiol. 2013;48:1539-54.

[17] Merikangas KR, Nakamura EF, Kessler RC. Epidemiology of mental disorders in children and adolescents. Dialogues Clin Neurosci. 2009;11:7-20. PMC2807642

[18] Lemogne C, Nabi H, Melchior M, Goldberg M, Limosin F, Consoli SM, et al. Mortality associated with depression as compared with other severe mental disorders: A 20-year follow-up study of the GAZEL cohort. J Psychiatr Res. 2013;47:851-7.

[19] Mulugeta W, Xue H, Glick M, Min J, Noe MF, Wang Y. Burden of Mental Illness and Non-communicable Diseases and Risk Factors for Mental Illness Among Refugees in Buffalo, NY, 2004-2014. J Racial Ethn Health Disparities. 2019;6:56-63.

[20] Murthy RS, Lakshminarayana R. Mental health consequences of war: a brief review of research findings. World Psychiatry. 2006;5:25-30.

[21] Paardekooper B, de Jong JT, Hermanns JM. The psychological impact of war and the refugee situation on South Sudanese children in refugee camps in Northern Uganda: an exploratory study. J Child Psychol Psychiatry. 1999;40:529-36.

[22] Steel Z, Chey T, Silove D, Marnane C, Bryant RA, van Ommeren M. Association of torture and other potentially traumatic events with mental health outcomes among populations exposed to mass conflict and displacement: a systematic review and meta-analysis. JAMA. 2009;302:537-49.

[23] Chapman DP, Whitfield CL, Felitti VJ, Dube SR, Edwards VJ, Anda RF. Adverse childhood experiences and the risk of depressive disorders in adulthood. J Affect Disord. 2004;82:217-25.

[24] Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of dsm-iv disorders in the national comorbidity survey replication. Arch Gen Psychiatry. 2005;62:593-602.

[25] GBD 2015 Disease and Injury Incidence and Prevalence Collaborators. 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. 2016;388:1545--602.

[26] Ministry of Local Government. Statistical abstract 2018. Kampala2018. p. 57.

[27] Uganda Bureau of Statistics. Demographics: Population & Censuses. Statistical Datasets. Kampala, Uganda: Uganda Bureau of Statistics; 2018.

[28] Uganda Bureau of Statistics. The national population and housing census 2014: Main report. Uganda Bureau of Statistics; 2016.

[29] Dalal S, Beunza JJ, Volmink J, Adebamowo C, Bajunirwe F, Njelekela M, et al. Non-communicable diseases in sub-Saharan Africa: what we know now. Int J Epidemiol. 2011;40:885-901.

[30] McNamara K. Seeking justice in Ugandan courts: amnesty and the case of Thomas Kwoyelo. Wash U Global Stud L Rev. 2013;12(3):653-671.

[31] Pham PN, Vinck P, Stover E. Returning home: Forced conscription, reintegration, and mental health status of former abductees of the Lord's Resistance Army in northern Uganda. BMC Psychiatry. 2009;9.

[32] Munn Z, Moola S, Lisy K, Riitano D. Chapter 5: Systematic reviews of prevalence and incidence. In: Aromataris E, Munn Z (Editors). Joanna Briggs Institute Reviewer's Manual: JBI. [internet]; 2017 (cited 29 August 2019]. Available from https://synthesismanual.jbi.global.

[33] Oleske DM. Epidemiology and the delivery of health care services: methods and application: Springer; 2014.

[34] World Health Organization. Mental Health Gap Action Programme - Scaling up care for mental, neurological, and substance use disorders. 2008. p. 44.

[35] World Health Organization. Mental Health Action Plan (2013-2020). Geneva: World Health Organization; 2013. p. 50.

[36] Munn Z, Moola S, Lisy K, Riitano D, Tufanaru C. Methodological guidance for systematic reviews of observational epidemiological studies reporting prevalence and cumulative incidence data. Int J Evid Based Healthc. 2015;13:147-53.

[37] Moher D, Liberati A, Tetzlaff J, Altman DG, The PG. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med. 2009;6:e1000097.

[38] Opio JN, Tufanaru C, Aromataris E. Prevalence of mental disorders in Uganda: a systematic review protocol. JBI Database System Rev Implement Rep. 2018;16:1613-20.

[39] Munn Z, Aromataris E, Tufanaru C, Stern C, Porritt K, Farrow J, et al. The development of software to support multiple systematic review types: the Joanna Briggs Institute System for the Unified Management, Assessment and Review of Information (JBI SUMARI). Int J Evid Based Healthc. 2018.17(1): 36-43.

[40] Munn Z, Moola S, Riitano D, Lisy K. The development of a critical appraisal tool for use in systematic reviews addressing questions of prevalence. Int J Health Policy Manag. 2014;3:123--8.

[41] Mwesiga EK, Mugenyi L, Nakasujja N, Moore S, Kaddumukasa M, Sajatovic M. Depression with pain co morbidity effect on quality of life among HIV positive patients in Uganda: A cross sectional study. Health Qual Life Outcomes. 2015;13:206.

[42] Abbo C, Kinyanda E, Kizza RB, Levin J, Ndyanabangi S, Stein DJ. Prevalence, comorbidity and predictors of anxiety disorders in children and adolescents in rural north-eastern Uganda. Child Adolesc Ment Health. 2013;7:21.

[43] Kinyanda E, Kizza R, Abbo C, Ndyanabangi S, Levin J. Prevalence and risk factors of depression in childhood and adolescence as seen in four districts of North-Eastern Uganda. BMC Int Health Hum Rights. 2013;13:19.

[44] Kinyanda E, Weiss HA, Mungherera M, Onyango-Mangen P, Ngabirano E, Kajungu R, et al. Psychiatric disorders and psychosocial correlates of high HIV risk sexual behaviour in war-affected Eastern Uganda. AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV. 2012;24:1323-32.

[45] Akena D, Kadama P, Ashaba S, Akello C, Kwesiga B, Rejani L, et al. The association between depression, quality of life, and the health care expenditure of patients with diabetes mellitus in Uganda. J Affect Disord. 2015;174:7-12.

[46] Devries KM, Child JC, Allen E, Walakira E, Parkes J, Naker D. School violence, mental health, and educational performance in Uganda. Pediatrics. 2014;133:e129-37.

[47] Jordans M, Rathod S, Fekadu A, Medhin G, Kigozi F, Kohrt B, et al. Suicidal ideation and behaviour among community and health care seeking populations in five low- and middle-income countries: a cross-sectional study. Epidemiol Psychiatr Sci. 2017:1-10.

[48] Kemigisha E. High prevalence of depressive symptoms among adolescents living with HIV/aids in Uganda. J Adolesc Health. 2018;62:S21-S2.

[49] Lloyd CE, Nouwen A, Sartorius N, Ahmed HU, Alvarez A, Bahendeka S, et al. Prevalence and correlates of depressive disorders in people with Type 2 diabetes: results from the International Prevalence and Treatment of Diabetes and Depression (INTERPRET-DD) study, a collaborative study carried out in 14 countries. Diabet Med. 2018; 35(6): 760-769

[50] Malamba SS, Muyinda H, Spittal PM, Ekwaru JP, Kiwanuka N, Ogwang MD, et al. "The Cango Lyec Project - Healing the Elephant": HIV related vulnerabilities of post-conflict affected populations aged 13-49 years living in three Mid-Northern Uganda districts. BMC Infect Dis. 2016;16:690.

[51] Odokonyero RF. Prevalence and associated factors of axis I psychiatric disorders presenting at the accident and emergency department of Mulago hospital: Makerere University; 2011.

[52] Okello J, De Schryver M, Musisi S, Broekaert E, Derluyn I. Differential roles of childhood adversities and stressful war experiences in the development of mental health symptoms in post-war adolescents in northern Uganda. BMC Psychiatry. 2014;14.

[53] Okello J, Nakimuli-Mpungu E, Klasen F, Voss C, Musisi S, Broekaert E, et al. The impact of attachment and depression symptoms on multiple risk behaviors in post-war adolescents in northern Uganda. J Affect Disord. 2015;180:62-7.

[54] Umeh GC, Bangirana P. Cognitive and social predictors of generalized anxiety disorder symptoms among fresh undergraduates in Uganda. Tanzan J Health Res. 2017;19:1.

[55] DerSimonian R, Laird N. Meta-analysis in clinical trials. Control Clin Trials. 1986;7:177-88.

[56] Barendregt JJ, Doi SA, Lee YY, Norman RE, Vos T. Meta-analysis of prevalence. J Epidemiol Community Health. 2013;67:974-8.

[57] Wallace BC, Dahabreh IJ, Trikalinos TA, Lau J, Trow P, Schmid CH. Closing the Gap between Methodologists and End-Users: R as a Computational Back-End. J Stat Softw; 2012; 49(5).

[58] Higgins JPT, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. BMJ. 2003;327:557--60.

[59] Higgins JP. Commentary: Heterogeneity in meta-analysis should be expected and appropriately quantified. Int J Epidemiol. 2008;37:1158-60.

[60] Mugisha J, Muyinda H, Malamba S, Kinyanda E. Major depressive disorder seven years after the conflict in northern Uganda: burden, risk factors and impact on outcomes (The Wayo-Nero Study). BMC Psychiatry. 2015a;15:48.

[61] Mugisha J, Muyinda H, Wandiembe P, Kinyanda E. Prevalence and factors associated with Posttraumatic Stress Disorder seven years after the conflict in three districts in northern Uganda (The Wayo-Nero Study). BMC Psychiatry. 2015b;15:170.[62] Saile R, Ertl V, Neuner F, Catani C. Children of the postwar years: A two-generational multilevel risk assessment of child psychopathology in northern Uganda. Dev Psychopathol. 2016;28:607-20.

[63] Meyer SR, Steinhaus M, Bangirana C, Onyango-Mangen P, Stark L. The influence of caregiver depression on adolescent mental health outcomes: findings from refugee settlements in Uganda. BMC Psychiatry. 2017;17:405.

