DEVELOPMENT OF A SCREENING PROTOCOL FOR DEPRESSION IN ANTENATAL CLINICS IN MALAWI

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Submitted to the School of Nursing in the Faculty of Community Health Sciences at the University of the Western Cape, South Africa in fulfilment of the Doctor of Philosophy degree

Supervisor: Professor Jennifer Chipps

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Declaration

I, Genesis Chorwe-Sungani, declare that this thesis is my original piece of work which has never been previously submitted in part or whole for any other award or purpose before. All resources utilised in this piece of work have been fully acknowledged by means of referencing. This original piece of work is submitted for a Doctor of Philosophy degree.

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Abstract

Depression is a source of significant disease burden of pregnant women although protocols for screening antenatal depression are lacking in Malawi. This research study aimed at developing a screening protocol for depression in antenatal clinics in Malawi. This thesis reports data from 4 studies to develop a screening protocol for antenatal depression, one peer reviewed published paper, one peer reviewed accepted paper and two papers submitted to peer reviewed journals.

Methodology

A sequential multimethod research approach comprising of 3 phases with a series of interrelated studies was used to develop a protocol for screening of depression during antenatal care in the Blantyre district of Malawi. This study was guided by the public health model to define the problem, identify risk factors and develop a screening protocol for antenatal depression. The 3 phases of the study are:

- Phase 1- A systematic review to review and recommend validated screening instruments for depression suitable for utilisation in antenatal services in low resource settings;
- Phase 2- A cross-sectional study to describe the demographic, clinical and risk profile of antenatal depression among pregnant women attending antenatal clinics and; a sensitivity analysis study to validate the instruments for screening of depression against a gold standard among pregnant women in antenatal clinics; and
- Phase 3- A Nominal Group Technique study to develop a Screening Protocol for Antenatal Depression (SPADe) in the Blantyre district of Malawi.

Findings

The estimated prevalence of antenatal depression is high with 1 in 5 of all the pregnant women attending antenatal services in the Blantyre district having probable depression. These women are depressed because the risk factors associated with depression exist in the local setting. This study further identified screening instruments for depression that were validated in low resource settings and it confirmed that the performance of these instruments vary in the local setting. However, the combination of the 3-item screener and Self Reporting Questionnaire appeared to be a practical approach for screening of depression in local antenatal clinics. This local evidence informed the development of a screening protocol for depression (SPADe) that was integrated into the usual antenatal care without increasing the workload of midwives.

Conclusion

Using SPADe may improve the detection rates of depression in local antenatal clinics, enabling timely management, and consequently contribute towards the attainment of the Malawi Government's goal to treat depression at the primary level of care. There is a need for further research to evaluate the cost benefits of SPADe and its application in the daily clinical practice of a midwife before it is adopted.

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I will always glorify the name of God because this work would not have been accomplished without His unfailing grace.

List of abbreviations and acronyms

AUC	Area under curve
BDI	Beck Depression Inventory
CESD 20	Centre for Epidemiologic Studies Depression Scale 20,
CINAHL	Cumulative Index of Nursing and Allied Health Literature
COMREC	College of Medicine Research and Ethics Committee
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders version 4
EHP	Essential Health Package
EPDS	Edinburgh Postnatal Depression Scale
HAM D	Hamilton Rating Scale for Depression
HICs	High income countries
HIV	Human Immunodeficiency Virus
HSCL-15	Hopkins Symptoms Checklist 15
HTS	HIV testing services
IBM	International Business Machines
ICD 10	International Classification of Diseases 10th revision
K 10	Kessler Psychological Distress Scale 10
LMICs	Low and middle income countries
MINI	Mini-International Neuropsychiatric Interview
NHS	National Health Service
NPV	Negative predictive values
OR	Odds ratios
PPV	Positive predictive values

PRQ	Pregnancy Risk Questionnaire
QUADAS	Quality Assessment of Diagnostic Accuracy Studies
ROC	Receiver Operating Characteristics
SCID	Structured Clinical Interview for DSM-IV
SDGs	Sustainable Development Goals
Se	Sensitivity
Sp	Specificity
SPADe	Screening Protocol for Antenatal Depression
SPSS	Statistical Package for Social Sciences
SRQ	Self Reporting Questionnaire
STARD	Standards for the Reporting of Diagnostic Accuracy Studies
UMICs	Upper middle income countries
USPSTF	United States Preventive Services Task Force
WHO	World Health Organisation

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Doctoral Thesis (PhD) by Publications

According to the University of the Western Cape Guidelines for the Doctoral Thesis (PhD) by Publications (2012), publications should comprise of articles published or accepted for publication in peer reviewed journals. There is no set number of publications required for the PhD, the only requirement is "that the number of articles presented in the thesis will depend on the contribution of the doctoral student and the scope of the thesis.

Papers published or submitted to peer reviewed journals

Paper 1: Chorwe-Sungani, G. & Chipps, J. (2017). A systematic review of screening instruments for depression for use in antenatal services in low resource settings. *BMC Psychiatry*, 17(1):112. (Published) — Chapter 4

Paper 2: Chorwe-Sungani G, Chipps J. A cross-sectional study of depression among women attending antenatal clinics in Blantyre district, Malawi. *South African Journal of Psychiatry.* (In Press) — Chapter 5

Paper 3: Chorwe-Sungani G, Chipps J. Performance of the 3-item screener, the Edinburgh Postnatal Depression Scale, the Hopkins Symptoms Checklist-15 and the Self-Reporting Questionnaire and Pregnancy Risk Questionnaire, in screening of depression in antenatal clinics in the Blantyre district of Malawi. *Malawi Medical Journal*. (In Press) — Chapter 6

Paper 4: Chorwe-Sungani G, Chipps J. Validity and utility of instruments for screening of depression in women attending antenatal clinics in Blantyre district in Malawi. *South African Family Practice.* 1(1), 1-7. (Published) — Chapter 6

Chapter One

THE RESEARCH STUDY

1.1 Introduction

This Doctor of Philosophy thesis reports on studies that were conducted in order to develop a screening protocol for antenatal depression in antenatal clinics in a low resource setting (Blantyre district in Malawi). The work was carried out in the School of Nursing at University of the Western Cape and is submitted in fulfilment of the Doctor of Philosophy degree at the University of the Western Cape. The thesis is submitted as a compilation of published and submitted papers in peer-reviewed journals, in accordance with the University of the Western Cape's rules. This chapter presents a background to the study, problem statement, aim of the research study, objectives of the research study, significance of the research study, definitions of terms, outline of the study, research framework and conclusion.

1.2 Background

Depression affects pregnant women during all stages of their pregnancy (Kaaya et al., 2010). Currently, there is no reliable comprehensive epidemiological statistics about the prevalence of depressive disorders during pregnancy in Malawi, though one study in a rural district reported prevalence of depression as 10.7% (major depression) and 21.1% (minor depression) (Stewart, Umar, Tomenson, & Creed, 2014). These figures fall within prevalence range of depressive disorders during pregnancy (8.3% to 41%) reported in sub-Saharan Africa (Stewart et al., 2009) with highest prevalence (47%) registered in rural parts of South Africa (Rochat, Tomlinson, Bärnighausen, Newell, & Stein, 2011).

There are numerous risk factors which are linked to antenatal depression. In Malawi, a previous study found that lower social support and intimate partner violence were linked with

antenatal depression (Stewart et al., 2014). Similarly, another study revealed that being single, poverty, stressful life events, unplanned pregnancy, childhood trauma, and intimate partner violence predicted antenatal depression (Brittain et al., 2015).

Evidence indicates that antenatal depression and its associated risk factors may be addressed through psychosocial interventions including screening to reduce burden they may cause on an individual (Clarke, King, & Prost, 2013; Stewart et al., 2014). Depression is often under diagnosed by treating health professionals (Vahter, Kreegipuu, Talvik, & Gross-Paju, 2007) which leads to poorer prognosis of co-morbid physical health conditions in primary healthcare settings (Hanlon et al., 2015). This is likely to put pressure on the poor resources available in antenatal clinics in low resource settings and add an additional burden to pregnant women themselves. The lack of routine screening can also delay identification and treatment of women who are affected by antenatal depression. Delayed diagnosis and treatment of antenatal depression may lead to the early disruption of mother-infant relationships and prolong distress for a mother (Clarke et al., 2013).

Antenatal depression thus causes adverse effects on the mother, family, and community which necessitate interventions of health professionals. Screening for depression can help in timely detection of pregnant women with depression (Rahman, Surkan, Cayetano, Rwagatare, & Dickson, 2013). Currently, there are many instruments for the screening of antenatal depression that are validated in low resource settings (Fernandes et al., 2011; Natamba et al., 2014; Stewart, Umar, Tomenson, & Creed, 2013). Some of these instruments were not specifically developed for use during pregnancy but have been used in these settings. Nevertheless, screening instruments for depression must be accurate (be sensitive and specific) in identifying individuals who have a condition [sensitivity (Se)] and those without a condition [specificity (Sp)] (Pilowsky & Wu, 2013).

The performance of screening instruments may vary with settings (Bossuyt et al., 2015). A concern is that most instruments for the screening of depression were validated in high income countries (HICs) whose contexts are dissimilar from those of low resource settings (Akena et al., 2012). For example, there is evidence that the Edinburgh Postnatal Depression Scale's (EPDS) discriminant ability in detecting antenatal depression varies according to settings (e Couto et al., 2015; Martins et al., 2015; Rubertsson, Börjesson, Berglund, Josefsson, & Sydsjö, 2011). The two most commonly used instruments in low resource settings, namely the EPDS and the Self Reporting Questionnaire (SRQ), were reported to be easy to administer to pregnant women by interviewers in Malawi (Stewart et al., 2013). However, evidence is emerging that some health professionals may find screening instruments which have 5 or more items as long, cumbersome and time consuming for routine screening (Lombardo et al., 2011). Ultra-brief screening instruments (having 4 or less items) can promote screening for depression in busy antenatal clinics (Tsai et al., 2013) and screening instruments with binary questions such as Whooley's questions are less time consuming and easy to score (van Heyningen et al., 2014).

It is documented that screening instruments which require individuals to choose more than 2 responses for each question may not be easy to apply among illiterate pregnant women in Malawi (Stewart et al., 2013). These screening instruments should be valid to assist health professionals to effectively detect antenatal depression (Ajinkya, Jadhav, & Srivastava, 2013; Thombs et al., 2012). A validation process through the application of a gold standard (a clinical diagnostic assessment) is required to confirm a diagnosis of depression among pregnant women who test positive on a screening instrument.

Currently, pregnant women are not routinely screened for depression in antenatal clinics in Malawi. However, mental health is integrated in general health care system at policy level in

Malawi (MOHP, 2001), so that people could have increased access to mental health services. This means that pregnant women should also receive mental health care at antenatal clinics along with the usual antenatal care as needed. Services at antenatal clinics in Malawi include history taking, physical and laboratory examination, antenatal drugs and vaccines and antenatal education (Mgawadere, 2009). This is similar to what happens in South Africa where antenatal care generally focuses on physical examinations (Honikman, van Heyningen, Field, Baron, & Tomlinson, 2012).

Integrating mental health with antenatal care requires midwives to assess and deal with mental health problems affecting pregnant women in antenatal care settings in Malawi. Nonetheless, some policy makers fear that mental health interventions may deter midwives from concentrating on other 'priority' interventions (Rahman et al., 2013). Furthermore, many general health care workers, including midwives, in Malawi are not confident and competent enough deal with mental health problems (Kauye, 2008). Research studies have asserted that midwives may lack skills and confidence in screening and treating antenatal depression (Rollans, Schmied, Kemp, & Meade, 2013). This is corroborated by Mathibe-Neke, Rothberg, and Langley (2014) who asserted that midwives from sub-Saharan Africa are not skilled enough to assess and treat common perinatal mental disorders even though they encounter many pregnant women with psychosocial problems. Nonetheless, there is evidence that nurses and midwives can effectively intervene to reduce depressive symptoms during pregnancy (Clarke et al., 2013).

In Malawi midwives are frequently the first health professionals who could identify antenatal depression, or to whom a pregnant woman with antenatal depression or any other common perinatal mental disorders may go to seek for help. The country has low mental health specialists to patients ratios (0.01 psychiatrists per 100 000 and 0.22 psychiatric nurses per

100 000) (WHO, 2011) for more than16 million people. This shows that pregnant women attending antenatal clinics may have limited access to mental health specialists. Despite a gross shortage of mental health specialists in the country, midwives therefore could participate in the detection of pregnant women with depression when providing antenatal care.

Antenatal care includes the health assessment of pregnant women, encouraging good health habits, addressing pregnancy related complications and providing social and psychological support (Akhund & Avan, 2011). The World Health Organization (WHO) recommends the implementation of new focused antenatal care which consists of a minimum of eight contacts between the pregnant woman and the healthcare providers with their first contact during the first 12 weeks' gestation, then following contacts taking place at 20, 26, 30, 34, 36, 38 and 40 weeks' gestation (Tunçalp et al., 2017). Malawi adopted focused antenatal care more than a decade ago (Banda, 2013; Mgawadere, 2009) with the aim of helping women to maintain normal pregnancies through identification of pre-existing health conditions, early detection of complications arising during pregnancy, health promotion, disease prevention, birth preparedness and complication readiness planning (Ejigu, Woldie, & Kifle, 2013). It encourages careful identification of pregnant women with special health conditions or risk factors for complications (Villar, Bergsjo, & World Health Organization, 2002). As described in literature, detection and treatment of diseases, is one of the essential elements of care during pregnancy (WHO, 2006).

For the routine screening for depression in antenatal care to occur, there is a need for standardised instruments for screening of depression to be designated for use in antenatal clinics in Malawi. Internationally there is evidence that midwives can effectively use instruments for screening of depression during antenatal care (Honikman et al., 2012).

Currently, there are reports which show that EPDS and SRQ are used in research to screen depression during antenatal care in low resource settings (Stewart et al., 2013). However, screening instruments such as EPDS and SRQ are considered to be too long and time consuming for routine screening (Lombardo et al., 2011). This could present a problem in busy antenatal clinics. In Malawi, antenatal clinics are usually staffed by one or two midwives who attend to a multitude of pregnant women. Literature indicates that antenatal clinics in low resource settings are understaffed, lack infrastructure and do not have adequate instruments for assessing antenatal depression (Mathibe-Neke et al., 2014). Screening protocols for antenatal depression could help midwives to implement effective interventions systematically without adding to their workload (Rahman et al., 2013) in these busy antenatal clinics. Routine antenatal visits by pregnant women could provide an appropriate time for antenatal depression screening (Lancaster et al., 2010). Protocols for screening antenatal depression which include instruments that are accurate, acceptable and easy to use in busy, low resource settings therefore are needed (van Heyningen et al., 2014).

Dealing with antenatal depression can assist in achieving the 17 Sustainable Development Goals (SDGs), particularly, goal number three which focuses on ensuring healthy lives and promoting well-being for all ages (Izutsu et al., 2015). The government of Malawi is already making efforts to achieve SDG 3 (good health and well-being) through the Essential Health Package (EHP) (MOH, 2011) which includes mental disorders as priority conditions for the first time. The government has gone a step further in the Malawi Health Sector Strategic Plan II 2017-2022 to emphasise the first line treatment of depression for the entire population at community, primary and secondary levels of care (MOH, 2017a). It is estimated that there are 847 767 people who are in need of treatment for depression, and the Government has targeted providing access to treatment for 27 822 people by 2022 (MOH, 2017a). In this regard, the Government of Malawi has prioritised research on mental health in the National

Health Research Agenda for Malawi (2012-2016) to promote the development of innovative and appropriate treatment strategies for mental health problems affecting the population (MOH, 2012).

1.3 Problem statement

Depression significantly contributes to the disease burden of pregnant women (Stewart et al., 2013). However, depression is often under diagnosed by health professionals (Vahter et al., 2007) especially in antenatal clinics. This is the situation in Malawi where there are no routine screening protocols for depression in antenatal clinics. Nonetheless, studies show that screening protocols can enable the effective management of pregnant women with depression at antenatal clinics (Honikman et al., 2012). There is therefore a need to integrate screening for depression into routine antenatal services to enhance the early identification of antenatal depression and intervention to improve and maintain the well-being of pregnant women (Rahman et al., 2013) and contribute towards achieving the efforts of the Government of Malawi in scaling up the treatment of depression (MOH, 2017a). As there is paucity of protocols, and screening instruments that are validated for use in the busy and under staffed antenatal clinics in Malawi, this study sets out to develop a protocol for screening depression in antenatal clinics in Malawi.

1.4 Aim of the research study

The aim of this study is to develop a screening protocol for depression for use in antenatal clinics in the Blantyre district in Malawi.

1.5 Objectives of the research study

Phase 1

1. To systematically review and recommend brief screening instruments for depression suitable for utilisation in antenatal services in low resource settings (Paper 1: Chapter 4).

Phase 2

2. To describe the risk profile for depression in women attending antenatal clinics in a selected district in Malawi using the recommended instruments (Papers 2: Chapter 5).
3. To determine the utility and validity of a range of screening instruments for depression in women attending antenatal clinics in a selected district in Malawi (Papers 3 and 4: Chapter 6).

Phase 3

4. Based on the findings of objectives 1 to 3, develop a screening protocol for depression in antenatal clinics in the Blantyre district in Malawi (Chapters 7 and 8).

1.6 Significance of the research study

1.6.1 Practice

The findings of this study identified valid instruments, for screening depression in antenatal clinics, such as EPDS and SRQ exist in Malawi, and these instruments were then included in the development of a screening protocol for antenatal depression. This protocol will benefit both pregnant women and midwives as it will enable midwives to effectively detect and manage pregnant women, with depression, in local antenatal clinics. The screening protocol for antenatal depression proposes a referral pathway for pregnant women with depression which would allow effective collaboration between midwives and mental health specialists. This would increase pregnant women's access to mental health care thereby contributing towards the government's agenda of uplifting the mental health of all Malawians.

1.6.2 Education

The findings of this study add to the existing knowledge on screening of antenatal depression and the instruments used. Midwifery educators may utilise the findings of this study when developing, reviewing or implementing curricula for midwives. In addition, the findings may be included in continuous professional development programmes for midwives so that they can have both competence and confidence in screening for antenatal depression.

1.6.3 Research

The findings of this study provide valuable data about a screening protocol for antenatal depression which is recommended for use by midwives. This will serve as a foundation for future research that will evaluate the effectiveness and the suitability of the screening protocol.

1.7 Definition of terms

The terms and their descriptions used in this study are presented in Table 1.

Table 1: Terms and their descriptions

Term	Description
Accuracy	The degree to which a measurement represents the true value of an attribute being measured and can be determined by comparing results from a screening instrument with results generated by a gold standard (Hajian-Tilaki, 2013)
Antenatal care	Routine health care which is offered to women during pregnancy(Akhund & Avan, 2011).
Antenatal depression	Depression which occurs during pregnancy (Wisconsin Association for Perinatal Care, 2016).
Brief screening instrument	An instrument for measuring depression which has 5 or more questions (Tsai et al., 2013).
Depression	A mood disorder characterised by an individual having five or more of the following nine symptoms present during the same two week period and experiencing change from previous functioning; and at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure: (1) depressed mood most of the day,

Term	Description
	nearly every day, (2) decreased interest or pleasure in most activities; (3) significant weight change or change in appetite; (4) change in sleep pattern; (5) psychomotor agitation or retardation; (6) fatigue or loss of energy; (7) feelings of worthlessness or excessive guilt; (8) diminished ability to think or concentrate, and (9) suicidality (American Psychiatric Association, 2013). *Operational definition:* In this study, depression refers to a diagnosis on the Mini-International Neuropsychiatric Interview (MINI) or a pregnant woman having a score equal to or above standard cut off scores of EPDS, HSCL-15, PRQ, SRQ and the 3-item screener
Gold standard	A formal diagnostic psychiatric assessment of depression which is the most accurate instrument to detect the presence or absence of depression (Sheehan et al., 1998).
Low resource settings	Settings where health care systems do not meet the minimum standards set by the World Health Organisation (WHO) or any other quasi-governmental organisation (Goldstuck, 2014).
Major Depressive Disorder	Type of depression characterised by depressed mood and lack of interest accompanied by weight loss or gain, increased or decreased appetite, sleep disturbances, disturbances in thinking lack of concentration, sustained fatigue and suicidal ideation whereby most of these symptoms normally are present almost daily and result in substantial distress and impaired level of functioning (American Psychiatric Association, 2013).
Performance	How well an instrument measures (McIntosh, 2013) antenatal depression
Prevalence	Proportion or percentage of people affected by a condition (existing cases) at a point in time (Indrayan, 2013).
Psychosocial risk factors	Adverse psychosocial characteristics which are unfavourable to mental health and wellbeing (Loisel & Anema, 2013) of a pregnant woman
Screening	Use of a measure to identify people at risk of a specific condition among people who have not sought medical attention because of symptoms of that condition to warrant further investigation or direct prevention (Wald, 2008).
Screening protocol for antenatal depression	A system of standard rules and principles that explain the correct procedures to be followed (Directorate General of Health Services, 2011) when screening for antenatal depression.
Sensitivity	How often will an instrument yield positive result if a person has a disease or how likely an instrument is able to detect presence of a disease in an individual who has it (Akobeng, 2007).

Term	Description
Specificity	How often will an instrument yield negative result if a person does not have a disease or how likely an instrument is able to exclude an individual who does not have a disease (Akobeng, 2007).
Ultra brief screening instrument	An instrument for measuring depression which has 4 or less questions (Tsai et al., 2013).
Utility	How practical it is to use the instrument in the field (Bannigan & Watson, 2009). *Operational definition:* In this study, utility is the applicability of a screening instrument or a combination of instruments in detecting depression antenatal clinics
Validity	The ability of an instrument to measure what it is supposed to measure (Bannigan & Watson, 2009) as determined by its Se, Sp, positive predictive values (PPV) and negative predictive values (NPV) (Wong & Lim, 2011). *Operational definition:* In this study, validity is synonymous with accuracy as measured by sensitivity, specificity and Area Under Curve of a screening instrument

1.8 Outline of the research study

- Phase 1 (Chapter 4): A systematic review of screening instruments for depression for use in antenatal services in low resource settings (Paper 1);
- Phase 2 (Chapters 5 and 6): A cross-sectional study of depression among women attending antenatal clinics in the Blantyre district, Malawi (Papers 2); Performance of the 3-item screener, the Edinburgh Postnatal Depression Scale, the Hopkins Symptoms Checklist-15 and the Self-Reporting Questionnaire and Pregnancy Risk Questionnaire, in screening of depression in antenatal clinics in the Blantyre district of Malawi (Paper 3); Validity and utility of instruments for screening of depression in women attending antenatal clinics in the Blantyre district in Malawi (Paper 4);
- Phase 3 (Chapters 7): Development of the screening protocol for antenatal depression.

1.9 Research frameworks

This study used the public health model as its overarching research framework (Tsolekile, Puoane, Igumbor, & Birkett, 2013; Violence Prevention Alliance, 2017) to guide the phases, and the conceptual framework of stress vulnerability, depression and health outcomes in women underpinned the study (Kinser & Lyon, 2014).

1.9.1 The public health model

The major concepts of the public health model are: defining the problem, identifying risk factors, developing and testing the interventions, and implementing the interventions (Mercy, Rosenberg, Powell, Broome, & Roper, 1993). These concepts are sequentially connected so that each step is informed by the one preceding it (Figure 1).

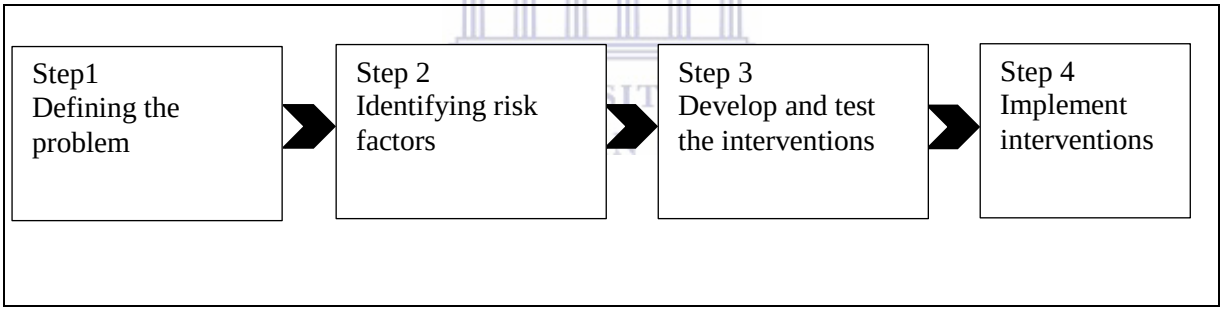

Figure 1: The public health model
Source: Mercy et al. (1993)

1.9.1.1 Step 1: Defining the problem,

The public health model proposes that the first step to develop prevention strategies is to define a problem (Mercy et al., 1993) and it involves systematic collection of data to answer the following questions about a problem: What problem do I want to prevent? What data are available to describe the scope and burden of the problem? How many people are affected by

the identified problem? Who is experiencing the problem? When and where is the problem occurring? (Centre for Disease Control and Prevention, 2015).

1.9.1.2 Step 2: Identifying risk factors

The public health model includes identification of risk factors for a condition as a way of understand "why" the condition is occurring (Centre for Disease Control and Prevention, 2015). This helps in suggesting relevant interventions for individuals or groups at high risk of a disease or condition (Mercy et al., 1993). Risk factors for a condition can be identified using epidemiologic studies (Mercy et al., 1993). These scientific research methods are help to generate evidence about risk factors, and protective factors that may decrease chances of a condition from occurring in the presence of risk (Centre for Disease Control and Prevention, 2015).

1.9.1.3 Step 3: Developing and testing the interventions

The public health model proposes that interventions should be developed based evidence generated from the process of defining the problem and identification of risk factors (Mercy et al., 1993). The developed interventions must be tested rigorously to determine their effectiveness in preventing a condition (Centre for Disease Control and Prevention, 2015).

1.9.1.4 Step 4: Implementing the interventions

The final step of the public health model is to implement the developed interventions that have been proved or have a high likelihood to be effective (Mercy et al., 1993). Data must be collected to evaluate the effectiveness of the intervention in clinical practice (Mercy et al., 1993). This helps to assure that all components of the developed intervention are applicable and effective in a local context (Centre for Disease Control and Prevention, 2015).

1.9.2 Conceptual framework of stress vulnerability, depression and health outcomes in women

The conceptual framework of stress vulnerability, depression and health outcomes in women proposes that a bidirectional relationship between stress vulnerability, depression and health outcomes in women exist (Kinser & Lyon, 2014) (Figure 2).

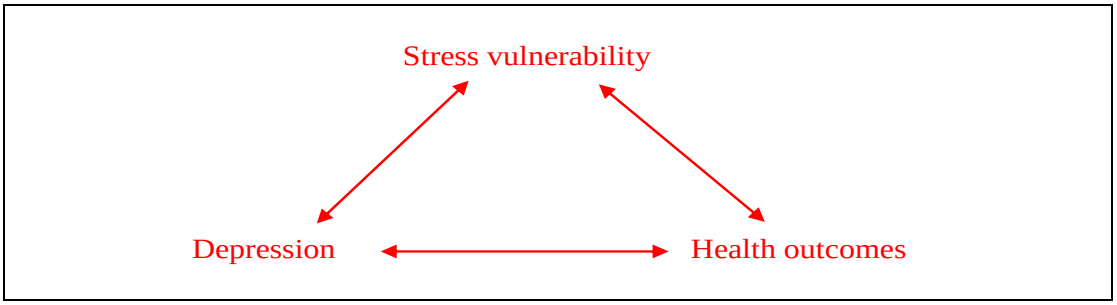

Figure 2: Diagrammatic presentation of the conceptual framework of stress vulnerability, depression and health outcomes in women
Source: Kinser and Lyon (2014)

1.9.2.1 Stress vulnerability

Potential stressors in a pregnant woman's life may contribute to the risk of depression and the woman's experience of depression may heighten her chances of having stressful episodes (Kinser & Lyon, 2014). Stressful life events predispose women to depression during pregnancy and antenatal depression leads to adverse obstetric outcomes (Ajinkya et al., 2013). The conceptual framework of stress vulnerability, depression and health outcomes in women states that depression and stress are interlinked such that potential stressors in a pregnant woman's life may interact and contribute to risk of depression and the experience of depression may heighten her tendency towards experiencing stressful episodes (Kinser & Lyon, 2014). It is evident that depressed women often live in stressful family environments where husbands and children might also have psychological problems (Hammen, 2005). The long term exposure to the chronic stress can overload pregnant women's capacity to cope which make them vulnerable to depression (Kinser & Lyon, 2014). In addition, there is

evidence that chronic stresses aggravate the effects of acute stressors on depression (Hammen, 2005).

1.9.2.2 Depression

There is evidence that periodic stressors often contribute to onset of depression (Hammen, 2005). This is in agreement with the conceptual framework of stress vulnerability, depression and health outcomes in women which states that psychobehavioural factors contribute towards development and maintenance of depressive states in women (Kinser & Lyon, 2014). The framework proposes that every individual woman has her own sense of control in the face of depression but depressed women often tend to have ruminations (repetitive negative thoughts) which increase stress of depression. Furthermore, the ability of women to respond to chronic stress associated with depression varies and depends upon availability and use of healthy biopsychosocial resources (Kinser & Lyon, 2014). The use of biopsychosocial resources is a protective mechanism essential for the capacity of women to deal with stressors.

1.9.2.3 Health outcomes

The conceptual framework of stress vulnerability, depression and health outcomes in women suggests that stress and depression influence health outcomes in women (Kinser & Lyon, 2014). This is consistent with Ajinkya et al. (2013) who asserted that depression during pregnancy is a major risk factor for post-natal depression and it also leads to adverse obstetric outcomes. Poor health outcomes may occur in pregnant women if biopsychosocial resources are not available or used. However, literature suggests that the early identification of pregnant women with depressive symptoms through screening (Rahman et al., 2013) may result in early intervention (Jones, Creedy, & Gamble, 2012), and consequently may improve health outcomes for these women.

1.9.3 Application of the research frameworks to the study

The public health model provided a relevant research framework to investigate the prevalence of antenatal depression and its risk factors; test the performance of a range of selected screening instruments; and develop a context specific screening protocol for antenatal depression (Figure 3). Step 1 and Step 2 of the public health model was Phase 2 of this research study where a cross-sectional study (Study 2: Paper 2) was conducted. To define problem and identify risk factors, the conceptual framework of stress vulnerability, depression and health outcomes in women was used to inform these two steps.

Step 3 was Phases 1 and 3 of this research study which was to develop a prevention strategy for antenatal depression, a systematic review was conducted to identify and recommend valid instruments for screening depression in antenatal clinics in low resource settings (Study 1 Paper 1). Then a cross-sectional study (Study 2: Paper 3) and a sensitivity analysis study (Study 3: Paper 4) were conducted to test the performance of a range of selected screening instruments in the local setting. Finally a screening protocol for antenatal depression which consisted of an algorithm that had screening instruments with best validity and utility was developed in this study (Study 4: Chapter 7).

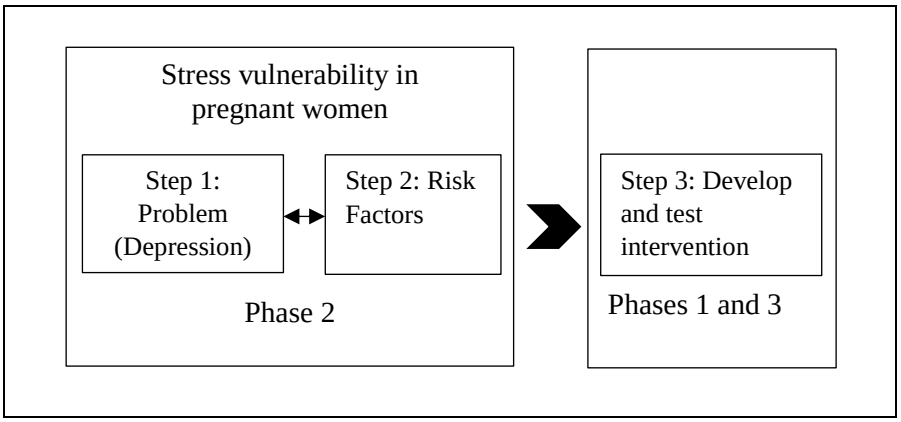

Figure 3: Application of the research frameworks to the study

However, the measurement of health outcomes (Step 4 of public health model), and the implementation and evaluation of the developed screening protocol for antenatal depression were beyond the scope of this research study.

1.10 Conclusion

This chapter has introduced the research study and presented its aim and objectives. The problem statement, the significance of the study and the research framework have also been described.

Chapter Two

LITERATURE REVIEW

2.1 Introduction

The review of literature intends to provide a context for the study and give an insight into the depth of the existing body of knowledge on the topic under study. It illustrates how the topic has previously been researched and identifies similarities and disparities within studies that were conducted elsewhere. Articles were identified by searching the following electronic databases: ScienceDirect, Cumulative Index of Nursing and Allied Health Literature (CINAHL), MEDLINE, PubMed, SABINET and PsychARTICLES. In addition some relevant articles were identified manually from reference lists of key articles. The literature search focused on English language articles that were dated between 2007 and 2017. However, several articles and books published more than a decade ago have been cited because they contain original work or relevant information which is not available in the more recent publications. The literature search yielded numerous articles HICs, low and middle income countries (LMICs), low income Countries (LICs) although articles from Malawi were scarce.

This literature review is supplemented by an in-depth systematic review of screening instruments for depression for use in antenatal services in low resource settings was conducted in this study (Paper 1). In addition, further specific and detailed literature reviews are included in the backgrounds of the papers which form part of this thesis.

The reviewed literature will be presented under the following sub-headings: burden of depression, burden of depression in pregnancy, strategies for addressing antenatal depression, screening for depression, instruments for screening of depression, screening protocol, ethics

of screening, cultural aspects of depression and treatment in Malawi, clinical and public health significance of antenatal depression, task shifting in screening of antenatal depression in low resource settings, summary of literature review and, conclusion.

2.2 Burden of depression

Depression affects over 120 million people globally and its lifetime prevalence in general population ranges from 10% to 15% (Lépine & Briley, 2011). Depression is one of the leading causes of disability- adjusted life year (DALY) (Fekadu, Shibeshi, & Engidawork, 2016). In 2010, it accounted for 40.5% (31·7–49·2) of DALYs caused by mental and substance use disorders worldwide (Whiteford et al., 2013) and its projections indicate that depression may become the second leading cause of disease by 2020 (Bindt et al., 2012). In Africa, depression is also a leading cause of disability (Sorsdahl, Stein, & Lund, 2012) with the prevalence being higher in women than men (Bindt et al., 2012). Recent evidence shows that depression is a public-health priority and cost-effective interventions should be implemented to reduce its burden (Ferrari et al., 2013).

2.2.1 Burden of depression in pregnancy

Depression has a significant impact on pregnant women (Stewart et al., 2014). Depression can lead to the poor uptake of antenatal services (Rochat, Tomlinson, Newell, & Stein, 2013) and can have adverse effects on both maternal and foetal well-being (Mathibe-Neke et al., 2014). These effects include premature birth, intra-uterine growth restriction, low birth weight (Kinser & Lyon, 2014), fatigue, poor concentration, and feelings of hopelessness in a pregnant woman (Stewart, 2007). There is further evidence that antenatal depression affect mothers' ability to provide sufficient nutritional care resulting in compromised infant growth and development (Stewart et al., 2010; Stewart et al., 2008). This calls for appropriate

identification and treatment of pregnant women with depression during antenatal visits (WHO, 2006) to ameliorate the problem.

2.2.2 Co-morbidity of antenatal depression and Human Immunodeficiency Virus in Malawi

Antenatal depression is associated with HIV (Manikkam & Burns, 2012) although the prevalence of antenatal depression among pregnant women in Malawi remains unknown (Crabb et al., 2012). Evidence showed that HIV-positive status was associated with depression in pregnant women in South Africa (Manikkam & Burns, 2012). This is corroborated by Peltzer, Rodriguez, and Jones (2016) who found a high prevalence (48.7%) of prenatal depression among pregnant women living with HIV in Mpumalanga, South Africa. It is documented that mental health issues are not usually considered as important aspects of HIV/AIDS intervention programmes in many developing countries (Lazarus & Freeman, 2009). However, antenatal HIV testing is considered as a cause of anxiety in Malawi, because a woman who found she was HIV positive would fear for her own life and for that of her child (Stewart, Umar, Gleadow-Ware, Creed, & Bristow, 2015). This is corroborated by Howard, Piot, and Stein (2014) who asserted that being diagnosed with HIV during pregnancy increases the risk of depression in many African women.

Human Immunodeficiency Virus (HIV) testing services are the gateway to HIV care and provides an opportunity for scaling-up antiretroviral treatment (MOH, 2016). Malawi introduced mandatory routine HIV testing of pregnant women in 2003 (Angotti, Dionne, & Gaydosh, 2010). Many women are tested of HIV for the first time during pregnancy in the country (Tenthani et al., 2015). Pregnant women are tested for HIV as part of their antenatal care visit, along with other routine examining procedures (Angotti et al., 2010). However, pregnant women's decisions to go for HIV testing are strongly influenced by their

perceptions (Conroy, 2015). Evidence showed that many rural Malawians perceive HIV testing as compulsory to receive antenatal care (Angotti et al., 2010). In addition some of these people consider compulsory HIV testing acceptable because it is important for pregnant women to know their HIV status. This is in agreement with the Malawi HIV testing services (HTS) guidelines emphasize both increasing access and improving quality of Malawi HTS guidelines which emphasises that all those tested should receive the correct result (MOH, 2016). However, it is documented that a source of stigma and major worry to women during perinatal period is HIV infection (Stewart et al., 2015).

Pregnant women's decisions to go for HIV testing are influenced by perceptions of a partner's risk for HIV than their own (Conroy, 2015). For instance if pregnant women and their partners perceive antenatal HIV testing as 'compulsory', it is possible that they may avoid public antenatal services to escape from something they or do not want (Angotti et al., 2010). This is supported by evidence which indicate that antenatal HIV testing decisions are deeply embedded within the relationship context so that men may forbid their partners from going for antenatal services due to 'compulsory' HIV testing in Malawi (Conroy, 2015). Conversely, a good relationship between a woman in perinatal period and her partner is a critical factor associated with her mental well being because it may bring emotional and economic security (Stewart et al., 2015).

2.3 Strategies for addressing antenatal depression

Strategies for dealing with depression during pregnancy include screening to identify those with depressive symptoms and treating those diagnosed with depression (Rahmani et al., 2013). It is crucial that screening must be followed by treatment of individuals who have a

condition (Andermann, Blancquaert, Beauchamp, & Déry, 2008). The two strategies for addressing antenatal depression are described in detail below:

2.3.1 Screening for depression

Screening is the application of an instrument to identify people at risk of a specific condition among people who have not sought medical attention because of symptoms of that condition to warrant further investigation or direct prevention (Wald, 2008). Literature suggests that it is reasonable to consider screening when the condition in question is significant and prevalent, can be effectively treated and cannot be readily detected without screening (Thombs et al., 2012). Screening for depression encompasses the use of instruments for measuring symptoms of depression to identify patients who may have depression but who have not sought treatment and whose depression has not already been detected by clinicians (Thombs et al., 2012).

For screening to be successful, it must detect a substantial number of individuals with undiagnosed depression and provide treatment to obtain sufficiently positive results to justify the costs and potential harms associated with screening (Thombs et al., 2012). It is documented that screening for depression in primary care requires the availability of a lot of resources (Rahman et al., 2013). In low resource settings, allocation of resources to screening activities could lead to a decline in the quality of care received by patients with more severe depression and who are more clearly in need (Thombs et al., 2012). More importantly, it is recommended that the WHO minimum criteria for screening should be met before screening is implemented (Andermann et al., 2008).

According to Andermann et al. (2008), the following is the aforementioned recommended minimum criteria for screening: (1) the screening programme should respond to a recognised

need; (2) the objectives of screening should be defined at the outset; (3) there should be a defined target population; (4) there should be scientific evidence of screening programme effectiveness; (5) the programme should integrate education, testing, clinical services and programme management; (6) there should be quality assurance, with mechanisms to minimise potential risks of screening; (7) the programme should ensure informed choice, confidentiality and respect for autonomy; (8); the programme should promote equity and access to screening for the entire target population; (9); programme evaluation should be planned from the outset; and (10) the overall benefits of screening should outweigh the harm. This criteria clearly focuses at improving clinical outcomes of individuals who participate in screening programmes, including pregnant women.

This study complied with the minimum criteria for implementing screening in many ways. Firstly, the aim of this study to develope a screening protocol was response to a need for detecting antenatal depression and associated risk factors. Secondly, the study clearly indicated that pregnant women attending antenatal clinic as target population for the screening of depression. Thirdly, the evidence about effectiveness of the proposed screening protocol for antenatal depression was locally generated by this study some of it was gathered from literature. Fourthly, this study minimised harm and ensured quality by submitting the proposal for review to two research and ethics committes, allowing participants to give consent for their voluntary participation in the study and ensuring privacy by not collecting personal details that could identify them during data collection. Pregnant women who were diagnosed as having depression were refered to a psychiatric unit. Finaly the protocol will be piloted to assess its clinical application and benefits and cost before it is adopted for clinical use. It is hoped that the proposed screening protocol will be used for screening depression in all pregnant women after its adoption.

Screening for depression is useful if it improves patient outcomes beyond those of standard care (Thombs et al., 2012). However, the Canadian Task Force on Preventive Health Care asserted that there is insufficient evidence about the benefits of screening to recommend routine screening of depression in adults in primary care settings (Joffres et al., 2013). The fact that there is insufficient evidence to recommend routine screening of depression does not change the importance of depression as a condition that negatively affects quality of life (Thombs & Ziegelstein, 2014). As such, clinicians in primary care settings should be alert to the possibility of depression in patients with characteristics that may increase their risk of depression (Joffres et al., 2013; Thombs & Ziegelstein, 2014). The American College of Preventive Medicine upholds the United States Preventive Services Task Force (USPSTF) proposal that all adults should be screened for depression in primary care settings and that there should be collaboration between primary care providers and mental health specialists to ensure accurate diagnosis and treatment of depression (Nimalasuriya, Compton, & Guillory, 2009).

2.3.1.1 Screening for depression in antenatal clinics

During antenatal care, midwives have a duty to screen pregnant women for various conditions (Mgawadere, 2009). Midwives are expected to routinely screen depression in all pregnant women (Choi et al., 2012) to improve detection of antenatal depression (Jones et al., 2012). There is evidence that screening for depression during pregnancy may reduce depressive symptoms among these women (O'Connor, Rossom, Henninger, Groom, & Burda, 2016). The American College of Obstetricians and Gynaecologists recommended that pregnant women should be screened for antenatal depression using a standardised and validated instrument (Committee on Obstetric Practice, 2015).

Midwives may consider screening for antenatal depression to be too demanding and requiring too much effort and this may result in a decreased frequency of screening (Mitchell & Coyne, 2009). The ideal timing and interval for screening for depression is not known (Siu et al., 2016). However, Wisconsin Association for Perinatal Care recommends that screening of depression should be done at first antenatal visit and the third trimester of pregnancy (Wisconsin Association for Perinatal Care, 2016).

2.3.2 Treatment for depression

Literature indicates that treatment for antenatal depression exists (Dennis & Dowswell, 2013; Vanderheyden, 2011). A systematic review found that drug therapy, acupuncture, the use of morning light, individual psychotherapy, cognitive behavioural therapy, counselling and end psychodynamic therapy are forms of depression treatment that are used during pregnancy (Syka, 2015). In addition, systematic reviews and controlled clinical trials found that various forms of psychotherapy (Dennis & Dowswell, 2013; Dennis, Ross, & Grigoriadis, 2007; Field, Diego, & Hernandez-Reif, 2010; Lavender, Ebert, & Jones, 2016; O'Connor et al., 2016; Sockol, 2015; Sockol, Epperson, & Barber, 2011; Spinelli & Endicott, 2003; van Ravesteyn, Lambregtse-van den Berg, Hoogendijk, & Kamperman, 2017), massage therapy (Dennis & Dowswell, 2013; Field et al., 2010), exercise (Daley et al., 2015; Robledo-Colonia, Sandoval-Restrepo, Mosquera-Valderrama, Escobar-Hurtado, & Ramirez-Velez, 2012), and drug therapy (Syka, 2015) may be effective in treating depression during pregnancy. This is supported by Whooley (2016) who asserted that exercise and other self-management strategies, behavioural activation, structured psychotherapy, and/or pharmacotherapy are effective treatments for depression.