[64] Iorio A, Spencer FA, Falavigna M, Alba C, Lang E, Burnand B, et al. Use of GRADE for assessment of evidence about prognosis: rating confidence in estimates of event rates in broad categories of patients. BMJ. 2015;350:h870.

[65] Akena D, Musisi S, Joska J, Stein DJ. The association between aids related stigma and major depressive disorder among HIV-positive individuals in Uganda. PLoS One. 2012;7:e48671.

[66] Ashaba S, Rukundo GZ, Beinempaka F, Ntaro M, LeBlanc JC. Maternal depression and malnutrition in children in southwest Uganda: a case control study. BMC Public Health. 2015;15:1303.

[67] Dokkedah S, Oboke H, Ovuga E, Elklit A. ICD-11 trauma questionnaires for PTSD and complex PTSD: Validation among civilians and former abducted children in Northern Uganda. Afr J Psychiatry (Johannesbg). 2015;18:335.

[68] Gyagenda JO, Ddumba E, Odokonyero R, Kaddumukasa M, Sajatovic M, Smyth K, et al. Post-stroke depression among stroke survivors attending two hospitals in Kampala Uganda. Afr Health Sci. 2015;15:1220-31.

[69] Irvine SL. Posttraumatic Stress Prevalence for Children Orphaned by AIDS in Rural Sub-Saharan Africa [Ph.D.]. Ann Arbor: Walden University; 2012.

[70] Kakyo TA, Muliira JK, Mbalinda SN, Kizza IB, Muliira RS. Factors associated with depressive symptoms among postpartum mothers in a rural district in Uganda. Midwifery. 2012;28:374-9.

[71] Kinyanda E, Hoskins S, Nakku J, Nawaz S, Patel V. Prevalence and risk factors of major depressive disorder in HIV/AIDS as seen in semi-urban Entebbe district, Uganda. BMC Psychiatry. 2011;11:97.

[72] Kinyanda E, Kuteesa M, Scholten F, Mugisha J, Baisley K, Seeley J. Risk of major depressive disorder among older persons living in HIV-endemic central and southwestern Uganda. AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV. 2016;28:1516-21.

[73] Perkins JM. Conducting social network and social norm research in low-resource settings: Food insecurity, depression, and HIV testing in rural Uganda [Health & Mental Health Treatment & Prevention 3300]. US: ProQuest Information & Learning; [internet]. 2016. [28 August 2019]. Available from: http://nrs.harvard.edu/urn-3:HUL.InstRepos:17467207

[74] Kinyanda E, Nakasujja N, Levin J, Birabwa H, Mpango R, Grosskurth H, et al. Major depressive disorder and suicidality in early HIV infection and its association with risk factors and negative outcomes as seen in semi-urban and rural Uganda. J Affect Disord. 2017;212:117-27.

[75] Wagner GJ, Holloway I, Ghosh-Dastidar B, Kityo C, Mugyenyi P. Understanding the influence of depression on self-efficacy, work status and condom use among HIV clients in Uganda. J Psychosom Res. 2011;70:440-8.

[76] Nakimuli-Mpungu E, Musisi S, Katabira E, Nachega J, Bass J. Prevalence and factors associated with depressive disorders in an HIV plus rural patient population in southern Uganda. J Affect Disord. 2011;135:160-7.

[77] Nakimuli-Mpungu E, Mojtabai R, Alexandre PK, Musisi S, Katabira E, Nachega JB, et al. Lifetime depressive disorders and adherence to anti-retroviral therapy in HIV-infected Ugandan adults: a case-control study. J Affect Disord. 2013;145:221-6.

[78] Musinguzi K, Obuku A, Nakasujja N, Birabwa H, Nakku J, Levin J, et al. Association between major depressive disorder and pro-inflammatory cytokines and acute phase proteins among HIV-1 positive patients in Uganda. BMC Immunol. 2018;19:1.

[79] Huang KY, Abura G, Theise R, Nakigudde J. Parental Depression and Associations with Parenting and Children's Physical and Mental Health in a Sub-Saharan African Setting. Child Psychiatry Hum Dev. 2017;48:517-27.

Appendices

Appendix 3.I: Search strategy employed for specific data sources

The JBI empirical approach for conducting an optimized search strategy for identifying papers on the prevalence of mental disorders in Uganda was used. In the first step, 15 articles published since 2015 deemed to be critical papers of interest for this review were identified. This set of papers were used to generate and improve search strategies in order to maximize their sensitivity and specificity for identifying relevant articles in separate databases: PubMed, PsycINFO, Embase, Scopus and Web of Science. The identified search terms were used to develop keywords for searching in Google Scholar and other gray literature sources, including websites of the Ugandan Ministry of Health. The search strategy was developed in PubMed, and iterative changes were made to enable optimal searching in the other databases, for example, using the all field (.exp, de, syn or mj) search field in Embase; in PsycINFO we used the multi-purpose (.mp or exp) field, as described below. We drew on existing optimized search strategies to identify mental health content in the general medical abstracting databases. Mental disorders were searched, using a combination of exp mental disorders AND mental disorders/ep or psychopathology OR Psychiatry/ep OR psychiatric. To identify studies reporting prevalence, we commenced with the basic search terms “prevalence” or “epidemiology” but were unable to obtain adequate sensitivity and specificity estimates. We then applied an advanced search strategy combined with this initial search to increase the specificity of searches without losing sensitivity. This was achieved by using one of two search strings to narrow the above search outcomes:

The initial search in PubMed was undertaken on 20 October 2017 (test search) and then updated for publications between 2 May 2018 and 4 May 2018. The full search strings are provided in supplementary data below. The search terms and strategies were customised for each data source. The numbering used in the first column represents topics searched. Number 1 represents the topic mental disorders; number 2 is the condition of interest – prevalence or epidemiology, and number 3 represents the geographical setting of Uganda. Number 4 is the advanced search strategy that combined the search topic using Boolean “AND” and applying a search limit to the year in which the paper was published.

PubMed search strategy

1 "Mental disorders"[MeSH Terms] OR "mental disorders"[major] OR "mental disorders"[All Fields] OR "mental disorder"[All Fields] OR "mental disorders"[All Fields] OR "Mentally ill persons"[MeSH Terms] OR "mentally ill persons"[All Fields] AND "mentally ill person"[All Fields] OR "mentally ill persons"[All Fields] OR "Psychopathology"[MeSH Terms] OR

"psychopathology"[All Fields] OR "psychiatry"[MeSH Terms] OR "psychiatry"[All Fields] OR "psychiatric"[All Fields] OR "Child psychiatry"[MeSH terms] OR "diagnostic and statistical manual of mental disorders"[MeSH Terms]

2 "Prevalence"[MeSH Terms] OR "epidemiology"[All Fields] OR "prevalence"[All Fields] OR "Epidemiology"[MeSH]

3 "Uganda"[MeSH Terms] OR Uganda [All Fields]

4 #1 AND #2 AND #3 AND Pub ("2010/01/01"[PDAT] : "2018/04/30"[PDAT])=199

Embase search strategy

1. 'mental disease'/mj OR 'mental disease'/exp OR 'mental patient'/exp OR 'mental patient'/de OR 'mental patient'/syn OR 'child psychiatry'/exp OR 'Psychopathology'/exp
2. 'prevalence'/mj OR 'prevalence'/exp OR 'epidemiology'/exp
3. 'Uganda'/exp OR 'Uganda'/de
4. #1 AND #2 AND #3 AND limit PY:2010-2018=**220**

PsycINFO search strategy

1 Psychological disorder.mp. OR psychiatric disorders.mp. OR exp Mental Disorders/ OR mental disorders.mp.

2 Prevalence.mp. OR epidemiology.mp.

3 Uganda

4 #1 AND #2 AND #3 Limit 2010-2018(current)=42

Scopus search strategy

1 "Mental disorders" OR "mental disease" OR "Psychiatric disorders" OR "Mentally ill persons" OR "Psychopathology" OR "psychiatry" OR "Child psychiatry" OR "diagnostic and statistical manual of mental disorders"

2 "prevalence" OR "epidemiology"

3 "Uganda"

4 #1 AND #2 AND # 3 AND PUBYEAR>2009=41

Web of Science search strategy

1 ("mental disorders" OR "Mentally ill persons" OR "Psychopathology" OR "psychiatry" OR "Child psychiatry" OR "psychiatric" OR "diagnostic and statistical manual of mental disorders")

2 ("prevalence" OR Epidemiology)

3 ("Uganda")

4 #1 AND #2 AND #3 Limit by time Span 2010-2018=68

Google Scholar search strategy

Advanced search to find relevant articles with all of the words "Uganda" with at least one of the words "Mental disorders" OR "mental disease" OR "Psychiatric disorders" OR "Mentally ill persons" OR "Psychopathology" OR "psychiatry" OR "Child psychiatry" AND "prevalence" anywhere in the article. Limit to return articles dated between 2010 and 2018=53

Cut-off at 6 as studies following were not relevant.

ProQuest search strategy

ab((Mental disorders OR mentally ill persons OR mental disease OR Psychopathology OR Psychiatric OR child psychiatry)) AND ab((prevalence OR epidemiology)) AND noft((Uganda)) limit from 1/1/2010 to 30/4/2018 =5

Key: ab-abstracts, noft-anywhere not in fulltext.

The Republic of Uganda Ministry of Health Knowledge Management Portal search strategy

http://library.health.go.ug/

Prevalence OR Epidemiology of mental disorders and Uganda filter by date of publication 2010-2018=0

WHO iris search strategy

http://apps.who.int/iris/simple-search?query

Prevalence OR Epidemiology of mental disorders and Uganda filter by date of publication 2010-2018=0

Reference list of eligible studies

Number of relevant citations found =4

Appendix 3.II: Response to reviewers' comments

Provided below is the response to reviewers for the initial submission to the *Journal of Affective Disorders* (Ref: JAD_2019_2834)

Response to reviewers

Reviewer 1

This is a systematic review of mental disorder prevalence in Uganda. The systematic review is reported in compliance with PRISMA and had an a priori registered protocol in PROSPERO. The literature search strategy is presented in a supplementary file. It seeks grey literature sources and also is supplemented by a manual search. The search is restricted to studies published later than 2010.

Other methodological safeguards have been included. There is an independent review of quality by two reviewers and also duplicate data extraction. They also do GRADE ratings.

I am not very comfortable with the logit transformation employed for the meta-analysis. With meta-analysis of proportions, the standard error is restricted due to the minimum and maximum values of a proportion, which can introduce bias into pooled estimates deriving form inverse variance weighting. Normally, this problem is addressed using a variance stabilizing transformation, e.g. the Freeman-Tukey Double Arcsine Transformation. The authors cite Barendregt to support their use of the logit transformation, but quoting Barendregt: "The double arcsine transformation addresses both the problem of confidence limits outside the 0..1 range and that of variance instability, and it is therefore preferred over the logit transformation"

> **Response:** We thank the reviewer for the overall comments and as well as raising a pertinent concern over methodological approach employed in our review.
>
> We agree that Logit transformation tend to suffer from the correlation between the estimate of the proportions and its variance especially when some studies had zero event reported. We have explored reviewer concerns using the same software we had used before, choosing Freeman-Tukey Transformed proportion metric as data type for analysis. The results (study weight, standard error, and pooled prevalence estimate) of analysis using Freeman-Tukey transformed proportion were comparable with that of Logit transformed proportion. The agreement in results may be due to the estimated proportion of people with mental disorders in relation to sample sizes

in all the included studies were large, such that the two-transformation techniques converge. In the meta-analysis, the smallest number of cases of a mental disorder reported by individual study was 23 and highest was 664. From the perspective of proportion, the lowest prevalence reported was 8.1% and the highest was 43.1%. Therefore, we have not made changes to method of data transformation from Logit to Freeman-Tukey Double Arcsine as it appears to change little and in keeping with the *a priori* protocol.

In the introduction, there is reference to a projected increase in prevalence in Uganda - but secular trends in prevalence do not seem to have been evaluated (e.g. the forest plots are sorted alphabetically rather than by year, no meta-regression is undertaken).

Response: We agree that trends in prevalence of mental disorders were not evaluated. The aim of this review was to establish the most recent prevalence estimate of mental disorders; this reasoning also formed the basis for limiting the search to 2010. However, we have re-analysed the data organised by year of publication (line 145-146, page 7). The revised results (forest-plots) are in Figure 3.2, Figure 3.3, and Figure 3.4. We have also made changes in Table 3.1 and Table 3.2, arranged by year of publication.

The visual inspection of the forest plot shows high inter-study variability. Studies published from 2012 to 2015 particularly revealed distinct prevalence patterns of mental disorders, this may be due to the participants characteristics (sampling frame) and sample size. For example, most of the included studies published from 2012-2015 investigated prevalence in diabetic patients, mothers of children admitted in hospital due to malnutrition, stroke patients and others. Consequently, participants were subject to a known adverse life events and therefore at risk for psychological disorders. This could explain why the prevalence reported by individual study during this period was much higher and the sample size were smaller.

To explore the observed heterogeneity in the pooled prevalence estimate, we only used subgroup (instruments, site from which participants were selected and sample size) analysis instead of meta-regression. We have added the results of subgroup analysis for sample size on line 322 - 337 (page 14-15) Section 3.3.8 of the manuscript.

The estimates are very high – possibly reflecting the inclusion both of diagnostic instruments, screening instruments and symptom rating scales. For example, the pooled point prevalence of depressive disorders among adults was 21.2%, which is much higher than lifetime prevalence reported by most

studies using diagnostic interviews. It seems that none of the included studies included a full-length structured or semi-structured diagnostic interview (the MINI is a brief interview that tends to overestimate prevalence, the scales employed are not diagnostic instruments at all). The authors state that the results are consistent with those of the GBD, but Ferrari et al. (2011) reported a global prevalence of major depression of 4.7%. The extent of heterogeneity seen in the forest plots is excessive and draws into question the value of the pooled estimates. In Figure 3.2b only 3 studies provide confidence intervals that are consistent with the estimated pooled prevalence. They are pooling apples and oranges together. I think there should be more focus on explaining the heterogeneity and less on pooling.

Response: As stated in our response above, we aimed to synthesise appropriately derived prevalence estimate of mental disorders in Uganda. Heterogeneity was investigated through subgroup analysis stipulated *a priori*.

We agree regarding the overall prevalence combined results of studies using different assessment instruments including those using diagnostic and screening instruments. We explored how each of these instruments influenced the pooled prevalence estimates in adults and the observed heterogeneity. In this case, the screening instruments used to ascertain mental disorders were PHQ-9 (n=3), HSCL-25 (n=4) and others (EPDS, ICD-11 and GAD-Q-IV) and the standard structured diagnostic instrument MINI (n=11). The analysis showed that instruments grouped as others had the highest prevalence 35.9% (95% CI 28.0%-43.8%) (this has been added in the manuscript line 315 - 316 (page 14). The results of other instruments were closer to pooled prevalence estimates.

We have expanded the results of the subgroups analysis to include sample size in the manuscript in Section 3.3.8, line 322 – 328 (page 14-15) of the manuscript. The method Section 3.2.6 of the manuscript has been updated in line 160-162 (page 8) to reflect this addition. We have also expanded the explanation of the observed heterogeneity in section 4.1, line 408 - 415 (page 19) of the manuscript.

We have revised including a statement to indicate that our finding was higher than reported by previous studies but showed a consistent pattern that depression and anxiety were highly prevalent, in Section 3.4 line 357 - 358 (page 17) of the manuscript.

Reviewer 2

This paper synthesizes existing data concerning the prevalence of mental disorders in Uganda, using meta-analytical methods. The topic is highly relevant to the Journal. Although reporting on prevalence rates of mental disorders is not new, I agree with the authors that data about the prevalence of mental disorders are a starting point to improve public mental health. There are many reasons why findings from countries such as Uganda may differ from places that have been studied in much more detail before. The paper is well written and the data clearly presented. I have a number of concerns and questions.

Response: We thank the reviewer for these comments

1. Given the relatively simple and descriptive research question, the paper seems overly long. All sections could be considerably shortened without losing the essential information or clarity.

Response: We appreciate the reviewer's comment regarding the length of the manuscript. To maintain accurate and complete reporting and adhere in full to PRISMA reporting guidelines and promote transparency and reproducibility, we do feel that the current presentation is required to do the work justice. The manuscript has been revised and words/sentences in some sections have been deleted.

2. In the introduction very little is said about differences that one might expect between data from Uganda, as compared to other places in the world.

Response: The Background section has been revised to include statements regarding what one may expect about prevalence of mental disorders in Uganda: Section 3.1, line 75-76, 78 - 80 (page 4) of the manuscript.

3. The authors chose a tight timeframe for their inclusion of studies (2010-2018) – why was that?

Response: The primary intention of the study was to establish a relatively recent picture of mental disorders in Uganda rather than establish long term trends/changes. We have added a word 'recent' to a sentence in the Methods Section 3.2 of the manuscript, line 107-108 (page 5).

4. I like the systematic and quantitative approach taken to the inevitable heterogeneity in the findings of the reviewed existing studies. However, very little conclusion has come of this. This is no fault of the authors, but it quite severely restricts the relevance of the paper.

Response: It is true that the heterogeneity in this review is substantial. We have explored the potential causes and discussed them in Section 3.4.1, line 408 - 415 (page 19) of the manuscript.

Notwithstanding the heterogeneity, the results suggests high prevalence of depression and anxiety disorders in both children and adults in Uganda. The review findings should stimulate interest to scale-up public health interventions aimed at minimizing burden associated with such disorders and further research to provide a stronger conclusion.

5. In most previous work, there is quite a large difference in prevalence estimates found, when using either more formal diagnostic instruments (such as the MINI or the CIDI) and symptom rating scales with cut-off points (such as PHQ). Diagnostic instruments are usually more selective before counting a symptom as a true symptom for a psychiatric disorder and therefore mostly yield lower prevalence rates. It is surprising and may also be worrying that such differences were not found here. Were these instruments properly employed?

Response: We believe that the instruments were to a large extent used correctly. During methodological quality assessment of studies, two questions Q6 and Q7 (see manuscript Table 3.2) were used to ascertain validity of instrument and reliability of its use to collect data. All studies met criterion Q6 validity of instruments, an indication that the instruments were validated and are therefore valid to assess specific mental disorder within Uganda cultural context. However, for Q7 that focussed on reliability of data collection, 70% of the studies had evidence to indicate that this criterion was satisfied. The remaining 30% were unclear regarding consistent and unbiased data collection. This criterion (Q7) was assessed by an explicit, documented evidence that data collectors were trained in the use of the instrument or had clinical or research experience in psychiatric discipline to ensure reliability of assessment of a mental disorder. Of interest though and perhaps a possible explanation of similarities in the result is that MINI was used as the gold standard to validate PHQ-9 and HSCL-25 depression module.

6. On pg 13 it is reported that the lifetime prevalence rates for depression were lower than the point prevalence. This seems illogical.

Response: We agree with the reviewer that the lifetime prevalence of depressive disorders in the present review are difficult to reconcile. This may be due to the data ultimately being available – 19 studies (involving 13,390 participants) reported current prevalence; of these, only two (involving 900 participants) also reported lifetime prevalence. The variability across the studies that only reported point prevalence overrode the differences seen in lifetime prevalence alone (see below).

7. In studies of prevalence of mental disorders, the time frame employed is important. Especially in episodic disorders, such as anxiety and depression, one would expect much higher lifetime prevalence

rates than point prevalence rates. This indeed is what is usually found. It seems worrying again that the differences reported here were small.

Response: As mentioned in our response to 6 above, most studies included in the review did not assess lifetime prevalence of reported mental disorders. We examined the two studies that provided both current and lifetime prevalence of major depressive disorders to better understand the pattern. It was clear that the lifetime prevalence of depression in adults (19.4%) was much higher than current prevalence (12.8%). We have therefore added a sentence to clarify this finding in Section 3.3.6 line 298 - 304 (page 14) of the manuscript.