However, some authors of systematic reviews have argued that there is no conclusive evidence on the effectiveness of these treatments for depression during pregnancy (Dennis &

Dowswell, 2013; Dennis et al., 2007; Syka, 2015). All in all one can argue that the lack of evidence on effectiveness of some treatments for depression during pregnancy does not mean that antenatal depression cannot be treated but simply means that evidence is not available.

2.4 Instruments for screening of depression

Screening for depression during pregnancy can be done using various instruments such as EPDS (Cox, Holden, & Sagovsky, 1987), Hopkins Symptoms Checklist 15 (HSCL-15) (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974), SRQ (Beusenberg, Orley, & World Health Organization, 1994) and Whooley's Questions (Whooley, Avins, Miranda, & Browner, 1997). Most of these screening instruments were not specifically developed for use during antenatal periods (Beusenberg et al., 1994; Cox et al., 1987; Derogatis et al., 1974). However, there are also numerous instruments for screening antenatal depression that were also validated for use in low resource settings (Chorwe-Sungani & Chipps, 2017) (Table 2). Detailed information on instruments for screening antenatal depression are presented in methodology, Chapter 3, Section 3.4.5.1.

Table 2: Summary of screening instruments that were validated in low resource settings

S.No	Screening Instrument	AUC	Se	Sp
1	Beck Depression Index	.87	.87	.74
2	Centre for Epidemiologic Studies Depression Scale 20	.82	.73	.79
3	Edinburgh Postnatal Depression Scale	.97	.87	.92
4	Hamilton Rating Scale for Depression	.86	.88	.75
5	Hopkins Symptoms Checklist 25	.86	.89	.8
6	Kessler Psychological Distress Scale 10	.95	1	.81
7	Self-Reporting Questionnaire	.83	.76	.81

Source: Chorwe-Sungani and Chipps (2017)

Screening instruments which were validated in specific settings have a high likelihood of generating accurate results (Akobeng, 2007) and may reduce the under-detection of

depression in those settings. However, screening instruments are generally limited in their accuracy (Sjögren, 2012) and their performance varies with populations or settings (Bossuyt et al., 2015). For instance, previous studies found that EPDS had different levels of accuracy and validity in antenatal clinics in various countries (Chorwe-Sungani & Chipps, 2017; e Couto et al., 2015; Martins et al., 2015; Rubertsson et al., 2011; Stewart et al., 2013).

2.4.1 Validity of screening instruments

Midwives should use valid screening instruments for them to effectively detect pregnant women with antenatal depression. A valid instrument should have an ability to measure what it is supposed to measure (Bannigan & Watson, 2009) and this is determined by its Se, Sp, PPV and NPV (Wong & Lim, 2011). The sensitivity of a screening instrument refers to the proportion of people with disease that are correctly identified (true positives) by the instrument while specificity is the proportion of people without the disease who will have a negative result (true negatives) (Akobeng, 2007). Sensitivity and specificity of a screening instrument are determined by comparing the results of the instrument against the outcomes of a gold standard. A gold standard is the single instrument (or a combination of instruments) that is considered the current preferred method of diagnosing a particular condition (Parikh, Mathai, Parikh, Sekhar, & Thomas, 2008). A good screening instrument should have both high sensitivity and specificity (Zhu, Zeng, & Wang, 2010). Nevertheless, sensitivity and specificity of a screening instrument are often in balance (trade off) and can vary with optimum cut off scores which are determined through using a Youden index (Fluss, Faraggi, & Reiser, 2005; Youden, 1950).

Both sensitivity and specificity are equally important although a screening instrument can be very specific without being sensitive, or it can be very sensitive without being specific (Zhu et al., 2010). It is recommended that a suitable screening instrument should have a minimum

acceptable balance of Se/Sp (.8/.7) (Pettersson, Boström, Gustavsson, & Ekselius, 2015). However, the sensitivity and specificity of a screening instrument has limited use in clinical practice when compared to PPV and NPV because they do not help clinicians to estimate the probability of disease in individual patients (Akobeng, 2007). PPV and NPV measure the likelihood that a positive or negative screening result is accurate for an individual (Vanderheyden, 2011). PPV and NPV of a screening instrument depend on the prevalence of disease in a population so that PPV increases with increasing prevalence of disease and NPV decreases with increasing prevalence (Parikh et al., 2008).

These predictive values are more useful measures of diagnostic accuracy in routine clinical practice because they assist a clinician to know the probability of a correct diagnosis being made (Akobeng, 2007). An instrument which has high sensitivity and NPV 'rules OUT' the disease while the one with high specificity and PPV 'rules IN' the disease (Parikh et al., 2008). Thus a highly sensitive screening instrument is most helpful to the clinician when the result is negative because an individual who screens negative is very unlikely to have the disease (Akobeng, 2007). Similarly, a screening instrument with high specificity is also most helpful to the clinician when the result is positive because an individual who screens positive is likely to have the disease. Literature indicates that a screening instrument cannot be valid without it reliably and consistently measuring what it is supposed to measure (Tavakol & Dennick, 2011). This suggests that for effective screening of depression in antenatal clinics, clinicians must utilise accurate screening instruments. Screening for antenatal depression using valid instruments can assist health professionals to accurately identify pregnant women who need mental health interventions (Ajinkya et al., 2013).

Accuracy refers to the degree to which a measurement represents the true value of the attribute being measured, and can be determined by comparing results from a screening

instrument with results generated by a gold standard using scores for area under curve (AUC) (Hajian-Tilaki, 2013), sensitivity and specificity (Henderson, 2009). In this context validity and accuracy may be used synonymously. AUC scores are used to categorise the accuracy of a screening instrument as low (0.5-0.7), moderate (>0.7-0.9) and high (>0.9) (Fischer, Bachmann, & Jaeschke, 2003). The higher the AUC score, the more accurate a screening instrument is in detecting individuals with or without the condition being tested (Zhu et al., 2010). As such, highly accurate instruments are necessary for the screening of depression in antenatal clinics (Chorwe-Sungani & Chipps, 2017). In addition, these screening instruments should be quick and easy to use in low resource settings (Hanlon et al., 2015; Tsai et al., 2013).

2.4.2 Strategies to increase accuracy and utility of screening instruments

2.4.2.1 Utility of screening instruments

In 2009, Bannigan and Watson (2009) asserted that the applicability of a screening instrument in the field is called utility. For a screening instrument to be considered suitable for use in low resource settings, it should be easy to administer and acceptable for use by midwives in busy and usually understaffed antenatal clinics (Honikman et al., 2012). As such, ultra-brief screening instruments which have a maximum of four or less items and requiring less than two minutes to administer, can be suitable for screening for depression in antenatal clinics with increased workloads (Tsai et al., 2013). Furthermore, a screening instrument which requires individuals to choose a response from multiple options for each question rather than a ‘yes’ or ‘no’ (binary) might not be easily understood by illiterate individuals (Stewart et al., 2013). Screening instruments with binary questions are also less time consuming and easier to score (van Heyningen et al., 2014). Due to concerns about the variation of performance of screening instruments in different contexts (Bossuyt et al., 2015),

it is necessary that clinicians should evaluate the utility of the instruments that they are expected to use (Bannigan & Watson, 2009) for screening.

2.4.2.2 Combining of screening instruments

Literature suggest that combining instruments may have increased utility in antenatal settings allowing for a distributed workload where initial screening could be done by midwives using an ultra-brief screener with only screen positives being referred for more detailed screening (van Heyningen et al., 2014). In addition, combining screening instruments may improve diagnostic accuracy in detecting a condition because various instruments may provide supplementary information about a condition of a given patient (Ladeira, Diniz, Nunes, & Forlenza, 2009) and increase the discriminant ability (Se and/or Sp) of individual instruments in accordance with the combination rules. Screening instruments can be combined using the following combination rules: compensatory, conjunctive, probability (Mackinnon & Mulligan, 1998) and sequential (Ramlall, Chipps, Bhigjee, & Pillay, 2013).

With the Compensatory (‘OR’) rule, two screening instruments are combined by classifying individuals as ‘cases’ if either instrument has a positive result (Mackinnon & Mulligan, 1998). This kind of combination increases sensitivity above either instrument when used alone and decreases specificity below that of either instrument when used alone (Mackinnon & Mulligan, 1998). This rule is suitable in situations where one instrument may pick up evidence missed by the other. When two screening instruments are combined using the Conjunctive (‘AND’) rule, only individuals with positive results on both instruments are classified as ‘cases’ (Ramlall et al., 2013). The Conjunctive rule improves specificity but decreases sensitivity over that of either instruments when applied alone (Mackinnon et al., 2003; Mackinnon & Mulligan, 1998). Probability combination, involves the mathematical combination of screening instruments using logistic regression to identify combinations

which have scores that best distinguishes ‘cases’ from ‘non-cases’(Mackinnon & Mulligan, 1998). However, a practical drawback of using probability combinations is that in clinical practice it involves calculations. The calculated scores are arbitrary and do not share the attributes of either of the combined instruments (Mackinnon & Mulligan, 1998), making it time consuming and difficult to interpret. With sequential combinations, one screening instrument is administered following the other so that all individuals who screen positive on initial screening are further assessed with the second one (Ramlall et al., 2013). Sequential combinations can help in addressing the challenges of trade-offs between sensitivity and specificity.

Screening for depression in antenatal clinics can be done in stages whereby various instruments are combined. Screening in stages may involve a two-step process where a short screening instrument is used to identify potential cases and, for those who screen positive, a second, often more detailed instrument with greater specificity, is used to confirm the diagnosis (Reme, Lie, & Eriksen, 2014). Literature proposes that any positive screen result on an ultra-brief instruments must be followed by a clinical interview to confirm the presence of depression (Whooley, 2016). Considering the workload in antenatal settings where screening for depression is not a key task, the use of an ultra-brief screening instrument as the first step in screening for depression, used in combination with a more detailed brief screening instrument to be completed on a smaller group of initial screen positives may be recommended. A meta-analysis reported that ultra-brief instruments are effective in detecting probable cases of depression, but that they should only be used when there are sufficient resources for second stage assessment of those who screen positive (Mitchell & Coyne, 2007). Nonetheless, if screening instruments or a combination of instruments are considered for screening in antenatal settings, these should be reliable and valid in detecting individuals (Zhu et al., 2010) with depression in this setting.

2.4.2.3 Screening protocols

Screening for depression should be followed by appropriate actions to support women identified as having depression (Wisconsin Association for Perinatal Care, 2016). This can be achieved through the use of protocols (McIntosh, 2017). Protocols refers to a comprehensive set of rigid criteria which outline steps for managing a specific clinical condition or aspects of organisation (Directorate General of Health Services, 2011). They prescribe a precise sequence of activities to be adhered to in the management of a specific clinical problem (Nightingale, 2008; The Newcastle Upon Tyne Hospitals NHS Foundation Trust, 2017). The protocols bring harmony in clinical settings by ensuring better work flow, uniformity in clinical practice, cost effectiveness in view of limited resources and, reduce bias and confusion among clinicians (Farooq, 2000).

Protocols that are based on a clear and robust evidence base are more likely to impact positively on outcomes (Rycroft-Malone, Fontenla, Bick, & Seers, 2010). These protocols are valuable instruments for clinicians and can improve care in almost any setting (NHS-MA & NICE, 2002) because they ensure that clinicians are implementing evidence based interventions (Nightingale, 2008). It is documented that locally developed protocols may be more acceptable to clinicians and consequently more likely to be adopted and used in practice (Rycroft-Malone et al., 2010).

However, before clinical protocols are adopted, it is important to ensure that they are suitable and sufficiently affordable to apply in a local setting without compromising the quality of healthcare (Farooq, 2000). To achieve this, protocols must be based on the best scientific evidence and expert opinion available at the time the protocol is adopted, the protocol must be re-evaluated and updated when more evidence on the protocol topic become available (Directorate General of Health Services, 2011).

There is evidence that the utilisation of protocols promotes systematic evidence-based screening for depression and, improved early detection and treatment of depression among adults in general health care settings (Bajracharya, Summers, Amatya, & DeBlieck, 2016; McIntosh, 2017). These protocols may help in improving the quality of health care (Vallejo-Ortega, Garcia-Perez, & Sanchez, 2017) for pregnant women receiving antenatal care in low resource settings. Literature suggests that integrating protocols within existing systems and processes may facilitate their use (Rycroft-Malone et al., 2010). This is in agreement with McIntosh (2017) who asserted that the utilisation of a protocol assisted with the systematic implementation of screening for depression along with medical treatment in a general health care setting. As such, for effective screening of depression to be achieved in antenatal clinics, clinicians should consider adopting protocols for screening of depression that can be implemented along with the usual antenatal care in local settings. Although protocols have the potential to facilitate the implementation of evidence based interventions, arguably their effectiveness will depend on whether (or not) they are successfully implemented and then routinely used (Rycroft-Malone et al., 2010).

2.5 Ethics of screening

Health professionals, including midwives, are required to deal with diverse ethical issues when new intervention strategies are developed because they may be unfamiliar with the ethical standards associated with the new practice (Cassetta & Goghari, 2015).

It is documented that screening may do more harm than good and it is ethical for clinicians to ensure that the benefits from the screening of each individual must outweigh the harm (Andermann et al., 2008). Potential harms from routine screening for depression include the treatment of depression in individuals who are incorrectly identified as having the condition,

and the treatment of mild symptoms that would often resolve without intervention (Thombs et al., 2012). As such, clinicians must be open and honest in telling their clients about the accuracy of screening instruments (Cassetta & Goghari, 2015) in detecting antenatal depression. According to Sjögren (2012), screening instruments are generally limited in their accuracy and interpretation of their results may lead to incorrect conclusions such that if the result is falsely negative, the individuals will consider themselves healthy, when they are actually ill, or if the result is falsely positive, a healthy individual will leave the practice with a false diagnosis.

2.5.1 Ethics of screening for depression

Screening for depression should include the provision of depression care support apart from those targeted at improving the effectiveness of treatment (O'Connor, Whitlock, Gaynes, & Beil, 2009). It should also ensure that an individuals' rights to informed choice, confidentiality and autonomy are respected by clinicians (Andermann et al., 2008). It is important that individuals should provide fully informed consent and be assured of confidentiality before they are screened for (Cassetta & Goghari, 2015) depression. Literature suggests that screening and referral for depression within the clinical settings makes it difficult for clinicians to maintain confidentiality (Boyd, Mogul, Newman, & Coyne, 2011) about a client's information. Clinicians have an ethical responsibility to ensure that the findings of screenings are not misunderstood or misused in manner that is detrimental to their client's well-being by the clients themselves, their families, community, other clinicians or policymakers (Cassetta & Goghari, 2015).

2.5.2 Ethics of screening for depression in antenatal clinics

Screening for depression during pregnancy may evoke a lot of ethical questions that need to be answered before midwives start implementing screening programmes. For instance, false

positives may be of ethical concern because they may add a burden to pregnant women and to clinical services. Screening may result in the use of medications, many of which can cause adverse effects (Cook et al., 2010) in pregnant women who are falsely detected as having depression. As such, a screening programme must be socially acceptable and must be at an acceptable cost (Reynolds, 2009) to pregnant women and their families. It is possible that some pregnant women may be placed on anti-depressant medications unnecessarily and will consequently be exposed to the negative side effects associated with these drugs (Thombs et al., 2012). However, when screening for antenatal depression, a higher level of false positives may be considered acceptable as, ethically, it would seem better not to miss a pregnant woman who needs treatment and support. As described in literature, it is possible for clinicians to exclude false positives from unnecessary treatment by conducting a further diagnostic assessment (gold standard) on all individuals, who screened positive, to confirm the presence of the disorder (Cook et al., 2010; Maurer, 2012; Trikalinos et al., 2012). This is corroborated by Thombs et al. (2012) who asserted that individuals who screen positive for depression need further assessment and, if confirmed, should be offered treatment.

A drawback is that the infrastructure and human resources required to implement an effective screening programme can be so costly that allocation of scarce resources demand the appropriate application of ethical principles of justice and equity (Andermann et al., 2008). It is documented that it is unethical to screen individuals without providing them with relevant interventions because it deprives them of rights to control their own lives and access to treatment (Cassetta & Goghari, 2015). Pregnant women who are diagnosed with depression may be discriminated or socially rejected by society (Williams, 2008). It is an ethical concern that after screening, a substantial proportion of women diagnosed with false positives may experience discrimination, self-stigma, and stress for unjustifiable reasons (Cassetta & Goghari, 2015). Although little is known about the possible "nocebo effect" of telling

individuals who are otherwise not specifically concerned about their mental health that they have depression (Thombs et al., 2012), a label of antenatal depression may negatively affect personal identity, relationships and the self-esteem of pregnant women (Cassetta & Goghari, 2015). The "nocebo effect" occurs when verbal suggestions of an adverse outcome can lead to the onset or exacerbation of symptoms (Benedetti, Lanotte, Lopiano, & Colloca, 2007).

The new label of having antenatal depression may influence the future goals of individuals and the type of support they may receive from significant others (Cassetta & Goghari, 2015). It is documented that individuals labelled with mental illness may lose their sense of entitlement to participation in community activities (Williams, 2008). It is possible that pregnant women, who screen positive for depression, may start distancing themselves from others, in anticipation of the associated stigma of depression, and this may negatively impact on their utilisation of antenatal and other social services. There is evidence which shows that stigmas due to a diagnosis of depression is one of the barriers to treatment among women (Ko, Farr, Dietz, & Robbins, 2012). However, opposing evidence showed that pregnant women who participated in screening for antenatal depression did not feel stigmatised, labelled or distressed by the screening process (Leigh & Milgrom, 2007). This is corroborated by Siu et al. (2016) who asserted that the negative extent of screening for depression in adults is small or sometimes non-existent.

2.6 Cultural aspects of depression and treatment in Malawi

In Malawi, all communities have their own explanations for illness. It is believed that mental disorders such as depression is caused by witchcraft, possession by spirits and 'evil eye' (punishment directed at a person by another person or a supernatural being) (Wilkinson, Mbuluma, Masache, & Robins, 1991). In addition, 'Chauta' (God) may punish wrongdoers who violate taboos (Wilkinson et al., 1991). Mental disorders may be caused by parents

performing culturally disapproved forms of sexual intercourse such as not abstaining from sexual activity from seventh month of pregnancy until six months after delivery to prevent the child from suffering from mental disorder (Steinforth, 2009). This shows that cultural beliefs should be considered as one of important factors which influence mental health interventions (Sefasi et al., 2008).

People may have negative cultural beliefs about mental disorders embedded in their community. Cultural beliefs related to mental disorders may affect the way the mentally ill person is handled locally (Wilkinson et al., 1991). Explanations of mental disorders, be it witchcraft, angry ancestors, will of God determine the acceptance of affected person's condition (Steinforth, 2009). People who believe in witchcraft as a cause of mental disorders may have no hope about recovery in the absence of traditional medicine (Sefasi et al., 2008). It is believed that pregnant women should avoid conflict with others because they may bewitch her to cause delay and complications in labour (Stewart et al., 2015). It is documented that people who fear witchcraft avoid offending other people who might use magical charms to retaliate (Wilkinson et al., 1991). Stewart et al. (2015) found that witchcraft was considered as a very real danger that makes a pregnant woman and her unborn baby vulnerable to illness.

Traditional healers use charms, herbs or mental suggestions to treat mental disorders (Wilkinson et al., 1991). However, stigma towards mental disorders exists in Malawi (Crabb et al., 2012) such that treatment may not be sought for an individual with depression who is not causing any trouble (Wilkinson et al., 1991). Furthermore, when people are sick, they want to know cultural explanations of their sickness such that they consult traditional healers before going for western medicine, or use both to be on the safe side (Wilkinson et al., 1991). This may suggest the need for developing culturally appropriate mental health interventions

(Crabb et al., 2012) for screening and treating of depression in pregnant women and other populations in the country.

There is evidence that the pathway to psychiatric care for patients with psychological problems in Malawi is comparable to other developing countries whereby traditional healers and paramedics play a significant role (Kauye, Udedi, & Mafuta, 2014). However, many cultural beliefs related to mental disorders are being challenged (Wilkinson et al., 1991) and there is high utilization of health services for people with common mental disorders in the local Primary Health Care settings (Udedi, Swartz, Stewart, & Kauye, 2014). This may suggest that screening for depression in local antenatal clinics may be feasible despite the prevailing cultural beliefs on mental disorders. In Malawi, mental health services are provides in all health centres, district hospitals and central hospitals across the country (Kauye, 2008).

2.7 Clinical and public health significance of antenatal depression

The lancet series on maternal mental health have established the clinical and public health importance of antenatal depression (Gelaye, Rondon, Araya, & Williams, 2016; Howard et al., 2014; Rondon & Stewart, 2017; Stringer et al., 2014). There is evidence that antepartum depression is highly prevalent in low resource settings (Gelaye et al., 2016). Literature show antenatal depression is associated with increased rates of adverse child outcomes in low resource settings where pregnant women have increased exposure to risk factors for depression (Herba, Glover, Ramchandani, & Rondon, 2017). The adverse mental health outcomes for the child include an increased risk of anxiety, depression, attention deficit hyperactivity disorder, and conduct disorder (Herba et al., 2017). It is documented that pregnant women with untreated depression have a higher likelihood of obstetric complications, premature deliveries, and low birthweight infants (Rondon & Stewart, 2017).

Antenatal depression and HIV infection form a vicious cycle, whereby the symptoms of each disease worsen the status of the other, and each needs to be sufficiently treated for the pregnant woman to become healthy (Stringer et al., 2014). It is of public health concern that pregnant women with co-morbidity of depression and HIV infection are less likely to adhere to antiretroviral therapy, which is critical for her survival and prevention of HIV transmission to the child (Howard et al., 2014). Stringer et al. (2014) recommended integration depression-screening technique in antenatal services that could identify a large proportion of affected women to break the cycle of depression and HIV infection interaction. It is documented that integrating mental health services into primary care may be the most viable way of closing treatment gap for mental health in low resource settings (Gelaye et al., 2016). An important step in this direction is the incorporation of the capacity to prevent, recognise, and treat depression within antenatal care (Herrman, 2015). This may help to meet the immediate mental health needs of a pregnant woman, ensure better maternal and child outcomes, and contribute towards success of HIV/AIDS services (Stringer et al., 2014).

Integrated antenatal services aimed at identifying and treating women with antenatal depression are needed because antenatal care is typically the first and only time of interaction with the health care system for many women in low resource settings (Gelaye et al., 2016). As such, antenatal care visits provide critically important opportunities for mental health interventions to occur. There is a need to develop protocols for early identification, treatment and preventing the adverse effects of antenatal depression in low resource settings because they do not exist (Gelaye et al., 2016). There is also a need to develop, refine and rigorously evaluate the predictive validity and reliability of instruments for screening of antenatal depression in low resource settings (Gelaye et al., 2016).

2.8 Task shifting in screening of antenatal depression in low resource settings

Mental disorders are underdiagnosed by primary care health workers in low resource settings, where mental health specialists are scarce (Gelaye et al., 2016). This poses a challenge to integration of screening of depression into antenatal care. However, literature suggests task shifting approaches could be used to effectively deliver mental health care in primary health care settings (Kakuma et al., 2011). Task shifting refers to the rational redistribution of tasks among health workforce teams, with specific tasks moved from highly qualified health workers to health workers with shorter training and fewer qualifications in order to make efficient use of the available human resources (Dambisya & Matinhure, 2012). In task shifting, tasks are shifted from health workers with more general training to workers with specific training for a particular task (Fulton et al., 2011). For instance, non-specialist health professionals or lay workers able to detect, diagnose, treat, and monitor individuals with mental disorders after receiving brief training and appropriate supervision by mental health specialists (Kakuma et al., 2011). This may help to mitigate the impact of health worker shortages an may provide an opportunity for establishing equitable and sustainable health systems in low resource settings (Dambisya & Matinhure, 2012).

Task shifting aims at increasing the number of health care services provided at a given quality and cost, or providing the same level of health care services at a given quality at a lower cost (Fulton et al., 2011). As such, task shifting may be of essence in this study because it proposes the inclusion of screening of depression in antenatal services which requires midwives to take up new tasks of detecting and treating of antenatal depression. In Uganda, nurses who run health centres diagnose and prescribe in addition to their usual nursing and midwifery duties (Dambisya & Matinhure, 2012). Similarly, anecdote reports indicate that task shifting makes nurses/midwives in Malawi, especially those deployed in health centres,

to operate beyond their scope of practice because circumstances demand that they do patient assessment, diagnosis and prescribing. This underscores the importance of having relevant policies and legislations to regulate the implementation of task shifting without compromising quality of care (Dambisya & Matinhure, 2012) in antenatal clinics.

In line with task shifting, the WHO recommended that the provision of mental health services in primary care should be the responsibility of primary care workers such as nurses and midwives who must receive ongoing training and supervision from specialist mental health specialists (Spedding, Stein, & Sorsdahl, 2014). This is corroborated by Honikman et al. (2012) who found that midwives were able to screen for depression and refer pregnant women appropriately after receiving some training in South Africa. Non-specialist health workers can effectively detect, diagnose, treat, and prevent common and severe mental disorders (Kakuma et al., 2011). It is documented that task-shifting mental health interventions from specialised to non-specialised health workers to treat common mental disorders could expanding access to mental health care (Spedding et al., 2014). Furthermore, task shifting can substantially reduce the expected number of health care providers otherwise needed to close mental health service gaps at primary health care level in low resource settings (Petersen et al., 2011).

However, task-sharing should not be viewed as an "outright solution" to the human resource crisis in low resource settings because specialist services will always be required regardless of the innovativeness and effectiveness of task shifting approaches in reducing the mental health treatment gap (Spedding et al., 2014). Considering that midwives in antenatal clinics in low resource settings are overburdened with increased workload (Mathibe-Neke et al., 2014), there is a need to ensure that task shifting happens in a team, based on which cadres are available, which tasks need to be undertaken and who has which competencies (Dambisya &

Matinhure, 2012). This study proposed that midwives who are readily available in antenatal clinics and mental health specialists-though scarce- should collaborate when screening for antenatal depression.

In Malawi task sharing initiative which involved lay health workers in providing mental health services led to the establishment of a new service within the community which increased access to mental health services (Wright & Chiwandira, 2016). The lay health workers received mental health training and were supervised by health professionals.There was increase in detection of people with severe mental illness by lay health workers. Lay health workers were also able to treat or refer patients with distress based on their assessment. However, the decision to refer patients to a district hospital was made by professional health workers. This is a local mental health initiative on which may inform successful implementation of the proposed screening protocol for antenatal depression in the country. Best-buy interventions may be another approach of implementing mental health services in antenatal clinics. These interventions emphasise cost effectiveness, feasibility, affordability and scalability (Kazdin & Rabbitt, 2013). Implementation of buy-in interventions depends on appropriateness of setting, capacity of system to deliver a given intervention to a targeted group of people, technical complexity of intervention and acceptability. It is hoped that screening of depression using the proposed screening protocol would be best-buy interventions because it will be integrated in usual antenatal care provided by midwives. However, mental health specialists remain key in screening of antenatal depression due to complexity of its diagnostic assessments and treatments. This may suggest the importance of utilising task sharing when providing best buy-interventions.

Mantal health services have traditionally been offered in psychiatric institutions. Nonetheless, the proposed screening protocol for antenatal depression suggests provision of mental health

care to pregnant women in unconventional settings of care. Interventions in unconventional settings model focuses on expanding care beyond traditional locales of service into settings where individuals attend (Kazdin & Rabbitt, 2013). Provision of care in unconventional settings open multiple opportunities to reach out to individuals or populations not otherwise served. However, implementation of this approach in local antenatal clinics may increase workload for midwives who are already burdened.

2.9 Summary of literature review

Depression significantly affects women during pregnancy and may lead to adverse outcomes. Screening for depression does not usually form part of antenatal care in low resource settings. Midwives in these settings may often have limited consultation time to screen for depression due to inadequate human and material resources. Antenatal depression is highly prevalent among pregnant women living with HIV. Antenatal depression also remains an important condition which negatively affects pregnant women's quality of life, but one that may respond to treatment. Numerous instruments are validated for screening antenatal depression in low resource settings although they were developed in high income countries. When screening is done in two stages, a short screening instrument can be used for initial screening with only positives screens being referred for more detailed screening. This would allow for a distributed workload in busy antenatal clinics. For effective screening for depression to be achieved in antenatal clinics, screening protocols for depression should be integrated into standard antenatal care. Successful implementation of the proposed screening protocol would require implementation of relevant task shifting approaches that to effectively deliver mental health care in local settings. Ethical questions may arise around screening for depression during pregnancy as there is the potential that it may cause harm. However, the extent of harm from screening for depression is negligible or at times non-existent. Despite the

prevailing cultural beliefs on mental disorders, screening for depression in local antenatal clinics may be feasible. Antenatal care contacts provide opportunities for screening depression and there is a need to develop protocols for early detection, treatment and preventing the adverse effects of antenatal depression in low resource settings.

2.10 Conclusion

This literature review provides an overview of issues that are important when screening for depression in antenatal clinics using screening instruments that were not specifically developed for detecting antenatal depression in low resource settings. The information provides the context for the study and compliments the specific literature that has been included in each of the published papers. The literature review has highlighted some challenges associated with routine screening for depression and in some instance included possible ways for dealing with such challenges.

Chapter Three

METHODOLOGY

3.1 Introduction

This chapter presents the methodology which includes the research approach described in the 3 phases of this research study which consisted of 4 studies, 4 papers and a screening protocol for antenatal depression. Phase 1 was a systematic review of screening instruments for depression for use in antenatal services in low resource settings. Phase 2 was a cross-sectional study which screened for depression in pregnant women and included sensitivity analysis study to validate screening instruments in a sub-sample of pregnant women. The third and final phase was a Nominal Group Technique study to review and endorse a screening protocol for antenatal depression. Validity of the research approach and ethics for this research study are also presented.

3.2 Research approach

A sequential multimethod research approach comprising a series of four interrelated studies was used (Brewer & Hunter, 2006; Morse, 2003) to answer the overall aim of this research study which was to develop a screening protocol for depression for use in antenatal clinics in the Blantyre district in Malawi. This research approach predominantly consisted of quantitative studies because its overall thrust was deductive (Morse, 2003). Therefore, a systematic review, a cross-sectional study, a sensitivity analysis study, and a Nominal Group Technique study were conducted sequentially in this order to address the specific objectives of this research study. Each of these studies were complete on their own, and were then used together to form essential components of the overall aim of the research study (Byrne & Humble, 2007).

A multimethod approach differs from mixed methods approach (Morse, 2003) as it does not require mixing of methods in order to have at least one qualitative/quantitative method in a research study (Hesse-Biber & Johnson, 2015). The use of multimethod approach allowed for the generation of data from different sources (Brewer & Hunter, 2006) and provided for the logical extension from findings of the preceding study such that the findings of each study informed the subsequent one (Morse, 2003). Thus sequential triangulation was utilised when the results of one study were used to inform the next study (Morse, 1991). Consequently, it facilitated the advancement of this research study (DeMarrais & Lapan, 2004). The 4 studies that were conducted in this research study were organised into 3 phases (Table 3) so that Phase 1 informed Phase 2 and Phase 2 consequently informed Phase 3.

Table 3: Phases of the research study

Phase	Objective	Study	Paper
1	To systematically review and recommend brief screening instruments for depression suitable for utilisation in antenatal services in low resource settings	Study 1: Systematic review of screening instruments for depression for use in antenatal services in low resource settings	1
2	To describe the risk profile for depression in women attending antenatal clinics in a selected district in Malawi using the recommended instruments	Study 2: A cross-sectional study that described demographic, clinical and risk profiles of antenatal depression among pregnant women attending antenatal clinics in the Blantyre district of Malawi	2
2	To determine the utility and validity of a range of screening instruments for depression in women attending antenatal clinics in a selected district in Malawi	Study 2: A cross-sectional study that described demographic, clinical and risk profiles of antenatal depression among pregnant women attending antenatal clinics in the Blantyre district of Malawi	3
		Study 3: A sensitivity analysis study using a sub-sample of women attending antenatal clinics in Blantyre district in Malawi	4
3	Based on the findings of objectives 1 to 3, develop a screening protocol for depression in antenatal clinics in the Blantyre district in Malawi	Study 4: A Nominal Group Technique study to develop a screening protocol for depression in antenatal clinics in Blantyre district in Malawi	-

3.3 Phase 1: Systematic review of screening instruments

The aim of Phase 1 was to systematically review and recommend brief screening instruments for depression suitable for utilisation in antenatal services in low resource settings (Study 1: Paper 1).

3.3.1 Study 1: Systematic review of screening instruments for depression for use in antenatal services in low resource settings

In this study, the researcher conducted a systematic review to identify and recommend validated screening instruments for depression suitable for utilisation in antenatal services in low resource settings. The methodology is described in detail in Chapter 4 (Paper 1).

3.3.1.1 Review question

What are the effective screening instruments for detecting depression in antenatal clinics in low resource settings?

3.3.1.2 Objectives of the systematic review

The objectives of this systematic review were:

1. To identify and select screening instruments for depression in antenatal clinics in low resource settings.
2. To assess methodological quality of studies which validated screening for antenatal depression.
3. To compare the psychometric properties of selected screening instruments for depression in antenatal clinics in low resource settings.

3.4 Phase 2: Cross-sectional study

Phase 2 was a cross-sectional study (Study 2) which screened for depression and psychosocial risk factors in pregnant women using a range of instruments and included a sensitivity analysis study (Study 3) using a sub-sample of pregnant women who participated in Study 2 to validate these screening instruments through a psychiatric interview using the MINI.

3.4.1 Setting

Malawi is situated in Sub-Saharan Africa and has an estimated population of 16 million people (Chorwe-Sungani, Shangase, & Chilinda, 2014). Majority of the people are poor, with low literacy levels and live in rural areas of the country. The county's economy is agro-based and most of the people are subsistence farmers. This study was conducted in Blantyre district which is located in the southern region of Malawi (Figure 4). The district has 1 central hospital, 1 mission hospital and 22 health centres which offer antenatal services. The Government of Malawi provide free health services to all its citizens in public health facilities although the country is faced with gross shortage of medical supplies, health professionals and infrastructure (MOH, 2017b).

Figure 4: Map of Malawi showing the location of Blantyre District.
Source: Norwich-Dedza Partnership (2017)

In this study, data were collected from 8 selected rural (4) and urban (4) public health centres in the Blantyre district of Malawi between January and May 2016. Cluster sampling was used to select the 8 health centres. Firstly the health centres were categorised into rural (12) and urban (10). Secondly, names of all 22 health centres were listed starting with rural and finishing with urban health centres. This list was then used as a sampling frame. The researcher used simple random sampling to select every third health centre on the list after randomly picking the first one. This accorded equal chance of being selected to all health centres listed on the sampling frame.

Antenatal clinics were run by 1 or 2 Nurse Midwife Technicians under supervision of a Registered Midwife in these health centres. Nurse Midwife Technicians are the lowest cadre of midwives (have college Certificate or Diploma in Nursing and Midwifery and valid licence to practice) (Nurses and Midwives Council of Malawi, 2009). On the other hand, Registered Midwives either have Bachelor of Science in Nursing and Midwifery or Bachelor of Science in Nursing plus a University Certificate in Midwifery or University Diploma in Nursing and Midwifery or University Diploma in Nursing plus a University Certificate in Midwifery (Nurses and Midwives Council of Malawi, 2009). This setting was suitable for this study because it had well established antenatal clinics where pregnant women were easily accessed. Antenatal clinics were conducted five days a week at two urban health centres while the rest of the six health centres attended to pregnant women twice a week.

Although majority of Malawians live in rural areas, urban health centres were generally attending to more pregnant women compared to rural health centres. This could be as a result of rapid migration of people from rural to urban centres. There is gross shortage of midwives in both rural and urban health centres. It is estimated that the ratio of person to midwives is at 5 058 people per midwife (Nyondo, 2017). Pregnancy-related mortality rate is 497 deaths per 100,000 live births and prevalence of HIV among women is higher in urban (17.8%) than rural (9.2%) areas across the country (National Statistical Office & ICF, 2017). The literacy levels of women both in rural and urban areas are genrally low and many women in both settings are unemployed. They mostly depend on their partners for financial and material support. All in all the characteristic of pregnant women in urban and rural areas were comparable.

3.4.2 Study population

The target population included all pregnant women attending the eight selected antenatal clinics at Chileka, Chilomoni, Limbe, Lirangwe, Mdeka, Mpemba, Ndirande and Zingwangwa Health Centres in the Blantyre district. The target population was based on February 2015's monthly attendance of pregnant women at these health centres which ranged from 88 to 366 (from clinic records) (Table 4). The total monthly antenatal attendance in these eight facilities was 1593. The researcher anticipated that there would be adequate pregnant women attending antenatal clinics to realise the study sample size.

Table 4: Antenatal attendance for February 2015

Location	Health centre	Monthly antenatal attendance (x)
Urban	Ndirande	366
	Limbe	336
	Chilomoni	134
	Zingwangwa	208
Rural	Chileka	135
	Lirangwe	88
	Mdeka	227
	Mpemba	99
	Total	**1593**

3.4.3 Sample size calculation

In Phase 2, the sample size for the cross-sectional study (Study 2) was calculated first and was used as one of the parameters for determining sample size for sensitivity analysis study (Study 3). Further details about sample size calculation for these two studies have been outlined.

3.4.3.1 Sample size for the cross-sectional study

Sample size for the cross-sectional study (Study 2) was calculated using the methodology detailed by Jones, Carley, and Harrison (2003). This was used to ensure there were enough

cases and non-cases of depression for sensitivity analysis study. Parameters for calculating sample size were as follows: estimated Se=.96, estimated Sp=.57 (Whooley et al., 1997), estimated population prevalence 0.21 (Stewart et al., 2014), and width of Confidence Interval 0.05. The number of potential cases was calculated and then a sample size for sensitivity was calculated as follows:

$$TP + FN = Z^2 \times (SN\ (1\text{-}SN))/W^2$$

In this formula, TP = True positive, FN = False negative, Z = Z score at 95 Confidence Interval, SN = estimated sensitivity and W = Confidence Interval.

$$TP + FN = 1.96^2 \times (0.96(1\text{-}0.96))/0.05^2 = 59$$

$$N1 = (TP + FN)/P = 59/0.21 = 281$$

The number of non-cases was calculated and then a sample size for specificity was also calculated using the following formula:

$$FP + TN = Z^2 \times (SP\ (1\text{-}SP))/W^2$$

In this formula, FP = False positive, TN = True negative, Z = Z score at 95 Confidence interval, SP = estimated specificity and W= Confidence interval.

$$FP + TN = 1.96^2 \times (0.57(1\text{-}0.57))/0.05^2 = 377$$

$$N2 = (TP + FN)/\ (1\text{-}P) = 377/\ (1\text{-}0.21) = 377/.79 = 477$$

The larger of the two sample sizes between N1 (281) and N2 (477) was selected for use in this study. Therefore, the final sample size for cross-sectional study (Study 2) was 477 which was rounded up to 480.

The sample (N) of 480 was further divided into sub-samples for each of the eight health centres (Table 5). The researcher calculated the proportion of pregnant women attending each facility by dividing the number of monthly antenatal attendance at each facility (x) by the

total number of antenatal visits for the eight health centres, 1593. This proportion (x/1593) was multiplied by the calculated total sample size (N) to compute sub-samples (x/1593*N) for each antenatal clinic.

Table 5: Sub-samples for each health centre

Sample size (N)	Location	Health centre	Monthly antenatal attendance (x)	Proportion (x/1593)	Sub samples (x/1593*N)
480	Urban	Ndirande	366	0.23	110
		Limbe	336	0.22	102
		Chilomoni	134	0.08	40
		Zingwangwa	208	0.13	62
	Rural	Chileka	135	0.08	40
		Lirangwe	88	0.06	26
		Mdeka	227	0.14	70
		Mpemba	99	0.06	30
		Total	**1593**	**1.00**	**480**

3.4.3.2 Sample size the sensitivity analysis study (Study 3)

A sample size for the sensitivity analysis study was calculated using a sample size calculator (Calculator.net, 2015). It was estimated that the prevalence of depression among pregnant women in Malawi is 21% (Stewart et al., 2014). Using 95% significance level, 7.12% confidence interval, proportion of 21% and 480 (sample size for Study 2) as population, a sample size of 100 was calculated to be sufficient for the sensitivity analysis study (Study 3) (Table 6).

Table 6: Description of sub-sample for sensitivity analysis study

Sample size for Cross-sectional study (N)	Health centre	Monthly antenatal attendance (x)	Proportion (x/1593)	Sub samples (n)	Sample size for sensitivity analysis study
480	Ndirande	366	0.23	110	23
	Limbe	336	0.22	102	22
	Chilomoni	134	0.08	40	8
	Zingwangwa	208	0.13	62	13
	Chileka	135	0.08	40	8
	Lirangwe	88	0.06	26	6
	Mdeka	227	0.14	70	14
	Mpemba	99	0.06	30	6
	Total	**1593**	**1.00**	**480**	**100**

3.4.4 Sampling

Two research assistants were each responsible for sampling pregnant women in each of the two studies, the cross-sectional study and sensitivity analysis study. Further details about sampling for these two studies were as follows:

3.4.4.1 Sampling for the cross-sectional study

Systematic random sampling was used to draw the sample (Grove, Burns, & Gray, 2012) for the cross-sectional study. Queues for women attending antenatal clinics were used as a sampling frame. A research assistant was assigned to randomly select pregnant women from queues at antenatal clinics and invite them to participate in the study. The research assistant chose every other third pregnant woman in the queue after randomly picking the first one on each day when data collection was done. The inclusion criteria for this study were: being 18 years old and above, and being able to speak and understand Chichewa. Pregnant women who had complications in their pregnancy or known mental/medical conditions were excluded from this study.

3.4.4.2 Sampling for sensitivity analysis study

A second research assistant randomly selected pregnant women who were already recruited in a cross-sectional study to be interviewed by the researcher using the MINI. The research assistant sent every third pregnant woman for further interview using the MINI, after randomly picking the first one. The inclusion criterion for this study was; accepting to undergo a further interview on the same day after participating in the cross-sectional study (Study 2). Pregnant women who declined to undergo a further interview on the same day after participating in Study 2 were excluded. The numbers of pregnant women that were sampled for both the cross-sectional study and sensitivity analysis study are presented in Figure 5.