8. Similarly, usually the rates of common mental disorders increase as the filters that are inherent in any health service are passed. One would expect higher rates of mental problems in health care settings than in the community, especially so in LMIC. This was not found. Of course, the authors cannot change the findings of the studies they have reviewed, but they could discuss these findings in a more critical way.

Response: We thank the reviewer for the insightful comments and suggestion. Looking at the profile of the population studied (Table 3.1) in Section 3.3.2 of the manuscript, the similarity of prevalence of mental disorders between the participants sampled from the health facility and community setting may be expected. These may be because most participants sampled from the health care setting were mainly outpatient attendees and therefore could have had closer commonality with those from the community. The only exception to outpatients was in a study by Ashaba et al., 2015 who assessed depression among two groups of patient's attendants. It is also worth noting here that family support and their physical presence during the whole length of hospital stay in Uganda may positively assist in reducing the psychological trigger of a mental disorder.

A sentence is added in Section 3.4 line 376 - 380 (page 18) of the manuscript to acknowledge the observed pattern of prevalence rate of mental disorders derived from health facilities and community settings in Uganda.

10. The exposure to known risk factors for mental disorders and their association with disorders is - for many purposes - more interesting than the prevalence estimates per se. Can they make more of this?

Response: Presentation of factors associated with prevalence of mental disorders qualitatively derived from primary studies are included in Section 3.4 line 383-388 (page 18) of the manuscript. The most common correlates of mental disorders reported by included studies include the uncertainty resulting from negative life events, self-perceived lack of social support, food

insecurity among women and living arrangements, particularly for children, among others, were reported as major attributors to anxiety and depressive disorders in Uganda.

11. Comparing the outcomes of the available studies with findings from other countries is hampered by the fact that the reviewed studies are limited to depression and anxiety. Although the authors mention this, they have not estimated what the effect might have been on the overall prevalence. This is likely considerable: if only data on substance abuse were added, the overall rates would likely have increased substantially.

Response: We agree. **T**he pooled prevalence was limited by paucity of a range of mental disorders data, in addition to the lack of any large-scale population-based studies. We have incorporated a suggestion for future reviews to consider a wider range of mental and substance use disorders in Section 3.4.1 line number 428 - 431 (page 20) of the manuscript.

Chapter 4 Discussion and summary

The previous chapter presents the systematic review of the prevalence of mental disorders among children and adults in Uganda. In Chapter 1, literature regarding mental disorders was examined. This chapter summarises issues relating to the key findings and their implications for policy, practice and research.

4.1 Summary of research findings

The results of the research presented in this thesis provide, for the first time, a consolidated prevalence estimate of mental disorders in children and adults in Uganda. The prevalence estimates show mental disorders are common in Uganda. About 229 per 1,000 children and adolescents were reported to have current depressive disorders and anxiety disorders. Similar patterns were revealed for adults 18 years or older, where an estimated 242 per 1,000 adults were reported with current and lifetime mental disorders. These results, from the systematic review and meta-analysis presented in Chapter 3, were based exclusively on 24 unique studies reporting the prevalence of mental disorders conducted in Uganda, conducted and published between 2010 and 2018 inclusive. Using transparent, internationally accepted processes developed by GRADE (see Section 3.4) allowed for a claim of moderate certainty of the true prevalence of mental disorders in Uganda which is likely to be close to the estimate presented by this research.

These results contribute to the understanding of the epidemiology of mental disorders, specifically prevalence data in Uganda. Prevalence data is even more important in this era, following the advent of the GBD, in which population health status is judged by not only death statistics but also disability.[23] The basis of this research rested on the lack of knowledge about the prevalence of mental disorders in Uganda, like many LMICs.[29,30] The high prevalence of depressive and anxiety disorders in children and adults presents public health, social and economic challenges for the Uganda population. There is considerable evidence in the literature that these two categories of mental disorders are more prevalent forms of mental disorders in the general population worldwide.[24,25,59,162]

4.1.1 Prevalence of specific mental disorders

Although it is clear from the existing literature that mental disorders encompass a wide range of emotional and behavioural conditions described in the ICD and DSM,[14,15] the results of this review suggest that MDD and PTSD are the most common disorders affecting children and adults in Uganda. Results from a single study reported prevalence of psychotic syndrome disorders (1.5%) and eating disorders (0.7%) among children.

Data on other specific mental disorders with onset in childhood, including schizophrenia, predetermined at the outset of the review (see Chapter 2) was generally lacking.[163] For example, evidence from the literature suggests that the median point prevalence of schizophrenia is 4.6 per 1,000, with a lifetime prevalence of 7.2 per 1,000 persons.[81,100] This was not identified by the current study. Notwithstanding the exclusion of neurological disorders such as ADHD among children, epilepsy and substance use disorders, that tend to coexist with anxiety and depressive disorders.[105] That lack of prevalence data for other mental disorders may not indicate their absence in the Uganda population. However, the high prevalence of the two major mental disorders revealed by this research is striking, despite both anxiety and depression being known to be highly prevalent and the leading cause of YLDs globally.[24,25,134,162]

4.1.2 Assessment of mental disorders

Epidemiological studies of mental disorders in the past have documented complexities in conceptualising and investigating the influence of measures used to obtain prevalence estimates (see Chapter 1).[76] The number of instruments developed for the assessment of mental disorders in children, adolescents and adults has considerably increased in recent years.[69,79] Some of the challenges in this research were drawing estimates from heterogeneous studies and the range of instruments used to assess mental disorders,[61] as described in Chapter 3, Section 3.3.2. Although there is ongoing debate on the effectiveness of screening and diagnostic instruments and their influence on the diagnosis of mental disorders,[73] there is evidence that both are appropriate for obtaining prevalence information and providing an indication of service needs.[75,76] However, the use of these two sets of instruments restricts comparability of prevalence estimates from the current research with past epidemiological systematic reviews that were based on diagnostic instruments or separate analyses of studies using diagnostic and screening instruments.[59,82]

Regardless of these conceptual issues surrounding measurement, there are important findings of the present research that are worth noting. In most studies from which data was extracted, the diagnostic criteria were mapped to DSM-IV and not based on consensus or expert opinion, therefore enabling the generation of valid prevalence estimates.[17,56] The need for validating screening or diagnostic instruments to measure mental disorders in the context of research for obtaining valid and reliable prevalence data has been emphasised.[74,76] This was an important element in this review (Chapter 2, Section 2.3.2).[163] Indeed, all the included studies used validated instruments; those that used screening instruments reported MINI[62] as a gold standard used for its calibration (validation). On the other hand, only MINI was used by studies that employed diagnostic interviews. Despite this, studies that employed MINI applied a two-step survey design, in which participants were first screened prior to the use of a diagnostic

instrument (MINI) for those who met certain criteria. This process did not appear to yield substantially different prevalence estimates than studies using screening instruments alone. Analysis of whether different instruments used had any bearing on the prevalence reported in the available research did not provide a clear picture. The similarity in prevalence obtained through diagnostic interviews and use of symptom checklists could be reinforced by validation of screening instruments using MINI in these studies.

4.1.3 Current, period, and lifetime prevalence of mental disorders

Past research shows that the prevalence of depression and anxiety disorders is influenced by the period over which it is assessed.[72,82] The prevalence estimates of mental disorders presented in this thesis were based on current (point) prevalence at the time of the conduct of the study, while 12-month prevalence and lifetime prevalence were less frequently reported. The results of lifetime prevalence estimates of MDD in this research at face value appeared lower than usually reported in previous studies. Research has demonstrated that the lifetime prevalence of mental disorders is often much higher, often double the current or point prevalence.[59,72,82] In the current research, there was insufficient data from which any realistic judgement could be made. This discrepancy found by this research could be explained by the variability in the number of studies and sample size. However, it must be acknowledged that lifetime prevalence has a potential problem with precision associated with respondent recall accuracy.[83] However, research suggests that shorter periods prevent recall bias and are more likely to provide a valid prevalence estimate than 12-month and lifetime prevalence of mental disorders.[59]

4.1.4 Comorbidity

Depression and anxiety disorders have been documented to be comorbid with other forms of mental disorders and in people experiencing a physical illness (see Chapter 1).[101,103,105,106] Detailed examination of comorbidity was beyond the scope of the current research and hence was not analysed. However, it is apparent from the included studies that co-occurrence of depression and anxiety disorders was common. In addition, the prevalence of MDD among stroke survivors, people with diabetes and HIV positive individuals was high (see Table 3.1 in Chapter 3). This appears to support the claim that there can be 'no health without mental health, further justifying the need for action in this area.[28] The concern for comorbidity therefore warrants future consideration. It is important to mention here that the somatic symptoms of depression and anxiety disorders, as described in ICD-10[14] and DSM-5,[15] mirror many of common physical illnesses.

4.1.5 Associated factors and consequences

The factors associated with mental disorders (see Chapter 1) present complex challenges and there are no clear-cut boundary between triggers and consequences that are mediated by separate events and occur over prolonged periods. An analysis of the determinants and consequences of mental disorders was not undertaken in this study.

The review findings in Chapter 3 (Section 3.3) suggest that anyone can develop mental disorders, regardless of age. The fact that children in the study were reported to have nearly a similar extent of mental disorders as adults is not unusual. Previous studies have shown that mental disorders have an early age of onset,[79,89,90] and can continue into adulthood, with a later age of onset associated with comorbid conditions. [90] Previous research have also reported a higher burden of mental disorders in young people aged 10 to 29 years,[25] particularly, with MDD and anxiety disorders.[24,25] This is particularly important in the Ugandan context where the demographic profile indicates a high proportion of under 30s.[88]

The high prevalence revealed by the current research points to important implications for children's and young persons' physiological, personal and social development. Childhood and young adulthood are considered critical periods in the life course of an individual whereby they are learning social and functioning skills, receiving education, starting work or negotiating independent living.[35] Research has demonstrated that mental disorders developed during childhood or as young adulthood can have long-term negative consequences for individuals' health and other areas of functioning.[16] For example, it has been documented that people who have mental disorders have a shorter life expectancy, mainly due to the comorbid nature of these disorders.[31,106] Similarly, a study in Ethiopia reported that people with mental disorders were found to die 30 years prematurely than the general population due to infectious diseases and suicides.[33] Moreover, mental disorders have been shown to worsen physical illnesses and quality of life.[39]

Explorations of factors associated with mental disorders from the primary research reviewed also revealed the coexistence of a number of social factors. Of interest were factors such as living arrangements (living with single parents, grandparents, number of siblings) and household poverty, which were reported to increase the risk of developing depression among participants studied. Similar factors have been documented by research as determinants of mental disorders.[123,126] Social factors like these are significant in the context of the demographic profile of Uganda, as reported in the National Population and Household Census 2014.[88] Depression and anxiety among young people have also been implicated for their poor educational attainment and productivity.[44] For example, studies have reported that children

with mental disorders, including MDD, bipolar disorder and anxiety disorders drop out of school early.[38] The majority of the participants represented in the current research were from those from rural settings, peasant farmers, small business owners and fishermen; most had no or lower than high school education. Similarly, the effects of depression and anxiety disorders on employment opportunities have been shown to be significant (see Chapter 1).[44,45] This research did not explore these aspects, and is unable to provide a judgement on whether mental disorders were the cause of or affected by the demographic attributes of participants.

4.2 Implications

4.2.1 Implications for policy

Given that the Ugandan national health policies and plans aim to address mental health needs through early detection and treatment at all levels of care,[149,150] the findings of this research highlight some important health policy applications.

The prevalence of mental disorders in this study highlights its potential impact on people at a young age and identifies its potential to disrupt education,[38] and social and working life.[45] This should provide the impetus for the Ugandan government to prioritise investments in improving mental health care across sectors. This could be achieved by inclusion of strategies aimed at identifying and reducing risk factors as well as factors that trigger or promote a relapse of mental disorders. People with conditions that warrant treatment and rehabilitation need unlimited access to the required health care. Similarly, it may be essential that the education sector incorporates activities that support mental health, such as mental health promotion activities in schools. According to the Ugandan National Population and Housing Census 2014, about 80% of the population are of school-going age at various levels of the education system. However, the rate at which children leave school, due to various reasons, increases exponentially, with 22% leaving between the age of 13 years and 18 years, and peaking at 53.7 % between the age of 15 years and 24 years.[88] This is further reflected in educational attainment, with 58% having primary level education, 15% O-level, 3% A-level, and 4.3% tertiary level.[88] A systematic review of universal school mental health programs indicates that such programs enhance mental health awareness.[116] These include identification and mitigation of potential triggers of mental disorders, such as bullying. Introducing mental health first aid training to all teachers so they can recognise symptoms of depression and anxiety disorders provide timely support and when necessary these teachers can make referrals to appropriate sources of help.

In studies informing this review, social and household factors have been identified as potential triggers as well as consequences of mental disorders. The association between mental disorders, social and

household factors such as poverty,[120,123] food insecurity,[92,129] poor housing,[119,120] social support,[98] low levels of education or literacy,[123,127] conflicts, verbal/physical abuse or violence,[42] broken families, [123] among others, have been previously identified by research in a similar vein. Therefore, it is imperative for mental health stakeholders to develop and evaluate interventions that address and reduce these factors that trigger mental disorders at the individual, household and community level.

Evidence has documented the potential benefits of improving household subsistence, education, transport systems, community cooperation and participation in mental health.[120] For example, an intervention study evaluating the impact of a comprehensive microfinance intervention on depression levels of AIDS-orphaned youth living in poorly resourced and AIDS impacted communities in the southwestern district of Uganda found strong support for its potential benefits to mental health.[121,122] In recent years, Village Savings and Loan Associations (VSLA) has proliferated as an option for providing financial services to the rural poor in Uganda and other countries in Africa.[164] The VSLA is a self-sustaining and self-replicating mechanism for access to financial services created by a group of people who pool their savings and lend funds, and has been reported to improve access to credit and empower poor communities.[165]

In addition, engagement with governments and community development sectors to identify common triggers and mitigating interventions may be helpful in reducing the number of individuals developing mental disorders in the future. Such engagement may be through embedding mental health in all policies that provide practical initiatives for all stakeholders to address mental wellbeing. These may include strategies to promote social inclusions and improve mental health literacy.

Furthermore, legislative support to protect people affected by mental disorders is one avenue to mitigate some of the direct and indirect impacts of mental disorders at the societal level in support of the proposed intervention goals in the WHO Mental Health action Plan 2013-2020.[148] However, for these efforts to be effective, they need to be supported by structures to operationalise them. Based on the assumption that people in the community are more aware of their members' life situations, they are best placed to detect abnormal, emotional and behavioural changes and triggers. Empowering leadership, establishing community structures and providing a mandate to identify, manage or refer mental disorder-related cases to appropriate services may prove helpful.

It is hoped that the results of the research presented in this thesis and greater appreciation of the enormity of the issues that it has highlighted will encourage the Ugandan government to increase financial investments in mental health services. Most of the Uganda population live in rural areas, many of whom are peasant farmers faced with a myriad of barriers in accessing essential amenities, including health

care. Improving financial allocations and recruitment of essential health professions to include mental health professionals, or training of existing non-specialist health providers to enhance task shifting may be helpful.

4.2.2 Implications for practice

The results of the research included in this thesis have implications for public health and clinical practice in Uganda. Based on data from the WHO Mental Health Atlas 2017,[150] it can be assumed that recognition and treatment of mental disorders in the community and health facilities are low. Therefore, practitioners should attempt to improve identification of mental disorders and their associated factors or determinants at all levels of care and manage or refer cases for appropriate care early. This process may include screening for mental disorders among patients presenting with chronic health conditions. In addition, clients with a complaint about physical health symptoms, who receive a negative test result for a commonly known illness with a similar presentation such as malaria, should be assessed further for mental disorders, specifically depression and anxiety disorders. There is therefore the need to established referral systems that can link people with recognised or suspected symptoms of mental disorders to appropriate sources of care.

4.2.3 Implication for research

The results of the prevalence of mental disorders in both children and adults from this review are limited by sample size, targeted sampling, assessing of other specific mental disorders, and measurement instruments used. As documented, the primary goal of research investigating the epidemiology of mental disorders informed the choice of instruments and types of data collected.[61] Therefore the following are needed:

- A countrywide study conducted with adequate sample size to address the current gap. The support of the Ministry of Health or Uganda Bureau of Statistics, intergovernmental and non-government organisations may prove helpful in order to design, organise and finance this research.
- Employing full-length diagnostic interviews to assess or capture more subtypes of mental disorders to ensure consistency and more robust data collection.
- Future research exploring the range of specific mental disorders, such as schizophrenia, eating disorders and others with a specific onset in childhood in Uganda.
- As discussed in Section 3.4, as the determinants or triggers of mental disorders vary, future research documenting such determinants to guide prevention and health promotion interventions.

Such research should also consider investigating the comorbidity of mental disorders with other physical illnesses.

- As research from high income countries has highlighted the substantial impact of mental disorders (depression and anxiety disorders) on education and economic productivity, research (a longitudinal epidemiological study) investigating the association of mental disorders with education and social issues such as domestic violence and work among children and adults in Uganda. Such evidence can be used to underpin decisions to improve mental health care.
- Economic evaluation of interventions targeting mental disorders for planning justification and improving communications for mental health services.
- Qualitative research to understand service utilisation to ensure appropriate design of strategies that are appropriate, meaningful, feasible and acceptable for users and providers.

4.3 Conclusion

The results of the systematic review show that about one in four children and adults in Uganda suffers from depression or anxiety disorders. The results presented in this thesis provide a new perspective for mental disorders in Uganda that build on existing literature in the field. While prevalence data by itself is not sufficient for policy decision making or practice change, it provides an important information to build on, such as financial and resources availability, population-level awareness of the problem and coping strategies, in order to facilitate better decision-making.[80] Further studies are required for bridging these gaps, including a nationally designed study to add strength the current review. Owing to the considerable contribution of MDD and anxiety to YLDs and premature death, alongside social and economic impacts, these disorders warrant specific attention in the health system response.

References

1. GBD 2015 Disease and Injury Incidence and Prevalence Collaborators. 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 2016; 388(10053): 1545--1602.
2. Murray CJL, Lopez AD, World Health Organization, World Bank , Harvard School of Public Health. The global burden of disease : A comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020 : Summary / edited by Christopher j. L. Murray, Alan d. Lopez. Geneva: World Health Organization; 1996.

3. Charlson FJ, Diminic S, Lund C, Degenhardt L , Whiteford HA. Mental and substance use disorders in Sub-Saharan Africa: Predictions of epidemiological changes and mental health workforce requirements for the next 40 years. PLoS One 2014; 9(10): e110208.

4. Saxena S, Thornicroft G, Knapp M , Whiteford H. Resources for mental health: Scarcity, inequity, and inefficiency. Lancet 2007; 370(9590): 878-889.

5. World Health Organization. Constitution of the World Health Organization. Basic Document Forthy-fifth edition2006. pp. 1--18.

6. Glass RM. Mental health theme issue: Call for papers. JAMA 2009; 302(4): 439-440.

7. Keyes CL. Mental illness and/or mental health? Investigating axioms of the complete state model of health. J Consult Clin Psychol 2005; 73(3): 539.

8. World Health Organization. Promoting mental health: Concepts, emerging evidence, practice. A report of the World Health Organization, department of mental health and substance abuse in collaboration with the victorian health promotion foundation and the university of melbourne, 2005.

9. World Health Organization. The World Health Report: Mental health : New understanding, new hope. World Health Organization; 2001.

10. Dalby JT. Terms of madness: Historical linguistics. Compr Psychiatry 1993; 34(6): 392-395.

11. Reaume G. Lunatic to patient to person: Nomenclature in psychiatric history and the influence of patients' activism in North America. Int J Law Psychiatry 2002; 25(4): 405-426.