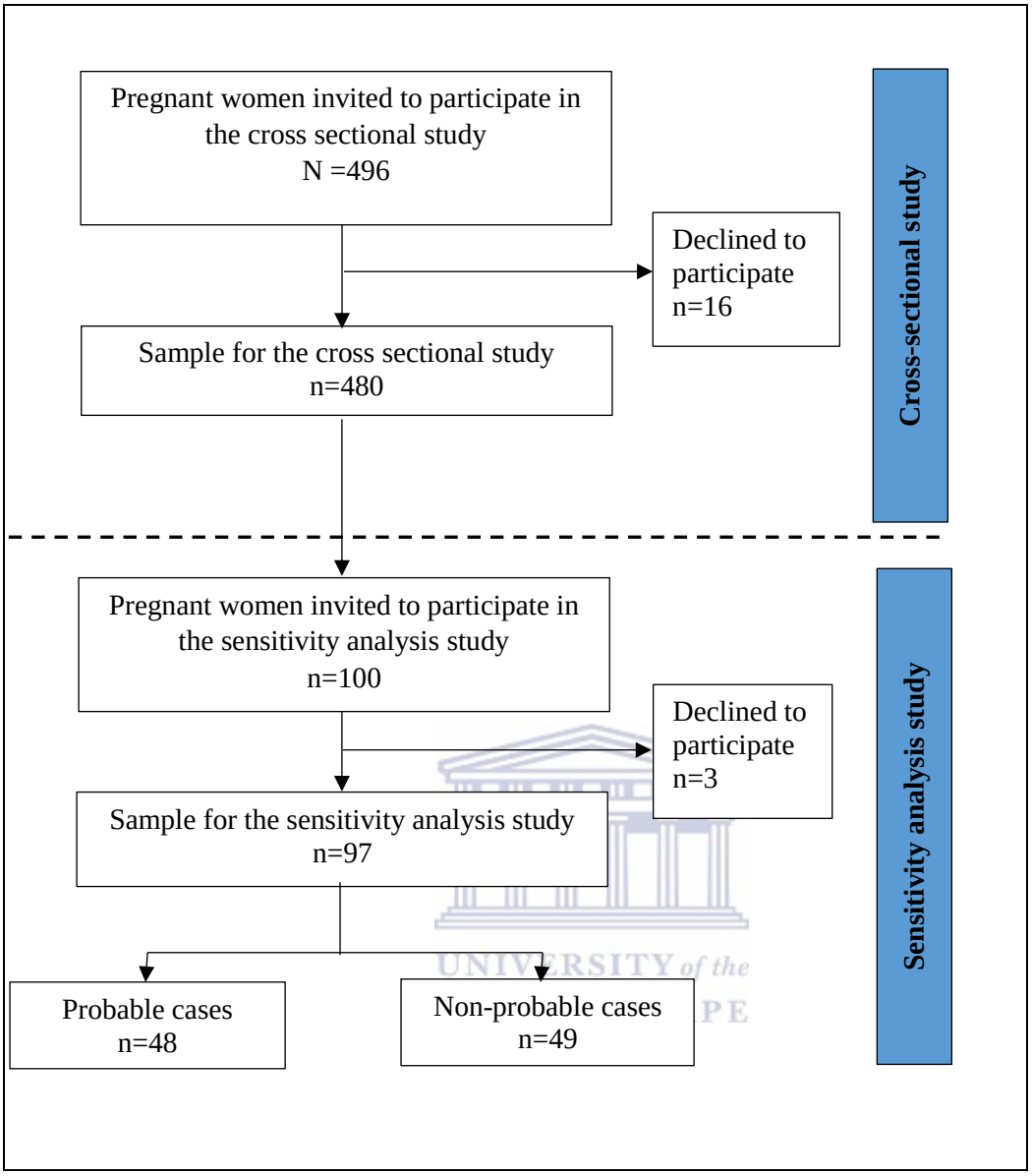

Figure 5: Flow diagram for sample size determination

3.4.5 Data collection instruments

Two sets of data collection instruments were used to collect data for the studies 2 and 3 that were conducted in Phase 2 of this research study. Firstly, Study 2, the cross-sectional study, used a questionnaire to collect data from all pregnant women who were sampled. The questionnaire had 4 sections namely: A, B and C (Appendix 1). Section A included the demographic characteristics of participants (age, highest level of education, marital status,

occupation, and number of pregnancies). Section B consisted of the selected instruments for screening of depression (the 3-item screener, EPDS, HSCL-15 and SRQ). Section C comprised of Pregnancy Risk Questionnaire (PRQ). Secondly, data for Study 3, the sensitivity analysis study, was collected using the MINI as a gold standard against which screening instruments were validated in a sub-sample of pregnant women. Both the questionnaire and the MINI were administered in Chichewa, a national language, which is spoken and understood by many Malawians.

3.4.5.1 Screening instruments

The cross-sectional study (Study 2) adopted the screening instruments that were identified in Phase 1 (Paper 1) as the most appropriate instruments for low resource settings to screen for depression in pregnant women. The systematic review which was conducted in Phase 1 of this study identified the EPDS, HSCL-15 and SRQ the as the most effective instruments that were previously used to screen for depression in pregnant women in a low resource settings (Chorwe-Sungani & Chipps, 2017). More details are presented in Chapter 4: Paper 1. The 3-item screener was included because there is evidence which showed that ultra-brief instruments are effective in detecting probable cases of depression in primary care (Mitchell & Coyne, 2007). The PRQ was also included because, apart from screening depression, it also assesses psychosocial risk factors for depression during pregnancy (Austin, HadziPavlovic, Saint, & Parker, 2005).

Edinburgh Postnatal Depression Scale

The EPDS is the most validated screening instrument in antenatal care in low resource settings with remarkable Se, Sp and AUCs (Adewuya, Ola, Aloba, Dada, & Fasoto, 2007; Alvarado-Esquivel, Sifuentes-Alvarez, & Salas-Martinez, 2014a, 2014b; e Couto et al., 2015;

Martins et al., 2015; Stewart et al., 2013; Tran et al., 2011). It does not include questions which assess for somatic symptoms. EPDS is a 10-item self-reported questionnaire about feelings of depression experienced in the postnatal period rated over the past seven days with each item being rated on four exclusive scores that range from 0 to 3 (Cox et al., 1987; Tran et al., 2014). EPDS has a maximum score of 30 which is calculated by adding together scores for all ten items. The standard cut off score for EPDS is ≥10 (Martins et al., 2015). Chichewa version (local language) of EPDS exist and it was previously found to be a valid instrument for screening antenatal depression during research in Malawi with Se= .69, Sp= .8, AUC= .811 and Cronbach's α = .9 (Stewart et al., 2013).

Hopkins Symptoms Check List-15

The HSCL-25 is a self-report inventory for identifying common psychiatric symptoms (Derogatis et al., 1974) which include 15 items for screening depression called HSCL-15. It was not specifically designed for screening antenatal depression and it includes assessment for somatic symptoms. This instrument was previously validated in Tanzania among HIV positive pregnant women (Se= .89, Sp= .8, AUC >.8) (Kaaya et al., 2002). The 15 items for this depression instrument have four possible responses ("Not at all," "A little," "Quite a bit," "Extremely," which are rated from 1 to 4, respectively). Maximum total score for HSCL-15 is 4. The total score for each respondent is the average score of all the 15 items. Standard cut off score for HSCL-15 is ≥1.75 and it had a Cronbach's α ≥ .9 in Norway (Skipstein, Janson, Stoolmiller, & Mathiesen, 2010).

Self Reporting Questionnaire

The SRQ was developed by the World Health Organisation (WHO) as a screening instrument for mental disturbance in the general population in developing countries (Beusenberg et al.,

1994). The instrument has 20 binary questions which ask for psychiatric symptoms experienced in the previous 4 weeks and its standard cut off is ≥10 (Kumbhar, Dhumale, & Kumbhar, 2012). SRQ has a maximum total score of 20 and each of the 20 questions is scored as 1 (for presence of symptom) and 0 (for absence of symptom). It can be self or interviewer administered and it includes numerous items which assess for non-specific somatic symptoms. The Chichewa version of SRQ was validated in Malawi among pregnant women and it had Se= .76, Sp= .81, AUC= .833 and Cronbach's α = .83 (Stewart et al., 2013).

The 3-item screener

This study also included two ultra-brief instruments for screening of depression, the one-item screening question (Vahter et al., 2007) and Whooley's questions (Whooley et al., 1997), which were combined to make a 3 item screener. The Whooley questions are 2 questions which are used to assess whether a person has experienced 2 key depressive symptoms (sadness and loss of interest) in the past month while the one screening question asks if a person is feeling depressed at that moment. These 3 questions for screening of depression had dichotomous responses: 'Yes' or 'No'. Any respondent who answered 'Yes' to 1 of the 3 questions was considered as a probable depression case. The maximum total score for the 3-item screener was 3 and cut off score was set as ≥1. The one-item screening question (Se= .94) (Vahter et al., 2007) and Whooley's questions (Se= .96) (Whooley et al., 1997) have proved to be effective in screening depression in other populations but these 3 questions have never been used in antenatal clinics in Malawi. There is paucity of information about use of Whooley questions in antenatal clinics in low resource settings. In South Africa, studies have found that Whooley's questions are a valid instrument (Se =.64, Sp= .8) for screening of depression during pregnancy (Marsay, Manderson, & Subramaney, 2017).

Pregnancy Risk Questionnaire

The study also used the PRQ to measure psychosocial risk factors for depression in pregnant women. PRQ has 18 items which were designed to antenatally assess risk factors for postnatal depression from childhood to the present (Austin et al., 2005). It comprises of binary questions and questions which have 5 options for answers. All items with binary questions were scored 1 for 'No' and 5 for 'Yes' and items with five options for answers were scored 1-2 for 'Not at all', 3-4 for 'Somewhat' and 5 for 'Very much'. It has a total minimum score of 18 and a total maximum score of 90. For questions which consisted of several parts (question 9 - past history of depression; question 11 - current history of depression; question 13 - stress in pregnancy) only the first yes/no is used when calculating the total PRQ score. It is a valid instrument for measuring antenatal depression (Se=44, Sp=.92, cut off ≥46) (Austin et al., 2005).

3.4.5.2 The Mini International Neuropsychiatric Interview (MINI)

The sensitivity analysis study (Study 3) used the MINI, a gold standard (Appendices 3 and 4) to collect data that confirmed the presence or absence of depression in a sub-sample of pregnant women. The MINI is a brief structured diagnostic interview for Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) and International Classification of Diseases (ICD) 10th revision (Sheehan et al., 1998) with Se/Sp >.8/.8 (Pettersson et al., 2015). The Major Depression module of the MINI was used to conduct clinical assessments to confirm the presence or absence of depression in a study sample.

3.4.5.3 Validity and reliability of data collection instruments

The data collection instruments that were used to collect data for Study 2 (cross-sectional study) and Study 3 (sensitivity analysis study) in Phase 2 of this research study were reliable

and valid (Austin et al., 2005; Martins et al., 2015; Sheehan et al., 1998; Skipstein et al., 2010; Stewart et al., 2013; Vahter et al., 2007; Whooley et al., 1997). The overall questionnaire comprising of the aforementioned data collection instruments was reviewed by midwifery and mental health experts at the School of Nursing at the University of the Western Cape for their content and face validity.

3.4.5.4 Translation of data collection instruments

The data collection instruments for the cross-sectional study (Study 2) and sensitivity analysis study (Study 3) in Phase 2 of this research study were translated into Chichewa, a local language, through forward translation, back translation and were *pre-tested* among pregnant women in the Blantyre district. This is in line with Maneesriwongul and Dixon (2004) who recommended that minimum standards for applying an instrument that was developed in another language are back translation and monolingual testing of a translated version of the instrument among the target language group. It was necessary to translate the screening instruments into Chichewa because it is the primary language spoken by the pregnant women who participated in this study.

Chichewa versions of EPDS and SRQ already existed and they were incorporated into the questionnaire for the cross-sectional study (Study 2). Stewart and colleagues translated the EPDS into Chichewa through forward and back translations and testing (Stewart et al., 2013). Similarly, the SRQ was translated into Chichewa through multiple forward translations, consensus translation, back-translation, focus groups, piloting and final revision of instrument (Stewart et al., 2009).

Forward translation: The 3 item screener, HSCL-15, PRQ and the MINI components of the data collection instruments for studies 2 and 3 were independently translated into Chichewa by the researcher. The researcher was suitable for this task because he is bilingual Malawian. He has an excellent command of English speaking and he is also fluent in his mother tongue, Chichewa. He is also a mental health professional who is familiar with terminology used in the screening instruments.

Back-translation: The Chichewa versions of the 3 item screener, HSCL-15, PRQ and the MINI were translated back into English by an independent bilingual Malawian - a social worker who had no knowledge about the screening instruments. The social worker was fluent in both Chichewa and English. Further modifications of the Chichewa versions of the translated instruments were done based on the back-translations. This helped in ensuring clarity, succinctness and correctness the translated screening instruments.

Pre-test: The translated versions of the 3 item screener, HSCL-15, PRQ and the MINI, together with the rest of the data collection instruments for studies 2 and 3 were administered to ten pregnant women at one antenatal clinic in the Blantyre district by the researcher to *pre-test* them. He checked on the clarity of items or difficulties women had in answering the questions included in these instruments. The results of the *pre-test* were discussed by the researcher, a mental health nurse and the social worker who translated the instruments. Data from the *pre-test* was utilised to make the necessary changes regarding the clarity of the instruments in the local language and then a consensus on the final Chichewa versions of the translated instruments was reached (Appendices 2 and 4). However, data from the *pre-test* of the data collection instruments for studies 2 and 3 was excluded from the main research study.

3.4.6 Data collection

The researcher collected data for the two studies of Phase 2 (cross-sectional study and sensitivity analysis study) of this research study with the help of two research assistants. Prior to data collection, 2 Registered Midwives were recruited as research assistants for this study. They received 2 days training which included an overview of the research study, review of data collection techniques and instruments, practice on the use of data collection instruments and a discussion on ethical issues pertaining to the study. Data collection for the cross-sectional study (Study 2) and the sensitivity analysis study (Study 3) was done concurrently from January 2016 to May 2016.The researcher and the 2 research assistants went to personally introduce themselves, explain the study to midwives in charge of antenatal clinics in the Blantyre district. They sought permission to recruit pregnant women at all stages at the 8 antenatal clinics. Data were collected from one antenatal clinic at a time before moving on to the next one. Data collection for the 2 studies in Phase 2 are described in detail below.

3.4.6.1 Data collection for the cross-sectional study (Study 2)

One research assistant used a face to face recruitment procedure by personally explaining the research study (Appendices 9 and 10) to pregnant women in antenatal clinics and inviting them to participate in the cross-sectional study that was screening for depression (Study 2). Pregnant women who agreed to participate in the study gave written consent which was collected by the researcher upon signing (Appendices 11 and 12). Those who could not write pressed their thumb print on the consent form.

The researcher and a second research assistant administered the screening instruments (Appendix 2) to pregnant in a private room by reading questions to them and filling in the responses on behalf of the women. This minimised the cognitive burden which may have

been placed on respondents with low literacy levels because reading skills were not required for them to participate in this study (Bowling, 2005). The screening instruments were administered consecutively starting with the 3-item screener followed by HSCL-15, SRQ, EPDS and PRQ in that order (Appendix 2). The pregnant women were interviewed as they were waiting to enter the treatment room to be physically examined by a midwife and each interview lasted for 25 minutes.

3.4.6.2 Data collection for sensitivity analysis study (Study 3)

The second research assistant randomly selected respondents from the cross-sectional study and invited them to a further interview using the MINI (Appendices 3 and 4). The researcher administered the MINI as a clinical assessment to confirm the presence or absence of depression in respondents who agreed to participate in the sensitivity analysis study on the same day. The researcher and the second research assistant were blinded of respondents' outcomes on screening instruments (Study 2) and the MINI (Study 3) respectively.

3.4.7 Data analysis

Data analysis for Phase 2 (cross-sectional study and sensitivity analysis study) of this research study was done using the International Business Machines (IBM) Statistical Package for Social Sciences (SPSS) 22.0 (IBM Corp, 2013) and MedCalc (MedCalc Software bvba, 2016). Data analysis for the 2 studies in Phase 2 are described below.

3.4.7.1 Data analysis for cross-sectional study (Study 2)

IBM SPSS 22.0 was used to analyse data for the cross-sectional study that screened for depression in pregnant women. Significance for all statistical tests was set at 95%. Total scores for each respondent on each screening instrument were computed. Caseness

(screening positive for probable antenatal depression) was determined using the following cut off scores: 3 item screener (cut off ≥1) (Vahter et al., 2007; Whooley et al., 1997), HSCL-15 (cut off ≥1.75) (Skipstein et al., 2010), SRQ (cut off ≥10) (Kumbhar et al., 2012), EPDS (cut off ≥10) (Martins et al., 2015) and the PRQ (cut off ≥46) (Austin et al., 2005).

Descriptive and inferential statistics were used to analyse and summarise demographic characteristics in relation to probable antenatal depression cases identified by each screening instrument. Cronbach's α was used to test internal consistency (reliability) of each screening instrument. Pearson Chi square test was used to compare differences between screen positives and negatives for different demographic variables. To test the agreement among instruments in detecting proportions of same individuals as screen positives, the McNemar test was used, with a statistically significant test confirming the presence of systematic differences between proportions of positive responses between any two instruments. The possible differences in screen positive results by demographics and pregnancy factors (modifying effects) were examined using binomial regression models.

3.4.7.2 Data analysis for sensitivity analysis study (Study 3)

Data from Study 3 (sensitivity analysis study) to validate the screening instruments that were administered in Study 2 against the MINI was analysed using IBM SPSS 22.0 and MedCalc. Prior to data analysis, respondents' outcomes on the MINI were extracted and entered into IBM SPSS 22.0 together with their data from Study 2 (cross-sectional study). A proportion of cases was calculated for demographic characteristics based on MINI and compared using Pearson Chi Square test. A clinical diagnosis of major depression based on MINI was used as a gold standard when calculating Se, Sp, PPV and NPV for the 3-item screener, EPDS, HSCL-15 and SRQ. Receiver Operating Characteristics (ROC) curve analysis for these instruments were calculated using MedCalc software. ROC curve analysis generated AUC

with 95% confidence intervals, optimal cut off scores, Youden index, and cut off scores for set Se=.8 and Sp=.8.

The reliability of each screening instrument was measured using Cronbach's α to assess if it consistently measured antenatal depression in the local setting. The researcher applied the following methods for combining screening instruments: sequential, compensatory ('OR') rule, conjunctive ('AND') and probability rules to determine whether two instruments together improved discrimination of cases from non-cases. Odds ratios (OR) for individual instruments and various combinations of instruments in predicting antenatal depression were also computed.

3.4.8 Data management

The researcher and research assistants administered questionnaires to respondents and kept custody of the completed questionnaires. This helped in preventing data contamination by limiting access to collected data to the researchers only and also ensuring confidentiality. The completed questionnaires were kept secured in a lockable cabinet, accessible only to the researcher during the research period. Each questionnaire was given a code for its identification. The researcher entered coded data into a computer and analysed it using IBM SPSS 22.0. Soft copies of data were secured on a Google drive with a PIN known the researcher alone. The raw data will be kept secure for 5 years after which the hard copies will be incinerated and the soft copies will be erased from the Google drive.

3.5 Phase 3: Developing a screening protocol for depression

This phase involved the synthesising of evidence generated in Phases 1 and 2 to develop a screening protocol for depression. Details about the process of developing of the protocol was

adapted from NHS-MA and NICE (2002).

3.5.1 A Step-by-Step Guide to Developing Protocols

A Step-by-Step Guide to Developing Protocols proposed a rigorous process for developing clinical protocols (NHS-MA & NICE, 2002). This process for developing protocols consists of 12 steps which have been illustrated in Figure 6.

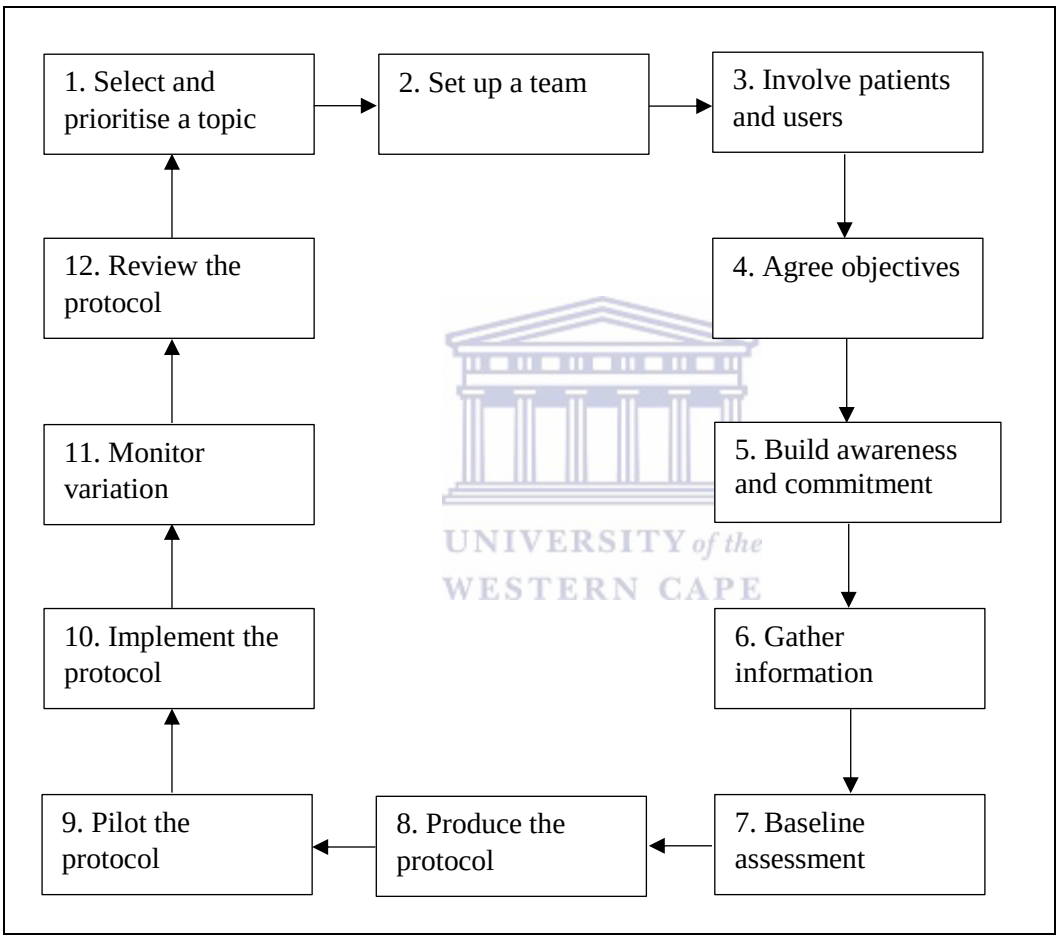

Figure 6: A Step-by-Step Guide to Developing Protocols.
Source: NHS-MA and NICE (2002)

A Step-by-Step Guide to Developing Protocols was adapted to ensure its applicability to this study. Firstly, Steps 3, 6 and 7 of A Step-by-Step Guide to Developing Protocols were combined in one step which involved gathering of evidence while Steps 5 and 9-12 were excluded because they were not within the scope of this research study. Secondly, a Nominal

Group Technique study (Study 4) was integrated in step 8 of A Step-by-Step Guide to Developing Protocols. Therefore, the final adapted process for developing the protocol that was utilised in this study had 5 steps which have been outlined in Figure 7.

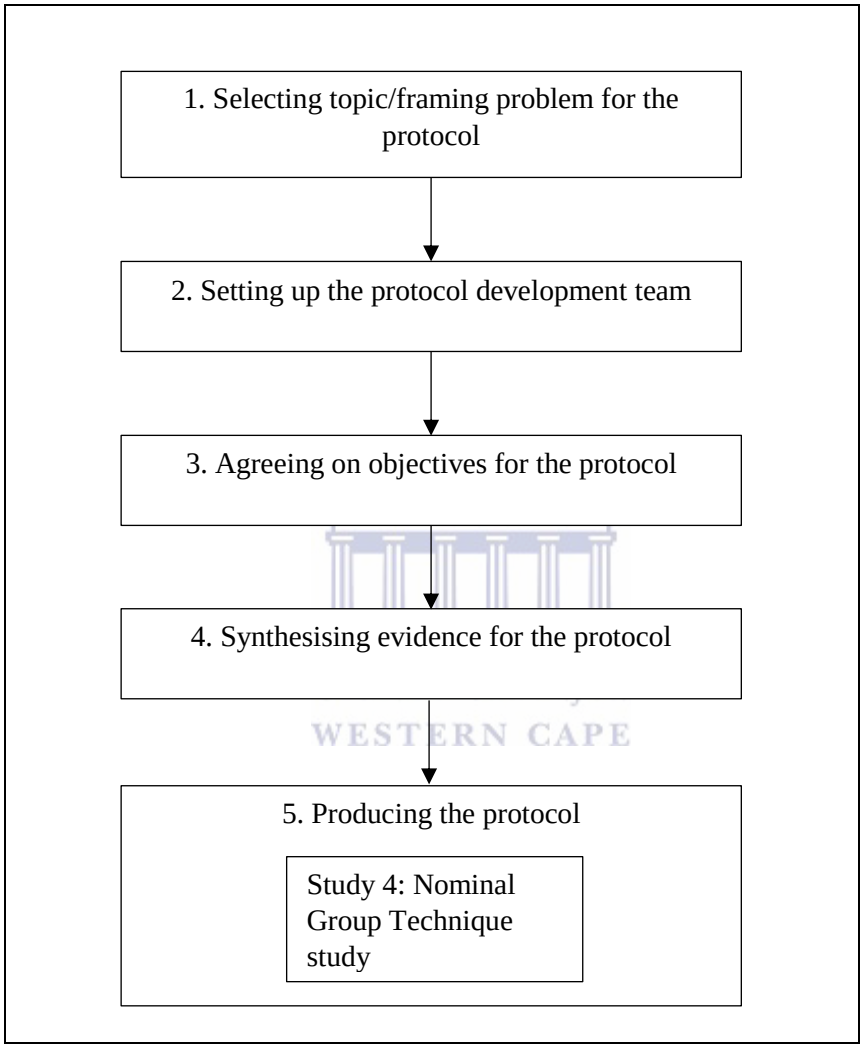

Figure 7: Adapted Protocol development process
Source: NHS-MA and NICE (2002)

3.5.2 Process for development of the protocol

The process of the development of the protocol included selecting topic/framing problem for the protocol; setting up of a protocol development team; agreeing on objectives of the protocol, synthesis of evidence for the protocol; and producing the protocol.

3.5.2.1 Step 1: Selecting topic/framing clinical problem for a protocol

Selecting a topic/framing a clinical problem was the first step in the process of protocol development (NHS-MA & NICE, 2002). In this step, the researcher consulted literature and identified the unique need of, "developing and recommending a screening protocol for depression in antenatal clinics in the Blantyre district" as a way of contributing towards achieving the government of Malawi's efforts of improving treatment of depression (MOH, 2011, 2017a). It was deemed necessary to develop a screening protocol because depression is prevalent among pregnant women in Malawi (Stewart et al., 2014) and there is a likelihood that a protocol will be effective in improving detection of depression (Bajracharya et al., 2016) in antenatal clinics where screening of depression is lacking or remain unstandardised.

It is recommended that protocols should be developed based on what is considered as best evidence available for achieving good care (NHS-MA & NICE, 2002). As such, framing of a clinical problem involved identification of evidence on the prevalence of depression and risk factors among pregnant women (Study 2: Cross-sectional study), and determining performance of screening instruments for antenatal depression (Study 2: Cross-sectional study and Study 3: Sensitivity analysis study) in the local setting.

3.5.2.2 Step 2: Setting up a protocol development team

There are no hard and fast rules about how many members should constitute a protocol development team (NHS-MA & NICE, 2002). In this research study, the protocol development team included the researcher (as lead person) and two professors. As described in literature, the protocol development team was responsible for identification, synthesis and interpretation of relevant evidence; and production of the protocol (Shekelle, Woolf, Eccles, & Grimshaw, 1999). The researcher was a lead person responsible for designing,

implementation and coordination of various aspects of the protocol development process. One professor from University of the Western Cape was the supervisor for the entire research study. She also provided technical advice and support regarding the screening protocol for antenatal depression and its development process. The second professor was a colleague to the researcher at University of Malawi who provided the researcher with expert guidance and support regarding protocol development and depression screening from local perspective.

3.5.2.3 Step 3: Agreeing on objectives of the protocol

The researcher drafted the objectives the screening protocol for antenatal depression which were discussed with the 3 members of the protocol development team and a consensus was reached. The team ensured that objectives for the protocol were clear, specific, measurable and had targets for achievement (NHS-MA & NICE, 2002). This helped in preventing confusion in the subsequent steps of protocol development.

3.5.2.4 Step 4: Synthesis of evidence for the protocol

The protocol development team synthesised relevant evidence available (NHS-MA & NICE, 2002) for the screening protocol for antenatal depression led by the researcher. The findings from all the 3 phases of this research study to describe the prevalence of depression in women attending antenatal clinics (Study 2: Paper 2) using recommended screening instruments (Study 1: Paper 1); and to determine performance of a range of screening instruments for depression (Study 2: Paper 3 and Study 3: Paper 4) were integrated by the researcher to compile the summarised evidence to inform the development of a screening protocol for antenatal depression (Study 4).

3.5.2.5 Step 5: Producing the protocol

The protocol development team was responsible for creating a document for the protocol (Browman et al., 1995; NHS-MA & NICE, 2002) and they agreed on the format of the (Nightingale, 2008) screening protocol for antenatal depression. This step involved designing of algorithm for screening antenatal depression, drafting of the protocol, and reviewing of the protocol by stakeholders and experts (Study 4).

Designing an algorithm for screening antenatal depression

The researcher designed an algorithm for screening depression using screening instruments that were identified as having best utility and validity in this context (Study 3: Paper 4). An algorithm is a crucial component of a protocol because it helps in facilitating uniformity in the provision of care (Browman et al., 1995). The protocol development team agreed on the final version of a two-steps screening algorithm which included screening instruments with the best performance (Study 2: Paper 3, Study 3: Paper 4) in detecting depression. The algorithm formed the basis of the proposed screening protocol for screening depression during the antenatal period that was developed in this study.

Drafting of the protocol

the protocol development team was responsible for drafting of the protocol (NHS-MA & NICE, 2002). In this study, the researcher produced an initial draft of the screening protocol for antenatal depression and it was shared with the protocol development team to feedback. The draft screening protocol for antenatal depression which was approved by the protocol development team included title, description of protocol, aim of the protocol, scope of the protocol, objectives of the protocol, principles of the protocol, algorithm for screening, components of the screening protocol and outcomes. It was presented to stakeholders and experts for review (Study 4: Nominal Group Technique study).

3.5.3 Study 4: Nominal Group Technique study

This study used a modified methodology of Nominal Group Technique (Delbecq & Van de Ven, 1971; Dunham, 1998; Potter, Gordon, & Hamer, 2004) which allowed for external reviewers to ensure content validity, clarity and applicability (Shekelle et al., 1999) of the proposed screening protocol for antenatal depression. In this study, a draft of the proposed screening protocol for antenatal depression was externally reviewed by a group of stakeholders and experts (Table 6) for consideration and endorsement at 2 workshops (Study 4: Nominal Group Technique study).

3.5.3.1 Setting

The research arranged a venue at a university college in Blantyre district where the 2 workshops for the Nominal Group Technique study were conducted.

3.5.3.2 Sampling

The researcher purposively selected (NHS-MA & NICE, 2002) 9 stakeholders and experts (Table 7) , and invited them to participate in a series of 2 separate one day workshops (1 and 2) which reviewed and considered the proposed screening protocol for antenatal depression. These participants were working in public sector in Blantyre district.

Table 7: Study participants for Nominal Group Technique study

Stakeholder/expert	Number	Qualifications
Midwives	2	Bachelors (1) and Diploma (1)
Mental Health Nurses	2	Doctor of Philosophy (1) and Masters (1)
Clinical Psychiatric Officer	1	Bachelors
Nurse/Midwifery Managers	2	Masters (2)
Nursing/Midwifery Educators	2	Masters (2)
Total	**9**	

3.5.3.3 Nominal Group Technique methodolody

The proposed screening protocol for antenatal depression was reviewed by the stakeholders and experts at workshops 1 and 2 which were facilitated by the researcher. The stakeholders and experts generated recommendations about the newly developed protocol (Shekelle et al., 1999). They reached a consensus about certain aspects of the protocol and the protocol as a whole (Vallejo-Ortega et al., 2017) by vote after deliberations (Potter et al., 2004).

Workshop 1

Preparation prior to the workshop: The researcher provided the participants with a workshop agenda which explained the aim for the workshop, summary of the findings from Phase 1 and 2 and a draft screening protocol (Appendix 5). The researcher arranged a venue to accommodate 10 participants sitting around a table set in a U-shape, with a flip chart at the open end of the U (Dunham, 1998).

Introduction and explanation: On the day of the workshop, the researcher welcomed participants and explained the aim and procedure of the workshop. The researcher shared with participants the evidence for the protocol. He then informed the participants that the aim of the workshop was to develop screening protocol for screening antenatal depression. This aspect of the workshop lasted for 10 minutes. The first task for the participants in this workshop was to silently generate responses to a given set of questions about the protocol.

Silent generation of responses: The researcher provided each participant with a sheet of paper which had the following questions on it:

- Why is it necessary to develop a protocol for screening of depression in antenatal clinics?
- What would be the best time for screening of depression during antenatal visit?

- What would be the best ways of managing pregnant women who screen positive of depression in antenatal clinics?
- What resources (human, material, policies etc) would be needed to implement a protocol for routine screening of depression in antenatal clinics?
- How feasible would it be to implement a protocol for routine screening of depression in antenatal clinics?
- Would they endorse the screening protocol for antenatal depression and what changes would they recommend?

Each participant was also given a blank worksheet of paper to write down answers to the questions. Participants were asked to write each answer (idea) in a brief phrase or a few words on the worksheet provided to them. During this period, participants were discouraged from consulting or discussing their answers with others. This task lasted for 20 minutes and participants were later asked to share their answers.

Sharing answers: The researcher invited participants to share the answers that they had generated. The researcher recorded the answers for each question on a flip chart using the participants' own words. The researcher asked each participant, one at a time, to give one answer from their worksheet, summarized in a brief phrase or a few words. The round robin process continued until all answers to all questions were presented. Participants were advised not to repeat the answers which they had on their worksheet but someone else had already shared with the group. If, however, in their judgment the answer on their worksheet contained different emphasis or variation, the answer was welcomed. This process ensured that all participants had an opportunity to make an equal contribution and provided a written record

of all ideas generated by the group. This task took 30 minutes and was followed by a discussion about endorsement and implementation issues for the proposed protocol.

Group discussion: After the entire list of answers was on the flip chart, the participants were allowed to discuss, clarify or dispute each idea. They were advised to feel free to express varying points of view or to disagree and the creator of the idea being discussed needed not to feel obliged to clarify or explain an item because any member of the group could play that role. This helped participants to express the meaning of the idea and their understanding of the logic behind the idea and its relative importance. The task lasted for 30 minutes.

Ranking of ideas: The researcher provided participants with 10 index cards each. They were asked to select the 10 ideas listed on the flip chart which they felt were very important for the screening protocol and to record each one on a separate index card. Participants were asked to write the number of the idea on the list in the upper left-hand corner of the card such that if participants felt that idea number 13 on the list is very important to them, they should write 13 in the upper left-hand corner. They were also asked to write the identifying words or phrase for the idea on the card. Participants had to do this for each of the 10 most important ideas from all those listed on the flip chart. Upon completion of this task, each participant had 10 cards, each with a separate phrase written on the index card and with identifying numbers using the numbering system from the list of ideas on the flip chart. Then participants were asked to rank-order the index cards.

The researcher asked participants to spread out their cards in front of them so that they could can see all the 10 index cards at once. They were asked to look at their set of 10 cards; decide which index card is the most important than other 9 cards; and to write a number "10" in the

lower right-hand corner of the card. This index card was turned over and participants had to look at the remaining 9 index cards to choose the one they felt was the least important, and write a number "1" in the lower right-hand corner. Then they were asked to choose the most important of the remaining 8 index cards and write the number "9" in the lower right-hand corner. They were also asked to choose the least important of the remaining 7 index cards and write the number "2" in the lower right-hand corner. They also chose the most important of the remaining 6 index cards and wrote number “8” in the lower right hand corner. Furthermore, participants were asked to choose the least important of the remaining 5 index cards and write the number "3" in the lower right-hand corner. They also chose the most important of the remaining 4 index cards and wrote the number “7” in the lower right-hand corner. Then the least important of the remaining 3 index cards was chosen and the number “4” was written in the lower right-hand corner. The more important of the remaining 2 index cards was chosen and the number “6” was written in the lower right-hand corner. Finally, the number “5” was written in the lower right-hand corner of the remaining card.

When all ideas were ranked in order of priority, all the index cards were handed to the researcher to enter the scores assigned to each idea in a tally sheet on a flip chart. A participant was requested to read the number of points allocated to each idea from the index cards and the researcher record the points on the tally sheet. Then the researcher added the scores on the tally sheet to identify most favoured group ideas endorsed for the protocol with the intent that the workshop had to conclude having reached a specific outcome about the protocol for screening depression in pregnant women with some recommendations for implementation. This task took 20 minutes to complete and the researcher concluded the workshop by thanking all participants and invited them to attend the next workshop for

ratification of the revised screening protocol for depression and its implementation plan in 2 weeks' time.

Workshop 2

All participants from the first workshop were present at this workshop (Table 6). This workshop took place at the same venue where the previous workshop was conducted. The researcher emailed a copy of the revised version of the screening protocol for antenatal depression and its implementation plan to participants prior to the workshop and hard copies were also made available at the workshop. The procedure that was utilised in the first workshop was employed to generate ideas. In addition, participants asked to consider the document for the screening protocol for antenatal depression page by page and answer the following question: Would you endorse the screening protocol for antenatal depression and its proposed implementation plan?

3.5.3.4 Data collection and analysis

The Nominal Group Technique study collected qualitative data (ideas and opinions of workshop participants) which was analysed quantitatively to develop a screening protocol for antenatal depression through two workshops. The three steps of analysis for Nominal Group Technique namely: categorisation of ideas, calculation of a score reflecting the importance of each idea, and ranking of the ideas according to their importance were used to analyse data for this study (Claxton, Ritchie, & Zaichkowsky, 1980).

Categorisation of ideas

The researcher together with participants categorised the ideas generated in the workshops based on the questions that participants were asked to answer in this study. Sometimes the

same ideas were not presented in exactly the same wording. As a result, all ideas (qualitative statements) were categorised through content analysis and same ideas that were presented with different statements were changed into a statement that had same words to allow comparison during analysis. This procedure was also used to prepare individual scoring cards for each idea.

Calculation of a score reflecting the importance of each idea

Scoring of ideas was done to reflect the frequency with which an idea was selected by participants as important, and the significance given to it when it was selected. An idea that was selected by most participants and was accorded a high score by most participants was considered as the most preferred and an idea that was rarely selected and given a low score was deemed as less preferred. In this study, a rank for an idea was based on the score assigned to it by that participant and an idea which ranked highest in importance received a score of 10 while the lowest received a score of 1. Total scores for each idea were calculated across all participants to provide a summary score reflecting its importance.

Ranking ideas

The calculated score reflecting importance of an idea was used to rank the different ideas within each category. This ranking of ideas represented sufficient analysis, as it provided the researcher with a quantitative measure of the importance of the various ideas expressed during the workshop (Claxton et al., 1980).

3.5.3.5 Rigour of Nominal Group Technique

The researcher used inductive content analysis to verify data collected during the workshop checking participants' comments against statements of ideas listed on the flipcharts (Potter et

al., 2004). After the workshop, the researcher checked the worksheets that were used by participants to answer questions during the workshop so that he could have a better understanding of their thoughts about the screening protocol for antenatal depression.

3.6 Validity of the research approach

The multimethod research approach was valid because it facilitated the use of multiple studies to collect data for answering each of the specific objectives of this research study (Morse, 2003). This research approach made it possible to integrate together the phases of the study, research framework, the objectives of this study, and data collection methods [studies that were employed to collect data] (Table 8). The validity and reliability of individual studies have been described and furthermore this research study used valid instruments (Austin et al., 2005; Beusenberg et al., 1994; Bossuyt et al., 2015; Cox et al., 1987; Derogatis et al., 1974; Dunham, 1998; Sheehan et al., 1998; Vahter et al., 2007; Whooley et al., 1997) to collect data.

Table 8: Relationship among phases of the study, research framework, objectives of study, and data collection methods

Phase of the study	Research framework	Objective of the study	Data collection methods
1 and 2	Defining the problem	1 and 2	Systematic review (Study 1) Cross-sectional study (Study 2)
2	Identifying risk factors	2	Cross-sectional study (Study 2)
2 and 3	Develop intervention	3 and 4	Cross-sectional study (Study 2) Sensitivity analysis study (Study 3) Nominal Group Technique study (Study 4)

3.7 Ethics

Ethics approval for this study was granted by the Senate Research and Ethics Committee at the University of the Western Cape (Appendix 6) and the College of Medicine Research and Ethics Committee (COMREC) at the University of Malawi (Appendix 7). Institutional clearance to carry out this study in the Blantyre district was granted by the Blantyre District Health Officer (Appendix 8).

The researcher and the two research assistants explained the nature and benefits of the study to pregnant women before they were recruited to participate in the study (Appendices 9 and 10). The researchers ensured that they minimised any harm to pregnant women who participated in this study. Respondents' names did not form part of the demographic data that was collected, thus respecting their privacy and maintaining confidentiality. The respondents were informed that they would not be offered any material rewards, but the information which they provided would be utilised in making recommendations about maternal mental health care in pregnant women. Respondents were informed that only aggregated data would be analysed and disseminated. They were also informed that all hard copies of the data collected would be locked in a cabinet at the researcher's workplace at the Kamuzu College of Nursing, University of Malawi and would be incinerated after five years. They were also informed that all electronic data would be secured by a password known only to the researcher and would be deleted from the storage device after five years.

The pregnant women were informed that their participation in the study was voluntary and that those who agreed to participate would be asked to give written informed consent (Appendices 11 and 12). They were told that they were free to withdraw at any time if they felt uncomfortable with any aspect of the study. They were also told that refusing to join the

study would not have any effect on their access to health care services because the researcher is not an employee of the Ministry of Health. The women who exhibited any signs of emotional breakdown, due to their participation in the study, or presented with clear signs of Major Depression or suicidal tendencies, were referred to the nearest psychiatric unit for assistance.

3.8 Conclusion

This chapter has described the methodology of this study including research approach, phases of the study and validity of the research approach. Ethics for this research study were also discussed.

Chapter Four

SCREENING INSTRUMENTS FOR ANTENATAL DEPRESSION: STUDY 1

4.1 Introduction

This chapter presents the findings from Phase 1: Study 1, a systematic review of screening instruments for depression for use in antenatal services in low resource settings. It includes a background, objectives, methodology, study outcome and Paper 1.

4.2 Background

Screening instruments suitable for use in antenatal services in low resource settings must be effective in the identification of pregnant women who are depressed. There are many screening instruments which have been validated in HICs whose cultures and socio-economic contexts differ from those of low resource settings. There are concerns that good performance of screening instruments in HICs may not be replicated in low resource settings. Therefore, a systematic review of instruments for screening depression used in antenatal care in low resource settings was conducted to identify suitable instruments to be recommended for use in antenatal services in low resource settings.

4.3 Objective

The objective of this phase was to systematically review and recommend validated brief screening instruments for depression suitable for utilisation in antenatal services in low resource settings.

4.4 Methodology

STARD guidelines were used to conduct the systematic review (Bossuyt et al., 2015). The selection of articles included application of PICOS criteria. The QUADAS was used to assess the methodological quality of the final articles selected (Whiting, Rutjes, Reitsma, Bossuyt, & Kleijnen, 2003). Descriptive data extraction and presentation was done to compare screening instruments' psychometrics data. A meta-analysis was conducted using REVMAN 5.0 by pooling individual and all instruments sensitivity and specificity.

4.5 Study outcome

The findings of the systematic review have been published in a peer reviewed journal (Chorwe-Sungani & Chipps, 2017): Paper 1.

Paper 1: Chorwe-Sungani, G. & Chipps, J. (2017). A systematic review of screening instruments for depression for use in antenatal services in low resource settings. (*BMC Psychiatry*, 17(1):112.)

Chorwe-Sungani and Chipps *BMC Psychiatry* (2017) 17:112
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BMC Psychiatry

RESEARCH ARTICLE Open Access

A systematic review of screening instruments for depression for use in antenatal services in low resource settings

Genesis Chorwe-Sungani[1,2*] and Jennifer Chipps[1,3]

Abstract

Background: In low resource settings, short, valid and reliable instruments with good high sensitivity and specificity are essential for the screening of depression in antenatal care. A review of published evidence on screening instruments for depression for use in antenatal services in low resource settings was conducted. The aim of this review was to appraise the best available evidence on screening instruments suitable for detecting depression in antenatal care in low resource settings.

Methods: Searching, selection, quality assessment, and data abstraction was done by two reviewers. ScienceDirect, CINAHL, MEDLINE, PubMed, SABINET and PsychARTICLES databases were searched using relevant search terms. Retrieved studies were evaluated for relevancy (whether psychometric data were reported) and quality. Data were synthesised and sensitivity and specificity of instruments were pooled using forest plots.