12. Orley JH. Culture and mental illness: A study from Uganda, East African Publishing House, 1970.

13. Feighner JP, Robins E, Guze SB, Woodruff RA, Winokur G , Munoz R. Diagnostic criteria for use in psychiatric research. Arch Gen Psychiatry 1972; 26(1): 57-63.

14. World Health Organization. The ICD-10 classification of mental and behavioural disorders : Clinical descriptions and diagnostic guidelines. Geneva: World Health Organization; 1992.

15. American Psychiatric Association. American psychiatric association: Diagnostic and statistical manual of mental disorders, fifth edition. American Psychiatric Association; 2013. p. 991.

16. Ustün B , Kennedy C. What is "functional impairment"? Disentangling disability from clinical significance. World Psychiatry 2009; 8(2): 82-85.

17. Spitzer RL, Endicott J , Robins E. Research diagnostic criteria: Rationale and reliability. Arch Gen Psychiatry 1978; 35(6): 773-782.

18. Wakefield JC. The concept of mental disorder: On the boundary between biological facts and social values. Am Psychol 1992; 47(3): 373.

19. World Health Organization. Depression and other common mental disorders global: Health estimates. World Health Organization. Geneva2017. pp. 1--24.

20. Murray CJ. Quantifying the burden of disease: The technical basis for disability-adjusted life years. Bull World Health Organ 1994; 72(3): 429-445.

21. Murray CJL , Lopez AD. The utility of dalys for public health policy and research : A reply / c. J. L. Murray & a. D. Lopez. Bull World Health Organ 1997; 75(4): 377-381.

22. World Health Organization. WHO methods and data sources for global burden of disease estimates 2000-2016. Global Health Estimates Technical Paper WHO/HIS/IER/GHE/2018.4, WHO, Geneva2018.

23. Murray CJ, Ezzati M, Flaxman AD, Lim S, Lozano R, Michaud C, et al. GBD 2010: Design, definitions, and metrics. Lancet 2012; 380(9859): 2063-2066.

24. Whiteford HA, Degenhardt L, Rehm J, Baxter AJ, Ferrari AJ, Erskine HE, et al. Global burden of disease attributable to mental and substance use disorders: Findings from the Global Burden of Disease Study 2010. Lancet 2013; 382(9904): 1575--1586.

25. Whiteford HA, Ferrari AJ, Degenhardt L, Feigin V , Vos T. The global burden of mental, neurological and substance use disorders: An analysis from the Global Burden of Disease Study 2010. PLoS One 2015; 10(2): e0116820.

26. Vigo D, Thornicroft G , Atun R. Estimating the true global burden of mental illness. Lancet Psychiatry 2016; 3(2): 171-178.

27. Fantom NS, Umar. The world bank's classification of countries by income. Policy research working paper;no. 7528. Policy Research Working Paper. Washington, DC: World Bank; 2016.

28. Prince M, Patel V, Saxena S, Maj M, Maselko J, Phillips MR, et al. No health without mental health. Lancet 2007; 370(9590): 859-877.

29. Baxter AJ, Patton G, Scott KM, Degenhardt L , Whiteford HA. Global epidemiology of mental disorders: What are we missing? PLoS One 2013; 8(6): e65514.

30. Saxena S, Paraje G, Sharan P, Karam G , Sadana R. The 10/90 divide in mental health research: Trends over a 10-year period. Br J Psychiatry 2006; 188(1): 81--82.

31. Thornicroft G, Newman SC, Bland RC, Wahlbeck K, Westman J, Nordentoft M, et al. Physical health disparities and mental illness: The scandal of premature mortality. Br J Psychiatry 2011; 199(6): 441--442.

32. Charlson FJ, Baxter AJ, Dua T, Degenhardt L, Whiteford HA , Vos T. Excess mortality from mental, neurological and substance use disorders in the Global Burden of Disease Study 2010. Epidemiol Psychiatr Sci 2015; 24(2): 121-140.

33. Fekadu A, Medhin G, Kebede D, Alem A, Cleare AJ, Prince M, et al. Excess mortality in severe mental illness: 10-year population-based cohort study in rural ethiopia. Br J Psychiatry 2015; 206(4): 289-296.

34. Lemogne C, Nabi H, Melchior M, Goldberg M, Limosin F, Consoli SM, et al. Mortality associated with depression as compared with other severe mental disorders: A 20-year follow-up study of the gazel cohort. J Psychiatr Res 2013; 47(7): 851-857.

35. Arnett JJ, Žukauskienė R , Sugimura K. The new life stage of emerging adulthood at ages 18–29 years: Implications for mental health. Lancet Psychiatry 2014; 1(7): 569-576.

36. Lépine JP. The epidemiology of anxiety disorders: Prevalence and societal costs. J Clin Psychiatry 2002; 63 Suppl 14: 4-8.

37. Fekadu W, Mihiretu A, Craig TKJ , Fekadu A. Multidimensional impact of severe mental illness on family members: Systematic review. BMJ Open 2019; 9(12): e032391.

38. Mojtabai R, Stuart EA, Hwang I, Eaton WW, Sampson N , Kessler RC. Long-term effects of mental disorders on educational attainment in the national comorbidity survey ten-year follow-up. Soc Psychiatry Psychiatr Epidemiol 2015; 50(10): 1577-1591.

39. Chen H, Cohen P, Kasen S, Johnson JG, Berenson K , Gordon K. Impact of adolescent mental disorders and physical illnesses on quality of life 17 years later. Arch Pediatr Adolesc Med 2006; 160(1): 93-99.

40. Mojtabai R, Stuart EA, Hwang I, Eaton WW, Sampson N , Kessler RC. Long-term effects of mental disorders on marital outcomes in the national comorbidity survey ten-year follow-up. Soc Psychiatry Psychiatr Epidemiol 2017; 52(10): 1217-1226.

41. Johnson JG, Cohen P, Kasen S, Smailes E , Brook JS. Association of maladaptive parental behavior with psychiatric disorder among parents and their offspring. Arch Gen Psychiatry 2001; 58(5): 453-460.

42. World Health Organization. Risks to mental health: An overview of vulnerabilities and risk factors. Geneva: World Health Organization; 2012. pp. 1-14.

43. Patel V , Kleinman A. Poverty and common mental disorders in developing countries. Bull World Health Organ 2003; 81(8): 609-615.

44. Veldman K, Reijneveld SA, Ortiz JA, Verhulst FC , Bültmann U. Mental health trajectories from childhood to young adulthood affect the educational and employment status of young adults: Results from the trails study. J Epidemiol Community Health 2015; 69(6): 588-593.

45. Mojtabai R, Stuart EA, Hwang I, Susukida R, Eaton WW, Sampson N, et al. Long-term effects of mental disorders on employment in the national comorbidity survey ten-year follow-up. Soc Psychiatry Psychiatr Epidemiol 2015; 50(11): 1657-1668.

46. Sobocki P, Jonsson B, Angst J , Rehnberg C. Cost of depression in europe. J Ment Health Policy Econ 2006; 9(2): 87-98.

47. de Oliveira C, Cheng J, Vigod S, Rehm J , Kurdyak P. Patients with high mental health costs incur over 30 percent more costs than other high-cost patients. Health Aff (Millwood) 2016; 35(1): 36-43.

48. Maselko J. Social epidemiology and global mental health: Expanding the evidence from high-income to low- and middle-income countries. Current epidemiology reports 2017; 4(2): 166-173.

49. First MB, Reed GM, Hyman SE , Saxena S. The development of the ICD-11 clinical descriptions and diagnostic guidelines for mental and behavioural disorders. World Psychiatry 2015; 14(1): 82-90.

50. Dohrenwend BP. A psychosocial perspective on the past and future of psychiatric epidemiology. Am J Epidemiol 1998; 147(3): 222--231.

51. Blashfield RK, Keeley JW, Flanagan EH , Miles SR. The cycle of classification: DSM-I through DSM-5. Annu Rev Clin Psychol 2014; 10(1): 25-51.

52. World Health Organization. The ICD-10 for mental and behavioural disorders diagnostic criteria for research. Geneva: World Health Organization; 1993. p. 262.

53. Clark LA, Cuthbert B, Lewis-Fernandez R, Narrow WE , Reed GM. Three approaches to understanding and classifying mental disorder: ICD-11, DSM-5, and the national institute of mental health's research domain criteria (RDoC). Psychol Sci Public Interest 2017; 18(2): 72-145.

54. Nemeroff CB, Weinberger D, Rutter M, MacMillan HL, Bryant RA, Wessely S, et al. DSM-5: A collection of psychiatrist views on the changes, controversies, and future directions. BMC Med 2013; 11(1): 202.

55. Kendell R , Jablensky A. Distinguishing between the validity and utility of psychiatric diagnoses. Am J Psychiatry 2003; 160(1): 4-12.

56. Spitzer RL , Wakefield JC. DSM-IV diagnostic criterion for clinical significance: Does it help solve the false positives problem? Am J Psychiatry 1999; 156(12): 1856-1864.

57. Kessing LV. Severity of depressive episodes according to ICD-10: Prediction of risk of relapse and suicide. Br J Psychiatry 2004; 184(2): 153-156.

58. Reed GM, Correia JM, Esparza P, Saxena S , Maj M. The WPA-WHO global survey of psychiatrists' attitudes towards mental disorders classification. World Psychiatry 2011; 10(2): 118-131.

59. Baxter AJ, Scott KM, Vos T , Whiteford HA. Global prevalence of anxiety disorders: A systematic review and meta-regression. Psychol Med 2013; 43(5): 897-910.

60. Robins E , Guze SB. Establishment of diagnostic validity in psychiatric illness: Its application to schizophrenia. Am J Psychiatry 1970; 126(7): 983-987.

61. Switzer GE, Dew MA , Bromet EJ. Issues in mental health assessment. In: Aneshensel CS, Phelan JC and Bierman A, eds. Handbook of the sociology of mental health, Dordrecht: Springer Netherlands, 2013; pp. 115-141.

62. Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, et al. The mini-international neuropsychiatric interview (MINI): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. J Clin Psychiatry 1998; 59(20): 22-33; quiz 34-57.