Results: Eleven articles were included in the review. The methodological quality ranged from adequate to excellent. The review found 7 tools with varying levels of accuracy, sensitivity and specificity, including the Edinburgh Postnatal Depression Scale, Beck Depression Index, Centre for Epidemiologic Studies Depression Scale 20, Hamilton Rating Scale for Depression, Hopkins Symptoms Checklist-25, Kessler Psychological Distress Scale and Self-Reporting Questionnaire. The Edinburgh Postnatal Depression Scale was most common and had the highest level of accuracy (AUC = .965) and sensitivity.

Conclusion: This review suggests that the Edinburgh Postnatal Depression Scale can be a suitable instrument of preference for screening antenatal depression in low resource settings because of the reported level of accuracy, sensitivity and specificity.

Prospero registration: CRD42015020316.

Keywords: Depression, screening instrument, antenatal, EPDS, Low resource setting

Background

Depression is a major health problem affecting pregnant women in low resource settings [1, 2] with high prevalence rates of antenatal depression (10.7 to 47%) [1–4]. Antenatal depression can lead to poor uptake of antenatal care, adverse birth outcomes [3] and is a risk factor for postnatal depression [5]. Routine screening for antenatal depression is essential for early identification of pregnant women with depressive symptoms [6] and routine antenatal contacts with health providers provide opportune times for assessing, preventing and treating depression during pregnancy [7].

There are however some challenges in these settings as many women may be ashamed to speak about depression as there is a cultural expectation of pregnancy happiness. In addition, these settings are understaffed, lack consultation rooms, have heavy workloads with high midwife to pregnant woman ratios. Midwives commonly have limited consultation time to explore depressive symptoms or risk factors and often lack guidelines or tools for assessing psychosocial status of pregnant

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women [8]. In this setting, screening instruments suitable for the early detection of depression must be effective in the identification of individuals who are cases and those who are not [9]. Suitable instruments must therefore demonstrate both high sensitivity and specificity [9].

Many validation studies for depression screening tools have previously been conducted in high income countries (HICs) whose cultures and socio-economic context differ from those in low resource settings. Due to a concern about the variation of performance of screening tools in different populations and settings [10] and with the aim of identifying a tool suitable to be recommended for use in antenatal services in low resource settings, a systematic review of instruments for screening depression in antenatal care in low resource settings was conducted.

Methods

The Standards for the Reporting of Diagnostic Accuracy Studies (STARD) guidelines were used to conduct the review [10].

Search process

A limited search of the Cumulative Index of Nursing and Allied Health Literature (CINAHL) and Medline was undertaken to identify relevant keywords contained in the title, abstract, and subject descriptors. Search terms and synonyms were then identified for use in searching different databases for screening studies conducted in antenatal clinics in low resource settings. Low resource settings refer to settings where health care systems do not meet the minimum standards set by the World Health Organisation (WHO) or any other quasi-governmental organisation [11]. In this review, low resource settings were defined as health care settings synonymous with those found in low income and lower middle income countries as defined by World Bank [12] and some health care settings in upper middle income countries (UMICs), such as South Africa, where disparities in the public health infrastructure or supplies or human resources [13] are found. Some articles from low resource settings are not indexed to indicate that they are reporting about health outcomes or disparities for under-served populations in low resource settings [14] and the term, 'low resource settings,' was not included in the search terms but applied manually at the article review stage. Date limits were set from 2000 to 2015 in anticipation that a wider period to be searched will yield many relevant studies with recent evidence. Detailed search terms are supplied in Table 1.

The following databases were searched: ScienceDirect, CINAHL, MEDLINE, PubMed, SABINET and PsychARTICLES and results were imported into Endnote. Reference lists of key articles identified were hand searched to identify further relevant articles. Manual searches of indexes and "grey" literature databases were not carried out. The preliminary searches were conducted between August and September 2015 and the final search was done on 4th September 2015.

Review process, selection and data extraction

After the initial search, duplicates and irrelevant articles (conferences, congresses, editorials, commentaries, reviews, news, old) in the Endnote database were removed and the search data were exported to Excel. Articles for review were then selected in three phases.

Abstract and title screening

In this phase, the reviewers scanned the identified titles and abstracts independently and indicated in the Excel database which articles were relevant. Where the abstract did not provide enough information or the reviewers were unsure, the full text articles were reviewed and agreement reached between the reviewers on the inclusion or exclusion of the article. A kappa statistic was calculated to assess the level of agreement for eligibility for inclusion at this stage.

Screening based on PICOS criteria

The second phase of selection consisted of a review of articles by applying and extracting the PICOS criteria: Participants (P) (pregnant women at any stage of pregnancy attending antenatal care), Index test (I) (Screening instrument), Comparator test (C) (gold standard- psychiatric assessment), Outcome measures (O) (psychometric properties of screening instrument) and study setting (S) (low resource settings). In this phase, articles from HICs were excluded. Full text articles from UMICs were reviewed and included if the study setting was a public health setting and the studies were located in low resource settings where disparities in the public health infrastructure or supplies or human resources in the services were adequately described.

Article review

In the third phase, full texts of the articles were reviewed for reported validity of one or a combination of depression screening instruments (sensitivity, specificity, area under curve [AUC]) and whether a gold standard was present. The articles were independently examined by the reviewers to confirm inclusion. The gold standard was set as a formal diagnostic psychiatric assessment of depression as the most accurate test to detect the presence or absence of depression [15]. Psychiatric diagnostic assessment of depression included the use of the Structured Clinical Interview for DSM-IV (SCID), the Mini-International Neuropsychiatric Interview (MINI), Composite International Diagnostic Interview (CIDI), International Classification of Diseases version 10 (ICD-10) or the Diagnostic

Table 1 Search terms

Data base	Terms used
ScienceDirect	ALL ("screening instruments" OR "screening tools" OR "screening scale") and ALL (depression AND antenatal).
	ALL ("screening instruments" OR "screening tools" OR "screening scale") and ALL (depression AND pregnancy OR prenatal) AND LIMIT-TO (topics, "woman, patient, depression, depression scale, pregnancy, mental health, depressive symptom, health care, maternal, adolescent, health").
	ALL (EPDS or CESD-10 or HSCL or K-6 or K-10 or SRQ or PHQ or GHQ) and ALL (depression AND antenatal) AND LIMIT-TO (topics, "woman, pregnancy, obstet gynecol, depression scale, depression, health, patient, maternal, depressive symptom, mental health").
	ALL ("screening instruments" OR "screening tools" OR "screening scale") and ALL (depression or "depressive disorder" AND antenatal or prenatal)
CINAHL	TI screening AND TI depression AND TI pregnancy
	screening AND depression AND pregnancy AND LIMIT-TO (research article)
	screening tools AND depression AND antenatal
	epds validity AND depression AND antenatal
	TI Edinburgh postnatal depression scale OR TI Hopkins symptom checklist OR TI self-report questionnaire OR TI center for epidemiological studies depression scale OR TI patient health questionnaire OR TI general health questionnaire OR TI beck depression inventory OR TI whooley questions AND TI antenatal AND LIMIT-TO (research article)
MEDLINE	TX depression AND TX screening tools AND pregnant women
	TI screening test AND TI antenatal depression
	TX depression AND TX screening AND TX pregnant women
	TI prenatal depression AND TI screening
Pubmed	((((“screening instruments”) OR “screening tools”) OR “screening scales”) AND depression) AND antenatal
	((screening[Title]) AND depression[Title]) AND antenatal[Title]
	(((screening[Title]) AND depression[Title]) AND pregnancy[Title])
SABINET	(alltext:(depression AND screening)^20 AND alltext:(antenatal)^20)
	(alltext:(depressive AND disorder AND screening)^20 AND alltext:(pregnant AND women)^20)
PsychARTICLES	depression AND screening AND pregnancy

and Statistical Manual of Mental Disorders version 4 (DSM-IV) by a psychiatrist to assign a diagnosis. The MINI and SCID are compatible with DSM-IV and have sensitivity/specificity above minimum acceptable level (.8/.8) for structured interviews which are used as gold standards [16]. Instruments that are routinely used for depression screening such as Edinburgh Postnatal Depression Scale (EPDS) or other nonconventional psychiatric assessment instruments were not considered as gold standards.

Eligibility for full article review, assessment of study characteristics, and relevant data extraction was conducted using a review tool in Excel that included the PICOS criteria and the confirmation of the presence of psychometrics and a gold standard. For each eligible study the reviewers extracted information concerning: author, country of study, sample, gold standard, screening instrument, Area under the Curve (AUC), sensitivity (Se) and specificity (Sp). All results were subject to double data entry.

Assessment of methodological rigour

The Quality Assessment of Diagnostic Accuracy Studies (QUADAS) [17] was used by both reviewers to assess the psychometric quality of the final selected articles. The QUADAS has 14 items with three possible responses 'Yes', 'No' and 'Unclear'. In the QUADAS, the target condition was depression during pregnancy, the index test was a screening instrument used to screen for depression, and the reference standard was the gold standard against which the index test was validated. The QUADAS items measure the variability of study samples (items 1–2), methodological rigor and bias (items 3–7, 10–12 and 14), and the quality of reporting methodology (items 8, 9 and 13). The scoring of QUADAS is not standardised [18] but studies were categorised as 'excellent' (11 to 14 items), 'good' (9 to 10 items), 'adequate' (6 to 8 items), 'poor' (4 to 5 items) or 'unacceptable' (0 to 3 items) based on the number of items that were answered 'Yes' [17].

Analysis

Descriptive data extraction and presentation was done to compare screening instruments' psychometrics data in a between-study literature analysis [19]. A meta-analysis was conducted using REVMAN by pooling individual and all instruments sensitivity and specificity data to show the

pooled ability of the screening instruments to identify depression. Upper and lower confidence intervals (95%) for sensitivity and specificity of screening instruments were calculated.

Results

Search and review results

The electronic search yielded 3666 published articles (Fig. 1). Eleven (11) additional articles were sourced from authors on ResearchGate and reference lists of full text articles resulting in a total number of 3677 published articles. A total of 1676 duplicates were removed leaving 2001 articles. Irrelevant articles consisting of conferences, congresses, editorials, commentaries, reviews, news and old articles (≤ 1999) were removed (n = 1750), leaving 251 articles. The 251 articles which remained were then screened for relevancy by the reviewers using the PICOS criteria, excluding a further 210 articles [Participants (n = 133), Outcome (n = 21) and HICs articles (n = 28)], leaving 41 articles (38 primary research studies and 3 systematic reviews). The reviewers' ratings were in agreement with a Kappa = .97.

The systematic reviews (n = 3) were excluded after being screened for relevancy for inclusion in this review. One systematic review [20] focused on the efficacy of antenatal group interventions aimed at reducing postnatal depression in at risk women. This systematic review did not report any validity data of the depression screening instruments and thus was excluded. The second systematic review by Akena and colleagues [21] examined the accuracy of depression screening instruments validated in general health settings in low and middle income countries (LMICs). This systematic review included three studies conducted in antenatal settings [4, 22, 23] which also had been identified as part of the 38 articles for primary studies in our review. The third systematic review focused on the reliability and validity of instruments for screening perinatal depression in African settings [24]. This systematic review included eight articles for studies which were conducted in antenatal settings of which four [3, 25, 26] were included in the 38 primary articles in our review. The other four articles [27–30] were published before 2000 and were excluded due to the time limits of the search terms. Further review of the full texts of the 38 articles showed that two pairs of articles [25, 31] and [3, 26]] reported the same data from two different studies and one article from each pair was retained resulting in 36 articles included for further review.

Selected studies for full text review (n = 36)

The study characteristics of the 36 selected studies for further review are provided in Table 2. The majority of the studies were published between 2010 and 2015 and only one study was published in a nursing journal. Most of the articles (n = 18) were cross sectional prevalence studies and five (n = 5) were psychometric validation studies measuring reliability and validity of screening instruments. In reviewing these studies for reported psychometrics of sensitivity, specificity, Area under the curve and the relevant gold standards, two studies [32, 33] were excluded (no gold standard as defined by this study) and a further 23 studies were excluded due to inadequate reporting of psychometrics.

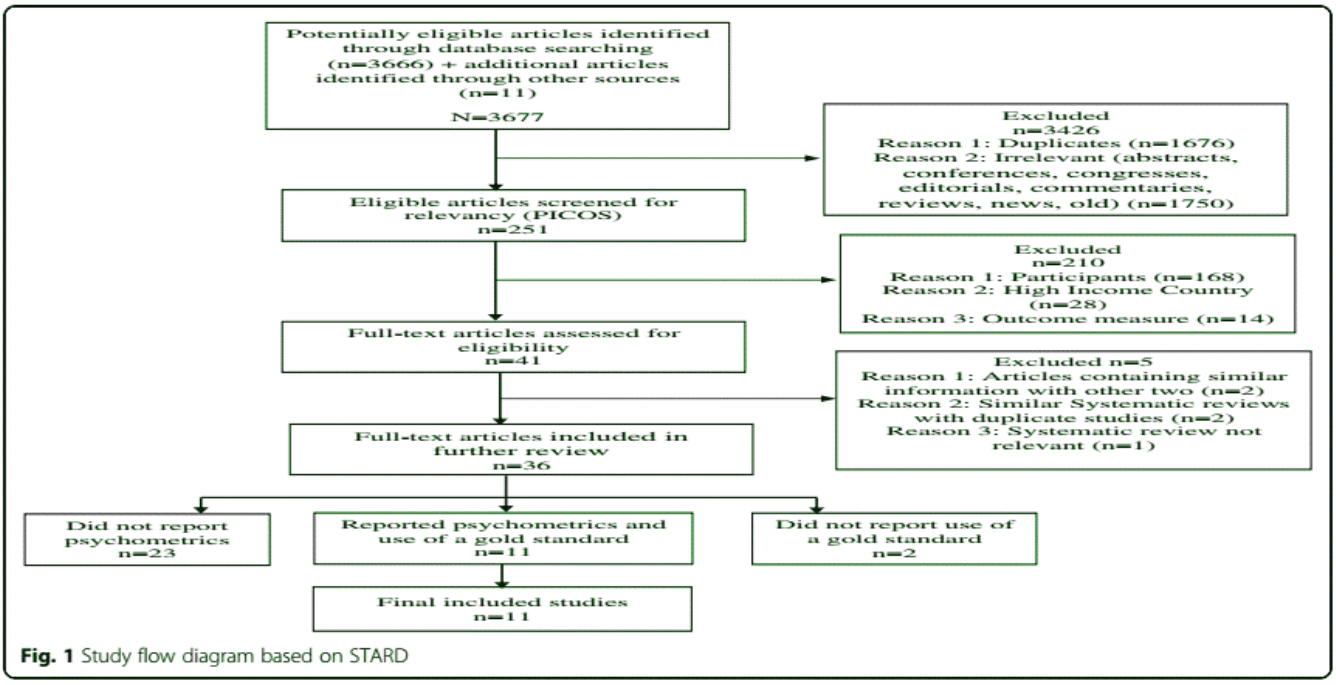

Fig. 1 Study flow diagram based on STARD

Table 2 Characteristics of 36 studies considered for review

Characteristics	*n* = 36(100%)	*n* = 11(100%)
Year of publication		
2000–2009	12(33.3)	3(27.3)
2010–2015	24(66.7)	8(72.7)
Upper Middle Income Country		
Brazil	7(19.4)	2(18.2)
China	1(2.8)	0(0)
Iran	1(2.8)	0(0)
Jamaica	1(2.8)	0(0)
Peru	2(5.6)	0(0)
South Africa	6(16.7)	2(18.2)
Thailand	1(2.8)	0(0)
Turkey	2(5.6)	0(0)
Mexico	3(8.3)	2(18.2)
Lower Middle Income Country		
India	1(2.8)	1(9.1)
Pakistan	2(5.6)	1(9.1)
Sri Lanka	1(2.8)	0(0)
Low Income Country		
Malawi	2(5.6)	1(9.1)
Tanzania	4(11.1)	1(9.1)
Nepal	1(2.8)	0(0)
Uganda	1(2.8)	1(9.1)
Study type		
Validation	5(13.9)	5(45.5)
Epidemiological	4(11.1)	0(0)
Cross sectional	18(50)	4(36.3)
Randomized controlled trial	3(8.3)	1(9.1)
Descriptive	1(2.8)	0(0)
Prospective	3(8.3)	1(9.1)
Ethnography	1(2.8)	0(0)
Naturalistic	1(2.8)	0(0)
Journal type		
Medicine	33(91.6)	11(100)
Nursing	1(2.8)	0(0)
Multidisciplinary	1(2.8)	0(0)
Social and behavioural sciences	1(2.8)	0(0)
Se, Sp, AUC, Gold standard reported	11(30.6)	11(100)

AUC area under curve, *Se* sensitivity, *Sp* specificity

One third of the articles (*n* = 11) reported psychometrics and a gold standard and met the final selection criteria for inclusion in the review (Table 2).

Findings from studies for inclusion in review (*n* = 11)

All 11 articles were published in medical journals, mostly from 2010 onwards (*n* = 8). A number of articles were validation studies (*n* = 5) that reported psychometrics (reliability and validity). There were also 4 cross sectional prevalence studies (*n* = 4), one prospective study and one randomised trial. These last-mentioned 6 studies generally reported on prevalence of prenatal depression and risk factors but included psychometric properties of the screening instruments. All the screening instruments reported in the selected articles were adapted by translating them to local languages in each setting.

Quality of reviewed studies

All 11 articles were rated for quality by both reviewers. Overall the quality was satisfactory with six articles [1, 23, 25, 34–36] rated as excellent, three [37–39] good and two [3, 4] adequate. All the articles clearly described the selection criteria for the sample and reported the index test as independent of the gold standard. All articles, except one [39], regardless of overall quality, used random samples. The two articles rated as 'adequate' [3, 4] did not sufficiently report the execution of a gold standard and it was difficult to ascertain whether individuals who administered index tests or gold standards were blinded to each other's results. Articles with 'excellent' quality were the psychometric validation studies and the randomised controlled trial.

Screening instruments used in antenatal care in low resource settings

The articles included seven (*n* = 7) screening tools, namely the Beck Depression Index (BDI), Centre for Epidemiologic Studies Depression Scale (CES-D)-20, Edinburgh Postnatal Depression Scale (EPDS), Hamilton Rating Scale for Depression (HAM-D), Hopkins Symptoms Checklist (HSCL)-25, Kessler Psychological Distress Scale (K-10) and Self-Reporting Questionnaire (SRQ) that were used for screening antenatal depression in low resource settings (Table 3). The BDI and HAM-D are not normally used for diagnostic purposes or screening purposes but to estimate the severity of depression for the past 3 or 7 days. EPDS was designed for use in postnatal period and it has been investigated for antenatal use as well.

Seven studies (*n* = 7) used a single screening instrument while four (*n* = 4) used a combination of two or three instruments. The EPDS was the most widely used instrument (8 studies), followed by the BDI and K-10 (2 studies each). The MINI was the most widely used gold standard being used in five of the 11 studies. In assessing the accuracy of screening instruments in detecting depression among pregnant women, an AUC score range is classified as low (.500 to .700), moderate (>.700 to .900) and high (>.900) [40]. The EPDS had the highest level of accuracy (AUC = 0.965) while K-10 had the lowest level of accuracy (AUC = .660). The BDI, CES-D, HAM-D, HSCL-25 and SRQ had moderate accuracy with AUC ranges from .820

Table 3 Results of included studies (n = 11)

Author	Country of study	Type of study	Sample (n)	Gold standard	Screening Instrument	AUC (95% CI)	Se	Sp
Adewuya et al. (2006) [25]	Nigeria	Validation study	182 pregnant women (32–36 weeks)	MINI	EPDS	.965	.867	.915
Alvarado-Esquivel et al. (2014a) [36]	Mexico	Validation study	158 adult pregnant women (2-9 months)	DSM-IV	EPDS	.810	.757	.744
Alvarado-Esquivel et al. (2014b) [37]	Mexico	Validation study	120 teenage pregnant women (3–9 months)	DSM-IV	EPDS	.890	.704	.849
e Couto et al. (2015) [1]	Brazil	Validation study	247 pregnant women (2nd trimester)	MINI	EPDS	.850	.816	.733
					BDI	.900	.820	.846
					HAM-D	.860	.877	.746
Fernandes et al. (2011) [4]	India	Cross sectional study	194 pregnant women (3rd trimester)	MINI	EPDS	.950	1.00	.849
					K-10	.950	1.00	.813
Kaaya et al. (2002) [23]	Tanzania	Randomized controlled trial	903 HIV positive pregnant women (8–26 weeks)	SCID	HSCL-25	.860	.890	.800
Martins et al. (2015) [39]	Brazil	Cross sectional study	807 adolescent pregnant women (2nd trimester)	MINI	EPDS	.890	.811	.827
					BDI	.870	.867	.738
Natamba et al. (2014) [35]	Uganda	Cross sectional study	123 [36 HIV positive and 87 HIV negative pregnant women] (10–26 weeks)	MINI	CES-D-20	.820	.727	.785
Rochat et al. (2013) [3]	South Africa	Cross sectional study	109 [49 HIV positive and 60 HIV negative pregnant women] (Second half of pregnancy)	SCID	EPDS	.817	.690	.780
Spies et al. (2009) [22]	South Africa	Prospective study	129 pregnant women (<20 weeks)	SCID	K-10	.660	.730	.540
Stewart et al. (2013) [34]	Malawi	Validation study	224 pregnant women (28–34 weeks)	SCID	EPDS	.811	.688	.795
					SRQ	.833	.763	.813

AUC area under curve, *BDI* beck depression index, *CES-D* centre for epidemiologic studies depression scale, *CI* confidence interval, *DSM-IV* diagnostic and statistical manual of mental disorders version 4, *EPDS* Edinburgh postnatal depression scale, *HAM-D* Hamilton rating scale for depression, *HSCL-25* Hopkins symptoms checklist 25, *K-10* Kessler psychological distress scale 10, *MINI* mini-international neuropsychiatric interview, *SCID* structured clinical interviews for DSM IV axis 1 diagnoses, *SRQ* self-reporting questionnaire, *Se* sensitivity, *Sp* specificity, [ ] number in reference list, *HIV* human immunodeficiency virus

to .900. A forest plot showed that the included studies were heterogeneous because error bars for sensitivity and specificity plots did not include the summary values-sensitivity of .82 and specificity of .79 (Fig. 2). As such 5 distinct subgroups based on participants or type of instrument were formulated and graphical test using forest plots showed that one EPDS studies subgroup of all pregnant women was heterogeneous while other four were homogeneous (Figs. 3, 4 and 5). Schriger and colleagues recommended that a forest plot should consist of a minimum of two studies and discourages conducting heterogeneity tests when there are less than five studies [41].

The EPDS

The EPDS is a 10-item self-reported questionnaire about feelings of depression experienced in the postnatal period rated over the past 7 days with each item being rated on four exclusive scores that range from 0 to 3 [42]. The EPDS is shorter compared to other instruments (BDI, CES-D-20, HSCL-15 and SRQ) and takes about 5 min to complete.

The sensitivity and specificity of EPDS differed across studies which may be attributed to variations in study methodologies [43] and characteristics of populations under study [1]. The sensitivity of the EPDS across the 8 studies ranged from Se = .688 to Se = 1, with a specificity from Sp = .733 to Sp = .915. EPDS had pooled sensitivity of. 80 and pooled specificity of .81 after excluding studies for pregnant women with Human Immunodeficiency Virus (HIV) [3] and those who were young [37, 39] (Fig. 3). Pooling was done in these two EPDS studies subgroups because they were considered to be sufficiently homogeneous in terms of participants, screening instrument and outcomes [44]. The EPDS had the highest level with an AUC ranging from .770 to .965 indicating a high level of accuracy in detecting depression in pregnant women in low resource settings.

The BDI

The BDI is a 21-item self-rating inventory which measures symptoms of depression on a scale from 0 to 3 [45]. Sensitivity of BDI in the two studies was Se = .867 and Se = .82

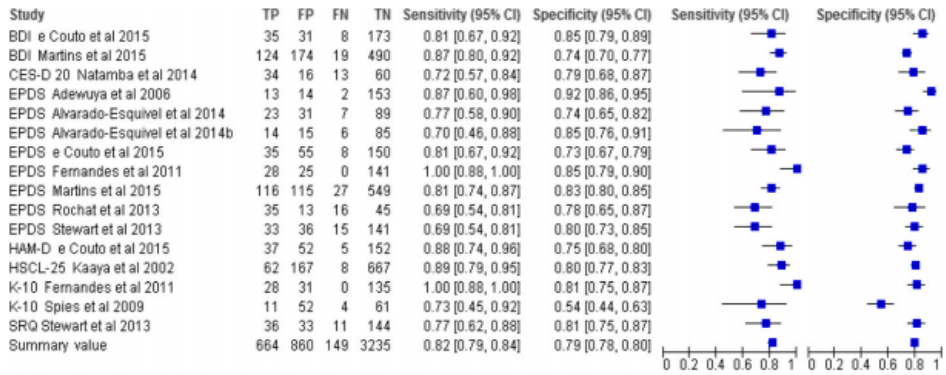

Fig. 2 Sensitivity and specificity of selected tools. BDI=Beck Depression Index, CES-D=Centre for Epidemiologic Studies Depression Scale, EPDS= Edinburgh Postnatal Depression Scale, HAM-D=Hamilton Rating Scale for Depression, HSCL 25=Hopkins Symptoms Checklist 25, K10=Kessler Psychological Distress Scale 10, SRQ 20=Self-Reporting Questionnaire 20, FN=False negative, FP=False positive, TN=True negative, TP=True positive

with AUC of .87 and .90 respectively (Table 3) BDI had pooled Se = .85 and pooled Sp = .76 (Fig. 4).

K-10

The Kessler-10 (K-10) is a self-administered 10-item questionnaire which measures anxiety and depression rated over the past 4 weeks [46]. The data from the two K-10 studies were inconsistent with the second highest accuracy (AUC = .95) in India and the lowest accuracy (AUC = .66) in South Africa and the highest sensitivity (Se = 1.0) in India and lowest specificity (Sp = .54) in South Africa (pooled Se = .91 and pooled Sp = .70) (Fig. 5).

Other instruments

A number of other screening instruments were also reported as having been used in low resource settings. These were: CES-D, a 20 item self-rating scale which measures depressive symptomatology in the general population [47]; the HSCL-25, a self-report inventory for identifying common psychiatric symptoms [48] which include fifteen items for screening depression (HSCL-15); the SRQ, a 20 item scale that is used to assess for psychiatric disturbance [49] and the HAM-D, a 21 items clinician administered scale that assesses severity of, and change in, depressive symptoms [50].

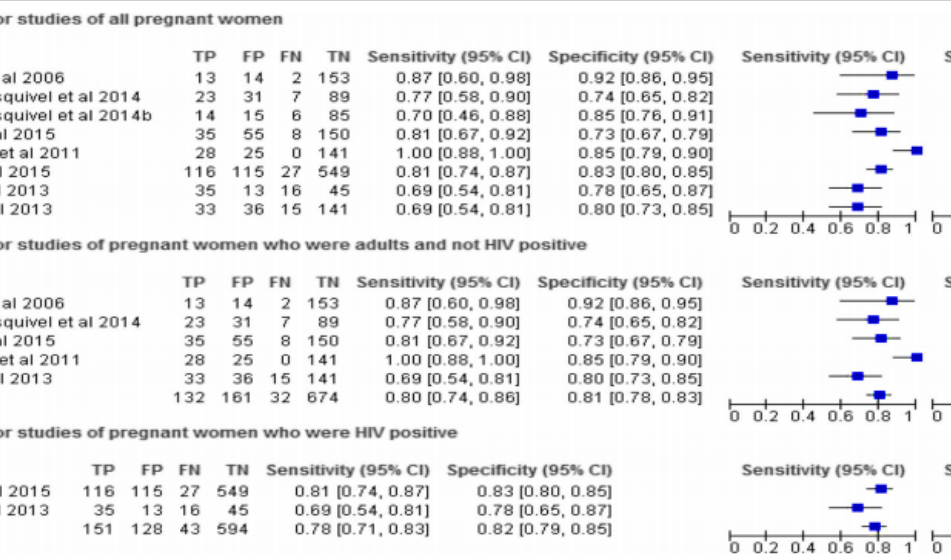

Fig. 3 Forest plot of EPDS studies. EPDS= Edinburgh Postnatal Depression Scale, FN=False negative, FP=False positive, TN=True negative, TP=True positive

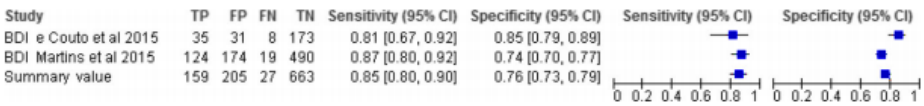

Fig. 4 Forest plot of BDI studies. BDI=Beck Depression Index, FN=False negative, FP=False positive, TN=True negative, TP=True positive

Discussion

An instrument being considered for selection for routine screening, should be inexpensive, be easy to administer, cause minimal discomfort and have high reliability and validity in distinguishing between cases and non-cases of a condition [51]. In this review, screening instruments with a pooled sensitivity/specificity balance >85% were considered as ideal to distinguish between depressed and non-depressed women. The EPDS met criteria for both brevity and validity with this review, similar to two earlier systematic reviews [21, 24] which found high sensitivity, high specificity and the highest level of accuracy (AUC = .965). Though the K-10 had the best pooled sensitivity (Se = .91), the EPDS had the best pooled specificity (Sp = .81). The BDI had a good sensitivity/specificity balance (Se = .85 and Sp = .76) respectively, but the EPDS sensitivity/specificity balance was more ideal with a higher specificity (important in screening out non-cases) and adequate sensitivity (Se = .80).

A second finding from this review is evidence that seven local language versions of depression screening instruments (BDI, CES-D-20, EPDS, HAM-D, HSCL-25, K-10 and SRQ) had acceptable sensitivities or specificities and level of accuracy in antenatal clinics in low resource settings. However, none of these instruments were specifically designed to measure antenatal depression in low resource settings and their sensitivity and specificity varied with studies. The included studies had significant differences in methodology, population sampled, gestation period, type of instrument used and gold standards which indicated that there was clinical heterogeneity amongst included studies. Nevertheless, forest plots showed that distinct subgroups of studies which used similar participants and instruments were homogeneous. But one has to bear in mind that this method of identifying heterogeneity has limited power in detecting bias when studies are few [52].

It is documented that HIV prevalence in a population may influence the prevalence and severity of depression [3]. However, in this review, the instruments (EPDS and K-10) which had highest sensitivity (Se = 1.0) were validated in general population of pregnant women while lowest sensitivity (Se = .69) of EPDS was found in both general population of pregnant women, and in sample comprising of HIV positive and HIV negative pregnant women. In this review, it was clear that the pooled sensitivity of EPDS (Se = .80) for a subgroup of adult and non-HIV positive pregnant women was higher than that for HIV positive women (Se = .78). Nonetheless, one may not clearly ascertain from this review the extent to which HIV status of pregnant women influenced validity of screening instruments.

In this review, it was clear that in Mexico, sensitivity of EPDS among teenager pregnant women was 0.05 lower than its sensitivity among adult pregnant women [36, 37]. This may suggest that the population sampled may influence validity of a screening instrument. Studies have found that instruments may have different levels of sensitivity and specificity when applied to women at different stages of pregnancy. In this review, the EPDS had both highest sensitivity (Se = 1.0) [4] and lowest sensitivity (Se = .69) [34] among third trimester pregnant women and BDI had different sensitivity values among second trimester pregnant women in Brazil [1, 39]. It was however not possible in this review it establish whether screening instruments may have different levels of sensitivity and specificity when applied to women at different stages of pregnancy due to inconsistencies in completeness of reporting in original studies.

Lastly, while systematic reviews are widely recognised as an efficient, reliable and comprehensive source of evidence for decision-making, few systematic reviews have considered effects on health equity [14]. In the light of this, the reviewers' recommendations were focused on the appropriate end-users (antenatal services in low resource settings) and we recognise that the findings are context-specific [14]. In this context, the EPDS emerged as the most suitable instrument for screening antenatal depression in low resource settings where time and other resources are limited. This performance of the

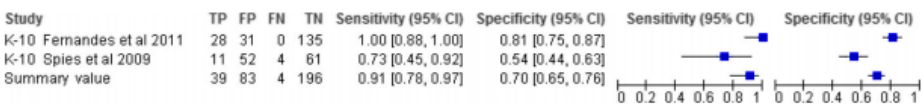

Fig. 5 Forest plot of K-10 studies. K10=Kessler Psychological Distress Scale 10, FN=False negative, FP=False positive, TN=True negative, TP=True positive

EPDS in low resource settings is important as it supports the existing evidence from HICs which cannot always be applied effectively in low resource settings [53]. As such, this *emic* evidence will supplement the existing *etic* evidence to bring transformational health changes in antenatal care in low resource settings [13] which have heavy workloads, insufficient staff, poor funding and lack of medicines and supplies [11].

Strengths and limitations

One of the key strengths of the review is the specific evidence on screening tools used in antenatal services in low resource settings. It may serve as an efficient, reliable and comprehensive source of evidence for decision-makers in low resource settings [14] since most evidence, generated from HICs, may not be applicable in low resource settings. A limitation of this review is that restrictions on language and date limits may have resulted in missing out some relevant articles.

Conclusion

This review suggests that the EPDS can be a suitable instrument of preference for screening antenatal depression in low resource settings because its level of accuracy ranged from moderate to high in various settings. The EPDS is an easy and cheap tool for clinicians to administer during antenatal attendances and can help in identifying pregnant women at risk of depression [39].

Abbreviations

AUC: Area under curve; BDI: Beck depression index; CES-D 20: Centre for epidemiologic studies depression scale 20; CI: Confidence interval; CIDI: Composite international diagnostic interview; CINAHL: Cumulative index to nursing and allied health literature; DSM-IV: Diagnostic and statistical manual of mental disorders version 4; EPDS: Edinburgh postnatal depression scale; HAM-D: Hamilton rating scale for depression; HICs: High income countries; HIV: Human immunodeficiency virus; HSCL-15: Hopkins symptoms checklist 15; HSCL-25: Hopkins symptoms checklist 25; ICD-10: International classification of diseases version 10; K-10: Kessler psychological distress scale; LMICs: Low and middle income countries; MINI: Mini-international neuropsychiatric interview; PICOS: Participants index test comparator test outcome measures study setting; QUADAS: Quality assessment of diagnostic accuracy studies; SCID: Structured clinical interview for DSM-IV; SRQ: Self-reporting questionnaire; STARD: Standards for the reporting of diagnostic accuracy studies; UMICs: Upper middle income countries

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Availability of data materials

All data generated or analysed during this review are included in this manuscript and its supplementary information files.

Authors' contributions

GC drafted the manuscript under supervision of JC. GC designed protocol for the review with guidance from JC and both participated in each of its phases. GC conducted the search for articles. Both authors participated in the review and revision of the manuscript and have approved the final manuscript to be published.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

Ethics approval and consent to participate

This review is part of a doctoral project which was approved by the Senate Research Committee at the University of the Western Cape and College of Medicine Research and Ethics Committee at University of Malawi.

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Chapter Five

RISK PROFILE OF ANTENATAL DEPRESSION IN BLANTYRE DISTRICT IN MALAWI: STUDY 2

5.1 Introduction

This chapter reports the findings from Phase 2: Study 2, a cross-sectional study on the prevalence of antenatal depression and associated risk factors among pregnant women attending antenatal clinics in the Blantyre district. The chapter covers the background, objective, methodology, study outcome and Paper 2.

5.2 Background

Depression is a common mental disorder that affects women during pregnancy. Its prevalence ranges from as low as 4.8% (Melville, Gavin, Guo, Fan, & Katon, 2010) to as high as 35.8% (Natamba et al., 2014) in low resource settings. Given the prevalence of antenatal depression, how it differs in different settings and the fact that it has not been documented in the Blantyre district, a cross-sectional study was conducted to determine magnitude of the problem in the local context.

5.3 Objective

The objective of this study was to describe the prevalence of depression and risk factors in women attending antenatal clinics in a selected district in Malawi using the recommended instruments from Phase 1: Study 1.

5.4 Methodology

A cross-sectional study was conducted to screen for depression among pregnant women in the Blantyre district using a range of selected screening instruments. Prevalence was determined using the EPDS and risk factors of depression were assessed using the PRQ. IBM SPSS 22.0 was used to analyse data by generating descriptive statistics, Pearson chi square test and binary logistic regression.

5.5 Study outcome

The findings of the cross-sectional study have been accepted for publication in a peer reviewed journal (Paper 2).

Paper 2: Chorwe-Sungani, G. & Chipps, J. A cross-sectional study of depression among women attending antenatal clinics in the Blantyre district of Malawi. (*South African Journal of Psychiatry*, In Press).

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MANUSCRIPT INFORMATION PAGE

Manuscript title	A cross-sectional study of depression among women attending antenatal clinics in Blantyre district, Malawi
Manuscript abstract	**Background**: Pregnancy is a period associated with major psychological and social changes in the life of a woman and can be associated with anxiety and depression. **Aim**: To describe demographic, clinical and risk profile of antenatal depression among pregnant women attending antenatal clinics in Blantyre district, Malawi. **Setting**: The study was conducted in eight antenatal clinics in Blantyre district, Malawi. **Methods**: A cross-sectional study of 480 randomly selected pregnant women attending antenatal clinics was conducted. Prevalence was determined using the Edinburgh Postnatal Depression Scale (EPDS) which was validated against a sub-sample using the Mini International Neuropsychiatric Interview. The risk factors of depression were assessed using the Pregnancy Risk Questionnaire. Data were analysed using descriptive statistics, Pearson chi-square test and binary logistic regression. **Results**: Prevalence of antenatal depression using the EPDS was 19% (95% CI 15.5% – 22.5%, *n* = 91) and was comparable to the Mini International Neuropsychiatric Interview [25.8% (95% CI = 17.5–34), *n* = 25]. The key risk factors that predicted antenatal depression were: 'being distressed by anxiety or depression for more than 2 weeks during this pregnancy' [OR = 4.1 (2.1–7.9), $p \leq 0.001$]; 'feeling that a relationship with partner is not an emotionally supportive one' [OR = 3.5 (1.4–8.4), *p* = 0.01]; 'having major stresses, changes or losses in the course of this pregnancy' [OR = 3.2 (1.7–6.2), *p* = 0.01]; 'feeling that father was critical of her when growing up' [OR = 3.2 (1.4–7.6), *p* = 0.01]; and 'having history of feeling miserable or depressed for ≥2 weeks before this pregnancy' [OR = 2.4 (1.3–4.4), *p* = 0.01]. **Conclusion**: This study confirmed the high-prevalence rate of depression in this group and illustrated that antenatal depression was associated with being distressed by anxiety or depression; support from partner; major stresses during pregnancy; and history of feeling miserable or depressed before pregnancy. History of poor relationship between pregnant women and their fathers during childhood makes them vulnerable to antenatal depression in this population.
Manuscript keywords	*Antenatal; Depression; Low-Resource Settings; Risk Factors; Pregnancy.*
Number of authors	2
Acknowledgements	The authors acknowledge all colleagues who offered guidance and technical support when this manuscript was being drafted.
Competing interests	The authors declare that they have no competing interests.
Author(s) contributions	G.C. (University of Malawi) drafted the manuscript with support from J.C. (University of the Western Cape). G.C. designed the study under guidance of J.C. Data collection and entry was performed by G.C. who analysed the data under J.C.'s supervision. Both G.C. and J.C. participated in the review and revision of the manuscript and have approved the final manuscript to be published.

Ethical consideration	The study received ethics approval from Senate Research and Ethics Committee at the University of the Western Cape and College of Medicine Research and Ethics Committee at University of Malawi. Institutional clearance was also granted by Blantyre District Health Office for the researcher to conduct this research in the district. Pregnant women who screened positive on the EPDS were referred to a psychiatric clinic.
Funding Information	This study was funded by University of Malawi through QZA-0484 NORHED 2013 grant.
Project research number (if applicable)	
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1. Introduction

Pregnancy is a period associated with major psychological and social changes in the life of a woman and can be associated with anxiety and depression (Ajinkya, Jadhav & Srivastava 2013). Depression may be a significant disease burden for pregnant women (Stewart et al. 2014), is a leading cause of disability (WHO 2008) and can impact on functional status of a pregnant woman and the development of the foetus (Manikkam & Burns 2012). Antenatal depression is also a risk factor for postnatal depression (Stewart et al. 2013). Therefore, it is important to conduct holistic comprehensive assessments of pregnant women that includes identifying risk and protective factors for depression during this time.

The early detection of risk factors for antenatal depression may result in reduction of disease burden experienced by these women (Lancaster et al. 2010). Nonetheless, antenatal depression and associated risk and protective factors are often not assessed during pregnancy in low-resource settings (Rochat et al. 2013) because antenatal services usually focus more on physical health and do not routinely screen for mental health issues (Manikkam & Burns 2012). Thus, data on the local prevalence of depression and its associated risk factors are needed to provide clinicians with clinically relevant, identifiable information to accurately assess pregnant women with depression.

Studies have shown that prevalence of antenatal depression ranges from as low as 4.8% in high-income countries (Melville et al. 2010) to as high as 35.8% in sub-Saharan countries (Manikkam & Burns 2012). Although the prevalence of antenatal depression and associated psychosocial risk factors have been extensively studied in other parts of the world, there remains a scarcity of similar studies in Malawi. Currently, there are no national epidemiological data for prevalence of depressive disorders among pregnant women in Malawi. Only one rural district study reported a prevalence of 21.1% major depression among pregnant women (Stewart et al. 2014). This study aims to add to the data on depression in pregnant women in Malawi by investigating the prevalence of depression and its associated psychosocial risk factors among pregnant women attending antenatal clinics in Blantyre district, Malawi.

2. Methods

2.1. Design

A cross-sectional study was conducted with an aim to screen for depression and associated risk factors in pregnant women attending antenatal care services in eight public antenatal clinics (four urban and four rural in January to May 2016) in the Blantyre district, Malawi, using the Edinburgh Postnatal Depression Scale (EPDS) and the Pregnancy Risk Questionnaire (PRQ). In a sub-sample, depression diagnosis was determined using the Mini International Neuropsychiatric Interview (MINI) and the EPDS was validated.

2.2. Sample

To determine the prevalence of depression in this setting, a sample size of 480 pregnant women was calculated using the formula: N = (TP + FN)/ (1-P) (Jones, Carley & Harrison 2003), with N = 1593, Sensitivity 96%, Specificity 57% (Whooley et al. 1997), confidence

interval 95% and p = 21% (Stewart et al. 2014). Inclusion criteria were: attending an antenatal service with a pregnancy of any stage, being 18 years old and above, agreeing voluntarily to participate in the study, giving a written consent before joining the study and being able to speak and understand Chichewa (a local language). Exclusion criteria were: having complications of pregnancy or a known mental disorder. To determine Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) criteria for major depressive disorder (MDD) and to validate the EPDS as a gold standard, a sub-sample of 100 pregnant women was calculated as adequate to validate the EPDS against the MINI with sample parameters of p = 21% (Stewart et al. 2014), N = 480, error level 7% and confidence interval 95%.

2.3. Materials

This study used a standardised depression screening instrument, namely, the EPDS and, the validated PRQ to collect data on risk factors for pregnancy. Although a previous study in Malawi used the SRQ (Stewart et al. 2014), this study was performed in a single clinic with a convenience sample. In this study, following a systematic review of accurate instruments for screening depression in low-resource settings (Chorwe-Sungani & Chipps 2017), the EPDS was selected. The EPDS is a 10-item self-reporting questionnaire for screening postnatal depression (Cox, Holden & Sagovsky 1987) which can also be used to screen for antenatal depression (Chorwe-Sungani & Chipps 2017). The instrument has a maximum total score of 30 with a standard cut-off score of ≥10 for depression caseness (Martins et al. 2015). The EPDS targets depressive symptoms that an individual has experienced in the past 7 days (Cox et al. 1987). The MINI, a brief structured diagnostic interview for DSM-IV (Sheehan et al. 1998), was used as the 'gold standard' in generating psychiatric diagnoses using only the MDD module. The PRQ is an 18-item scale which is designed to assess psychosocial factors for depression during pregnancy. The instrument was designed to assess psychosocial risk factors for depression during pregnancy and used to predict antenatal or postnatal depression (Austin et al. 2005). The PRQ has a maximum total score of 90. Previously validated Chichewa language versions of the EPDS were used in this study (Stewart et al. 2013). The PRQ and the MINI were translated into Chichewa by the researcher and a bilingual social worker through forward and backward translations (Maneesriwongul & Dixon 2004).