63. First MB , Gibbon M. The structured clinical interview for DSM-IV axis i disorders (SCID-I) and the structured clinical interview for DSM-IV axis ii disorders (SCID-II). Comprehensive handbook of psychological assessment 2004; 2: 134-143.

64. Bolton P. Cross-cultural validity and reliability testing of a standard psychiatric assessment instrument without a gold standard. J Nerv Ment Dis 2001; 189(4): 238-242.

65. Kroenke K, Spitzer RL , Williams JB. The patient health questionnaire-2: Validity of a two-item depression screener. Med Care 2003; 41(11): 1284-1292.

66. Derogatis LR, Lipman RS, Rickels K, Uhlenhuth EH , Covi L. The hopkins symptom checklist (HSCL): A self-report symptom inventory. Behav Sci 1974; 19(1): 1-15.

67. Radloff LS. The ces-d scale: A self-report depression scale for research in the general population. Appl Psychol Meas 1977; 1(3): 385-401.

68. Beck AT, Ward CH, Mendelson M, Mock J , Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry 1961; 4(6): 561-571.

69. Beidas RS, Stewart RE, Walsh L, Lucas S, Downey MM, Jackson K, et al. Free, brief, and validated: Standardized instruments for low-resource mental health settings. Cogn Behav Pract 2015; 22(1): 5-19.

70. Pettersson A, Boström KB, Gustavsson P , Ekselius L. Which instruments to support diagnosis of depression have sufficient accuracy? A systematic review. Nord J Psychiatry 2015; 69(7): 497-508.

71. Gelaye B, Williams MA, Lemma S, Deyessa N, Bahretibeb Y, Shibre T, et al. Validity of the patient health questionnaire-9 for depression screening and diagnosis in East Africa. Psychiatry Res 2013; 210(2): 653-661.

72. Steel Z, Marnane C, Iranpour C, Chey T, Jackson JW, Patel V, et al. The global prevalence of common mental disorders: A systematic review and meta-analysis 1980–2013. Int J Epidemiol 2014; 43(2): 476-493.

73. Tanios CY, Abou-Saleh MT, Karam AN, Salamoun MM, Mneimneh ZN , Karam EG. The epidemiology of anxiety disorders in the arab world: A review. J Anxiety Disord 2009; 23(4): 409-419.

74. Paniagua FA. ICD-10 versus DSM-5 on cultural issues. Sage open 2018; 8(1): 2158244018756165.

75. Hopper K. Some old questions for the new cross-cultural psychiatry. Med Anthropol Q 1991; 5(4): 299-330.

76. Sweetland AC, Belkin GS , Verdeli H. Measuring depression and anxiety in sub-saharan africa. Depress Anxiety 2014; 31(3): 223-232.

77. Regier DA, Kaelber CT, Rae DS, Farmer ME, Knauper B, Kessler RC, et al. Limitations of diagnostic criteria and assessment instruments for mental disorders. Implications for research and policy. Arch Gen Psychiatry 1998; 55(2): 109-115.

78. Flaherty JA, Gaviria FM, Pathak D, Mitchell T, Wintrob R, Richman JA, et al. Developing instruments for cross-cultural psychiatric research. J Nerv Ment Dis 1988; 176(5): 257-263.

79. Costello EJ, Egger H , Angold A. 10-year research update review: The epidemiology of child and adolescent psychiatric disorders: I. Methods and public health burden. J Am Acad Child Adolesc Psychiatry 2005; 44(10): 972-986.

80. Oleske DM. Epidemiology and the delivery of health care services: Methods and application. New York: Kluwer Academic Publisher; 2014. p. 407.

81. Bhugra D. The global prevalence of schizophrenia. PLoS Med 2005; 2(5).

82. Ferrari AJ, Somerville AJ, Baxter AJ, Norman R, Patten SB, Vos T, et al. Global variation in the prevalence and incidence of major depressive disorder: A systematic review of the epidemiological literature. Psychol Med 2013; 43(3): 471-481.

83. Moffitt TE, Caspi A, Taylor A, Kokaua J, Milne BJ, Polanczyk G, et al. How common are common mental disorders? Evidence that lifetime prevalence rates are doubled by prospective versus retrospective ascertainment. Psychol Med 2010; 40(6): 899-909.

84. GBD 2017 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017. Lancet 2018; 392(10159): 1789-1858.

85. Erskine HE, Baxter AJ, Patton G, Moffitt TE, Patel V, Whiteford HA, et al. The global coverage of prevalence data for mental disorders in children and adolescents. Epidemiol Psychiatr Sci 2017; 26(4): 395-402.

86. World Health Organization. Adolescent mental health; [internet]. [cited 2018 12 October]. Available from: https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health accessed 10 December 2018.

87. Polanczyk GV, Salum GA, Sugaya LS, Caye A , Rohde LA. Annual research review: A meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. J Child Psychol Psychiatry 2015; 56(3): 345-365.

88. Uganda Bureau of Statistics. The national population and housing census 2014: Main report. Uganda Bureau of Statistics; 2016.

89. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR , Walters EE. Lifetime prevalence and age-of-onset distributions of dsm-iv disorders in the national comorbidity survey replication. Arch Gen Psychiatry 2005; 62(6): 593-602.

90. Kessler RC, Amminger GP, Aguilar-Gaxiola S, Alonso J, Lee S , Ustn TB. Age of onset of mental disorders: A review of recent literature. Curr Opin Psychiatry 2007; 20(4): 359--364.

91. Abbo C, Kinyanda E, Kizza RB, Levin J, Ndyanabangi S , Stein DJ. Prevalence, comorbidity and predictors of anxiety disorders in children and adolescents in rural north-eastern Uganda. Child Adolesc Psychiatry Ment Health 2013; 7(1).

92. Roberts B, Ocaka KF, Browne J, Oyok T , Sondorp E. Factors associated with post-traumatic stress disorder and depression amongst internally displaced persons in northern Uganda. BMC Psychiatry 2008; 28(1): 36-47.

93. Karunakara UK, Neuner F, Schauer M, Singh K, Hill K, Elbert T, et al. Traumatic events and symptoms of post-traumatic stress disorder amongst sudanese nationals, refugees and Ugandans in the west nile. Afr Health Sci 2004; 4(2): 83-93.

94. Pfeiffer A , Elbert T. PTSD, depression and anxiety among former abductees in northern Uganda. Confl Health 2011; 5(1): 14.

95. Salomon JA, Haagsma JA, Davis A, de Noordhout CM, Polinder S, Havelaar AH, et al. Disability weights for the global burden of disease 2013 study. Lancet Glob Health 2015; 3(11): e712-e723.

96. Ovuga E, Boardman J , Wasserman D. The prevalence of depression in two districts of Uganda. Soc Psychiatry Psychiatr Epidemiol 2005; 40(6): 439-445.

97. Mugisha J, Muyinda H, Malamba S , Kinyanda E. Major depressive disorder seven years after the conflict in northern Uganda: Burden, risk factors and impact on outcomes (the wayo-nero study). BMC Psychiatry 2015; 15(1).

98. Kinyanda E, Hoskins S, Nakku J, Nawaz S , Patel V. Prevalence and risk factors of major depressive disorder in HIV/AIDS as seen in semi-urban Entebbe district, Uganda. BMC Psychiatry 2011; 11(205): 9.

99. Hoek HW. Review of the worldwide epidemiology of eating disorders. Curr Opin Psychiatry 2016; 29(6): 336-339.

100. Saha S, Chant D, Welham J , McGrath J. A systematic review of the prevalence of schizophrenia. PLoS Med 2005; 2(5): e141.

101. Kessler RC, Chiu WT, Demler O, Merikangas KR , Walters EE. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the national comorbidity survey replication. Arch Gen Psychiatry 2005; 62(6): 617-627.

102. Brown TA, Campbell LA, Lehman CL, Grisham JR , Mancill RB. Current and lifetime comorbidity of the DSM-IV anxiety and mood disorders in a large clinical sample. J Abnorm Psychol 2001; 110(4): 585.

103. Gorman JM. Comorbid depression and anxiety spectrum disorders. Depress Anxiety 1996; 4(4): 160-168.

104. Rush AJ, Zimmerman M, Wisniewski SR, Fava M, Hollon SD, Warden D, et al. Comorbid psychiatric disorders in depressed outpatients: Demographic and clinical features. J Affect Disord 2005; 87(1): 43-55.

105. Kessler RC, Nelson CB, McGonagle KA, Edlund MJ, Frank RG , Leaf PJ. The epidemiology of co-occurring addictive and mental disorders: Implications for prevention and service utilization. Am J Orthopsychiatry 1996; 66(1): 17-31.

106. Sartorius N, Holt RIG , Maj M. Comorbidity of mental and physical disorders: Key issues in mental health, Basel: Karger, 2015.

107. Porter R. Madness: A brief history. New York: Oxford University Press; 2002. p. 250.

108. Foerschner AM. The history of mental illness: From" skull drills" to" happy pills". Inquiries Journal 2010; 2(09).

109. World Health Organization. Prevention of mental disorders: Effective interventions and policy options: Summary report, World Health Organization, 2004.

110. Kessler RC. Psychiatric epidemiology: Selected recent advances and future directions. Bull World Health Organ 2000; 78(4): 464-474.

111. Sullivan PF, Neale MC , Kendler KS. Genetic epidemiology of major depression: Review and meta-analysis. Am J Psychiatry 2000; 157(10): 1552-1562.

112. Light G, Greenwood TA, Swerdlow NR, Calkins ME, Freedman R, Green MF, et al. Comparison of the heritability of schizophrenia and endophenotypes in the cogs-1 family study. Schizophr Bull 2014; 40(6): 1404-1411.

113. Hettema JM, Neale MC , Kendler KS. A review and meta-analysis of the genetic epidemiology of anxiety disorders. Am J Psychiatry 2001; 158(10): 1568-1578.

114. Pitman RK, Rasmusson AM, Koenen KC, Shin LM, Orr SP, Gilbertson MW, et al. Biological studies of post-traumatic stress disorder. Nat Rev Neurosci 2012; 13(11): 769-787.