2.4. Data collection

Research assistants trained in administration of the EPDS and PRQ collected the data from 480 pregnant women. They systematically picked every other third pregnant woman from the queue after randomly picking the first one. A sub-sample of 100 pregnant women drawn from the 480 respondents volunteered to undergo further interview using the MINI. A mental health nurse administered the MINI and was blind to the respondents' initial screening outcomes.

2.5. Data analysis

The International Business Machines (IBM) Statistical Package for Social Sciences (SPSS) version 22.0 was used to analyse data. Significance level for all tests was set at 95%. Descriptive statistics were used to summarise data. A diagnosis of MDD based on the MINI was assigned. An EPDS 'case' of depression, that is, being screened positive was computed based on a cut-off score of ≥10. The EPDS cases were validated against the MDD diagnosis using standard sensitivity analysis. Differences in demographics and psychosocial risk factors between screen positives and negatives were compared using Pearson chi-square test. Associations between psychosocial risk factors and EPDS depression cases were tested using

odds ratios (OR). Direct logistic regression was performed to assess the impact of demographic variables and psychosocial risk factors in screening positive for depression in pregnant women.

3. Results

3.1. Demographics

A total of 480 out of a possible 496 respondents had the EPDS and PRQ administered (response rate of 96.8%). The age of respondents ranged from 18 to 43 years (mean 25.2 ±5.5). The mean number of pregnancies per respondent was 2.4 ±1.3 (range =1–6 pregnancies), with a current mean gestation period of 26.7 weeks ±7.4 (range = 5–40 weeks). More than half of the respondents were unemployed (52.5%, *n* = 252), had more than primary school education (53.8%, *n* = 256) and were from an urban area (65.2%, *n* = 313). Nearly all the respondents were supported by a partner (92.9%, *n* = 446). No significant differences were found between demographic data of the depression cases and non-depression cases except for marital status and occupation (approached significance) and no difference by clinical pregnancy variables (Table 1).

TABLE 1: Demographic and clinical characteristics of respondents (*n* = 480).

	EPDS			
Item	**Positives 91(19)**	**Negatives 389(81)**	**Statistic χ^2, *p***	**OR (95%CI), *p***
Occupation			1.5, 0.22	0.62(0.37–1), 0.06*
Unemployed	53(58.2)	199(51.2)		
Employed	38(41.8)	190(48.8)		
Education level			0.84, 0.36	0.79(0.48–1.3), 0.36
Primary or none	46(50.5)	176(45.2)		
Secondary or above	45(49.5)	213(54.8)		
Marital status			4.3, 0.04*	3.2(1.4–7.6), 0.01*
Supported by partner	80(87.9)	366(94.1)		
Not supported by partner	11(12.1)	23(5.9)		
Setting			0.33, 0.57	1.2(0.71–1.9), 0.55
Urban	57(62.6)	256(65.8)		
Rural	34(37.4)	133(34.2)		
Age in years	25.2±4.9	25.1±5.6	2.7, 0.43	1.1(0.98–1.1), 0.21
Gestation in weeks	27.7±7.4	26.5±7.4	6.4, 0.09	1(0.99–1.1), 0.19
Pregnancies	2.3±1.2	2.4±1.3	5.7, 0.13	0.87(0.64–1.2), 0.37

Data = *n*(%) or mean ± standard deviation; OR = odds ratio; CI = confidence interval; EPDS = Edinburgh Postnatal Depression Scale.
*significance set at ≤ 0.05.

3.2. Sensitivity analysis

A total of 3 out of the 100 respondents in the sub-sample refused to be interviewed, resulting in a sample size of 97 (97%) – 48 screen positives and 49 screen negatives (mean = 27.7±7.9 years). The prevalence of current MDD using the MINI was 25.8% (95% CI = 17.5% – 34.0%, *n* = 25), with no significant differences between demographic and clinical data of the MDD cases and non-MDD cases. The EPDS had a sensitivity of 68%, specificity of 88% and AUC = 0.85, using the MDD diagnosis as the gold standard (MINI), confirming its validity in measuring risk for antenatal depression.

3.3. Antenatal depression and demographic risk factors

Using the EPDS, this study found rates for antenatal depression cases (screen positives) of 19% (95% CI 15.5% – 22.5%, *n* = 91) in pregnant women attending antenatal clinics in Blantyre district. A significantly higher proportion of EPDS cases reported that were not supported by a partner (12.1%, *n* = 366) compared to 5.9% (*n* = 80) non-cases (*p* = 0.01) (Table 1). The demographic characteristics of the EPDS cases were similar to the sub-sample MDD cases [urban areas (62.8% vs. 60%), secondary education or over (49.5% vs. 56%), not supported by a partner (12.1% vs. 12%)], except for unemployment which were higher in MDD cases (58.2% vs. 80%). Similarly, the mean number of pregnancies in the EPDS versus MDD cases were 2.3 versus 2.5 and mean gestations of 27.7 weeks for both.

3.4. Psychosocial risk factors for antenatal depression

The PRQ was used to assess psychosocial risk factors associated with antenatal depression. There were significant differences between EPDS positive and negative screened cases in 12 of the psychosocial risk factors measured by PRQ (Table 2).

TABLE 2: Psychosocial risk factors associated with antenatal depression.

	EPDS			
Pregnancy Risk Questionnaire item	**Positive (19%, *n* = 91) *n*(%)**	**Negative (81%, *n* = 389) *n*(%)**	**Statistic χ^2, *p***	**OR (95%CI), *p***
Feeling that mother was critical of her when growing up	84(92.3)	353(90.7)	0.22, 0.64	0.52(0.12–2.2), 0.37
Feeling that father was critical of her when growing up	78(85.7)	295(75.8)	4.2, 0.04*	3.5(0.97–12.8), 0.06*
Having trouble finishing jobs because of wanting to get it exactly right	59(64.8)	189(48.6)	7.8, 0.01*	1.8(0.92–3.4), 0.09
Being distressed by anxiety or depression for ≥2 weeks during this pregnancy	53(58.2)	44(11.3)	101, <0.001*	4.2(2.2–8.2), <0.001*
Having history of feeling miserable or depressed for ≥2 weeks before this pregnancy	45(49.5)	85(21.9)	28.5, <0.001*	2.3(1.2–4.3), 0.01*
Having major stresses, changes or losses in the course of this pregnancy	48(52.7)	44(11.3)	81.7, <0.001*	3.5(1.7–6.9), <0.001*
Was physically abused when growing up	34(37.4)	64(16.5)	19.8, <0.001*	1.7(0.82–3.4), 0.15
Feeling that will have no people to depend on for emotional support after giving birth	30(33)	47(12.1)	23.9, <0.001*	1.9(0.86–4.1), 0.12
Feeling that a relationship with partner is not an emotionally supportive one	25(27.5)	20(5.1)	43.3, <0.001*	3.8 (1.5–9.5), 0.004*
Feeling that pregnancy has not been a positive experience	20(22)	29(7.5)	16.9, <0.001*	1.6(0.64–4.1), 0.3
Feeling that father was not emotionally supportive of her when growing up	15(16.5)	83(21.3)	1.1, 0.3	0.98(0.30–3.1), 0.98
Generally considers herself as a worrier	15(16.5)	52(13.4)	0.59, 0.44	1(0.40–2.5), 0.99
Feeling that mother is not emotionally supportive of her at present	11(12.1)	46(11.8)	0.01, 0.94	0.45(0.15–1.3), 0.15
Previously told by health professional that she was depressed or needed antidepressants	9(9.9)	12(3.1)	8.2, 0.004*	2.3(0.62–8.2), 0.22
Feeling that mother was not emotionally supportive of her when growing up	8(8.8)	10(2.6)	7.9, 0.01*	3.9(0.84–18.1), 0.08*
Not liking herself as a person	6(6.6)	17(4.4)	0.79, 0.37	1.4(0.40–4.9), 0.59
Was sexually abused when growing up	6(6.6)	3(0.80)	13.6, <0.001*	4.1(0.56–30.2), 0.17
Thinking that her mother was not happy to be a mother	4(44.4)	8(2.1)	1.7, 0.19	0.27(0.03–2.4), 0.24

EPDS, Edinburgh Postnatal Depression Scale; CI, confidence interval; OR, odds ratio.
*Significance set at ≤ 0.05.

Edinburgh Postnatal Depression Scale screen positives were significantly associated ($p < 0.05$) with being 'distressed by anxiety or depression for a period of 2 weeks or more during this pregnancy' ($\chi^2 = 101$, $p < 0.001$) [OR = 4.2(2.2–8.2), $p < 0.001$], experiencing 'major stresses, changes or losses in the course of this pregnancy' ($\chi^2 = 81.7$, $p < 0.001$) [OR = 3.5(1.7–6.9), $p < 0.001$], were 'physically abused when they were growing up' ($\chi^2 = 19.8$, $p < 0.001$) [OR = 1.7(.82–3.4), $p = 0.15$], had a history of feeling 'miserable or depressed for 2 weeks or more before this pregnancy' ($\chi^2 = 28.5$, $p < 0.001$) [OR = 2.3(1.2–4.3), $p = 0.01$], 'feeling that father was critical of her when growing up' ($\chi^2 = 4.2$, $p = 0.04$) [OR = 3.5(0.97–12.8), $p = 0.06$], 'having trouble finishing jobs because of wanting to get it exactly right' ($\chi^2 = 7.8$, $p = 0.01$) [OR = 1.8(0.92–3.4), $p = 0.09$], 'feeling that will have no people to depend on for emotional support after giving birth' ($\chi^2 = 23.9$, $p < 0.001$) [OR = 1.9(0.86–4.1), $p = 0.12$], 'feeling that a relationship with partner is not an emotionally supportive one' ($\chi^2 = 43.3$, $p < 0.001$) [OR = 3.8(1.5–9.5), $p = 0.004$], 'feeling that pregnancy has not been a positive experience' ($\chi^2 = 16.9$, $p < 0.001$) [OR = 1.6(0.64–4.1), $p = 0.3$], 'feeling that mother was not emotionally supportive of her when growing up' ($\chi^2 = 7.9$, $p = 0.01$) [OR = 3.9(0.84–18.1), $p = 0.08$], 'previously told by health professional that she was depressed or needed antidepressants' ($\chi^2 = 8.2$, $p = 0.004$) [2.3(0.62–8.2), $p = 0.22$] and 'sexually abused when growing up' ($\chi^2 = 13.6$, $p < 0.001$) [OR = 4.1(0.56–30.2), $p = 0.17$] compared to screen negatives (Table 2).

3.5. Multivariate analysis of EPDS score and other variables

A direct logistic regression model with 14 variables (2 demographic and 12 psychosocial risk factors with significant differences) was constructed. The model with the 14 variables was statistically significant ($\chi^2 = 153.9$, $p < 0.001$) and it correctly classified 87.7% of screen positives. Furthermore, the model showed that there were only five predictors of caseness for antenatal depression, namely: (1) 'being distressed by anxiety or depression for more than 2 weeks during this pregnancy' [OR = 4.1 (2.1–7.9), $p \leq 0.001$]; (2) 'feeling that a relationship with partner is not an emotionally supportive one' [OR = 3.5 (1.4–8.4), $p = 0.01$]; (3) 'having major stresses, changes or losses in the course of this pregnancy' [OR = 3.2 (1.7–6.2), $p = 0.01$]; (4)'feeling that father was critical of her when growing up' [OR = 3.2 (1.4–7.6), $p = 0.01$]; and (5) 'having history of feeling miserable or depressed for ≥2 weeks before this pregnancy' [OR = 2.4 (1.3–4.4), $p = 0.01$]. This showed that respondents who had been distressed by anxiety or depression for 2 weeks or more during pregnancy had the highest likelihood (four times) of screening positive for antenatal depression in this study.

4. Discussion

Depression is the third largest contributor to the global burden of disease in the world which is estimated at 4.3% (WHO 2008). As such, the high burden of depression among pregnant women may hinder their effective utilisation of antenatal services (Rochat et al. 2013) and may result in poor birth outcomes. In addition, these women may face challenges in taking care of themselves mentally and physically (Kinser & Lyon 2014) and may have increased likelihood of developing postnatal depression (Lancaster et al. 2010).

This is the second study to investigate depression and associated risk factors in antenatal care in Malawi. This study found a prevalence of 19% (95% CI 15.5% – 22.5%, $n = 91$) for antenatal depression in pregnant women attending eight antenatal clinics in Blantyre in Malawi. This is consistent with previous studies' prevalence ranges reported for sub-Saharan Africa (Manikkam & Burns 2012; Stewart et al. 2014). A previous study by Stewart et al.

(2014) in one district hospital clinic in Malawi reported prevalence of current major depressive episode and current major or minor depressive episode of 10.7% (95% CI 6.9% – 14.5%) and 21.1% (95% CI 15.5% – 26.6%), respectively, using the SRQ (Stewart et al. 2014). The SRQ differs from EPDS because it consists of binary questions that are easily understood by illiterate individuals and it includes somatic symptoms (Stewart et al. 2013). However, both the EPDS and SRQ were previously found to be valid instruments for measuring antenatal depression in Malawi although the EPDS was adapted to include use of visual prompts (Stewart et al. 2013). Consistent with previous studies (Martins et al. 2015), our findings showed that the EPDS remains to be a valid instrument (sensitivity of 68%, specificity of 88% and AUC = 0.85) for detecting antenatal depression when used in its original form locally.

4.1. Psychosocial risk factors associated with antenatal depression

This study found that depression is significantly associated with being alone, unemployment, major stresses, poor relationships, physical or sexual abuse, lack of support and prior history of anxiety or depression. There is evidence which shows that domestic violence, maternal anxiety, life stress, prior depression and lack of social support are psychosocial risk factors of antenatal depression (Lancaster et al. 2010). This study confirmed these factors. A personal history of depression and experiencing stress are risk factors that are associated with antenatal depression (Lancaster et al. 2010). The risk factor which was the strongest predictor of depression was 'being distressed by anxiety or depression during pregnancy', with respondents reporting this being four times more likely to screen positive for antenatal depression. Another risk factor that was associated with screening positive for antenatal depression was 'having major stresses, changes or losses in the course of this pregnancy' with respondents who had experienced major stresses, changes or losses during pregnancy being three times more likely to be depressed.

It is documented that antenatal depression is more likely to occur among pregnant women with a recent history of stressful life events (Brittain et al. 2015; Kinser & Lyon 2014). Major stresses such as the death of a relative or intimate partner violence may have contributed to their depressive symptoms. In addition, it has been postulated that childhood physical abuse is associated with depressive symptoms in early pregnancy (Barrios et al. 2015). 'Having history of physical abuse when growing up' was significantly associated with antenatal depression in this study, although this was not a significant factor in the overall prediction model.

The thought of having an unsupportive partner was significant in this study, with 'feeling that relationship with partner is not an emotionally supportive one' being found to be a risk factor that predicted antenatal depression [OR = 3.5 (1.4–8.4), $p = 0.01$]. This is supported by other studies that showed that a pregnant woman may suffer from depression if she lacks support from her partner (Stapleton et al. 2012). Most pregnant women attending antenatal clinics in low-resource settings depend on their partners for financial support (Stewart et al. 2014) and are at risk of depression if they do not receive adequate psychosocial support (Lancaster et al. 2010). Psychosocial support serves as a buffer from stressful life events by providing resources, support and strength during pregnancy (Dibaba, Fantahun & Hindin 2013).

The relationship of children and their fathers during childhood may reduce or increase the children's vulnerability to emotional problems. This study found that pregnant women who indicated that their fathers were critical of them when growing up were three times more

likely to screen positive of antenatal depression. Consistent with this finding is Rosenberg and Wilcox who asserted that girls who had a good relationship with their fathers develop a stronger self-esteem and are less likely to experience depression (Rosenberg & Wilcox 2006). Therefore, this study suggests that poor relationship between father and girl child during childhood is a risk factor for antenatal depression.

4.2. Study limitations

This study may have been affected by selection bias because pregnant women who did not present themselves at antenatal clinics were not represented. Secondly, the interviewer administration of screening instruments may have influenced respondents to give answers that they deemed as socially acceptable in the presence of the interviewer.

5. Conclusion

This study showed that antenatal depression was associated with being distressed by anxiety or depression, lack of support from partner, major stresses during pregnancy and history of feeling miserable or depressed before pregnancy. A history of poor relationship between pregnant women and their fathers during childhood makes them vulnerable to antenatal depression in this population. Knowledge of risk factors for antenatal depression is important to enable midwives in low-resource settings to timely detect depression during pregnancy (Stewart et al. 2013) and implement relevant psychosocial interventions in order to reduce incidences of antenatal depression.

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Chapter Six

PERFORMANCE OF SCREENING INSTRUMENTS FOR ANTENATAL DEPRESSION: STUDIES 2 AND 3

6.1 Introduction

This chapter presents findings form Phase 2: Study 2, a cross-sectional study on the performance of a range of selected screening instruments for depression from Phase 1, and Study 3, a sensitivity analysis study to determine the utility and validity of a range of selected screening instruments for depression from Phase 1 in the local setting. The chapter includes a background, objectives, methodology, study outcome and Papers 3 and 4.

6.2 Background

Screening for depression in antenatal clinics require the use of valid instruments (Chorwe-Sungani & Chipps, 2017) with good utility. Nevertheless the validity and utility of screening instruments vary in different contexts. Due to concerns about variations in performance of screening instruments (Bossuyt et al., 2015), a cross-sectional study (Study 2) included a sensitivity analysis study, using a sub-sample of pregnant women (Study 3), to test the performance of a range of selected screening instruments for antenatal depression in the local setting.

6.3 Objectives

1. To assess the performance of a range of screening instruments in detecting depressive symptoms in antenatal clinics in the Blantyre district of Malawi (Study 2: Paper 3); and
2. To determine the utility and validity of a range of screening instruments for depression in women attending antenatal clinics in the Blantyre district of Malawi (Study 3: Paper 4).

6.4 Methodology

A cross-sectional study (Study 2) and a sensitivity analysis study (Study 3) were conducted to establish the performance of a range of screening instruments for depression in antenatal clinics. IBM SPSS 22.0 and MedCalc software was used to analyse the data. Performance differences in proportions of screen positives detected by the screening instruments and the differences in screen positive results by other variables were tested using the McNemar test and binomial regression (Study 2: Paper 3). The validity of the screening instruments was determined by validating each screening instrument against a gold standard, the MINI. Se, Sp, AUC, PPV and NPV were generated using ROC analysis for each instrument. The utility of combinations of the screening instruments was tested using the compensatory, conjunctive, probability and sequential rules.

6.5 Outcomes of study

The findings from the cross-sectional study (Study 2) have been accepted for publication in a peer reviewed journal (Paper 3) (Appendix 13). The findings from the sensitivity analysis study (Study 3) were published in a peer reviewed journal (Chorwe-Sungani & Chipps, 2018) : Paper 4.

Paper 3: Chorwe-Sungani, G. & Chipps, J. The performance of the 3-item screener, Edinburgh Postnatal Depression Scale, Hopkins Symptoms Checklist-15, Self-Reporting Questionnaire and Pregnancy Risk Questionnaire in screening of depression in antenatal clinics in the Blantyre district of Malawi (*Malawi Medical Journal*, In Press) (Appendix 13).

Performance of the 3-item screener, the Edinburgh Postnatal Depression Scale, the Hopkins Symptoms Checklist-15 and the Self-Reporting Questionnaire and Pregnancy Risk Questionnaire, in screening of depression in antenatal clinics in the Blantyre district of Malawi

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Short-running head: Performance of instruments in screening antenatal depression

ABSTRACT

Background

Screening instruments for antenatal depression vary in performance. This study aimed at assessing the performance of a range of screening instruments in detecting depressive symptoms in antenatal clinics in Blantyre district, Malawi.

Methods

A cross-sectional study was conducted to screen for depression among women attending 8 selected antenatal clinics in Blantyre district using 3-item screener, Edinburgh Postnatal Depression Scale (EPDS), Hopkins Symptoms Checklist-15 (HSCL-15), Self-Reporting Questionnaire (SRQ) and Pregnancy Risk Questionnaire (PRQ). The instruments were administered to a random sample of 480 pregnant women. Data were analysed using SPSS 22.0 testing for performance differences in proportions of screen positives and how screen positive results might differ by particular variables.

Results

The prevalence estimates yielded by screening instruments ranged from 12.9% (SRQ) to 42.1% (3-item screener). There were no significant differences in prevalence estimates for EPDS, HSCL-15, PRQ and SRQ. There were performance differences in the proportions of screen positives with significant systematic differences between proportions of screen positives of PRQ and SRQ ($p<.001$), EPDS and HSCL-15 ($p=.001$), HSCL and PRQ ($p<.001$), and EPDS and SRQ ($p<.001$). Screen positive results on HSCL-15, PRQ, 3-item screener and EPDS were found to differ by variables such as "not being supported by partner" which resulted in respondents having ≥3 times chances to screen positive on these four instruments. The screen positive results on SRQ were found not to differ by age, education, employment status, marital status, setting, gestation and number of pregnancies.

Conclusions

There were minimal variations in the performance of the EPDS, SRQ and HCLS-15 as standard public health screening instruments. However, systematic differences between proportions of screen positives exist and screen positive results from these instruments differed by demographics. It is important to validate screening instruments against a gold standard to ensure relevant clinical outcomes for pregnant women with depression.

Keywords: Antenatal; antenatal screening; depression; depressive symptoms; instruments

INTRODUCTION

Screening for depression and risk factors during pregnancy is important for the management of the mental health and well-being of pregnant women and unborn babies[1]. In different resource level settings, effective screening of antenatal depression is dependent on instruments that are validated in these contexts. Though numerous instruments for screening of depression in antenatal clinics in low resource settings exist,[2] some of these instruments are not specifically designed for use during pregnancy. Some instruments have been designed for post-natal depression and few validation studies have been conducted in antenatal settings.

Performance of these instruments in detecting depression during pregnancy may vary with population, setting and structure of screening instruments themselves[3-9]. Inclusion of somatic items in a screening instrument may also affect the validity of the instrument as these may occur as part of the normal pregnancy[10]. Furthermore, the structure and format of these screening instruments which requires an individual to choose a response out of multiple options for each question rather than 'yes' or 'no' might not be easily understood by individuals with low literacy levels[10].

Due to concerns about variations of performance of screening instruments in different contexts,[11] the validity of screening instruments currently being used in antenatal clinics in low resource settings is of concern. In these settings, many women have low literacy levels, and midwives have high workloads with limited time to screen the emotional status of pregnant women[12]. This study aimed to assess the performance of the Edinburgh Postnatal Depression Scale (EPDS), Hopkins Symptoms Checklist-15 (HSCL-15), Self-Reporting Questionnaire (SRQ) and Pregnancy Risk Questionnaire (PRQ) in detecting depression in antenatal clinics in Blantyre district, Malawi. In addition, the 3-item screener for depression was included as it has been recommended that valid ultra-brief instruments for screening of depression which are short, easy to administer, clinically acceptable, and are minimally affected by literacy, may be more suitable in detecting possible cases of depression in primary care[13,14]. The PRQ was included because apart from screening depression it also assesses psychosocial risk factors for depression during pregnancy[15].

METHODS

This study used a cross-sectional quantitative survey design to screen for depression amongst a population of pregnant women (N=1593) attending 8 selected antenatal clinics in Blantyre district in February 2015. Sample size was calculated using the following parameters: estimated sensitivity (S_e) of 96%, estimated specificity (S_p) of 57%, estimated prevalence (p) of 21%,[16] and the Confidence Interval (CI) of .05. The calculated sample of 480 provided adequate caseness for screening for depression in pregnant women.[16] Sample inclusion criteria were: attended antenatal care, 18 years old and above, written consent before joining the study and ability to speak and understand *Chichewa* (a local language). Exclusion criteria were: complications of pregnancy or known mental or medical conditions. A total of 496

pregnant women were invited to participate in this study of which 16 declined resulting in 480 who participated.

Screening instruments

Five instruments were included, namely: EPDS, HSCL-15, SRQ, PRQ and the 3-item screener for depression.

EPDS

The EPDS is the most commonly used instrument in pregnancy and has previously been reported as a valid (S_e= 68.8%, S_p= 79.5%) and reliable (Cronbach's α=.9) instrument for screening antenatal depression in Malawi[10]. The EPDS is a 10-item self-reporting questionnaire which was originally designed to measure postnatal depression[17] but has also been validated for screening antenatal depression[2]. The instrument measures depressive symptoms experienced by an individual in the past seven days[18]. The EPDS has a maximum total score of 30 with a standard cut off score of ≥10 for depression caseness[19].

HSCL-15

The HSCL-15 was found to be valid (S_e= 89%, S_p= 80%) and reliable (Cronbach's α =.9) in screening depression among pregnant women in Tanzania[9]. The HSCL-15 consisted of a fifteen items self-reporting inventory for assessing depressive symptoms which have been disturbing an individual in the past seven days[20]. The 15 items are measured on a Likert scale (1 to 4). The depression score is the calculated average of the 15 items. The HSCL-15 has a maximum average score of 4 with standard cut off of average depression score ≥1.75[21].

SRQ

The SRQ has previously been used in Malawi and was found to be valid (S_e= 76.3% , S_p= 81.3%) and reliable (Cronbach's α = .83) in detecting possible depression cases among pregnant women[10]. The SRQ has 20 questions which are used to assess for psychiatric symptoms that an individual has experienced in the past month[22]. The instrument has a maximum total score of 20 with a standard cut off ≥10 for depression caseness[23].

PRQ

The PRQ is a valid instrument (S_e=44% and S_p= 92% in an Australian population)[15] designed to assess psychosocial risk and protective factors for depression during pregnancy and used to predict antenatal or postnatal depression[15]. The instrument has a maximum total score of 90 with a cut off ≥46 for depression caseness. The PRQ has 18 items which assess for psychosocial risk and protective factors for depression from childhood to the present.

The 3-item Screener

The instrument has two screening questions (S_e= 96%)[24] and a question asking " are you depressed?" (S_e= 94%)[25] which have been found to be effective in screening depression. The screening questions rate depressive symptoms a person has had in the past month. The one-

item screening question asks if a person is feeling depressed. The maximum total score for the 3-item screener was 3 and cut off was set as ≥1 for depression caseness.

Translation of screening instruments

Previously validated Chichewa language versions of the EPDS and the SRQ existed and were used in this study[10]. The 3-item screener, HSCL-15 and PRQ were translated into *Chichewa* by the first author and a social worker based on the minimum standards (back translation and monolingual testing) for applying an instrument that was developed in another language[26].

Data collection procedure

Data collection was done by the first author and two registered midwives as research assistants, from January to May 2016. The assistants received two days training to familiarise them with the study, the data collection instruments and the data collection process. One research assistant was assigned to randomly select pregnant women from queue at antenatal clinics and invite them to participate in the study. The research assistant systematically picked every other third pregnant woman on the queue after randomly picking the first. Due to the low literacy levels, the first author and a second research assistant administered the 3-item screener, HSCL-15, SRQ, EPDS and PRQ by reading the questions and recording the answers on behalf of respondents.

Data analysis

The IBM Statistical Package for Social Sciences (SPSS) version 22.0 was used to analyse data. Significance level was set at 95%. Caseness (screening positive for probable antenatal depression) was determined using the following cut off scores: the 3-item screener (cut off ≥1), the HSCL-15 (cut off ≥1.75),[21] the SRQ (cut off ≥10),[23] the EPDS (cut off ≥10)[19] and the PRQ (cut off ≥46).[15] Descriptive statistics were used to analyse and summarise demographic characteristics in relation to probable antenatal depression cases identified by each screening instrument. Instruments' reliability were tested using Cronbach's α. Pearson Chi square test was used to compare differences between screen positives and negatives and different demographic variables. To test the agreement among instruments in detecting proportions of same individuals as screen positives, the McNemar test was used, with a statistically significant test confirming the presence of systematic differences between proportions of positive responses between any two instruments[27]. In addition, the possible differences in screen positive results by demographics and pregnancy factors were examined using binomial regression models.

Ethics approval

The study was granted ethics approval by the research committee of the University of the Western Cape and the College of Medicine Research and Ethics Committee (COMREC), University of Malawi.

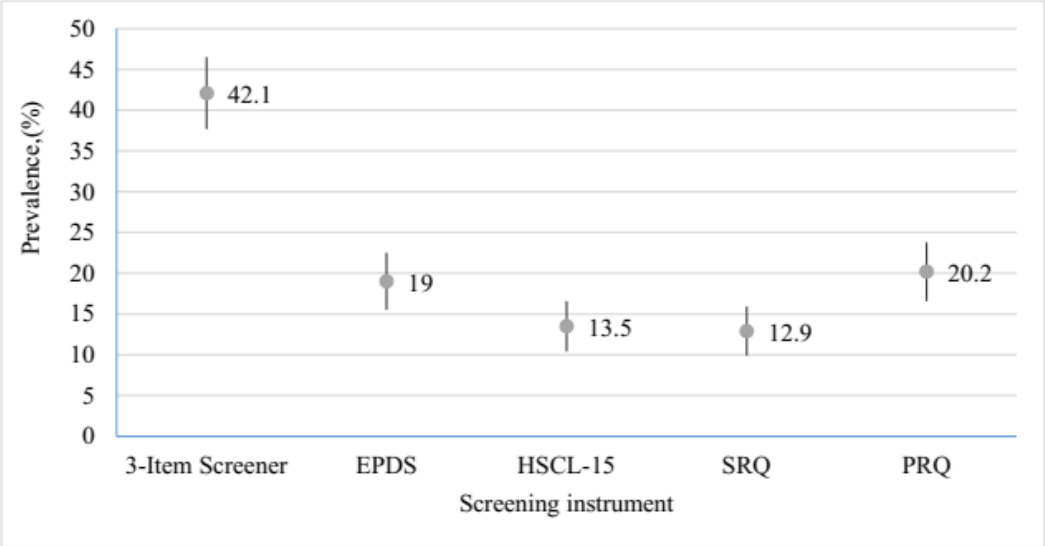
RESULTS

Demographics

A total of 480 respondents completed questionnaires (response rate of 96.8%). The age of respondents ranged from 18 to 43 years (mean 25.2 ±5.5). The mean number of pregnancies per respondent was 2.4 ±1.3 (range =1 to 6 pregnancies), with a current mean gestation period of 26.7 weeks ±7.4 (range= 5 to 40 weeks). More than half of the respondents were unemployed (52.5%, n=252), had more than primary school education (53.8%, n=256) and were from an urban area (65.2%, n=313). Nearly all the respondents were supported by a partner (92.9%, n=446).

Prevalence of depression (screen positives for depression caseness) by different instruments

The SRQ, HSCL-15, EPDS, PRQ and 3-item screener were reliable instruments in the setting (Cronbach's α= .86, .85, .80, .70 and .70 respectively). The prevalence (respondents who screened positive for depression) ranged from 12.9% (95% CI 9.9%-15.9%) (SRQ) to 42.1% (95% CI 37.7%-46.5%) (3-item screener) (Figure 1). There were no significant differences in the proportions of screen positives identified by the PRQ [20.2% (95% CI 16.6%-23.8%)], EPDS [19% (95% CI 15.5%-22.5%)], HSCL-15 [13.5% (95% CI 10.4%-16.6%)] and, SRQ [12.9% (95% CI 9.9%-15.9%)], though the 3-item screener detecting a significantly higher number of screen positives [42.1% (95% CI 37.7%-46.5%)] (Figure 1).



EPDS=Edinburgh Postnatal Depression Scale, HSCL-15=Hopkins Symptoms Checklist-15, SRQ=Self Reporting Questionnaire, PRQ=Pregnancy Risk Questionnaire

Figure 1: Screen positive prevalence for depression with confidence levels for all instruments

Agreement of instruments in detecting screen positives

Though there were insignificant variations among the prevalence estimate identified by the instruments, excluding the 3-item screener, there were performance differences in the proportions of screen positives, indicating that these estimates do not include exactly the same individuals. The McNemar's tests revealed significant systematic differences between proportions of screen positives from the following instruments: PRQ and SRQ (p<.001), EPDS and HSCL-15 (p=.001), HSCL and PRQ (p<.001), and EPDS and SRQ (p<.001). No significant systematic differences were found between proportions of screen positives from HSCL-15 and SRQ (p=.77), and EPDS and PRQ (p=.58).

Differences in performance of instruments by demographics and pregnancy factors

Possible differences in screening positive results by other variables such as demographics and pregnancy factors were examined using a binomial regression models for all the five screening instruments used in this study. With the odds (the chance of an individual without depression being a screen positive) as the effect measure, the SRQ at cutoff≥10, was the only instrument with screen positive results which did not differ by age (Odds Ratios [OR]=1.02, p=.63), education (OR=.72, p=.27), employment status (OR=.71, p=.25), marital status (OR=1.69, p=.34), setting (OR=.96, p=.90), gestation (OR=.99, p=.72) and number of pregnancies (OR=1.07, p=.71). This is consistent with the finding that there were no significant demographic differences between screen positives and negatives on the SRQ (Table 1).

"Not being supported by partner" was significantly associated with being screen positive for depression in three out of the five screening instruments, with the SRQ and PRQ being the exceptions (Table 1). However, screen positive results on all instruments differed by a variable, "not being supported by partner" [HSCL-15 (OR=7.75, p=.<001), PRQ (OR=3.69, p=.004), the 3-item screener (OR=3.27, p=.003) and EPDS (OR=3.23, p=.01)], except the SRQ (OR=1.69, p=.34) with respondents "not being supported by partner" having 3 or more chances to screen positive on EPDS, HSCL-15, PRQ and the 3-item screener. Being older was also associated with a single chance of screening positive on PRQ (OR=1.07, p=.04), and approaching significance in the 3-item screener (Table 1).

Though a significant association between unemployment and screening positives for depression were found on the HSCL-15, respondents who were employed were less likely to screen positive on EPDS, HSCL-15, PRQ and the 3-item screener with the ratios of the probability of screening positive on the 3-item screener (OR=.66, p=.04), EPDS (OR=.62, p=.06), and PRQ (OR=.51, p=.01) and HSCL-15 (OR=.26, p<.001) were less than 1.

Significant associations were only found for education level with screen positives for depression on the PRQ with most of the screen positives having low education (primary education or none) (Table 1). However, screen positive results for the 3-item screener only were found to differ with education (OR=1.5, p=.05).

All instruments showed pregnancy factor differences between screen positives and screen negatives with the number of pregnancies being a significant factor in the HSCL-15 and PRQ, with the SRQ and 3-item screener approaching significance (with screen positive women reporting higher number of pregnancies) (Table 1). For the HSCL-15, the differences in screen positive results by number of pregnancies approached significance (OR=1.38, p=.07) with the other instruments being not significant. Depression was also associated with higher gestation ages, with the SRQ being significantly higher and the EPDS approaching significance (Table 1). However, screen positive results for all five instruments did not differ by gestational ages in this study.

Table 1: Demographics, pregnancy factors and the performance of screening instruments

Demographic and Pregnancy factors	EPDS≥10		HSCL-15 ≥1.75		SRQ≥10		PRQ≥46		3-item screener ≥1	
	Positive, 91(19)	Negative, 389(81)	Positive, 65(13.5)	Negative, 415(86.4)	Positive, 62(12.9)	Negative, 418(87.1)	Positive, 97(20.2)	Negative, 383(79.8)	Positive, 202(42.1)	Negative, 278(57.9)
Occupation										
Unemployed	53(58.2)	199(51.2)	45(69.2)	207(49.9)	36(58.1)	216(51.7)	58(59.8)	194(50.7)	109(54)	143(51.4)
Employed	38(41.8)	190(48.8)	20(30.8)	208(50.1)	26(41.9)	202(48.3)	39(40.2)	189(49.3)	93 (46)	135(48.6)
	(χ^2=1.5, p=.22)		(χ^2=8.4, p=.004)*		(χ^2=.88, p=.34)		(χ^2=2.6, p=.11)		(χ^2=.29, p=.59)	
Education level										
Primary or none	46(50.5)	176(45.2)	34(52.3)	188(45.3)	34(54.8)	188(45)	54(55.7)	168(43.9)	86 (42.6)	136(48.9)
Secondary or above	45(49.5)	213(54.8)	31(47.7)	227(54.7)	28(45.2)	230(55)	43(44.3)	215(56.1)	116(57.4)	142(51.1)
	(χ^2=.84, p=.36)		(χ^2=1.1, p=.29)		(χ^2=2.1, p=.15)		(χ^2=4.3, p=.04)*		(χ^2=1.9, p=.17)	
Marital status										
Supported by partner	80(87.9)	366(94.1)	56(86.2)	390(94)	57(91.9)	389(93.1)	87(89.7)	359(93.7)	182(90.1)	264(95)
Not being supported by partner	11(12.1)	23(5.9)	9(13.8)	25(6)	5(8.1)	29(6.9)	10(10.3)	24(6.3)	20 (9.9)	14(5)
	(χ^2=4.3, p=.04)*		(χ^2=5.2, p=.02)*		(χ^2=.1, p=.75)		(χ^2=1.9, p=.17)		(χ^2=4.2, p=.04)*	
Setting										
Urban	57(62.6)	256(65.8)	40(61.5)	273(65.8)	40(64.5)	273(65.3)	60(61.9)	253(66.1)	135(66.8)	178(64)
Rural	34(37.4)	133(34.2)	25(38.5)	142(34.2)	22(35.5)	145(34.7)	37(38.1)	130(33.9)	67 (33.2)	100(36)
	(χ^2=.33, p=.57)		(χ^2=.45, p=.5)		(χ^2=.02, p=.9)		(χ^2=.6, p=.44)		(χ^2=.41, p=.52)	
Age in years	25.2±4.9	25.1±5.6	25.9±4.9	25±5.6	25.7±5.3	25.1±5.5	26.5±5.7	24.8±5.4	25.8±5.74	24.7±5.5
	(χ^2=2.7, p=.43)		(χ^2=5.1, p=.17)		(χ^2=5.3, p=.15)		(χ^2=7.4, p=.06)#		(χ^2=7.4, p=.06)#	
Gestation in weeks	27.7±7.4	26.5±5.7	27±7.3	26.7±7.4	26.5±7.7	26.8±7.3	26.4±7.4	26.8±7.4	26.7±7.6	26.8±7.2
	(χ^2=6.4, p=.09)		(χ^2=1.5, p=.68)		(χ^2=7.3, p=.06)#		(χ^2=6.2, p=.1)		(χ^2=4.2, p=.24)	
Pregnancies	2.3±1.2	2.4±1.3	2.7±1.2	2.3±1.3	2.5±1.2	2.3±1.3	2.6±1.3	2.3±1.3	2.5±1.3	2.2±1.3
	(χ^2=5.7, p=.13)		(χ^2=13.7, p=.003)*		(χ^2=7.5, p=.06)#		(χ^2=9, p=.03)*		(χ^2=7.1, p=.07)#	

Data= n(%) or mean ± standard deviation, EPDS=Edinburgh Postnatal Depression Scale, HSCL-15=Hopkins Symptoms Checklist-15, SRQ=Self Reporting Questionnaire, PRQ=Pregnancy Risk Questionnaire, p=p value, *=significance set at ≤.05, #=approaching significance set at ≤.05

DISCUSSION

This study confirmed that the performance of the screening instruments in detecting depression during pregnancy may vary in different populations or settings,[2,13,28] and by the types of instrument used for screening antenatal depression[29].

Performance in identifying screen positives by instruments

Excluding the 3-item screener, there were no significant variations in the sample depression prevalence estimates between the instruments based on screen positives as identified by the standard cutoffs for each instrument. From a public health screening perspective, this confirms the validity of these instruments for screening for depression in this setting,[30,31] though further studies need to be done to assess the validity of these cutoff scores for these settings. In addition, there were performance differences in the proportions of screen positives with significant systematic differences between proportions of screen positives of the PRQ and SRQ ($p<.001$), EPDS and HSCL-15 ($p=.001$), HSCL and PRQ ($p<.001$), and EPDS and SRQ ($p<.001$), indicating that the proportions of screen positives do not include the same respondents. The differences in time frames of the screening instruments might have contributed to variations in performance of these instruments as it ranged from lifetime (PRQ) and last week (EPDS). Pregnant women may have memory lapse to recall remote information asked by instruments with longer time frames (the 3-item screener, PRQ and SRQ) compared to those with shorter ones (EPDS and HSCL-15). This has implications for using these instruments routinely for clinical screening for depression of pregnant women in antenatal clinics in Malawi. The variations in performance of instruments indicate the importance of validating screening instruments for clinical settings in the actual context prior to clinical use and comparing the results generated by a screening instrument against a gold standard to establish the instrument's level of accuracy [32,33] in detecting depression.

Demographics, pregnancy factors and the performance of screening instruments

Differences in screening results by other variables was found. Demographics such as age, education, employment status[34] and marital status[35-38] are associated with the chances of individuals screening positive on various instruments.

Single status is associated with antenatal depression[16,39,40] and pregnant women who lack support from their partners are likely to suffer from depression.[37,41] Our study is consistent with other studies which found that "not being supported by partner" was associated with screening positive on EPDS[37,38] and a 2-question screener[38], and screening positive results for four instruments (EPDS, HSCL-15, PRQ and the 3-item screener) were found to differ by "not being supported by partner" with respondents who were not being supported by partner having 3-8 times chances of screening positive on these four instruments. Despite that "not being supported by partner" impacted performance of all screening instruments, it remains a risk factor for depression in the local context where nearly all the respondents were supported by a partner (92.9%, n=446).

A systematic review found that unemployment was not significantly associated with antenatal depression.[35] Consistent with this study, there were no significant differences in employment status among pregnant women who screened positive on EPDS, PRQ, SRQ and the 3-item screener. However, contrary evidence indicates that employment status is significantly associated with positive screen on EPDS among South Korean pregnant women [42] and antenatal depression is more prevalent amongst unemployed pregnant women[43-46]. In this study, respondents who were employed had high chances to screen negative on EPDS, HSCL-15, PRQ and the 3-item screener while screen positive results on SRQ did not differ with employment. These inconsistent findings may be attributed to the effect of employment status on the performance of screening instruments which is not unidirectional.

Pregnancy factors and depression has had mixed results with some studies showing no significant association between number of pregnancies and antenatal depression rated on the EPDS, [37] SRQ[47] and other screening instruments,[48] and other studies showing that women with multiple pregnancies are likely to have depression during pregnancy[49-52]. Our study confirms this with a significant association between number of pregnancies per woman and screening outcomes on HSCL-15, PRQ, SRQ and the 3-item screener.

LIMITATIONS OF THE STUDY

The screening instruments were administered sequentially, and it is possible that performance of subsequent instruments might have been influenced by respondents' knowledge of similar questions already covered by the preceding instrument/s. The differences in rating time frames and structures of the screening instruments may also be a further limitation.

CONCLUSION

There appears to be minimal variations in the performance of the EPDS, SRQ and HCLS-15 as standard public health screening instruments. However, systematic differences between proportions of screen positives exist and screen positive results from these instruments differ by demographics. Therefore, it is important to validate screening instruments in local settings against a gold standard to ensure relevant clinical outcomes for pregnant women with depression attending antenatal care.

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Competing interests
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Authors' contributions

G.C. (University of Malawi) drafted the manuscript. G.C. designed the study under guidance of J.C (University of the Western Cape). Data collection and entry was done by G.C. who analysed the data with guidance from J.C. Both G.C. and J.C. participated in the review and revision of the manuscript and have approved the final manuscript to be published.