115. Chapman DP, Whitfield CL, Felitti VJ, Dube SR, Edwards VJ , Anda RF. Adverse childhood experiences and the risk of depressive disorders in adulthood. J Affect Disord 2004; 82(2): 217-225.

116. Salerno JP. Effectiveness of universal school-based mental health awareness programs among youth in the united states: A systematic review. J Sch Health 2016; 86(12): 922-931.

117. Kieling C, Baker-Henningham H, Belfer M, Conti G, Ertem I, Omigbodun O, et al. Child and adolescent mental health worldwide: Evidence for action. Lancet 2011; 378(9801): 1515-1525.

118. Walker SP, Wachs TD, Gardner JM, Lozoff B, Wasserman GA, Pollitt E, et al. Child development: Risk factors for adverse outcomes in developing countries. Lancet 2007; 369(9556): 145-157.

119. Lund C, Breen A, Flisher AJ, Kakuma R, Corrigall J, Joska JA, et al. Poverty and common mental disorders in low and middle income countries: A systematic review. Soc Sci Med 2010; 71(3): 517-528.

120. Patel V , Kleinman A. Poverty and common mental disorders in developing countries. Bull World Health Organ 2003; 81(8): 609-615.

121. Han C-K, Ssewamala FM , Wang JS-H. Family economic empowerment and mental health among AIDS-affected children living in AIDS-impacted communities: Evidence from a randomised evaluation in southwestern Uganda. J Epidemiol Community Health 2013; 67(3): 225.

122. Ssewamala FM, Neilands TB, Waldfogel J , Ismayilova L. The impact of a comprehensive microfinance intervention on depression levels of AIDS-orphaned children in Uganda. J Adolesc Health 2012; 50(4): 346-352.

123. Kinyanda E, Woodburn P, Tugumisirize J, Kagugube J, Ndyanabangi S , Patel V. Poverty, life events and the risk for depression in Uganda. Soc Psychiatry Psychiatr Epidemiol 2011; 46(1): 35-44.

124. Rogers AC. Vulnerability, health and health care. J Adv Nurs 1997; 26(1): 65-72.

125. Roberts B, Ocaka KF, Browne J, Oyok T , Sondorp E. Factors associated with post-traumatic stress disorder and depression amongst internally displaced persons in northern Uganda. BMC Psychiatry 2008; 8(1): 38.

126. Roberts B , Browne J. A systematic review of factors influencing the psychological health of conflict-affected populations in low- and middle-income countries. Glob Public Health 2011; 6(8): 814-829.

127. Kalaria RN, Maestre GE, Arizaga R, Friedland RP, Galasko D, Hall K, et al. Alzheimer's disease and vascular dementia in developing countries: Prevalence, management, and risk factors. Lancet Neurol 2008; 7(9): 812--826.

128. Steel Z, Chey T, Silove D, Marnane C, Bryant RA , van Ommeren M. Association of torture and other potentially traumatic events with mental health outcomes among populations exposed to mass conflict and displacement: A systematic review and meta-analysis. JAMA 2009; 302(5): 537-549.

129. Hadley C, Tegegn A, Tessema F, Cowan JA, Asefa M , Galea S. Food insecurity, stressful life events and symptoms of anxiety and depression in east africa: Evidence from the gilgel gibe growth and development study. J Epidemiol Community Health 2008; 62(11): 980-986.

130. Fazel S , Seewald K. Severe mental illness in 33 588 prisoners worldwide: Systematic review and meta-regression analysis. Br J Psychiatry 2012; 200(5): 364-373.

131. Forsythe L , Gaffney A. Mental disorder prevalence at the gateway to the criminal justice system. Trends & issues in crime and criminal justice. Canberra: Australian Institute of Criminology,; 2012.

132. Pham PN, Weinstein HM , Longman T. Trauma and PTSD: Their implication for attitudes towards justice and reconciliation. JAMA 2004; 292.

133. Schaal S , Elbert T. Ten years after the genocide: Trauma confrontation and posttraumatic stress in rwandan adolescents. J Trauma Stress 2006; 19(1): 95-105.

134. Vinck P, Pham PN , Stover E. Exposure to war crimes and implications for peace building in northern Uganda. J Am Med Assoc 2007; 298(5): 543-554.

135. McFarlane AC. Posttraumatic stress disorder: A model of the longitudinal course and the role of risk factors. J Clin Psychiatry 2000; 61 Suppl 5: 15-20; discussion 21-13.

136. McDonald P, Bryant RA, Silove D, Creamer M, O'Donnell M , McFarlane AC. The expectancy of threat and peritraumatic dissociation. Eur J Psychotraumatol 2013; 4.

137. Yehuda R , LeDoux J. Response variation following trauma: A translational neuroscience approach to understanding PTSD. Neuron 2007; 56(1): 19-32.

138. Başoğlu M, Paker M, Paker O, Ozmen E, Marks I, Incesu C, et al. Psychological effects of torture: A comparison of tortured with nontortured political activists in turkey. Am J Psychiatry 1994; 151(1): 76-81.

139. Uganda Bureau of Statistics. Demographics: Population & censuses; [internet]. [cited 2018 31 August]. Available from: https://www.ubos.org/explore-statistics/statistical-datasets/6133/ accessed.

140. Ministry of Local Government. Statistical abstract 2018. Kampala2018. p. 57.

141. Uganda Bureau of Statistics. The national population and housing census 2014: Status of older persons, thematic report series. In: Statistics UBo editor. Kampala, Uganda: Ugand Bureau of Statistics; 2019.

142. McNamara K. Seeking justice in ugandan courts: Amnesty and the case of thomas kwoyelo. Wash U Global Stud L Rev 2013; 12(3): 653-671.

143. Pham PN, Vinck P , Stover E. Returning home: Forced conscription, reintegration, and mental health status of former abductees of the lord's resistance army in northern Uganda. BMC Psychiatry 2009; 9(1): 23.

144. Titeca K , Vlassenroot K. Rebels without borders in the rwenzori borderland? A biography of the allied democratic forces. J East Afr Stud 2012; 6(1): 154-176.

145. Dalal S, Beunza JJ, Volmink J, Adebamowo C, Bajunirwe F, Njelekela M, et al. Non-communicable diseases in sub-saharan africa: What we know now. Int J Epidemiol 2011; 40(4): 885-901.

146. Ferrari AJ, Baxter AJ , Whiteford HA. A systematic review of the global distribution and availability of prevalence data for bipolar disorder. J Affect Disord 2011; 134(1): 1-13.

147. World Health Organization. Mental health gap action programme - scaling up care for mental, neurological, and substance use disorders. 2008. p. 44.

148. World Health Organization. Mental health action plan (2013-2020). Geneva: World Health Organization; 2013. p. 50.

149. The Ministry of Health. Health sector development plan 2015/16 - 2019/20. In: Uganda MoH editor. Kampala: Ministry of Health; 2015. p. 110.

150. World Health Organization. Mental health atlas 2017, Geneva: World Health Organization, 2018.

151. Mulrow CD. Systematic reviews: Rationale for systematic reviews. BMJ 1994; 309(6954): 597.

152. Higgins JPT TJ, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (ed). Cochrane handbook for systematic reviews of interventions version 6.1 (updated september 2020). Cochrane; 2020.

153. Munn Z, Stern C, Aromataris E, Lockwood C , Jordan Z. What kind of systematic review should i conduct? A proposed typology and guidance for systematic reviewers in the medical and health sciences. BMC Med Res Methodol 2018; 18(1): 5.

154. Munn Z, Moola S, Lisy K , Riitano D. Chapter 5: Systematic reviews of prevalence and incidence. In: Aromataris E and Munn Z editors. Joanna Briggs Institute Reviewer's Manual: The Joanna Briggs Institute; 2017.

155. Hoffmann F, Eggers D, Pieper D, Zeeb H , Allers K. An observational study found large methodological heterogeneity in systematic reviews addressing prevalence and cumulative incidence. J Clin Epidemiol 2020; 119: 92-99.

156. Migliavaca CB, Stein C, Colpani V, Barker TH, Munn Z, Falavigna M, et al. How are systematic reviews of prevalence conducted? A methodological study. BMC Med Res Methodol 2020; 20(1): 96.

157. Migliavaca CB, Stein C, Colpani V, Munn Z , Falavigna M. Quality assessment of prevalence studies: A systematic review. J Clin Epidemiol 2020; 127: 59-68.

158. Munn Z, Moola S, Lisy K, Riitano D , Tufanaru C. Methodological guidance for systematic reviews of observational epidemiological studies reporting prevalence and cumulative incidence data. Int J Evid Based Healthc 2015; 13(3): 147-153.

159. Moher D, Liberati A, Tetzlaff J, Altman DG , The PG. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Med 2009; 6(7): e1000097.

160. Stroup DF, Berlin JA, Morton SC, Olkin I, Williamson GD, Rennie D, et al. Meta-analysis of observational studies in epidemiology: A proposal for reporting. Meta-analysis of observational studies in epidemiology (MOOSE) group. JAMA 2000; 283(15): 2008-2012.

161. Stevens GA, Alkema L, Black RE, Boerma JT, Collins GS, Ezzati M, et al. Guidelines for accurate and transparent health estimates reporting: The GATHER statement. PLoS Med 2016; 13(6): e1002056.

162. GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: A systematic analysis for the Global Burden of Disease Study 2016. Lancet 2017; 390(10100): 1211-1259.

163. Opio JN, Tufanaru C , Aromataris E. Prevalence of mental disorders in Uganda: A systematic review protocol. JBI Database System Rev Implement Rep 2018; 16(8): 1613-1620.

164. Karlan D, Savonitto B, Thuysbaert B , Udry C. Impact of savings groups on the lives of the poor. Proceedings of the National Academy of Sciences 2017; 114(12): 3079-3084.

165. Hendricks L , Chidiac S. Village savings and loans: A pathway to financial inclusion for Africa's poorest households. Enterprise Development and Microfinance 2011; 22(2): 134-146.