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RESEARCH

Validity and utility of instruments for screening of depression in women attending antenatal clinics in Blantyre district in Malawi

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Introduction: Screening instruments should be brief, valid and easy to use if they are to be useful in a busy antenatal clinic in low-resource settings. A short instrument can be used in a busy antenatal clinic in combination with a more detailed instrument once referred. This study aimed at assessing the validity of a range of depression screening instruments and to test the utility of combining these instruments for use in antenatal clinics in Blantyre district, Malawi.
Methods: This was a sensitivity analysis study using a sub-sample of 97 pregnant women drawn from a cross-sectional study (sample size = 480) that was screening for depression in eight antenatal clinics. Data from the cross-sectional study for the 97 pregnant women on the 3-item screener, Edinburgh Postnatal Depression Scale (EPDS), Hopkins Symptoms Checklist-15 (HSCL-15) and Self-Reporting Questionnaire (SRQ), was compared with a gold standard, the Mini International Neuropsychiatric Interview (MINI). Sensitivity, specificity and area under curve (AUC) were calculated to test for validity of the instruments. The utility of various combinations of the instruments was tested using the compensatory, conjunctive, probability and sequential rules.
Results: The 3-item screener, EPDS, HSCL-15 and SRQ were valid instruments for screening antenatal depression. Sequential combination of the 3-item screener and SRQ had superior discriminant ability over similar combinations of the 3-item screener and either EPDS or HSCL-15 (sensitivity = 78%, specificity = 88%, AUC = 0.885).
Discussion: The 3-item screener, EPDS, HSCL-15 and SRQ are valid instruments for screening depression in local antenatal clinics. The sequential combination of the 3-item screener and SRQ may be a practical, accurate and suitable method for multistage screening of depression in antenatal clinics in Blantyre district, Malawi.

Keywords: Antenatal, depression, screening instrument, utility, validity

Introduction

Depression is a mood disorder largely characterised by low mood and lack of interest or pleasure,[1] which can affect women during pregnancy. In sub-Saharan Africa, prevalence of antenatal depression ranges from 21% to 47%, significantly contributing to the disease burden of women.[2,3] Depression may cause fatigue, poor concentration and feelings of hopelessness in a pregnant woman.[4] It is often associated with premature birth, intrauterine growth restriction and low birthweight.[5] However, depression is often under-diagnosed by treating health professionals,[6] especially in antenatal care as is seen in Malawi. In that country, midwives generally focus on the physical health of pregnant women and their babies at the expense of mental health.

Pregnant women with depression can be identified through routine screening in antenatal clinics.[7] An instrument for screening of depression should be accurate, reliable and valid to use in antenatal clinics. Screening instruments cannot be valid without being reliable.[8] A reliable instrument for screening of depression should be able to measure depression in pregnant women consistently.[8] According to Wong and Lim, a valid instrument should have an ability to measure what it is supposed to measure.[9] This is determined by its sensitivity, specificity, positive predictive values (PPV) and negative predictive values (NPV).[9] PPV and NPV measure the likelihood that a positive or negative screening test result is accurate for an individual.[10] An instrument with high specificity and PPV 'rules IN' the disease while the one with high sensitivity and NPV 'rules OUT' the disease.[11] Sensitivity and specificity of a screening instrument are often in balance and can vary depending on cut-off scores. Optimum cut-off scores are recommended through using a Youden index.[12]

For effective depression screening in antenatal clinics in low-resource settings, instruments should be accurate. Accuracy refers to the degree to which a measurement represents the true value of an attribute being measured.[13] This can be determined by comparing results from a screening instrument with results generated by a gold standard using scores for area under curve (AUC),[13] sensitivity and specificity.[14] In this context, the terms accuracy and validity can be used synonymously. Screening instruments that are validated in specific settings such as antenatal clinics have a high likelihood of generating accurate results[15] and may reduce under-diagnosis of depression in these settings. However, screening instruments are not a replacement for gold-standard diagnostic assessments for depression, such as the Mini International Neuropsychiatric Interview (MINI).[16]

Lastly, to be effective in a busy antenatal setting, screening instruments should be brief and easy to use.[17] The literature suggests that brief screening instruments have greater utility in low-resource settings.[18] There are reports which show that Edinburgh Postnatal Depression Scale (EPDS) and Self-Reporting Questionnaire (SRQ) have been used in research to detect antenatal depression in Malawi.[2] For these instruments to be considered suitable for use in low-resource settings, they should be easy to administer and acceptable for use by midwives in busy and usually understaffed antenatal clinics.[7] Sometimes brief screening instruments may be considered as too long and time consuming for routine screening,[19] especially in low-

resource settings. As such, the use of ultra-brief screening instruments which have a maximum of four items or fewer and requiring less than 2 min to administer can be suitable when using staged screening[20] for depression in antenatal clinics with increased workloads.[17]

Screening in stages may involve a two-step process where a short screening instrument is used to identify potential cases.[21] For those who screen positive (cases), a second, often more detailed instrument with greater specificity is used to confirm caseness.[21] This approach may be appropriate in busy antenatal settings which are not directly tasked to screen for depression as a key task. As such, the use of an ultra-brief screening instrument as the first step in screening in combination with a brief screening instrument (to be completed on a smaller group of initial screen positives) may be recommended in these settings. Screening instruments can be combined using compensatory, conjunctive, probability and sequential rules.[22] It is important that if screening instruments or a combination of instruments are considered for screening in antenatal settings, these should be reliable and valid in detecting individuals[23] with depression in this setting. A study was conducted to assess the validity of a range of instruments for screening of depression and to test the utility of combining these instruments for use in antenatal clinics in Blantyre district, Malawi.

Materials and methods

This was a sensitivity analysis study, which used a sub-sample drawn from a cross-sectional study (sample size = 480) that was screening for depression using the 3-item screener, EPDS, Hopkins Symptoms Checklist-15 (HSCL-15) and SRQ in eight antenatal clinics in Blantyre district from January to May 2016. A sample size for this sensitivity analysis study was calculated using a sample size calculator.[24] It was estimated that the prevalence of depression among pregnant women in Malawi is 21%.[2] Using 95% significance level, 7.12% confidence interval, proportion of 21% and 480 (sample size for cross-sectional study) as population, a sub-sample of 100 was calculated to be sufficient for this study. A research assistant randomly selected a sub-sample of 100 pregnant women who were participating in a cross-sectional study that was going on in the eight antenatal clinics, to be interviewed further by the researcher using the MINI. The research assistant sent every third pregnant woman for further interview using the MINI, after randomly picking the first one until the desired sub-sample for each of the eight antenatal clinics was achieved. Three pregnant women declined resulting in a sub-sample of 97 pregnant women (Ndirande [$n = 25$], Limbe [$n = 23$], Mdeka [$n = 14$], Zingwangwa [$n = 10$], Chilomoni [$n = 8$], Mpemba [$n = 7$], Chileka [$n = 6$] and Lirangwe [$n = 4$] health centres) participating in this sensitivity analysis study. The inclusion criterion for this study was accepting to undergo a further interview on the same day after participating in the cross-sectional study and those who declined were excluded.

Screening instruments

This study used HSCL-15, SRQ and EPDS because they were identified as effective screening instruments for antenatal depression in low-resource settings.[25] The 3-item screener for depression was included because it has been recommended that valid ultra-brief instruments for screening of depression may be more suitable in detecting possible cases of depression in primary care.[26,27] The MINI was also used because it was identified as the most widely used gold standard in low-resource settings.[25]

The 3-item screener consisted of two ultra-brief depression screening instruments—Whooley's questions[28] and the one-item screening question.[6] The Whooley's questions screen for sadness and loss of interest in the past month. The maximum total score for the 3-item screener was 3 and cut-off was set as ≥ 1 because each of the two instruments comprising the 3-item screener have a cut-off = 1. Unlike the 3-item screener, the HSCL-15 consists of 15 items of HSCL-25, a self-report inventory, which assesses for depressive symptoms a person has been bothered by in the past seven days.[29] Each item is rated on a Likert scale of 1–4 and the average of the 15 items is the depression score at a cut-off ≥ 1.75. Maximum average score for HSCL-15 is 4.

With regard to the SRQ, it was designed for screening psychiatric symptoms experienced by an individual in the previous four weeks and consists of 20 questions.[30] The instrument has a maximum total score of 20 with a standard cut-off ≥ 10.[31] As for the EPDS, it is a 10-item self-reported questionnaire which measures depressive symptoms experienced in the past seven days and each item is rated on four exclusive scores (0–3).[32] The instrument has a maximum total score of 30 with a standard cut-off ≥ 10.[33] As a gold standard, the MINI is a brief structured diagnostic interview for the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV),[16] which was used to confirm presence or absence of depression in pregnant women in this study.

Translation of instruments

Previously validated Chichewa-language versions of EPDS and SRQ were used in this study.[34] The HSCL-15, the MINI and the 3-item screener were translated into Chichewa by the first author and a social worker based on the minimum standards (back-translation and monolingual testing) for applying an instrument that was developed in another language.[35]

Data collection

This study used data from a sub-sample of respondents ($n = 97$) who participated in a cross-sectional study that was screening for depression using the 3-item screener, EPDS, HSCL-15 and SRQ. The research assistant (registered midwife) trained in administration of data-collection instruments collected data for the cross-sectional study. In addition, he recruited a sub-sample ($n = 97$) of respondents from the cross-sectional study for further interview using the MINI in this sensitivity analysis study. The first author, a mental health nurse, administered the MINI to all respondents who agreed to participate in the sensitivity analysis study to confirm the presence or absence of depression in respondents on the same day. The first author was blind to the respondents' initial screening outcomes in the cross-sectional study. Due to the low literacy levels, the interviewer read the questions and recorded the answers on behalf of respondents.

Data analysis

Data were analysed using Statistical Package for Social Sciences (SPSS®) version 22.0 (IBM Corp, Armonk, NY, USA) and MedCalc® (www.medcalc.org). Prior to data analysis, respondents' outcomes on the MINI were extracted and entered into IBM SPSS® 22.0 together with their data from the cross-sectional study for EPDS, HSCL-15, SRQ and the 3-itm screener. Prevalence of depression as determined by the MINI was calculated. A chi-square test was used to test for significant differences between demographic characteristics and depression prevalence. The reliability of each screening instrument was calculated using Cronbach's alpha. In testing for validity of these instruments,

Bayesian 2 x 2 tables and the MINI diagnosis of depression as the gold standard were used to compute sensitivity and specificity. PPV and NPV were also calculated to determine the predictive ability of the screening instruments. Receiver operating characteristics (ROC) curve analysis was used to generate AUC, standard cut-off scores, and Youden indices with their associated sensitivity and specificity for each instrument. Utility of combinations of the 3-item screener with either EPDS or HSCL-15 or SRQ to detect depression were tested using compensatory ('OR') rule, conjunctive ('AND') rule, probability rule and sequential rule. Odds ratios were computed to test the ability of individual instruments and combinations of instruments to predict antenatal depression.

Findings

A total of 97 pregnant women agreed to participate in the sensitivity analysis study. The respondents were from rural (32%, *n* = 31) and urban (68%, *n* = 66) areas of Blantyre district. More than half of them (53.6%, *n* = 52) had secondary education or above, most were married (74.2%, *n* = 72) and more than two-thirds were unemployed (71.1%, *n* = 69). The prevalence of major depression based on the MINI in this sample was 25.8% (*n* = 25). Major depression was most prevalent amongst unmarried (88%, *n* = 22) and unemployed pregnant women (80%, *n* = 20). Age (mean = 26 ± 5.7 years), number of pregnancies (mean = 2.5 ± 1.4) and gestation periods (mean = 27.9 ± 8.1 weeks) for respondents with depression were comparable to those without depression (Table 1).

Validity of screening instruments

The 3-item screener (cut-off ≥ 1), HSCL-15 (cut-off > 1.75), SRQ (cut-off ≥ 10) and EPDS (cut-off ≥ 10) were all valid when standard cut-off scores as specified by the developers of the tools were applied (sensitivity = 60–80%, specificity = 81–97%, PPV = 59–88%, NPV = 88–92%). The 3-item screener, HSCL-15, SRQ and EPDS levels of accuracy (AUC) were ≥ 0.85.

The 3-item screener at cut-off ≥ 1 was found to be a reliable (Cronbach's alpha = 0.7), accurate (AUC = 0.85) and valid instrument for screening depression among pregnant women. It

Table 1: Relationship between demographic characteristics of respondents and depression

Item	Depression	No depression	Total	Chi-square statistic	*p*-value
	25 (25.8)	72 (74.2)	97 (100)		
Occupation				1.4	0.53
Unemployed	20 (80)	49 (68.1)	69 (71.1)		
Employed	2 (8)	7 (9.7)	9 (9.3)		
Small-scale business	3 (12)	16 (22.2)	19 (19.6)		
Education level				1.3 0	0.26
Primary school or none	14 (56)	31 (43.1)	45 (46.4)		
Secondary school or above	11 (44)	41 (56.9)	52 (53.6)		
Marital status				1.9	0.33
Married	3 (12)	69 (95.8)	72 (74.2)		
Unmarried	22 (88)	3 (4.2)	25 (25.8)		
Setting				1	0.32
Urban	15 (60)	51 (70.8)	66 (68)		
Rural	10 (40)	21 (29.2)	31 (32)		
Age in years	26±5.7	25.8±5.1	25.8±5.2	2.7	0.45
Gestation period in weeks	27±7.4	27.9±8.1	27.7±7.9	1.8	0.62
Number of pregnancies	2.5±1.4	2.4±1.3	2.5±1.3	4.7	0.19

Note: Data = *n* (%) or mean ± standard deviation, MINI = Mini International Neuropsychiatric Interview.

Table 2: Validity of screening instruments

Instrument cut-off	Sensitivity % (95% CI)	Specificity % (95% CI)	PPV % (95% CI)	NPV % (95% CI)	AUC (95% CI), *p*-value	Optimum cut-off (Se, Sp, J)	Cut-off @ Se 80% Sp in %	Cut -off Se in % @ Sp 80%
EPDS ≥ 10	68 (47–85)	88 (78–94)	65 (44–83)	89 (79–95)	0.850 (0.763–0.915), < 0.001*	> 6 (88%, 74%, 0.62)	> 7, 80, 81	> 7, 81, 80
HSCL-15 ≥1.75	72 (51–88)	93 (85–98)	78 (56–93)	91 (82–97)	0.910 (0.835–0.959), < 0.001*	> 1.7 (72%, 93%, .65)	> 1.5, 80, 82	> 1.5, 82, 80
SRQ ≥ 10	60 (39–79)	97 (90–99)	88 (64–99)	88 (78–94)	0.912 (0.837–0.960), < 0.001*	> 9 (72%, 96%, .68)	> 6, 80, 83	> 6, 83, 80
3-item screener ≥1	80 (59–93)	81 (70–89)	59 (41–75)	92 (82–97)	0.854 (0.768–0.918), < 0.001*	> 1 (80%, 81%, .61)	> 1, 80, 81	> 1, 80, 80

Notes: Se = sensitivity, Sp = specificity, AUC = area under curve, CI = confidence interval, HSCL-15 = Hopkins Symptoms Checklist-15, EPDS = Edinburgh Postnatal Depression Scale, SRQ = Self Reporting Questionnaire, * = significance set at ≤ 0.05, J = Youden index, PPV = positive predictive value, NPV = negative predictive value.

had a good balance of sensitivity = 80%, and specificity = 81%, and NPV = 92%, suggesting that it would be good for 'ruling out' depression. The optimum cut-off score of the instrument was > 1 (Youden index = 0.61) (Table 2). This demonstrated the potential of the 3-item screener as a valid ultra-brief screening instrument for depression during pregnancy. The 3-item screener was also good at predicting depression in pregnant women (OR = 4.1 [2.3–7.4], $p < 0.001$) with screen positives being four times more likely to have depression.

This study also found that HSCL-15 (cut-off ≥ 1.75) is a reliable (Cronbach's alpha = 0.85), accurate (AUC = 0.91) and valid (sensitivity = 72%, specificity = 93%) instrument for measuring depression (see Table 2). The high specificity (93%) and PPV (78%) showed that HSCL-15 could be a good instrument for 'ruling in' depression. The HSCL-15 had the second highest accuracy (AUC = 0.91) in detecting probable depression cases, confirming its utility as a screening instrument for antenatal depression. When the cut-off score was adjusted from ≥ 1.75 to > 1.7 in order to optimise sensitivity and specificity (Youden index = 0.65), the sensitivity = 72% and specificity = 93% of HSCL-15 remained constant. The HSCL-15 predicted depression in pregnant women very well (OR = 59.3 [12–123], $p < 0.001$) with screen positives being 59 times more likely to have depression.

The SRQ (cut-off ≥ 10) was found to be reliable (Cronbach's alpha = 0.86), had the highest level of accuracy (AUC = 0.912) and was a valid (sensitivity = 60%, specificity = 97%) instrument for screening depression during pregnancy (see Table 2). The instrument had high specificity (97%) and PPV (88%), confirming that it was the best instrument for 'ruling in' depression (see Table 2). The optimum cut-off score for SRQ was > 9 (sensitivity = 72%, specificity = 96%, Youden index = 0.68). SRQ predicted depression in women (OR = 1.5 [1.3–1.8], $p < 0.001$) with screen positives being twice as likely to have depression.

The EPDS (cut-off ≥ 10) was also found to be reliable (Cronbach's alpha = 0.8), accurate (AUC = 0. 85) and valid (sensitivity of 68%, specificity of 88%) with a high NPV (89%) (see Table 2). The optimum cut-off for EPDS was > 6 (sensitivity = 88%, specificity = 74%, Youden index = 0.62) (see Table 2). Decreasing the cut-off score of EPDS from ≥ 10 to > 7 resulted in a good balance between sensitivity (80%) and specificity (81%). The EPDS predicted depression in pregnant women (OR = 1.2 [1.2–1.5], $p < 0.001$) with screen positives being likely to have depression.

Utility of combining depression screening instruments

The following combination rules were tested in this study: compensatory, conjunctive, probability[36] and sequential.[22]

Compensatory ('OR') rule

The 3-item screener and either EPDS or HSCL-15 or SRQ were combined using the compensatory rule such that a respondent was considered a case if she screened positive on any of the two combined instruments. Combination of the 3-item screener and EPDS using the compensatory rule resulted in picking 49 cases, of which one case that was missed by the 3-item screener was picked up by EPDS (Table 3). The 3-item screener detected 48 cases, which included all cases identified by HSCL-15 and SRQ. There was a substantial increase in sensitivity and a drastic decrease in specificity of EPDS, HSCL-15 and SRQ when they were combined with the 3-item screener using the 'OR' rule with all combinations having sensitivity above 80% and specificity below 70%.

Table 3: Performance of individual instruments and various combinations of screening instruments

Instrument	Optimum cut-off	Se % (95% CI)	Sp % (95% CI)	AUC (95% CI), *p*-value
Individual test				
EPDS	> 6	88 (69–98)	74 (62–83)	0.850 (0.763–0.915), < 0.001*
HSCL-15	> 1.7	72 (51–88)	93 (85–98)	0.910 (0.835–0.959), < 0.001*
SRQ	> 9	72 (51–88)	96 (88–99)	0.912 (0.837–0.960), < 0.001*
3-item screener	> 1	80 (59–93)	81 (70–89)	0.854 (0.768–0.918), < 0.001*
Compensatory rule testing (either test is positive)				
3-item screener or EPDS (*n* = 49, 50.5%)	> 1/> 6	96 (78–100)	50 (30–70)	0.769 (0.627–877), < 0.001*
3-item screener or HSCL-15 (*n* = 48, 49.5%)	> 1/> 1.4	91 (72–99)	56 (35–76)	0.866 (0.737–0.947), < 0.001*
3-item screener or SRQ (*n* = 48, 49.5%)	> 1/> 6	87 (66–97)	68 (69–98)	0.885 (0.760–0.959), < 0.001*
Conjunctive rule testing (positive on both tests)				
3-item screener and EPDS (*n* = 29, 29.9%)	> 1/> 15	42 (20–67)	90 (56–100)	0.608 (0.410–0.783), 0.33
3-item screener and HSCL-15 (*n* = 23, 23.7%)	> 1/> 2.5	33 (13–59)	100 (49–100)	0.772 (0.552–0.919), 0.03*
3-item screener and SRQ (*n* = 21, 21.6%)	> 1/> 15	33 (13–59)	100 (29–100)	0.685 (0.449–0.867), 0.28
Probability combination				
3-item screener and EPDS		88 (69–97)	82 (71–90)	0.877 (0.794–0.960), < 0.001*
3-item screener and HSCL		88 (69–97)	88 (78–94)	0.917 (0.852–0.982), < 0.001*
3-item screener and SRQ		92 (74–99)	83 (73–91)	0.920 (0.856–0.983), < 0.001*
Sequential rule				
3-item screener → EPDS (*n* = 48→29, 60.4%)	> 1/> 6	96 (78–99)	52 (31–72)	0.775 (0.631–0.883), < 0.001*
3-item screener → HSCL-15 (*n* = 48→23, 47.9%	> 1/> 1.7	78 (56–93)	80 (59–93)	0.866 (0.737–0.947), < 0.001*
3-item screener → SRQ (*n* = 48→21, 43.7%)	> 1/> 9	78 (56–93)	88 (69–98)	0.885 (0.760–0.959), < 0.001*

Notes: AUC = area under curve, CI = confidence interval, HSCL-15 = Hopkins Symptoms Checklist-15, EPDS = Edinburgh Postnatal Depression Scale. SRQ = Self Reporting Questionnaire, PPV = positive predictive value, NPV = negative predictive value, Se = sensitivity, Sp = specificity, * = significance set at ≤ 0.05.

Conjunctive ('AND') rule

Respondents who screened positive on both combined instruments were considered as cases using the conjunctive

('AND') rule. All the combinations of instruments under this rule had sensitivity of ≤ 42% and specificity of ≥ 90% with AUCs of ≤ 0.772 (see Table 3). Furthermore, combinations of the 3-item screener and EPDS and that of the 3-item screener and SRQ under this rule were poor at discriminating probable cases from non-probable cases, $p > 0.05$.

Probability combination

Mathematical combination of screening instruments was done using logistic regression to identify combinations which had test scores that best distinguished respondents with antenatal depression from those without. All the combinations performed in this manner achieved sensitivity of ≥ 88% and specificity of ≥ 82% with AUCs of ≥ 0.877 (see Table 3). The probability combination of the 3-item screener and SRQ had the best level of accuracy (AUC = 0.920 [0.856–0.983]) and a good balance between sensitivity (92%) and specificity (83%). Probability combination of the 3-item screener and SRQ was the best predictor of depression (OR = 479 [49–4689], $p < 0.001$) in this study (Table 4).

Sequential rule

In sequential combination of instruments, all respondents were initially screened using the 3-item screener and all respondents who screened positive ($n = 48$) were further assessed using EPDS, HSCL-15 and SRQ. Sequential combination of the 3-item screener and other instruments increased sensitivity above that of each instrument when used alone (see Table 3). Most of the sequential combinations' validity in detecting depression decreased below that of the individual instruments. For instance, the AUC of EPDS decreased from 0.850 (0.763–0.915) to 0.775 (0.631–0.883) and specificity decreased from 81% to 52% when the 3-item screener and EPDS were sequentially combined. The sequential combination of 3-item screener (cut-off > 1) and SRQ (cut-off > 9) had a good balance between sensitivity (78%) and specificity (88%) and demonstrated superior ability in detecting depression (AUC = 0.885 [0.760–0.959]) over other sequentially combined instruments.

Discussion

Availability of an accurate and usable screening instrument helps a health-care system to use its limited resources efficiently to provide care to those who are most vulnerable.[37] Screening instruments with less than four questions can effectively detect depression and are considered easy to use in clinical settings.[6,19] This is corroborated by van Heyningen *et al.*,[38] who asserted that a screening instrument for use in antenatal care in low-resource settings should be short and quick to administer, easy to score and interpret, have good sensitivity and specificity, and should be relevant to the setting. Nonetheless, there is always a trade-off between sensitivity and specificity of any screening instrument.[39] A suitable screening instrument should have a minimum acceptable balance of sensitivity/specificity (80%/70%).[40] This was achieved by EPDS (sensitivity = 88%, specificity 74%, optimum cut-off > 6) and the 3-item screener (sensitivity = 80%, specificity 81%, optimum cut-off > 1), confirming their suitability for screening depression in this population. The 3-item screener had a moderate discriminant ability (AUC = 0.85) in detecting antenatal depression. The 3-item screener is advantageous over EPDS in clinical practice because it is very short, easy to administer and easy to score, making it feasible and acceptable for use in busy settings that have inadequate resources. Therefore, this study suggests that the 3-item screener may be a suitable instrument for initial depression screening in busy antenatal clinics where true and false positives would undergo further screening.

Table 4: Predictive ability of probability combinations of instruments

Instrument	Wald	OR (95% CI), *p*-value	Correctly classified depression cases (%)
3-item screener and EPDS	26.5	358 (38–3 365), < 0.001*	80.4
3-item screener and HSCL-15	28.9	401 (45–3 569), < 0.001*	87.6
3-item screener and SRQ	33.9	479 (49–4 689), < 0.001*	86.6

Notes: CI = confidence interval, HSCL-15 = Hopkins Symptoms Checklist-15, EPDS = Edinburgh Postnatal Depression Scale, SRQ = Self Reporting Questionnaire, * = significance set at ≤ 0.05.

Working from the premise that midwives may be trained to screen and refer antenatal depression cases in low-resource settings,[7] the discriminant validity of screening instruments which can complement each other in detecting a condition if they are combined[41] were tested. Probability combination of the 3-item screener and SRQ provided the best discriminant ability (AUC = 0.92) in this study. Nonetheless, probability combination has limited utility in clinical practice because its outcomes scores are arbitrary and do not share attributes of either instruments combined,[36] making it difficult to interpret.

The most utility was achieved by sequential combination of the 3-item screener and SRQ, which had the best balance of sensitivity (78%) and specificity (88%) compared with other instruments combined at optimum cut-off scores. This suggests that a multistage process for depression screening[20] can be utilised to administer a combination of an ultra-brief instrument (as initial screener) followed by a more detailed instrument (only to those who initially screened positive) in busy and understaffed antenatal clinics. The 3-item screener and SRQ combination would be feasible and acceptable for use in busy local antenatal clinics where midwives may be required to participate in screening because both instruments have binary questions that would be easy to score and interpret. Screening instruments with binary questions are less time consuming, easy to score[38] and easily understood by illiterate pregnant women.[42]

Implications

Screening for depression in antenatal services, which are busy and usually understaffed in low-resource settings, should be done as a multistage process[20] to reduce workload by referring initial screen positives only for more detailed screening. A two-step process can be used where the 3-item screener (ultra-brief instrument), would initially be used to identify potential depression cases followed by SRQ (a more detailed instrument) to confirm the cases. Referral for specialist clinical assessment will then be determined by SRQ results. It is therefore recommended that screening and referral protocols which are developed to facilitate the detection of depression during antenatal care should incorporate this two-step process for best utility and accuracy.

Limitations of this study

The limitation of this study is that it may have been affected by recall effects and response-choice order effects.[43]

Conclusion

This study has confirmed that the 3-item screener, EPDS, HSCL-15 and SRQ are valid instruments which are effective in screening antenatal depression when applied alone. Furthermore, sequential combination of the 3-item screener and SRQ may be a possible practical, accurate and suitable method for multistage screening of antenatal depression in antenatal clinics.

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Chapter Seven

DEVELOPMENT OF THE SCREENING PROTOCOL FOR ANTENATAL DEPRESSION: STUDY 4

7.1 Introduction

This chapter presents findings from Phase 3: Study 4, a Nominal Group Technique study to develop a screening protocol for antenatal depression based on findings from Phases 1 and 2. It includes background, evidence for the screening protocol for antenatal depression, outcomes of the study, and conclusion.

7.2 Background

The potential users of a screening protocol should be involved in its development process. This may help in ensuring that the protocol being developed is acceptable to clinicians and, increase its chances of being adopted and used in practice (Rycroft-Malone et al., 2010). Therefore the need to involve stakeholders and experts in the development of the proposed screening protocol for antenatal depression was identified. This study developed a context specific (relevant and applicable) screening protocol for antenatal depression with the aim of adoption in the local settings.

7.3 Objective

The objective of this study was to review and endorse a screening protocol for antenatal depression for use in antenatal clinics in the Blantyre district of Malawi.

7.4 Methodology

Development of screening protocol for antenatal depression required compilation of evidence collected and presented in publications in previous chapters and Nominal Group Technique study to consult stakeholders and experts. A summary of the evidence is presented in section 7.5. The Nominal Group Technique study comprised of 2 sequential consultative workshops with stakeholders and experts to develop a screening protocol for antenatal depression. During the first workshop, 9 participants were asked to generate their ideas about the proposed screening protocol for antenatal depression, discussed them and ranked the ideas by assigning scores to reach a consensus. The most preferred ideas were the ones which had high total scores assigned to them by participants. The same group of 9 participants attended a second workshop where they endorsed the final document for the screening protocol for antenatal depression. The methodology has been described in detail under Phase 3 in Chapter 3: Section 3.5.

7.5 Outcomes of study

7.5.1 Evidence for the screening protocol for antenatal depression

The Government of Malawi considers depression as a priority condition although a screening protocol for antenatal depression is lacking. In this research study, a series of studies (Studies 1-4: Papers 1-4 and Chapter 7) were conducted to generate local evidence, which informed the development of a screening protocol for antenatal depression.

7.5.1.1 Evidence of local prevalence and risk factors for antenatal depression

Using the EPDS, the prevalence rate of depression among pregnant women in the Blantyre district was found to be very high [19 %(95%CI 15.5%-22.5%)] (Study 2: Paper 2). The prevalence estimates yielded by other instruments ranged from 12.9 %(95%CI 9.9%-15.9%)

(SRQ) to 42.1% (95%CI37.7%-46.5%) (3-item screener), with no significant differences, except for the 3-item screener (Study 2: Paper 2). The prevalence of major depression based on the MINI in the sub-sample of 97 pregnant women was 25.8% (n=25). In this context, major risk factors which predicted depression were: being distressed by anxiety or depression; lack of support from a partner; experiencing major stresses during pregnancy; history of feeling miserable or depressed before pregnancy and history of a poor relationship with the father during childhood (Study 2: Paper 3).

7.5.1.2 Published evidence of screening instruments for depression in antenatal care in low resource settings

A systematic review was conducted which identified instruments for screening of depression in low resource settings including Malawi. The EPDS was found to be the most widely used screening instrument with highest level of accuracy (AUC=.965) (Study 1: Paper 1).

7.5.1.3 Performance of screening instruments in local setting

In determining, performance of screening instruments, screen positive results on the EPDS, the HSCL-15, the PRQ and the 3-item screener were found to differ by variables such as "being on their own" which resulted in respondents having ≥3 times chances to screen positive on these four instruments (Study 2: Paper 3). The screen positive results on SRQ were found not to differ by age, education, employment status, marital status, setting, gestation and number of pregnancies. The 3-item screener, EPDS, HSCL-15 and SRQ are valid instruments for screening depression in local antenatal clinics. The sequential combination of the 3-item screener and SRQ may be a practical, accurate and suitable method for multistage screening of depression in antenatal clinics in the Blantyre district of Malawi (Study 3: Paper 4).

7.5.2 Findings from Nominal Group Technique study

The findings from Nominal Group Technique workshops to consult stakeholders and experts no the screening protocol for antenatal depression are presented below.

7.5.2.2 Reviewing of the protocol

The Nominal Group Technique study to develop a screening protocol for antenatal depression provided data which included a list of 27 statements of ideas generated by participants at workshop 1 (Appendix 14). These statements of ideas were assigned scores by participants to reflect the importance they attached to 10 of the 27 ideas of they felt were important for the screening protocol for antenatal depression. Then the ideas were categorised based on the inherent themes in the questions participants were asked to answer and are presented below as ranked lists ordered by participants.

Importance of having a screening protocol

Idea 1-Protocol will provide a systematic and uniform method for early detection of depression.

Idea 27-Protocol will improve treatment of women with depression.

Idea 4-Protocol will help in avoiding miscarriages.

Best time for screening

Idea 5-History taking at initial antenatal visit is best time for screening.

Idea 22-Screen for depression before physical examinations is done on a woman.

Idea 7-Screen for depression during preconception care.

Management of antenatal depression

Idea 9-Midwives should administer the SRQ to all pregnant women who screen positive on the 3-item screener.

Idea 12-Involve family members in the screening programme for antenatal depression.

Idea 16-Midwives should refer to mental health specialists all pregnant women who screen positive on SRQ.

Idea 8-Midwives should administer the 3-item screener to all pregnant women at every visit.

Resources needed to implement the protocol

Idea 15-Midwives should know risk factors, and signs and symptoms of depression

Idea 13-Additional staff to be assigned to screen for depression.

Idea 20-Transportation for mental health specialists to visit antenatal clinics.

Idea 14-Adequate space, time and stationery will be needed.

Feasibility of implementing a screening protocol

It is feasible to implement the screening protocol if:

Idea 11-Midwives are trained in using the screening protocol for antenatal depression properly.

Idea 26-Curricula for pre-service training programmes of clinicians who work in antenatal clinics will have a strong component of maternal mental health.

Idea 25-Supportive supervision and effective mechanisms for monitoring and evaluation are put in place.

Idea 23-The screening protocol will be integrated into routine antenatal care.

Idea 21-Staff working in antenatal clinics are committed.

Idea 24-The screening protocol receives support from government.

Changes needed

Idea 6-The 3-item screener should be included in the current assessment guide for antenatal women (Yellow woman's health passport book).

Idea 18-Government should deploy mental health specialists in antenatal clinics.

Idea 17-Include screening for depression in the Malawi Sexual and Reproductive Health Policy.

Idea 10-Mental health specialists should attend to pregnant women who screen positive on SRQ or with confirmed depression within antenatal clinics.

Face validity of the screening protocol

Idea 3-Proposed screening protocol is simple and easy to understand.

Idea 2-Screening protocol will be cumbersome for staff to use without proper training.

7.5.2.2 Revision of the screening protocol for antenatal depression

The researcher with support from the protocol development team revised the screening protocol for antenatal depression and developed its implementation plan based on the findings from workshop 1 of the Nominal Group Technique study (Study 4). At this stage, the researcher proposed the name for the protocol to be "SPADe" which stands for Screening Protocol for Antenatal Depression. The name "SPADe" draws its figurative meaning from a tool that is used to dig the ground, the *'spade'*. The revised version of the screening protocol for antenatal depression together with its proposed implementation plan were reviewed and considered for ratification at the second workshop.

7.5.2.3 Endorsement of the screening protocol for antenatal depression

The second workshop of Nominal Group Technique study to develop a screening protocol for antenatal depression generated a list of 11 statements of ideas (Appendix 14) which were allocated scores by participants to reflect the importance they attached to them in relation to the screening protocol for antenatal depression. Then the ideas were ranked ordered by participants.

Validation of the screening protocol

Idea 2-The proposed screening protocol is good tool for detecting depressive symptoms during pregnancy.

Idea 6-Protocol is clear and simple tool to use with good management strategy.

Idea 11-Integration makes screening for depression to be seen as an integral part of antenatal care assessment.

Idea 1-Short screening instruments included in protocol can be ideal for our health facilities which have few midwives and heavy workload.

Suggestions for improvement

Idea 9-Algorithm should reflect context in which screening for depression will be done.

Idea 3-Include Chichewa versions of the screening instruments because assessments are conducted in vernacular language.

Idea 7-Teaching aids for psychoeducation of antenatal depression are needed.

Validation of the implementation plan

Idea 10-Protocol should be submitted to Ministry of Health in Malawi for approval

Idea 8-The implementation plan is detailed.

Idea 5-The protocol should be tested.

Idea 4-Orient midwives on the use of protocol before it is implemented in a clinic.

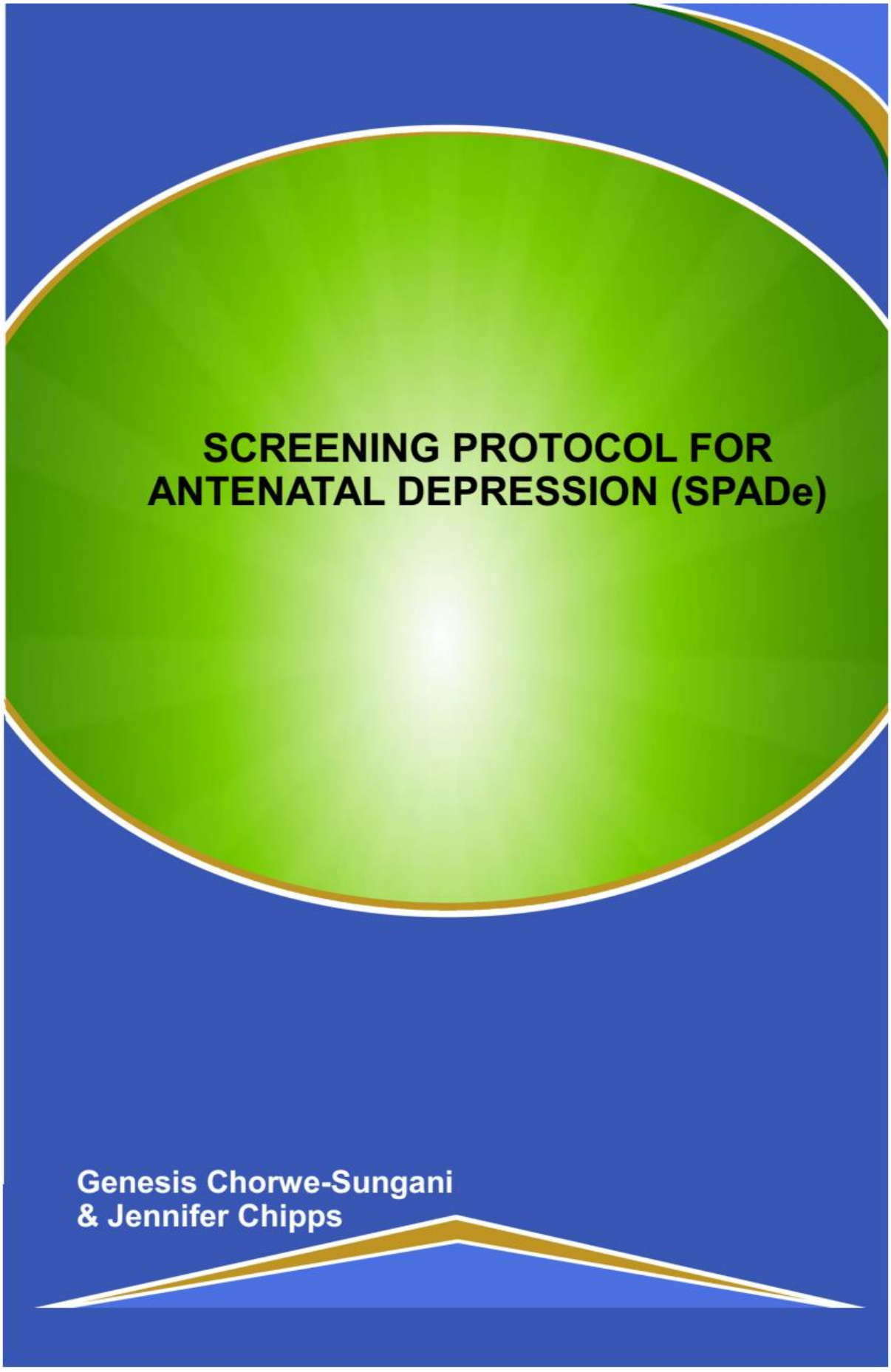
7.5.2.4 Finalisation of the screening protocol for antenatal depression

The screening protocol for antenatal depression was unanimously ratified and adopted in principle by participants at the second workshop. The researcher together with the protocol development team utilised the findings from the second workshop to finalise the proposed screening protocol for antenatal depression and its implementation plan. The protocol development team ensured that the proposed screening protocol for antenatal depression and its implementation plan were based on the best scientific evidence (Studies 1-4: Papers 1-4) available at the time the protocol was being developed (Directorate General of Health Services, 2011). The protocol has been integrated within existing systems and processes to facilitate its application (Rycroft-Malone et al., 2010) in local antenatal clinics.

It is hoped that this protocol would enable screening for depression along with medical treatment (McIntosh, 2017) during pregnancy. In addition, the proposed screening protocol would allow collaboration between midwives and mental health specialists to ensure accurate diagnosis and treatment of depression (Nimalasuriya et al., 2009). This screening protocol would help in the early detection of pregnant women with depression who may require treatment or need any form of support. However, implementation of screening for depression would require a lot of resources (Rahman et al., 2013; Thombs et al., 2012) and supporting systems to be put in place (Siu et al., 2016). This has been addressed in the implementation plan for the proposed screening protocol for antenatal depression. The final version of the screening protocol for antenatal depression that was developed is presented in form of a booklet below:

7.5.2.5 The Protocol

Screening protocol for antenatal depression (SPADe) in the Blantyre district of Malawi



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SPADe

SCREENING PROTOCOL FOR ANTENATAL DEPRESSION

in

Blantyre District, Malawi

and

Preface

The booklet is about a Screening Protocol for Antenatal Depression (SPADe). The name "SPADe" was coined by Genesis Chorwe-Sungani and it draws its figurative meaning from the word *'spade'* which refers to tool that is used to dig the ground. The SPADe emanates from a PhD project entitled 'Development of a screening protocol for depression in antenatal clinics in Blantyre District in Malawi. The project was undertaken, at University of the Western Cape (2015-2017) by Genesis Chorwe-Sungani under supervision of Professor Jennifer Chipps. The project got funding from University of Malawi through QZA-0484 NORHED 2013 grant.

The booklet will prove to be a useful companion for midwives who work in antenatal clinics in low resource settings. It offers them a necessary instrument they will require to screen for depression in pregnant women in antenatal clinics.

Acknowledgement

I would like to thank my supervisor, Professor Jennifer Chipps, and Associate Professor Diana Jere for their excellent guidance and support during this process. I also wish to thank all of the respondents, without whose cooperation I would not have been able to conduct this project.

To my brother Leo Chorwe-Nkhongono: I would like to thank you for your wonderful contribution in designing this booklet. My wife Allena and, my daughters, Dalitso and Mwayi, deserve a particular note of thanks: your wise counsel and kind words have, as always, served me well.

Abbreviations/Acronyms

SPADe	:	Screening protocol for antenatal depression
SRQ	:	Self Reporting Questionnaire
USPSTF	:	United States Preventive Services Task Force

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BACKGROUND

The SPADe as a screening protocol, seeks to facilitate provision of maternal mental health care that is not readily accessible to pregnant women. It is underpinned by the proposition that routine screening in antenatal clinics improves detection of pregnant women with depression and that midwives can be trained to effectively screen for antenatal depression, offer psychoeducation and, make appropriate referrals. This protocol includes aim, rationale, scope, objectives, principles underpinning SPADe, SPADe algorithm for screening, components of SPADe, SPADe pathway and, proposed outcomes for the SPADe..

AIM OF THE SPADE

The aim of the SPADe is to improve the health of pregnant women and the child they are expecting.

RATIONALE FOR THE SPADE

The SPADe will ensure a standardised and quality assured approach for detecting and dealing with pregnant women who have, or are at risk of developing depression. It will make it possible for midwives to detect pregnant women with depression at an early stage and be able to put in place appropriate support systems for these women. In addition, the SPADe will allow for the involvement of the pregnant women and their families in discussions about their care and treatment options. Furthermore, it will ensure that information about pregnant women with depression is documented and shared appropriately with all relevant practitioners providing care.

There is evidence which indicate that collaborative care for adults with depression produces substantial clinical improvements and has a high prospect of long-term cost savings (Unützer et al., 2008). The United States Preventive Services Task Force (USPSTF) recommends collaborative care which has

been shown to be effective in the treatment of depression in adults (Siu et al., 2016). Collaborative care of depression includes a systematic, multicomponent, and team-based approach that strengthens and supports self-care, while assuring that effective medical, preventive, and health maintenance interventions take place to improve the quality and outcome of patient care (Siu et al., 2016). Therefore, the SPADe recommends effective collaboration of antenatal services and mental health services for effective screening of antenatal depression.

Scope of the SPADe

The SPADe is specifically designed for pregnant women with depression and it is not intended to cover the whole spectrum of pregnant women with other mental disorders. This screening protocol focuses on improving the quality and accessibility of maternal mental health care by integrating routine screening for depression into antenatal services so that pregnant women with, or at risk of, depression are timeously detected and the appropriate treatment can commence. The SPADe is intended to reflect optimum practice in routine screening for depression and the management of pregnant women at risk or with depression in antenatal clinics in Malawi.

Objectives of the SPADe

The objectives of the SPADe are to:

1. Detect pregnant women who have or are at risk of depression in local antenatal clinics;
2. Refer pregnant women, who have been detected with depression, to the relevant mental health services.

The principles underpinning SPADe

The following principles will enable the SPADe to be useful in the context of antenatal clinics in Malawi:

1. The SPADe should facilitate human rights based screening for depression which will ensure early identification and treatment.
2. The SPADe should be based on the clinical needs of pregnant women and clinicians involved in the provision of health services in antenatal clinics.
3. The SPADe should be owned by the midwifery profession which should take a leading role in lobbying for the integration of routine screening for depression into antenatal services and policy.
4. An implementation plan for the SPADe need to be developed.

SPADe algorithm for screening

The Spade's algorithm, to ensure an effective and multidisciplinary approach to routine screening of depression in antenatal clinics, is diagrammatically presented in figure 1.

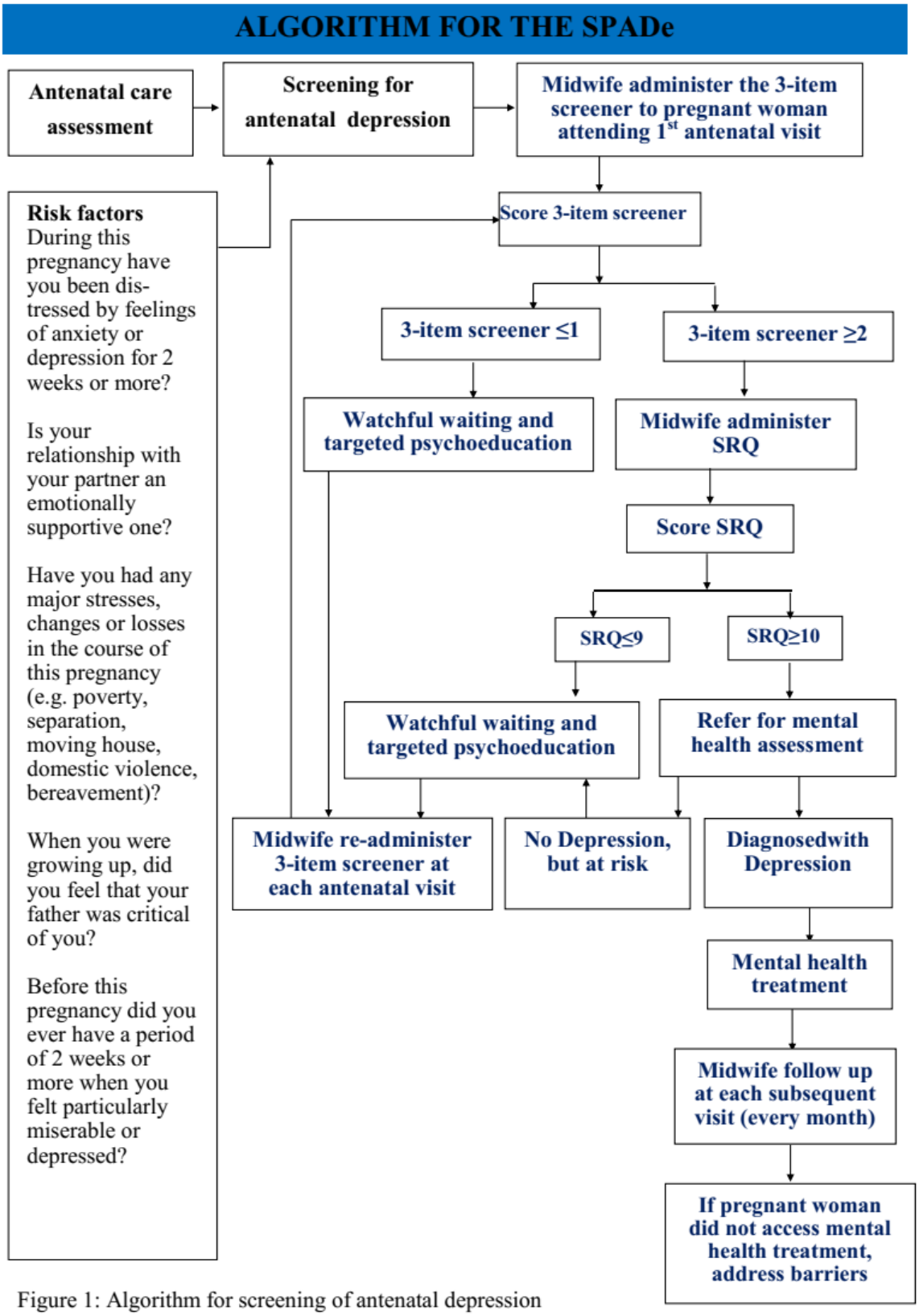

Figure 1: Algorithm for screening of antenatal depression

COMPONENTS OF THE SPADE

The components of the SPADe include: antenatal services and antenatal care assessment; midwives' functions, screening instruments and mental health assessment.

Antenatal services and antenatal assessment

Midwives provide antenatal services to the majority of women in Malawi. These services include antenatal assessment, encouraging good health habits, addressing pregnancy related complications and provision of psychosocial support (Akhund & Avan, 2011). The World Health Organization (WHO) recommends that antenatal care should consists of four visits for normal pregnancies (Villar et al., 2002; WHO, 2006) with the first visit in the first trimester (before 12 weeks but not later than16 weeks) and subsequently at 24 –28 weeks, 32 weeks and 36 weeks (Ejigu et al., 2013). An antenatal assessment includes taking a psychosocial, medical and obstetric history; a complete general and obstetrical examination; screening for HIV and Syphilis; and testing for proteinuria, blood/rhesus group and bacteriuria (Lincetto, Mothebesoane-Anoh, Gomez, & Munjanja, 2006). History taking provides the midwife with an opportunity to screen for depression during the antenatal assessment.

Midwives functions

The functions of a midwife in screening for antenatal depression include:

- Screening for depression of all pregnant women attending antenatal clinics and to facilitate the management of those detected with depression;
- Appropriately referring pregnant women with probable depression for mental health assessment using SPADe pathway;
- To be a resource person for other healthcare professionals in the care of pregnant women undergoing screening for antenatal depression;

- To provide information about the screening for antenatal depression and available specialist support services to pregnant women and their families;
- To liaise with the relevant members of the multidisciplinary team to facilitate the effective screening for depression; and provision of appropriate care and support for pregnant women with depression in antenatal clinics;
- To maintain a knowledge base in screening for antenatal depression by attending in-service training, undergoing continuous professional development sessions and attending relevant conferences;
- To provide education and training related to screening for depression to all staff in antenatal clinics;
- To maintain a register of results, of the screening for depression done, in antenatal clinics and produce reports to relevant authorities;
- To participate in the development of policies, procedures and guidelines related to screening for depression in antenatal clinics; and
- To monitor quality and effectiveness of screening for depression in antenatal and take effective action to address issues and promote quality.

Screening instruments

SPADe recommends the use of the 3-item screener and the SRQ to screen for antenatal depression in the local setting

The 3-item screener

Instructions

Remember - The 3-item screener is a screening instrument and should never override clinical judgment. A Self Reporting Questionnaire (SRQ) should be administered to confirm caseness of pregnant women who screen positive on the 3-item screener.

Administration

1. Administer either Chichewa or English versions of the 3-item screener depending on the language which a client can easily understand.
2. Read the questions aloud to the pregnant woman and ask her to respond 'Yes' or 'No' depending on how she is feeling **now** or has been feeling in the **past month.**
3. Circle the response given by a woman against the corresponding question
4. All the 3 items in the 3-item screener must be completed.
5. Care should be taken to avoid the possibility of the pregnant woman discussing her answers with others. (Answers should come directly from the pregnant woman)

Scoring

1. Each question is scored with a 0 for 'No' (AYI) or 1 for 'Yes' (EYA).
2. The higher a score is, the more likely the woman is experiencing some level of antenatal depression.
3. When validating the 3-item screener in antenatal clinics in the Blantyre district, optimum cut off score of greater than 1 was used.
4. Administer SRQ to all pregnant women who score 2 or more on the 3-item screener. If the 3-item screener score is 1 or less, stop.

Please circle the response that comes closest to how a client has been feeling. *Please answer all questions*

Here is an EXAMPLE already completed

	No	Yes	
Are you tired?	0	(1)	This would mean: 'Client is feeling tired'.

Please complete the other questions in the same way

English version

	NO	YES
During the past month, have you been bothered by feeling down de-	0	1
During the past month, have you been bothered by little interest or	0	1
Are you depressed?	0	1

Chichewa version

	AYI	EYA
Kodi mmwezi wapitawu mwakhala mukuvutika mumtima mwanu chifukwa chakukhumudwa kapena kukhala opanda chiyembekezo?	0	1
Kodi mmwezi wapitawu mwakhala mukuvutika mumtima mwanu chifukwa chokhala opanda chidwi kapena kusasangalatsidwa pochita zinthu?	0	1
Kodi mumtima mwanu mukumva kuti ndinu okhumudwa?	0	1

For official use only	**Screened on**	**Score**
Name of Client:_____	Date: _____	Total: _____
Administered by: _____		

Sources: Whooley, M. A., Avins, A. L., Miranda, J., & Browner, W. S. (1997). Case-finding instruments for depression. *Journal of general internal medicine, 12* (7), 439-445.

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Self-Reporting Questionnaire (SRQ)

Instructions

Remember - The SRQ is a screening instrument and should never override clinical judgment. A diagnostic mental health assessment should be done to confirm presence or absence of depression.

Administration

1. Administer either Chichewa or English versions of the SRQ depending on the language which a client can easily understand.
2. Read the questions aloud to the pregnant woman with low literacy and ask her to respond 'Yes' or 'No' depending on how she has been feeling in the **previous 4 weeks.**
3. Circle the response given by a woman against the corresponding question
4. All the 20 items in the SRQ must be completed.
5. Care should be taken to avoid the possibility of the pregnant woman discussing her answers with others. (Answers should come directly from the pregnant woman)

Scoring

1. Each question is scored with a 0 for 'No' or 1 for 'Yes'.
2. The higher a score is, the more likely the woman is experiencing some level of antenatal depression.
3. Standard cut off score of 10 or greater is recommended as an indicator of possible depression (Kumbhar, Dhumale, & Kumbhar, 2012)
4. When validating SRQ in antenatal clinics in the Blantyre district, optimum cut off score of greater than 9 was used.
5. Refer for diagnostic mental health assessment all pregnant women who score 10 or more on SRQ.

6. If a pregnant woman scores 1 specifically on questions 16 or 17, immediate action is needed. An immediate emergency referral to a mental health professional may be the most appropriate next step if a patient has suicidal ideation.

Self-Reporting Questionnaire (SRQ)

Instructions

Please circle the response that comes closest to how you have been feeling **IN THE PAST 4 WEEKS**. Please answer all questions

---

Here is an EXAMPLE already completed

	NO	YES	
Do you feel restless?	0	(1)	This would mean: 'I have felt restless in the past 4 weeks' Please complete the other questions in the same way

---

Please answer all questions below:
(Circle one answer in each question)

With reference to the past 4 weeks:

	NO	YES
1. Do you often have headaches?	0	1
2. Is your appetite poor?	0	1
3. Do you sleep badly?	0	1
4. Are you easily frightened?	0	1
5. Do your hands shakes?	0	1
6. Do you feel nervous, tense or worried?	0	1
7. Is your digestion poor?	0	1
8. Do you have trouble thinking clearly?	0	1
9. Do you feel unhappy?	0	1
10. Do you cry more than usual?	0	1
11. Do you find it difficult to enjoy your daily activities?	0	1
12. Do you find it difficult to make decisions?	0	1
13. Is your daily work suffering?	0	1
14. Are you unable to play a useful part in life?	0	1
15. Have you lost interest in things?	0	1
16. Do you feel that you are a worthless person?	0	1
17. Has the thought of ending your life been on your mind?	0	1
18. Do you feel tired all the time?	0	1
19. Do you have uncomfortable feelings in your stomach?	0	1
20. Are you easily tired?	0	1

For official use only	**Screened on**	**Score**
Name of Client:_____	Date: _____	Total: _____
Administered by: _____	Scores for #16 and / or 17 _____	

Sources:Beusenberg, M., Orley, J. H., & World Health Organization. (1994). A User's guide to the self reporting questionnaire (SRQ). Geneva: World Health Organisation.

Kumbhar, U. T., Dhumale, G. B., & Kumbhar, U. P. (2012). Self Reporting Questionnaire as a tool to diagnose psychiatric morbidity. *Natl J Med Res, 2*, 51-54.

Self-Reporting Questionnaire (SRQ)-Chichewa version

Malangizo

Chondezungulizaniyankholomwelikufananirandimomwemwakhalamukumvera ma **SABATA ANAYI APITAWA**.Chondeyankhanimafunsoonse

Ichindi CHITSANZO choyankha kale

	AYI	EYA	
Kodi mumakhala osakhazikika?	0	1 ◯	Tanthauzo: 'Mumakhala osakhazikika mmasabata anayiapitawa'

Chonde yankhani mafunso enawanso chimodzimodzi

Chondeyankhanimafunsoonsealimmunsiwa:

(Zungulizaniyankholimodzi pa funsolirilonse)

	AYI	EYA
1. M'masabata anayi apitawa, kodi mumamvakupweteka mutu pafupipafupi?	0	1
2. M'masabata anayi apitawa, kodi simumakhala ndichilakolako cha chakudya?	0	1
3. M'masabata anayi apitawa, kodi mumavutika kugona usiku?	0	1
4. M'masabata anayi apitawa, kodi manja anu amanjenjemera?	0	1
5. M'masabata anayi apitawa, kodi mumakhala ndinkhawa, mantha kapena madandaulo?	0	1
6. M'masabata anayi apitawa, kodi simumachedwa kututumutsidwa?	0	1
7. M'masabata anayi apitawa, kodi mumadzimbidwa dzimbidwa?	0	1
8. M'masabata anayi apitawa, kodi mumakhala ndivuto kuganiza bwinobwino?	0	1
9. M'masabata anayi apitawa, kodi mumakhala osasangalala kapena osakondwa?	0	1
10. M'masabata anayi apitawa, kodi mumaliralira pafupipafupi ndipo koposera muyeso?	0	1
11. M'masabata anayi apitawa, kodi mumaona ngati ndichinthu chokuvutani kusangalatsidwa ndizinthu zimene mumapanga tsiku ndi tsiku?	0	1
12. M'masabata anayi apitawa, kodi mumakhala ndivuto kupanga maganizo Kapena kumangamfundo?	0	1
13. M'masabataanayiapitawa, kodintchitozanuzatsikunditsikusizimayenda bwino?	0	1
14. M'masabataanayiapitawa, kodimumalepherakupangazinthuzaphindu kapenazofunikiram'moyowanu?	0	1
15. M'masabataanayiapitawa, kodimunasiyakukhalandichidwi mu zinthu zosiyanasiyana?	0	1
16. M'masabata anayi apitawa, kodi mumaziona ngati ndinu munthu wopanda ntchito kapena wosafunikira?	0	1
17. M'masabataanayiapitawa, kodimaganizoodziphaanayambaakubwereranipo?	0	1
18. M'masabata anayi apitawa, kodi mumamva kapena kukhala otopatopa nthawi zonse?	0	1

19. M'masabata anayi apitawa, kodi mumakhala ndi vuto losamva bwino m'mimba? 0 1

20. M'masabata anayi apitawa, kodi simumachedwa kutopa? 0 1

For official use only	**Screened on**	**Score**
Name of Client:_____	Date: _____	Total: _____
Administered by: _____	Scores for #16 and / or 17 _____	

Sources: Beusenberg, M., Orley, J. H., & World Health Organization. (1994). A User's guide to the self reporting questionnaire (SRQ). Geneva: World Health Organisation.

Kumbhar, U. T., Dhumale, G. B., & Kumbhar, U. P. (2012). Self Reporting Questionnaire as a tool to diagnose psychiatric morbidity. *Natl J Med Res, 2*, 51-54.

Mental health assessment

Mental health specialists (psychiatrist or clinical psychiatric officer or mental health nurse) should conduct mental health assessments on pregnant women who screen positive on SRQ to confirm the presence or absence of depression. Mental health assessment should be conducted using a diagnostic assessment (DSM-V or ICD 10). Mental health specialists should assess pregnant women in antenatal clinics through outreach to promote the integration of screening for depression. They should conduct diagnostic assessments on all pregnant women who screened positive on SRQ immediately or within 14 days of referral (Mental Treatment Act Chap. 34.02) (Kalemba, 2010) by the midwife. Mental health specialists should communicate the results of the mental health assessment to the midwife within two weeks from the date of referral by documenting it in the Woman's Health Passport. They should immediately prescribe appropriate treatment for pregnant women who are diagnosed with depression or refer them to the appropriate services using the existing referral pathways.

SPADE PATHWAY

All pregnant women should be screened for depression at their initial antenatal booking and subsequent visits to identify if they have, or are at risk of depression. Identifying the need for early intervention is important when planning care and can often prevent an escalation or deterioration of a situation.

- The midwife should initially screen all pregnant women with the 3-item screener during history taking at the initial antenatal visit and again just before the physical examination at subsequent visits.
- The midwife should immediately administer the Self Reporting Questionnaire (SRQ) to all pregnant women who screen positive on the 3-item screener

- The midwife should immediately refer any pregnant woman who screens positive on SRQ for a further mental health diagnostic assessment to confirm the initial diagnosis and to provide access to specialised treatment.
- The midwife should refer to mental health services immediately or within 24 hours any pregnant woman at risk of suicide (**who answers 'Yes' to items 16 and/or 17 on SRQ**). It should be considered as an emergency if any woman is at risk of committing suicide.
- The midwife should actively monitor pregnant women who screen negative on the 3-item screener or SRQ "Watchful waiting". Which involves monitoring of depressive symptoms without any active treatment
- The midwife should provide targeted psychoeducation to all pregnant women who screen positive or negative on the 3-item screener or SRQ.
- The midwife needs to document all information regarding the woman's diagnosis of depression, her medication and other therapies in the Woman's Health Passport.
- If a pregnant woman is already involved with mental health services, the midwife should continue to liaise closely with them.
- The midwife needs to ensure that the woman understands the boundaries of confidentiality and that in some circumstances it may be necessary to share certain information with others.
- If a pregnant woman is on antidepressant medication, the midwife should discuss this with the mental health specialist, if one is involved, or alternatively refer the woman to mental health services.
- The midwife should document all missed appointments in the Woman's Health Passport and communicate with other services involved in providing support to a pregnant woman with or at risk of depression.
- The midwife should identify and address issues that led to a pregnant

woman missing her appointments.

- Any deterioration in the mental health state throughout the patient's journey should result in an urgent referral to mental health services.

PROPOSED OUTCOMES FOR THE SPADE

The following are the proposed outcomes of the SPADe:

- Improved screening for depression coverage and increased cost effectiveness of the screening process which would improve detection of pregnant women with or at risk of depression and facilitate access to mental health care.
- Increased contact through supervision and continuing education between antenatal clinics, staff and mental health specialists, resulting in increased knowledge, skills, competencies and confidence of midwives and other general practitioners in dealing with pregnant women with or at risk of depression.

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7.5.2.6 Implementation plan for the SPADe

The implementation of the SPADe will require the collaboration of health workers at all levels. This will serve as a crucial component of building sustainable and effective collaborative care for depression (Whitebird et al., 2014) in antenatal clinics. The researcher recommends the following steps for the successful implementation of the proposed screening protocol for antenatal depression:

Approval for the screening protocol for antenatal depression

The proposed screening protocol for antenatal depression needs to be submitted to the Reproductive Health Directorate which will table it at the Ministry of Health Management meeting for approval before it is adopted for use in clinical practice. It is recommended that protocols must be approved by relevant authorities before testing it in clinical practice (NHS-MA & NICE, 2002).

Policies for the screening protocol for antenatal depression

There is a need to negotiate for policies which will facilitate the effective implementation of the proposed screening protocol. Policies will help in dealing with clinical, practical and administrative constraints that can impede implementation of an approved protocol (NHS-MA & NICE, 2002).

Piloting and adoption of the screening protocol for antenatal depression

Following approval from authorities, the proposed screening protocol will need to be piloted in clinical settings. The NHS Modernisation Agency recommended that implementation of a protocol should start with a pilot phase because it helps in addressing any operational problems to ensure that it delivers the expected benefits (NHS-MA & NICE, 2002). In addition, conducting a pilot will help in evaluating the proposed protocol for its ease of use,

its effectiveness, and its impact on: patients, multidisciplinary team, clinical governance and clinical audit (NHS-MA & NICE, 2002). The proposed protocol and policies associated with it need to be considered for adoption once a determination concerning feasibility, sustainability, benefits and challenges for use in clinical practice is done through piloting.

At policy level, the researcher will collaborate with the Non Communicable Diseases and Mental Health Unit, in the Clinical Services Directorate of Ministry of Health, the Directorate of Nursing and Midwifery Services and Directorate of Reproductive Health to tap on their expert advice and lobby for their buy-in of the proposed screening protocol, and consequently influence relevant policy changes for the implementation. He will also engage in dialogue with practicing mental health specilists and midwives during piloting to garner for their contributions, support and buy-in of the proposed protocol. He will also involve some of the midwives and mental health specialists during piloting proposed screening protocol in antenatal clinics. The involvement of mental health specialists and midwives in piloting may help in gathering data on utility of the proposed screening protocol to detect and treat antenatal depression in clinical practice.

Implementing the screening protocol for antenatal depression

Successful implementation of the adopted screening protocol for antenatal depression demands that the following are considered and put in place:

Strategic plan: Once the proposed screening protocol for antenatal depression is adopted, there will be a need to develop a strategic plan to map out the infrastructure and costs implications for the implementation of the protocol in antenatal clinics. Strategic planning will provide a sense of direction and outline measurable goals which will be useful in guiding

day-to-day decisions and evaluating progress when (Steiner, 2010) implementing the protocol.

Cost analysis: There will also be a need to conduct an economic assessment for implementation of the screening protocol in clinical practice (antenatal and referral services). Cost effectiveness analysis will help in determining relative value for money associated (Patel, Chisholm, Dua, Laxminarayan, & Vos, 2016) with the protocol. Consider implementing the screening protocol for antenatal depression as part of the already existing antenatal and mental health services.

Training: For implementation of the screening protocol for antenatal depression to be successful, train all potential users on how to utilise the protocol in clinical practice. This is supported by NHS Modernisation Agency that recommended that full implementation of a protocol should be supported by a detailed training programme for the staff who will use the protocol (NHS-MA & NICE, 2002). In addition ongoing training for health workers is an integral aspect of perinatal mental health interventions (Honikman et al., 2012; van Heyningen et al., 2014).

Monitoring and evaluation: Monitoring and evaluation mechanisms will need to be put in place to measure if the screening protocol for antenatal depression is being implemented effectively and whether pregnant women and health care workers are satisfied with the services. Monitoring will help to establish what is happening in practice while the protocol is being implemented (NHS-MA & NICE, 2002). Monitoring will involve measuring and tracking relevant data against set objectives. Evaluation would confirm whether or not the desired objectives (Kaufman & Guerra-Lopez, 2013) of the protocol have been achieved. This will allow health workers to seek feedback from a patient, to assess that patient's

progress, and to use their clinical judgement, or to review the overall operation of the protocol (NHS-MA & NICE, 2002).

Change management plan: Since routine antenatal care usually does not involve screening for depression, developing a change management plan will be central to implementation of the protocol. To move from traditional antenatal care and introduce screening for depression in antenatal clinics will result in major change that may pose many challenges. The introduction of the screening protocol for antenatal depression may be considered as interfering with the usual antenatal care and resistance to change can occur at clinics and planning and organisational levels. Some policy makers fear that mental health interventions may divert the energies of clinicians and lessen the impact of other 'priority' maternal health interventions (Rahman et al., 2013). Furthermore, health workers may have a negative attitude towards mental illness. As such a formal change management plan will be necessary to facilitate smooth implementation of the protocol in antenatal clinics. The success of implementing the screening protocol in antenatal clinics will require committed leaders, enthusiastic and flexible health workers with a shared vision and a commitment to ensure the sustainability of the protocol.

Review and updating of the screening protocol for antenatal depression:It is necessary to set a future expiry date for the screening protocol for antenatal depression so that it can be subjected to regular review in accordance with new evidence, new technology and changes in finances or other administrative aspects of a clinic (Browman et al., 1995). It is crucial to review the screening protocol to: measure and quantify benefits to patients and staff; ensure that objectives continue to be met and remain appropriate; ensure that all new staff receive training in the use of the protocol; take account of new evidence available; keep up-to-date with changes in clinical practice; ensure full integration with clinical governance

arrangements; and support the implementation of national standards which are regularly reviewed to ensure that they remain up-to-date (NHS-MA & NICE, 2002).

7.6 Conclusion

There is currently no viable screening protocol for depression in antenatal clinics in Malawi. The proposed screening protocol for antenatal depression will need to be approved by the relevant authorities; further evaluation and refinement should be done before it is adopted for routine screening in antenatal clinics.

Chapter Eight

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

8.1 Introduction

The main aim of this research study was to develop a screening protocol for depression for use in antenatal clinics in the Blantyre district of Malawi. The focus was to describe the size of the problem and identify instruments for use and establish validity and utility of these screening instruments in detecting depression in local antenatal clinics.

This chapter reviews the main findings and conclusions of the study, highlights key contributions to the field; addresses limitations and weaknesses for this research study, and identifies priority areas for future research.

8.2 Main findings and contributions to the field

To develop a protocol for the screening of depression, it was important to identify valid and suitable instruments for use in antenatal care in Malawi. To this end, the following key findings emerged from the study:

8.2.1 Key finding 1: High prevalence of antenatal depression and risk factors in the local setting

This study confirmed the high prevalence of antenatal depression for pregnant women in the local setting. The prevalence estimate of antenatal depression using the EPDS was found to be 19% (95% CI 15.5%-22.5%, n=91) and this was confirmed by the diagnostic interviews using the MINI (25.8% (95% CI =17.5-34, n=25)) (Study 2: Paper 2). This is consistent with previous studies which reported high prevalence of depression (>20%) among pregnant women in sub-Saharan Africa (Manikkam & Burns, 2012; Stewart et al., 2014).

The key risk factors that predicted antenatal depression in the local setting were: "being distressed by anxiety or depression for more than two weeks during this pregnancy" [OR=4.1 (2.1-7.9), p=<.001]; "feeling that a relationship with partner is not an emotionally supportive one" [OR=3.5 (1.4-8.4), p=.01]; "having major stresses, changes or losses in the course of this pregnancy" [OR=3.2 (1.7-6.2), p= .01]; "feeling that father was critical of her when growing up" [OR=3.2 (1.4-7.6), p=.01]; and "having history of feeling miserable or depressed for ≥2 weeks before this pregnancy" [OR=2.4 (1.3-4.4), p=.01].

8.2.2 Key finding 2: Valid screening instruments suitable for screening of depression in antenatal clinics in low resource settings exist

In Malawi, antenatal clinics usually have insufficient staff to deal with their workload, it is therefore important to consider the validity and suitability of any instrument for screening depression because these factors may act as barriers to screening for depression and providing optimal care. Since the country has inadequate mental health specialists (WHO, 2011) the screening instruments for use in antenatal clinics should be valid and be ones that midwives can easily administer and interpret. Therefore, the need for suitable and valid instruments for screening for depression in local antenatal clinics was identified.

This research confirmed the existence of a number of valid screening instruments suitable for screening of depression in antenatal care in countries with low resources settings. Phase 1 of this research study, a systematic review, identified the Beck Depression Index (BDI), Centre for Epidemiologic Studies Depression Scale (CESD) 20, the EPDS, the Hamilton Rating Scale for Depression (HAM D), the HSCL-25, the Kessler Psychological Distress Scale 10 (K 10), and the SRQ as valid screening instruments of depression which have been used in low resource settings (Study 1: Paper 1). Out of these, the EPDS had highest level of accuracy (AUC=.965) and was the most widely used screening instrument (Study 1: Paper 1).

However, these findings should be cautiously applied and interpreted because though all were used in low resource settings, they are context specific.

8.2.3 Key finding 3: Demographic characteristics and the nature of instruments affect the performance of screening instruments in local settings

In determining the performance of screening instruments in the local setting, systematic differences were found between proportions of screen positives, and screen positive results by demographics (Study 2: Paper 3). Using the McNemar test, significant systematic differences were found between proportions of screen positives from PRQ and SRQ ($p<.001$), EPDS and HSCL-15 ($p=.001$), HSCL and PRQ ($p<.001$), and EPDS and SRQ ($p<.001$). In addition, regression models showed that the SRQ was the only instrument with screen positive results, which did not differ by age, education, employment status, marital status, setting, gestation and number of pregnancies. These systematic differences and differences in screen positive results by demographics may have contributed to the variations in the prevalence (respondents who screened positive for depression) which ranged from 12.9% (95% CI15.5%-22.5%) (SRQ) to 42.1% (95% CI37.7%-46.5%) (3-item screener) in this study. The differences in prevalence identified by the PRQ [20.2% (95% CI 16.6%-23.8%)], EPDS [19% (95% CI 15.5%-22.5%)], HSCL-15 [13.5% (95% CI 10.4%-16.6%)] and, SRQ [12.9% (95% CI9.9%-15.9%)] were not significant (Study 2: Paper 3).

8.2.4 Key finding 4: Optimum cut off scores for EPDS, HSCL-15 and SRQ are lower than their standard cut off scores in the local setting

The optimum cut off scores for EPDS (>6), HSCL-15 (>1.7) and SRQ (>9) were found to be lower in the local setting compared to their standard cut off scores (Study 3: Paper 4). It was important for the study to generate context specific optimum cut off scores for EPDS, HSCL-

15 and SRQ since none of these screening instruments was specifically designed for assessing antenatal depression. Generally, standard cut off score for EPDS was set for measuring depression in postnatal mothers (Cox et al., 1987) while those for HSCL-15 (Derogatis et al., 1974) and SRQ (Beusenberg et al., 1994) were set for measuring depression in general population.

8.2.5 Key finding 5: The 3-item screener is a valid ultra-brief instrument for screening depression in the local setting.

It is recommended that ultra-brief instruments are effective in screening for depression during pregnancy (van Heyningen et al., 2014). The 3-item screener, an ultra-brief instrument, was found to be a valid screening instrument for depression with a good balance between sensitivity and specificity (Se= .8, Sp=.8, cut off >1) in the local setting (Study 3: Paper 4). The instrument's tendency to over detect antenatal depression (Study 1: Paper 1) makes it to be a useful instrument for initial screening in the local setting where screen positives will undergo further assessment. In addition, the 3-item screener would be easy for midwives to administer and interpret in the local setting with insufficient staff, large workloads and limited time.

8.2.6 Key finding 6: The SRQ is the best instrument for screening depression in local antenatal clinics

The SRQ was found to be the most accurate screening instrument (AUC=.912) with good balance of sensitivity and specificity (Se=.72 and Sp=.96) at the optimum cut off score of >9 when applied alone in local antenatal clinics. The high values for specificity (Sp=.96) and high PPV (PPV=.88) for SRQ suggests that it may be a good instrument for "ruling in" antenatal depression in the local setting. Despite the SRQ being the longest screening

instrument (20 items), its binary questions were found to be easy to administer by interviewers and were easily understood by illiterate pregnant women when compared to questions with multiple responses in the EPDS and HSCL-15. Our findings suggest that the SRQ may be a suitable and valid instrument for screening of depression in local antenatal clinics. This is contrary to the systematic review of all instruments used in low resource settings to screen for antenatal depression (Chorwe-Sungani & Chipps, 2017) (Study 1:Paper 1), which found that the EPDS was the most accurate screening instrument in the local setting (Study 3: Paper 4). Therefore, it remains important to validate an instrument in the local setting before starting to use it for routine screening. Furthermore, these findings add value to the body of already existing evidence on validity of SRQ in screening for antenatal depression (Stewart et al., 2013, 2014).

8.2.7 Key finding 7: The combination of 3-item screener and SRQ is the best option for screening antenatal depression in local context

To integrate screening instruments of depression as part of routine care in the antenatal setting requires a brief instrument for initial identification of possible cases. However, as the 3-item screener over detected antenatal depression, there was a need to follow up with a brief instrument for screening depression. Screening instruments which complement each other may be combined to improve their discriminant ability (Ladeira et al., 2009). Using compensatory, conjunctive, probability (Mackinnon & Mulligan, 1998) and sequential (Ramlall et al., 2013) rules, the 3-item screener was combined with either EPDS or HSCL-15 or SRQ to test their discriminant validity and utility in the local context.

The findings of this research study showed that the sequential combination of the 3-item screener and SRQ may be useful for local clinical practice because it achieved the best balance of sensitivity (Se.=78) and specificity (Sp=.88) with highest AUC (.885) compared to

other combined instruments using compensatory, conjunctive and sequential rules (Study 3: Paper 4). The findings of this research study showed that combining the 3-item screener with either EPDS or HSCL-15 using compensatory or conjunctive rules has minimal value in clinical practice because both rules result in very huge trade-offs between sensitivity and specificity (Study 3: Paper 4). Our findings further showed that the probability combination of the 3-item screener and SRQ had the best discriminant ability (AUC =.92) (Study 3: Paper 4). However, probability combination has limited utility in clinical practice because its outcomes' scores are arbitrary and do not share the attributes of either instruments combined, (Mackinnon & Mulligan, 1998) making it difficult to interpret.

The application of the 3-item screener and SRQ using sequential rule may allow for screening for depression in stages in local antenatal clinics. The 3-item screener would be administered as an initial screener which would be followed by a more detailed instrument, the SRQ, which would only be administered to those who screened positive on the 3-item screener. This 3-item screener and SRQ combination would be feasible and acceptable for use in busy local antenatal clinics where midwives would be required to participate in the screening because both instruments have binary questions which would be easy to score and interpret. Screening instruments with binary questions are less time consuming, easy to score (van Heyningen et al., 2014) and easily understood by illiterate pregnant women (Stewart et al., 2013).

8.3 Unique contributions of the study

8.3.1 The development of a screening protocol for depression in antenatal care in low resource settings

The SPADe is the first screening protocol for depression in antenatal care developed in Malawi which is: 1) based on the need for screening due to the high prevalence of depression and associated risk factors in this context; 2) is informed by locally generated evidence; 3) is suitable and applicable in the local setting; and 4) provides recommendations on how to integrate screening into the routine antenatal care (Studies 1-4: Papers 1-4 and Chapter 7).

As the SPADe is integrated with antenatal care, midwives would be able to screen for antenatal depression while providing the usual antenatal care. This integration would help to ease the poor access to mental health services due to gross shortage of mental health specialists (.01 psychiatrists and .22 mental health nurses per 100 000) (WHO, 2011) and centralisation of mental health services in tertiary psychiatric units which are often far away (Kauye, 2008). The multistage screening proposed by the SPADe would not increase workload at antenatal clinics but would allow for its distribution among midwives available in antenatal clinics.

Finally, the SPADe is unique because it is internal to antenatal services, as the midwifery profession would own it. It is hoped that the SPADe would improve the detection of pregnant women with depression and increase their access to mental health services through appropriate referrals in the local setting.

8.3.2 The contribution of new knowledge on screening instruments for depression in antenatal care in low resource settings

This research study contributed new knowledge on the accuracy of HSCL-15, and the 3-item screener in measuring antenatal depression in low resource settings. This was the first study to validate the HSCL-15 and the 3-item screener in local antenatal clinics in Malawi. New knowledge included information on optimum cut off for HSCL-15 (>1.7) and the 3-item screener (>1) (Study 3: Paper 4) in this setting and found that the accuracy of HSCL-15 (AUC=.91) was high and comparable to SRQ (AUC=.912) (Study 3: Paper 4). Though the 3-item screener level of accuracy was found to be moderate (AUC=.85) (Study 3: Paper 4), using the 3-item screener as an initial screen, these findings suggested that the HSCL-15 and the 3-item screener may be suitable instruments for screening depression in the local setting.

This study also added new knowledge on the use of the PRQ which was used for the first time to assess for risk factors of antenatal depression in Malawi (Study 2: Paper 2). This study found that five (5) questions (risk factors) of the PRQ predicted antenatal depression in the local setting. These five (5) questions can provide a targeted approach for assessing depression during pregnancy and were included in the algorithm for screening antenatal depression (Study 4: Chapter 7).

8.3.3 Addressing issues of equity in systematic reviews

The systematic review (Study 1: Paper 1) which was conducted in this research study is a unique contribution to the literature on screening instruments for antenatal depression in low resource settings. This review goes some way towards addressing the problem of equity in systematic reviews (Welch et al., 2015) as it was the first systematic review on antenatal depression which included only studies from low resource settings. This review broadens the

source of evidence for decision-makers in low resource settings as it recommended suitable and context specific instruments for screening antenatal depression in these settings.

In most systematic reviews, most of the evidence from primary studies is generated in HICs it may not be directly applicable in LMICs (BOLDER Research Group, 2016) and the uniqueness of health systems in low resource settings limits utilisation of existing international evidence-informed clinical guidelines (Young, Garner, Clarke, & Volmink, 2016). Context is important in interpreting the evidence (Lewin et al., 2008) presented in a systematic review and LIMICs need evidence produced within their own populations by their patients, clinicians, and researchers to address health care challenges (BOLDER Research Group, 2016). This context specific evidence synthesized in the systematic review (Study 1: Paper 1) complements the abundant *etic* evidence from reviews of HICs.

8.4 Limitations of the research study

Limitations exist in all research and the limitations of this study are discussed below:

8.4.1 Random error

There are many reasons that may influence a pregnant woman's decision to choose to go and receive antenatal care. These may include culture, religion, finances and the accessibility of clinics themselves, to mention a few. The researcher had no power to influence socio-demographic characteristics of the pregnant women who attended antenatal clinics. However, the sample was deemed to be appropriate because the study was investigating facility based screening of depression.

8.4.2 Selection bias

This study may have been affected by selection bias because it recruited pregnant women who presented themselves at antenatal clinics and excluded pregnant women with known mental disorders or pregnancy complications thus potentially biasing the performance of screening instruments.

8.4.3 Methods for collecting data

The interviewer administration of screening instruments may have influenced pregnant women to give answers which they deemed to be socially acceptable in the presence of the interviewer. In addition pregnant women's willingness to reveal sensitive information may have been affected by the presence of the interviewer. This study may have also been affected by recall effects since the interviewers asked the pregnant women to report issues about their health from as far back as the previous month and is some instances childhood. Despite, the aforementioned limitations, the face to face interview remains an appropriate method of administering the screening instruments in the local context because most of the pregnant women are not fully literate. Another limitation of this study is that because the screening instruments were administered sequentially it is possible that the performance of subsequent instruments might have been influenced by the respondents' knowledge from similar questions covered by the preceding instrument/s. In addition, the differences in rating time frames and structures of the screening instruments may be a further limitation.

8.4.4 Utility of screening instruments

This research study is limited because it did not test the application of the SPADe in the local setting. As such perceptions of potential users (midwives) on utility of screening instruments included in the screening protocol remain unknown.

8.5 Recommendations

The following recommendations with regard to practice, education and future research are made based on the findings of this research study:

8.5.1 Practice

Use SPADe to screen for depression locally. This could improve the detection of pregnant women with depression by midwives and increase their access to mental health care through appropriate referrals. Thus midwives and mental health specialists need to collaborate effectively and become more familiar with each other's roles in the care of pregnant women with or at risk of depression. The use of SPADe also demands that relevant policies should be put in place to facilitate the smooth implementation of screening for depression locally.

8.5.2 Education

Involve midwives in ongoing education about screening for depression using SPADe. Mental health specialists, though very few, could serve as a valuable resource for providing in-service education to midwives. This could increase the competence and confidence of midwives in detecting and dealing with depression in local antenatal clinics. Midwifery educators also need to ensure that curricula for pre-service midwifery training adequately prepare midwives to screen for depression during pregnancy. Literature suggest that improving the mental health component of pre-service midwifery education, and providing additional in-service clinical mental health education to midwives, may improve their competencies in dealing with mental health problems (Ross & Goldner, 2009). Therefore it is imperative that the Nurses and Midwives Council in Malawi should review the syllabi for all nursing and midwifery training programmes so that they adequately equip nurses and midwives with knowledge and skills for screening of antenatal depression.

8.5.3 Research

There is a need for a further qualitative research to investigate midwives perceptions about the proposed screening protocol for antenatal depression. Furthemore the SPADe should be tested in the local setting using a Randomised Control Trial or other relevant experimental study designs. This would be a vital step for evaluating the applicability and effectiveness of the SPADe in clinical practice locally. It would also provide a crucial opportunity to review and adapt the SPADe for successful clinical use or to reject it.

Studies should be conducted to assess the costs and benefits of screening for depression using SPADe in local antenatal clinics. These studies should assess cost based routine utilisation data and relevant economic costing models for health services.

The experience of pregnant women regarding SPADe should be explored qualitatively. In addition, cultural and social issues that may impact on the implementation and acceptance of screening for depression have not been specifically dealt with in this research and should be further researched.

8.6 Conclusion

SPADe has the potential of contributing towards the achievement of the goal of the Malawi government to treat depression at the primary level of care (MOH, 2017a), by improving detection of depression in local antenatal clinics. The SPADe pathway would help to improve the detection of depression and access to mental health services by women during pregnancy. Currently, there is no routine screening for depression in the local antenatal clinics and there are no protocols in place for this either. The studies reported here recommended SPADe as a suitable protocol for screening for depression in antenatal clinics in countries like Malawi.

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APPENDICES

Appendix 1: Data collection instrument for the cross-sectional study (Study 2)

Date_____ Setting_____ CODE_____

Gestation period _____ weeks

SECTION A

Demographic Characteristics of participants

Fill in the blank spaces

1. What is your age in years? _____
2. Indicate number of pregnancies you have had_____

Please circle the option which applies to you

3. What is your occupation?
    a. House wife,
    b. Business lady
    c. Farmer
    d. Other specify_____
4. Indicate your highest level of education attended
    a. No formal education
    b. Primary school
    c. Secondary school
    d. Tertiary education
5. Indicate your marital status
    a. Single
    b. Married
    c. Divorce
    d. Widow
    e. Other specify_____

SECTION B

The 3-item screener for assessing depression in pregnant women

Tick yes/no, as applicable against the following questions

S.N	Question	Yes	No
6	During the past month, have you been bothered by feeling down, depressed or hopeless?		
7	During the past month, have you been bothered by little interest or pleasure in doing things?		
8	Are you depressed?		

HSCL-15: Please tell me how much the following symptoms have bothered or distressed you in the last week including today. Tick the appropriate column.

S. N	Item	Not at all	A little	Quite a bit	Extremely
9	Feeling hopeless about the future				
10	Feelings of worthlessness				
11	Feeling blue				
12	Thoughts of ending one's life				
13	Feeling trapped or caught				
14	Blaming oneself for things				
15	Feeling lonely				
16	Crying easily				
17	Feeling everything is an effort				
18	Feeling no interest in things				
19	Poor appetite				
20	Feeling low in energy, slowed down				
21	Difficulty falling sleep or staying asleep				
22	Loss of sexual interest or pleasure				
23	Worrying too much about things				

SRQ: Tick yes/no, as applicable against the following questions

With reference to the past thirty days

S.N	Question	Yes	No
24	Do you often have headaches?		
25	Is your appetite poor?		
26	Do you sleep badly?		
27	Are you easily frightened?		
28	Do your hands shakes?		
29	Do you feel nervous, tense or worried?		
30	Is your digestion poor?		
31	Do you have trouble thinking clearly?		
32	Do you feel unhappy?		
33	Do you cry more than usual?		
34	Do you find it difficult to enjoy your daily activities?		
35	Do you find it difficult to make decisions?		
36	Is your daily work suffering?		
37	Are you unable to play a useful part in life?		
38	Have you lost interest in things?		
39	Do you feel that you are a worthless person?		
40	Has the thought of ending your life been on your mind?		
41	Do you feel tired all the time?		
42	Do you have uncomfortable feelings in your stomach?		
43	Are you easily tired?		

EPDS: As you are pregnant, tell me closest how you have felt in the past seven day including today. Circle that which apply

In the past seven day:

44 I have been able to laugh and see funny side of things

[3]. as much as I always could

[2]. not quite so much now

[1]. definitely not so much now

[0]. not at all

45 I have looked forward with enjoyment to things

[3]. as much as I ever did

[2]. rather less than I used to

[1]. definitely less than I used to

[0]. hardly at all

46 I have blamed myself unnecessarily when things went wrong

[3]. Yes, most of the time

[2]. Yes some of the time

[1]. Not very often

[0]. No never

47 I have been anxious or worried for no good reason

[3]. not at all

[2]. hardly ever

[1]. yes, sometimes

[0]. yes very often

48 I have felt scared or panicky for no very good reason

[3]. yes quite a lot

[2]. yes sometimes

[1]. no not much

[0]. no not at all

49 Things have been getting on top of me

[3]. yes most of the time I have not been able to cope at all

[2]. yes sometimes I have not been coping as well as usual

[1]. no, most of the time I have coped quite well

[0]. no I have been coping as well as ever

50 I have been so unhappy that I have had difficulty sleeping

[3]. yes most of the time

[2]. yes, sometimes

[1]. not very often

[0]. no not at all

51 I have felt sad or miserable

[3]. yes most of the time

[2]. yes, sometimes

[1]. not very often

[0]. no not at all

52 I have been so unhappy that I have been crying

[3]. yes most of the time

[2]. yes quite often

[1]. only occasionally

[0]. no never.

53 The thought of harming myself has occurred to me

[3]. yes quite often

[2]. sometimes

[1]. hardly ever

[0]. never

SECTION C

PRQ: Questions assessing psychosocial risk factors in pregnant women

Please circle numbers 1–5 (or 6 if present) or tick yes/no, as applicable.

54	Overall, has this pregnancy been a positive experience for you?	1	2	3	4	5	6
		Not at all		**somewhat**		**very much**	
55	Do you feel you will have people you can depend on for emotional support when you go home with your baby?	1	2	3	4	5	6
		Not at all		**somewhat**		**very much**	

Note questions 3–8 refer to your key parental figures whether your own parents, adoptive or step-parents. Please circle number 6, if you did not have a mother or father figure in childhood.

56	When you were growing up, do you think your mother was happy to be a mother?	1	2	3	4	5	6
		Not at all		**somewhat**		**very much**	
57	When you were growing up, did you feel that your mother was critical of you?	1	2	3	4	5	6
		Not at all		**somewhat**		**very much**	
58	When you were growing up, did you feel your mother was emotionally supportive of you?	1	2	3	4	5	6
		Not at all		**somewhat**		**very much**	
59	At present, is your mother emotionally supportive? (circle 6 if mother not alive)	1	2	3	4	5	6
		Not at all		**somewhat**		**very much**	

60 When you were growing up, did you feel that your father as critical of you? 1 2 3 4 5 6

Not at all somewhat very much

61 When you were growing up, did you feel your father was emotionally supportive? 1 2 3 4 5 6

Not at all somewhat very much

62 Before this pregnancy did you ever have a period of 2 weeks or more when you felt particularly miserable or depressed? **Yes** ☐ **No** ☐

If so, did being depressed:

a. interfere with your ability to get things done or your relationships with friends and family? 1 2 3 4 5 6

Not at all somewhat very much

b. lead you to seek professional help? **Yes** ☐ **No** ☐

63 Have you ever been told by a health professional you were depressed or needed antidepressants? **Yes** ☐ **No** ☐

64 During this pregnancy have you been distressed by feelings of anxiety or depression for 2 weeks or more? **Yes** ☐ **No** ☐

If so, did this distress:

a. lead you to seek professional help? **Yes** ☐ **No** ☐

b. interfere with your ability to get things done or your relationships with friends and family? 1 2 3 4 5 6

Not at all somewhat very much

65 Is your relationship with your partner an emotionally supportive one? (If you have no partner circle 6) 1 2 3 4 5 6

Not at all somewhat very much

66 Have you had any major stresses, changes or losses in the course of this pregnancy (e.g. poverty, separation, moving house, domestic violence, bereavement)? **Yes** ☐ **No** ☐

a. If so, please list: _____

b. To what extent has this stress affected your emotional wellbeing?	1 2 3 4 5 6	
	Not at all somewhat very much	
67 Would you generally consider yourself a worrier?	1 2 3 4 5 6	
	Not at all somewhat very much	
68 In general, are you the sort of person who has trouble finishing jobs because you want to get it exactly right?	1 2 3 4 5 6	
	Not at all somewhat very much	
69 Do you generally like yourself as a person?	1 2 3 4 5 6	
	Not at all somewhat very much	

70 Were you ever physically abused when you were growing up? **Yes** ☐ **No** ☐

71 Were you ever sexually abused when you were growing up? **Yes** ☐ **No** ☐

THANK YOU VERY MUCH FOR YOUR PARTICIPATION IN THIS STUDY

Appendix 2: Data collection instrument for the cross-sectional study (Study 2) (Chichewa version)

Date_____ Setting_____ CODE_____

Gestation period _____ weeks

GAWO LOYAMBA

Tsopano ndikufunsani mafunso okhudzana ndi inuyo kuti ndikudziweni.

Lembani mmipatayi

1. Kodi muli ndi zaka zingati? _____
2. Kodi mwakhalapo ndi pathupi pangati? _____

Zungulizani yankho lomwe liri lolondola kwa inu kuyambila funso la 3 mpaka la 5

3. Kodi mmagwira ntchito yanji?
    a. Mzimayi ongokhala panyumba
    b. Mzimayi wogulitsa malonda
    c. Mlimi
    d. Zina, tchulani_____
4. Kodi sukulu munafika nayo patali bwanji?
    a. Sindinaphunzirepo
    b. Pulayimale sukulu
    c. Sekondale sukulu
    d. Koleji
5. Kodi ndinu okwatiwa?
    a. Okwatiwa
    b. Osakwatiwa
    c. Banja lidatha
    d. Mwamuna adamwalira
    e. Zina, tchulani _____

GAWO LACHIWIRI

Tsopano ndikufunsani mafunso achidule amene amadziwitsa ngati amayi apathupi ali ndi nthenda yokhumudwa. Mundiyankhe kuti "eya" kapena "ayi" pa funso lirilonse lomwe ndi kufunseni. Ngati funso simunalimvetse bwino, chonde funsani ndipo ndidzakufotokozerani chomwe funsolo likutanthauza.

The 3-item screener yoyezera amayi apathupi omwe ali ndi matenda okhumudwa

Chongani yankho loyenera (6-8)

	Funso	**Eya**	**Ayi**
6	Kodi mmwezi wapitawu mwakhala mukuvutika mumtima mwanu chifukwa chaku khumudwa kapena kukhala opanda chiyembekezo?		
7	Kodi mmwezi wapitawu mwakhala mukuvutika mumtima mwanu chifukwa chokhala opanda chidwi kapena kusasangalatsidwa pochita zinthu?		
8	Kodi ndinu okhumudwa?		

HSCL-15: Tsopano ndikufunsani mafunso okhudzana ndi mmene zizindikiro izi zakuvutitsirani kapena kukusowetsani mtendere msabata yapitayi kuphatikizaponso lero. Muyanke *Ayi, Pang'ono, Kwambiri* kapena *Kwambiri zedi* pa funso liri lonse. Ngati funso simunalimvetse bwino, chonde funsani ndipo ndidzakufotokozerani chomwe funsolo likutanthauza.

Chongani yankho loyenera (9-23)

S. N	Funso	Ayi	Pang'ono chabe	Kwambiri	Kwambiri zedi
9	Msabata yapitayi, kodi mumtima mwanu mwakhala mukumva kuti mulibe chiyembekezo pa zatsogolo lanu?				
10	Msabata yapitayi, kodi mumtima mwanu mwakhala mukumva kuti ndinu munthu osafunikira?				
11	Msabata yapitayi, kodi mumtima mwanu mwakhala mukumva kuti ndinu okhumudwa?				
12	Msabata yapitayi, kodi mumtima mwanu mwakhalapo ndi maganizo ofuna kudzipha?				
13	Msabata yapitayi, kodi mumtima mwanu mwakhala mukumva kuti mwapezeka (muli mmavuto osathawika)?				
14	Msabata yapitayi, kodi mumtima mwanu mwakhala mukuzidzudzula nonkha pa zinthu?				
15	Msabata yapitayi, kodi mumtima mwanu mwakhala mukumva kuti muli panonkhanokha?				
16	Msabata yapitayi, kodi simumachedwa kulira?				
17	Msabata yapitayi, kodi mumtima mwanu mwakhala mukumva kuti chinthu chili chonse ndichokakamiza?				
18	Msabata yapitayi, kodi mumtima mwanu mwakhala muli opanda chidwi ndi zinthu?				
19	Msabata yapitayi, kodi mwakhalapo opanda chilakolako cha chakudya?				
20	Msabata yapitayi, kodi mwakhala mukumva kufooka, kuchita zinthu mochedwa?				
21	Msabata yapitayi, kodi mwakhala mukuvutika kuti tulo tibwere, kapena kuti mukhale muli mtulo mukagona?				
22	Msabata yapitayi, kodi mwakhalapo opanda chilakolako kapena kusasangalatsidwa ndi kugonana?				
23	Msabata yapitayi, kodi mumtima mwanu mwakhala mukudandaula kwambiri za zinthu?				

SRQ: Tsopano ndikufunsani za momwe mwakhala mukumamvera mumtima mwanu ndi maganizo omwe mwakhala muli nawo mmasabata anayi omwe apitawa. Mundiyankhe kuti "eya" kapena "ayi" pafunso lirilonse lomwe ndi kufunseni. Ngati mukukaikira, yankhani mofanizira ndi momwe mwakhala mukumvera. Ngati funso simunalimvetse bwino, chonde funsani ndipo ndidzakufotokozerani chomwe funsolo likutanthauza.

Chongani yankho loyenera (24-43)

	Funso	**Eya**	**Ayi**
24	M'masabata anayi apitawa, kodi mumamva kupweteka mutu pafupipafupi?		
25	M'masabata anayi apitawa, kodi simumakhala ndi chilakolako cha chakudya?		
26	M'masabata anayi apitawa, kodi mumavutika kugona usiku?		
27	M'masabata anayi apitawa, kodi simumachedwa kututumutsidwa?		
28	M'masabata anayi apitawa, kodi manja anu amanjenjemera?		
29	M'masabata anayi apitawa, kodi mumakhala ndi nkhawa, mantha kapena madandaulo?		
30	M'masabata anayi apitawa, kodi mumadzimbidwadzimbidwa?		
31	M'masabata anayi apitawa, kodi mumakhala ndi vuto kuganiza bwinobwino?		
32	M'masabata anayi apitawa, kodi mumakhala osasangalala kapena osakondwa?		
33	M'masabata anayi apitawa, kodi mumaliralira pafupipafupi ndipo koposera muyeso?		
34	M'masabata anayi apitawa, kodi mumaona ngati ndi chinthu chokuvutani kusangalatsidwa ndi zinthu zimene mumapanga tsiku ndi tsiku?		
35	M'masabata anayi apitawa, kodi mumakhala ndi vuto kupanga maganizo kapena kumanga mfundo?		
36	M'masabata anayi apitawa, kodi ntchito zanu za tsiku ndi tsiku sizimayenda bwino?		
37	M'masabata anayi apitawa, kodi mumalephera kupanga zinthu za phindu kapena zofunikira m'moyo wanu?		
38	M'masabata anayi apitawa, kodi munasiya kukhala ndi chidwi mu zinthu zosiyanasiyana?		
39	M'masabata anayi apitawa, kodi mumaziona ngati ndinu munthu wopanda ntchito kapena wosafunikira?		
40	M'masabata anayi apitawa, kodi maganizo odzipha anayamba akubwereranipo?		
41	M'masabata anayi apitawa, kodi mumamva kapena kukhala otopatopa nthawi zonse?		
42	M'masabata anayi apitawa, kodi mumakhala ndi vuto losamva bwino m'mimba?		
43	M'masabata anayi apitawa, kodi simumachedwa kutopa?		

EPDS: Tsopano ndikufunsani mafunso am'mene mwakhala mukuganizira ndikumvera masiku asanu ndi awiri apitawa. Musankhe yankho logwiridzana ndi m'mene mwakhala mukumvera masiku asanu ndi awiri apitawa.

Zongulizani yankho loyenera (44-53)

44. Masiku asanu ndi awiri apitawa, kodi mwakhala mukutha kuseka komanso kuona kusangalatsa kwa zinthu?
    [3] Olo mpang'ono komwe
    [2] Panopa osati kwambiri
    [1] Osati bwino kwambiri
    [0] Monga m'mene mumathera nthawi zonse
45. Masiku asanu ndi awiri apitawa, kodi mwakhala mukudikira ndi nsangala mu zinthu zozachitika mtsogolo?
    [3] Olo mpang'ono komwe
    [2] Panopa osati kwambiri
    [1] Osati bwino kwambiri
    [0] Monga m'mene mumathera nthawi zonse
46. Masiku asanu ndi awiri apitawa, kodi mumazida nokha mosafunikira pamene zinthu sizinayende bwino?
    [3] Nthawi zambiri
    [2] Kawirikawiri
    [1] Mwakamodzikamodzi
    [0] Sizinachitikepo □
47. Masiku asanu ndi awiri apitawa, kodi mumakhumudwa kapena kudera nkhawa popanda chifukwa chenicheni?
    [3] Kwambiri □
    [2] Nthawi zina
    [1] Sizimachitika
    [0] Olo mpang'ono pomwe

48. Masiku asanu ndi awiri apitawa, kodi mumachita mantha kapena kusowa mtendere popanda chifukwa chenicheni?

    [3] Kwambiri

    [2] Nthawi zina

    [1] Osati kwambiri

    [0] Ngakhale pang'ono □

49. Masiku asanu ndi awiri apitawa, kodi mwakhala mukuganiza kapena kumva ngati munalindi zinthu zambiri zoyenera kuchita koma simumakwanisa kuchita?

    [3] Nthawi zambiri mwakhala mukulepheratu

    [2] Nthawi zina mwakhala mukulepheratu

    [1] Nthawi zambiri mwakhala mukutha

    [0] Mwakhala mukutha ngati m'mene mumapangira nthawi

50. Masiku asanu ndi awiri apitawa, kodi mwakhala osasangalala moti mwakhala mukulephera kugona?

    [3] Nthawi zambiri

    [2] Kawirikawiri

    [1] Osati kawirikawiri

    [0] Mpang'ono pomwe □

51. Masiku asanu ndi awiri apitawa, kodi munali wokhumudwa kapena kusowa mtendere wa mumtima?

    [3] Nthawi zambiri

    [2] Kawirikawiri

    [1] Osati kawirikawiri

    [0] Mpang'ono pomwe □

52. Masiku asanu ndi awiri apitawa, kodi mwakhala osasangalala moti mwakhala mukulira?

    [3] Nthawi zambiri

    [2] Kawirikawiri

    [1] Mwakamodzikamodzi

    [0] Sizinachitikepo

53. Masiku asanu ndi awiri apitawa, kodi munakhalapo ndi maganizo ofuna kuzipweteka?

[3] Nthawi zambiri

[2] Kawirikawiri

[1] Mwakamodzikamodzi

[0] Sizinachitikepo □

GAWO LACHITATU

PRQ: Tsopano ndikufunsani mafunso okhudzana ndi zovuta zomwe amakumana nazo amayi oyembekezera (*54 -74*). Muyankhe Ayi. Pang'ono kapena Kwambiri kapenanso Eya kapena Ayi pa mafunso otsatirawa. Ngati mukukaikira, yankhani mofanizira ndi momwe mwakhala mukumvera. Ngati simukumvetsa funso, chonde funsani ndipo ndikupatsani chitsanzo chotanthauzira funsolo.

Chonde zungulizani numbala 1–6 kapena chongani Eya kapena Ayi moyenerera (54-74).

54. Kodi pathupi apa pakhala ndiubwino kwa inu? 1 2 3 4 5 6
Ayi **pang'ono** **kwambiri**

55. Kodi mukuona ngati mukakhala ndi anthu owadalira pathandizo la mmalingaliro mukabwerera kunyumba ndi mwana? 1 2 3 4 5 6
Ayi **pang'ono** **kwambiri**

Dziwani kuti mafunso nambala 56 mpaka 61 akukhudzana ndi makolo ofunikira kaya ndi amene anakuberekani kapena kungokulerani. Chonde zungulizani 6, ngati munalibe munthu amene mmamutcha mayi kapena bamboo muli wamng'ono.

56. Pamene munkakula, mukuganiza kuti amayi anu anali wokondwa kukhala nakubala? 1 2 3 4 5 6
Ayi **pang'ono** **kwambiri**

57. Pamene munkakula, mumkamva mumtima mwanu kuti amayi anu ankakudzudzulani? 1 2 3 4 5 6
Ayi **pang'ono** **kwambiri**

58. Pamene munkakula, mumkamva mumtima mwanu, kuti amayi anu amakupatsani chithandizo chokhudzana ndi malingaliro? 1 2 3 4 5 6
Ayi **pang'ono** **kwambiri**

59. Panthawi ino, kodi amayi anu amakupatsani chithandizo chokhudzana ndi mmalingaliro?
(zungulizani 6 ngati amayi anu anamwalira) 1 2 3 4 5 6

Ayi **pang'ono** **kwambiri**

60. Pamene munkakula, mumkamva mumtima mwanu kuti abambo anu ankakudzudzulani? 1 2 3 4 5 6

Ayi **pang'ono** **kwambiri**

61. Pamene munkakula, mumkamva mumtima mwanu, kuti abambo anu amakupatsani chithandizo chokhudzana ndi mmalingaliro? 1 2 3 4 5 6

Ayi **pang'ono** **kwambiri**

62. Musanakhale ndi pathupipa kodi mudakhalapo ndi nyengo ya masabata awiri kapena ochulukirapo amene kwenikweni mumtima mwanu mmamva kusautsidwa kapena nkhawa? **Ayi** ☐ **Eya** ☐

Ngati ndichoncho, kodi kukhala okhumudwako:

a. kumasokoneza kuti muthe kupanga zinthu kapena ubale wanu ndi anzanu komanso banja lanu? 1 2 3 4 5 6

Ayi **pang'ono** **kwambiri**

b. kumakupangitsani kuti mukafune thandizo kwa akadaulo (azachipatala)? **Ayi** ☐ **Eya** ☐

63. Munayamba mwauzidwapo ndi ogwira ntchito za umoyo kuti ndinu okhumudwa ndipo mukusoweka mankhwala? **Ayi** ☐ **Eya** ☐

64. Mmene muli ndi pathupipa mwakhalapo ovutika mumtima chifukwa cha nkhawa kapena kukhumudwa kwa masabata awiri kapena kuposera apo? **Ayi** ☐ **Eya**☐

Ngati ndichoncho, kodi kuvutika mumtimako:

a. kumakupangitsani kuti mukafune thandizo kwa akadaulo (azachipatala)? **Ayi** ☐ **Eya** ☐

b. kumasokoneza kuti muthe kupanga zinthu kapena ubale wanu ndi anzanu komanso banja lanu? 1 2 3 4 5 6

Ayi **pang'ono** **kwambiri**

65. Kodi ubale wanu ndi wachikondi wanu ndi woti mmapatsana chithandizo chokhudzana ndi mmalingaliro?
(ngati mulibe wachikondi zungulizani 6) 1 2 3 4 5 6
Ayi **pang'ono** **kwambiri**

66. Kodi mwakumanako ndi zothodwetsa zikuluzikulu, kusintha kapena kutaya chinthu mnyengo imene muli ndi pathupipa (Zitsanzo: umphawi, kukhala padera, kusintha nyumba, khanza za mbanja, kuferedwa)? **Ayi** ☐ **Eya** ☐

a. Ngati ndi choncho, chonde zilembeni:

_____

_____

b. Kodi zothodwetsa zimenezi zatsautsa mtima wanu ndi mlingo wotani? 1 2 3 4 5 6
Ayi **pang'ono** **kwambiri**

67. Kodi mnyengo zambiri mmaziona ngati ndinu munthu amene amakhala odandaula? 1 2 3 4 5 6
Ayi **pang'ono** **kwambiri**

68. Kodi mnyengo zambiri, kodi ndinu munthu amene amavutika kutsiriza ntchito chifukwa mukufuna kuti muyigwire molondola bwino lomwe? 1 2 3 4 5 6
Ayi **pang'ono** **kwambiri**

69. Kodi mnyengo zambiri mmazikonda nokha ngati munthu? 1 2 3 4 5 6
Ayi **pang'ono** **kwambiri**

70. Kodi munayamba mwachitiridwapo chinthu choipa pa thupi lanu mmene mmakula? **Ayi** ☐ **Eya** ☐

71. Kodi munayamba mwagwiriridwapo panthawi imene mmakula? **Ayi** ☐ **Eya** ☐

ZIKOMO KWAMBIRI POTENGAKO GAWO PA KAFUKUFUKU

Appendix 3: Data collection Instrument for sensitivity analysis study (Study 3): the MINI

MAJOR DEPRESSIVE EPISODE MODULE FOR MINI

Circle the response which apply against each question

A1. Have you been consistently depressed or down, most of the day, nearly every day, for the past two weeks? NO YES

A2. In the past two weeks, have you been much less interested in most things or much less able to enjoy the things you used to enjoy most of the time? NO YES

IS **A1** OR **A2** CODED **YES?** NO YES

A3. **Over the past two weeks, when you felt depressed or uninterested:**

a. Was your appetite decreased or increased nearly every day? Did your weight decrease or increase without trying intentionally (±3.5 kgs person in a month)? NO YES

IF **YES** TO EITHER, CODE **YES**.

b. Did you have trouble sleeping nearly every night (difficulty falling asleep, waking up in the middle of the night, early morning wakening or sleeping excessively)? NO YES

c. Did you talk or move more slowly than normal or were you fidgety, restless or having trouble sitting still almost every day? NO YES

d. Did you feel tired or without energy almost every day? NO YES

e. Did you feel worthless or guilty almost every day? NO YES

f. Did you have difficulty concentrating or making decisions almost every day? NO YES

g. Did you repeatedly consider hurting yourself, feel suicidal, or wish that you were dead? NO YES

To meet criteria for current episode of depression at least one symptom A1 or A2 plus four of A3 are coded YES; or both A1 and A2 plus three or more are coded YES for A3

NO YES
MAJOR DEPRESSION

THANK YOU VERY MUCH FOR YOUR PARTICIPATION IN THIS STUDY

Appendix 4: Data collection Instrument for sensitivity analysis study (Study 3): the MINI (Chichewa version)

GAWO LOYEZERA KUKHUMUDWA KWA KUKULU LA MINI

Chongani yankho loyenera pa funso lirilonse

A1. Kodi mwakhalapo okhumudwa mwachizolowezi, kwa nthawi yayitali pa tsiku, pafupipifupi tsiku liri lonse mmasabata awiri apitawa? AYI EYA

A2. Mmasabata awiri apitawa, kodi mwakhalapo opanda chidwi kwambiri ndi zinthu zochuluka kapena kusangalatsidwa mochepera ndi zinthu zomwe munkasangalala nazo nthawi zambiri kale? AYI EYA

KODI **A1** KAPENA **A2** WAYANKHINDWA KUTI EYA? AYI EYA

A3. **Mmasabata awiri omwe munali okhumudwa kapena opanda chidwi:**

a. kodi chilakolako cha chakudya chimakula kapena chimachepa tsiku liri lonse? kodi munawonda kapena kunenepa osati mwakufuna kwanu (+/-3.5 kilogaramu pa mwezi)? AYI EYA

   NGATI NDI **EYA** KUTI MUNANENEPA KAPENA KUWONDA, YANKHANI **EYA**

b. Kodi mumavutika kugona pafupifupi usiku uli wonse? (kulephera kuti tulo tibwere, kudzuka mkati mwausiku, kudzuka mbandakucha kapena kugona mopyolera muyeso?) AYI EYA

c. Kodi mmalankhula kapena kuyenda pangónopangóno kusiyana ndi mmene zimakhalira nthawi zonse kapena mmanjenjemera, mmakhala kakalakakala kapena kukanika kukhala malo amodzi pafupifupi tsiku liri lonse? AYI EYA

d. Kodi mumamva kutopa kapena kukhala opanda mphamvu pafupifupi tsiku liri lonse? AYI EYA

e. Kodi mumtima mwanu mumamva kuti ndinu munthu osafunikira kapena ochimwa pafupifupi tsiku liri lonse? AYI EYA

f. Kodi mumavutika kuti muchite chinthu chimodzi pa nthawi imodzi kapena kumanga mfundo pafupifupi tsiku liri lonse? AYI EYA

g. Kodi mudaganizirako mobwerezabwereza zofuna kuzivulava nokha, kufuna kuzipha kupena kufuna kuti mutafa? AYI EYA

Kuti afikire pa mlingo wakukhumudwa kwa panopa pafupifupi chizindikiro chomodzi cha **A1** kapena **A2** kuphatikizapo zizindikiro zinayi za **A3** ziyankhidwe kuti **EYA**; kapena zizindikiro ziwiri zonse **A1** ndi **A2** kuphatikiza zitatu kapena zoposera apo zayankhidwa kuti **EYA** pa **A3**

AYI EYA
KUKHUMUDWA KWAKUKULU

ZIKOMO KWAMBIRI POTENGA NAWO GAWO PA KAFUKUFUKUYU

Appendix 5: Workshop agenda, evidence for screening protocol and a draft screening protocol

AGENDA FOR THE WORKSHOP

To develop screening protocol for screening antenatal depression.

EVIDENCE FOR THE SCREENING PROTOCOL

I would like to share with you the evidence for the protocol that was previously generated and may be helpful for you to consider as we progress in today's session.

The Government of Malawi considers depression as a priority condition although screening protocol for antenatal depression is lacking. In this research study, a series of studies were conducted to generate local evidence, which could be used to inform the development of a screening protocol. A summary of evidence that informed the screening protocol development is as follows:

Evidence of local prevalence and risk factors

Using the EPDS, the prevalence rate of depression among pregnant women in Blantyre district was found to be very high (19%) (Study 2: Paper 2). The prevalence estimates yielded by other instruments ranged from 12.9% (SRQ) to 42.1% (3-item screener), with no significant differences, except for the 3-item screener (Study 2: Paper 3). The prevalence of major depression based on the MINI in the sub-sample of 97 pregnant women was 25.8% (n=25) (Study 3: Paper 4). In this context, major risk factors for depression identified from research were: being distressed by anxiety or depression; lacking support from partner; experiencing major stresses during pregnancy; and history of feeling miserable or depressed

before pregnancy and history of poor relationship with the father during childhood (Study 2: Paper 2).

Published evidence of screening instruments for depression in antenatal care in low resource settings

A systematic review was conducted which identified instruments for screening of depression in low resource settings including Malawi. The EPDSwas found to be the most widely used screening instrument with highest level of accuracy (AUC=.965) (Study 1: Paper 1) (Chorwe-Sungani & Chipps, 2017).

Performance of screening instruments in local settting

In determining, performance of screening instruments, variations were found to exist (Study 2: Paper 3). There were performance differences in the proportions of screen positives with significant systematic differences between proportions of screen positives of PRQ and SRQ ($p<.001$), EPDS and HSCL-15 ($p=.001$), HSCL and PRQ ($p<.001$), and EPDS and SRQ ($p<.001$). Screen positive results on the HSCL-15, the PRQ, the 3-item screener and the EPDS were found to differ by variables such as “being on their own” which resulted in respondents having ≥3 times chances to screen positive on these four instruments. The screen positive results on SRQ were found not to differ by age, education, employment status, marital status, setting, gestation and number of pregnancies (Study 2: Paper 3). With regard to validity and utility of instruments, the 3-item screener, EPDS, HSCL-15 and SRQ were valid instruments for screening antenatal depression. The sequential combination of the 3-item screener and SRQ appeared to be a practical, accurate and suitable method for multistage screening of depression in this local setting (Study 3: Paper 4).

DRAFT SCREENING PROTOCOL FOR ANTENATAL DEPRESSION

The screening protocol, seeks to facilitate provision of maternal mental health care that is not readily accessible to pregnant women during antenatal. It is underpinned by the proposition that routine screening in antenatal clinics improves detection of pregnant women with depression and midwives can be trained to effectively screen for antenatal depression, offer psychoeducation and, make appropriate referals.

Aim

The purpose of the screening protocol is to ensure a standardised and quality assured approach for detecting and dealing with pregnant women who have, or are at risk of developing depression. The protocol will thus aim to improve the health of pregnant women and children they are expecting. It will allow involvement of pregnant women and their families in discussions about their care and treatment options. It will also ensure that information about pregnant women with depression is documented and shared appropriately with all relevant practitioners providing care.

Scope

The proposed screening protocol is specifically designed for pregnant women with depression and it is not intended to cover the whole spectrum of pregnant women with other mental disorders. This screening protocol focuses at improving the quality and accessibility of maternal mental health care by integrating routine screening of depression into antenatal services so that pregnant women at with or risk of depression are timely detected and commenced on appropriate treatment. The protocol is intended to reflect optimum practice in routine screening of depression and the management of pregnant women at risk or with depression in antenatal clinics in Malawi.

Objectives

The objectives of the protocol are to:

1. Improve the identification, detection and care of pregnant women who have or are at risk of developing depression;
2. Ensure that pregnant women who may be vulnerable to depression have their needs identified at an early stage in their pregnancy, to allow appropriate supports to be put in place;
3. Support pregnant women and their families to be involved in discussions about their care and treatment options;
4. Advocate that practitioners who are supporting pregnant women and their families in antenatal clinics have the appropriate skills and expertise through training and development to meet the needs of pregnant women who have or may be at risk of depression; and
5. Ensure that information is documented and shared appropriately with all relevant practitioners providing care to the pregnant woman.

The principles underpinning SPADe

The following principles will enable the SPADe to be useful in the context of antenatal clinics in Malawi:

1. The SPADe should facilitate human rights based screening of depression which will ensure non-discrimination, participation and accountability;
2. The SPADe should be based on the clinical needs of pregnant women and clinicians involved in the provision of health services in antenatal clinics;

3. The SPADe should be owned by the midwifery profession which should take a leading role in lobbying for integration of routine screening of depression into antenatal services and policy; and
4. A change management plan for the implementation of the SPADe need to be developed.

Structural and functional aspects of the protocol

The protocol proposes roles and organisational arrangements which are crucial for effective multidisciplinary approach to routine screening of depression in antenatal clinics. This is diagrammatically presented in the algorithm for this protocol (Figure 1). There is evidence which indicate that collaborative care for adults with depression produces substantial clinical improvements and has a high prospect of long-term cost savings (Unützer et al., 2008). The United States Preventive Services Task Force (USPSTF) recommends collaborative care which has shown to be effective in treatment of depression in adults (Siu et al., 2016). Collaborative care of depression include a systematic, multicomponent, and team-based approach that strengthens and supports self-care, while assuring that effective medical, preventive, and health maintenance interventions take place to improve the quality and outcome of patient care (Siu et al., 2016). Therefore, the protocol recommends effective collaboration of antenatal services and mental health services for effective screening of antenatal depression.

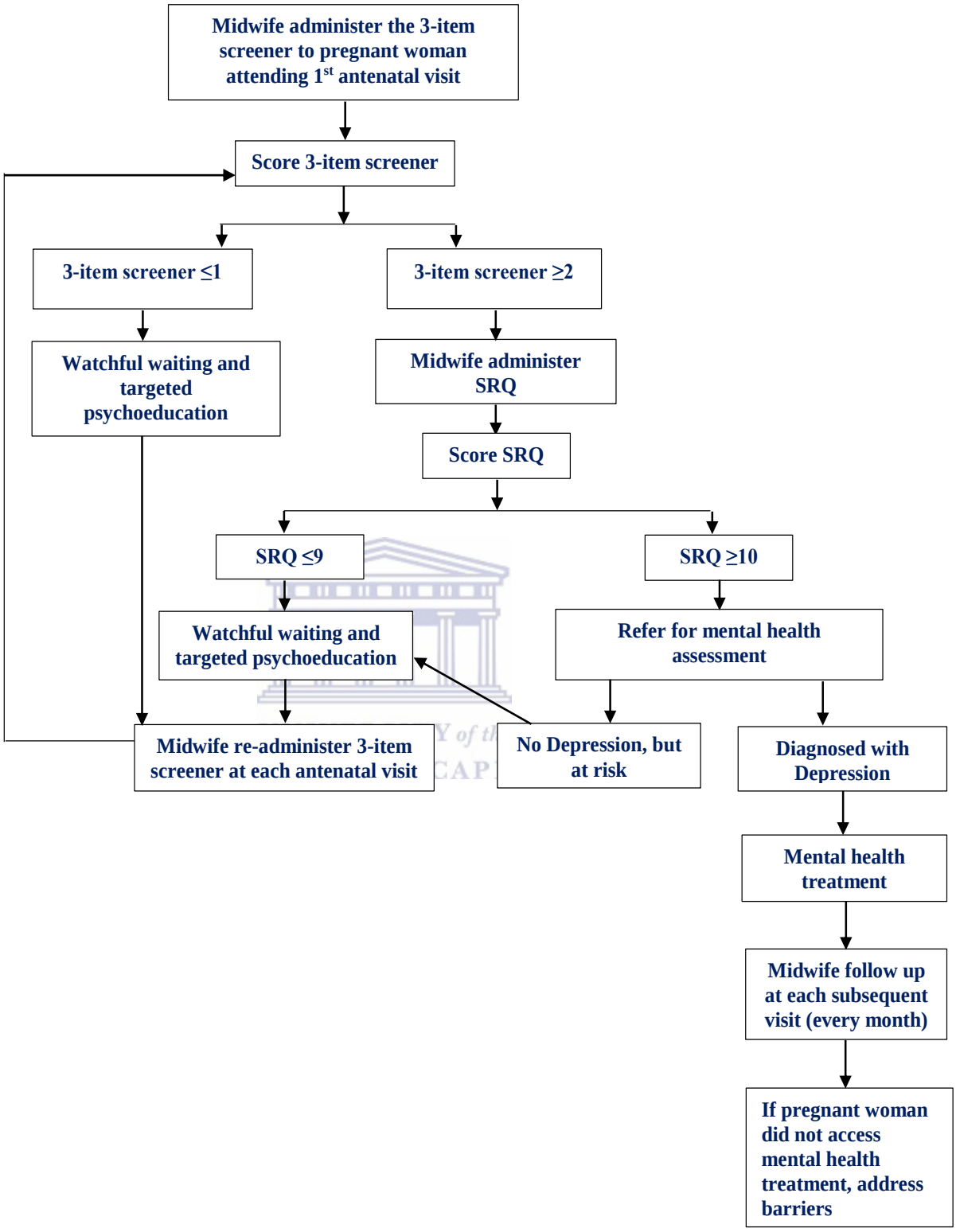

Figure 1: Algorithm for screening of antenatal depression

Antenatal services

Midwives provide antenatal care for the majority of women attending antenatal clinics in Malawi. All pregnant women should be screened of depression at their antenatal booking and subsequent visits to identify women with or at risk of depression. Identifying the need for early intervention is important when planning care and can often prevent escalation or deterioration of a situation.

- Midwife should initially screen all pregnant women with the 3-item screener during history taking at intitial antenatal visit and just before physical examinations at subsquent visits;
- Midwife should immediately administer Self Reporting Questionnaire (SRQ) to all pregnant women who screen positive on the 3-item screener;
- Midwife should immediately refer any pregnant woman who screen positive on SRQ for further diagnostic mental health aseessment to confirm presence of diagnosis and access to specialised treatment;
- Midwife should refer to mental health services immediately or within 24 hours any pregnant woman at risk of suicide (who answers 'Yes' to items 16 and/or 17 on SRQ). It should be considered as an emergency if any woman is at risk of committing suicide;
- Midwife should actively monitor pregnant women who screen negative on the 3-item screener or SRQ "Watchful waiting". Which involves monitoring of depressive symptoms without any active treatment;
- Midwife should provide targeted psychoeducation to all pregnant women who screen positive or negative on the 3-item screener or SRQ;
- Midwife should conduct diagnostic assessment using the MINI on all pregnant women who screened positive on SRQ to confirm presence or absence of depression;
- Midwife should refer all pregnant women confirmed with depression to a psychiatric unit

- Midwife needs to document all information regarding the woman's diagnosis of depression, medication and other therapies in the Woman's Health Passport.
- If a pregnant woman is already involved with mental health services, midwife should continue close liaison with them;
- Midwife needs to ensure that the woman understands the boundaries of confidentiality and that in some circumstances certain information may require to be shared with others.
- If a pregnant woman is on antidepressant medication, midwife should discuss with mental health specialist if involved, if not involved, refer to mental health services;
- Midwife should document all missed appointments in Woman's Health Passport and communicate with other services involved in providing support to a pregnant woman with or at risk of depression;
- Midwife should identify and address issues that made a pregnant woman to miss her appointments;
- Any deterioration in mental health state throughout the patient's journey should result in urgent referral to mental health services;

Screening instruments

The 3-item screener

1. During the past month, have you been bothered by feeling down, depressed or hopeless? NO YES
2. During the past month, have you been bothered by little interest or pleasure in doing things? NO YES
3. Are you depressed? NO YES

Total Score: _____

0-1=Non-probable depression case
2-3=Probable depression case

Self-Reporting Questionnaire (SRQ)

With reference to the past thirty days:

1. Do you often have headaches? NO YES
2. Is your appetite poor? NO YES
3. Do you sleep badly? NO YES
4. Are you easily frightened? NO YES
5. Do your hands shakes? NO YES
6. Do you feel nervous, tense or worried? NO YES
7. Is your digestion poor? NO YES
8. Do you have trouble thinking clearly? NO YES
9. Do you feel unhappy? NO YES
10. Do you cry more than usual? NO YES
11. Do you find it difficult to enjoy your daily activities? NO YES
12. Do you find it difficult to make decisions? NO YES
13. Is your daily work suffering? NO YES
14. Are you unable to play a useful part in life? NO YES
15. Have you lost interest in things? NO YES
16. Do you feel that you are a worthless person? NO YES
17. Has the thought of ending your life been on your mind? NO YES
18. Do you feel tired all the time? NO YES
19. Do you have uncomfortable feelings in your stomach? NO YES
20. Are you easily tired? NO YES

Total Score: _____

0-9=Non-probable depression case

10-20=Probable depression case

Major depressive episode module for the MINI

A1. Have you been consistently depressed or down, most of the day, nearly every day, for the past two weeks? NO YES

A2. In the past two weeks, have you been much less interested in most things or much less able to enjoy the things you used to enjoy most of the time? NO YES

IS **A1** OR **A2** CODED **YES?** NO YES

A3. **Over the past two weeks, when you felt depressed or uninterested:**

a. Was your appetite decreased or increased nearly every day? Did your weight decrease or increase without trying intentionally (i.e., by ±5% of body weight or ±8 lbs. or ±3.5 kgs., for a 160 lb./70 kg person in a month)? NO YES
   IF **YES** TO EITHER, CODE **YES**.
b. Did you have trouble sleeping nearly every night (difficulty falling asleep, waking up in the middle of the night, early morning wakening or sleeping excessively)? NO YES
c. Did you talk or move more slowly than normal or were you fidgety, restless or having trouble sitting still almost every day? NO YES
d. Did you feel tired or without energy almost every day? NO YES
e. Did you feel worthless or guilty almost every day? NO YES
f. Did you have difficulty concentrating or making decisions almost every day? NO YES
g. Did you repeatedly consider hurting yourself, feel suicidal, or wish that you were dead? NO YES

To meet criteria for current episode of depression at least one symptom A1 or A2 plus four of A3 are coded YES; or both A1 and A2 plus three or more are coded YES for A3

NO YES
MAJOR DEPRESSION

Scoring the 3-item screener, SRQ and the MINI

1. Assign a score to each of the responses as follows: No=0 and Yes=1;
2. Add up total score questions 1-3 of the 3-item screener. If the 3-item screener score is 2 or greater, continue with SRQ. If the 3-item screener score is 1, stop;
3. For SRQ, add up the total score for questions 1-20. Assign a score. If a score is >9 or greater, Refer to Psychiatric. If SRQ score is 9 or less, stop;
4. If any positive response to questions 16 and 17 of SRQ proceed with suicideality screening questions; and
5. As for the MINI, to meet criteria for current or past episode of depression, at least one symptom of A1 or A2 plus four of A3 are coded YES; or both A1 and A2 plus three or more are coded YES for A3.

Appendix 6: Ethics approval letter from University of the Western Cape

UNIVERSITY of the
WESTERN CAPE

OFFICE OF THE DEAN
DEPARTMENT OF RESEARCH DEVELOPMENT

01 September 2015

To Whom It May Concern

I hereby certify that the Senate Research Committee of the University of the Western Cape approved the methodology and ethics of the following research project by:
Mr G Chorwe-Sungani (School of Nursing)

Research Project:	Development of a screening protocol for depression in antenatal clinics in Malawi.
Registration no:	15/6/3

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

Private Bag X17, Bellville 7535, South Africa
T: +27 21 959 2988/2948 . F: +27 21 959 3170
E: pjosias@uwc.ac.za
www.uwc.ac.za

Appendix 7: Ethics approval letter from University of Malawi

CERTIFICATE OF ETHICS APPROVAL

This is to certify that the College of Medicine Research and Ethics Committee (COMREC) has reviewed and approved a study entitled:

P.10/15/1810 – Development of a screening protocol for depression in antenatal clinics in Malawi by Mr. Genesis Chorwe-Sungani

On 6 November 2015

As you proceed with the implementation of your study, we would like you to adhere to international ethical guidelines, national guidelines and all requirements by COMREC as indicated on the next page

Dr. C. Dzamalala- Chairperson (COMREC)

Approved by College of Medicine
06 NOV 2015
(COMREC) Research and Ethics Committee

6th Nov, 2015
Date

Appendix 8: Clearance letter from Blantyre District Health Office

Telephone: Blantyre 01875332 / 01877401
Fax: 01872551/01 878 539

Communication should be addressed to:

The District Health Officer

In reply please quote No. .....

MINISTRY OF HEALTH AND POPULATION
DISTRICT HEALTH OFFICE
P/BAG 66
BLANTYRE
MALAWI

Ref. NO. BTDHO/MED/9

8th July, 2015

Mr. Genesis Chorwe- Sungani
Kamuzu College of Nursing
P.O Box 415
BLANTYRE

Dear Sir,

REQUEST FOR PERMISSION TO CONDUCT RESEARCH STUDY

I am pleased to inform you that Blantyre District Health Office has granted you permission to use our Health Facilities for your study entitled **Development of a screening protocol for depression in antenatal clinics in Malawi** for your thesis.

However, this is subject to approval by College of Medicine Research Ethics Committee (COMREC).

Yours sincerely,

Dr. Medson Matchaya
DISTRICT HEALTH OFFICER

Appendix 9: Information sheet

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 3482 Fax: 27 21-959 2679

E-mail: 3568867@myuwc.ac.za

Revised: September 2014

INFORMATION SHEET

Study Title: Development of a screening protocol for depression in antenatal clinics in Malawi.

What is this study about?

This is a research study being conducted by Genesis Chorwe-Sungani_ at the University of the Western Cape. We are inviting you to participate in this research study because you are pregnant and pregnant women are at risk of depression. The purpose of this research study is to develop a screening protocol for depression in antenatal clinics in Malawi.

What will I be asked to do if I agree to participate?

You will be asked to undergo an oral interview in a private room within this clinic. The interview will last for 30 minutes. You might also be selected to undergo a subsequent 30 minutes interview afterwards. You will be asked about signs and symptoms of depression during the interview. Furthermore, you will be asked about psychosocial risk factors for depression which you might have experienced.

Would my participation in this study be kept confidential?

The researchers undertake to protect your identity and the nature of your contribution. To ensure your anonymity, the survey will not contain information that may personally identify you. Your name will not be included on the surveys and other collected data; (2) a code will be placed on the survey and other collected data; (3) through the use of an identification key, the researcher will be able to link your survey to your identity; and (4) only the researcher will have access to the identification key. Your responses in this survey will not be linked to your identification particulars by reporting aggregated data only in our research report or any publication that will come out of this study. They will also be informed that all hard copies of data collected will be locked in a cabinet at University of the Western Cape and will be incinerated after five years. As for electronic data, it will be secured by a password known only to the researcher and would be deleted from the storage device after five years.

In accordance with legal requirements and/or professional standards, we will disclose to the appropriate individuals and/or authorities information that comes to our attention concerning intimate partner violence or abuse or potential harm to you or others. In this event, we will inform you that we have to break confidentiality to fulfil our legal responsibility to report to the designated authorities.

What are the risks of this research?

There may be some risks from participating in this study because all human interactions and talking about self or others carry some amount of risks. We will nevertheless minimise such risks and act promptly to assist you if you experience any discomfort, psychological or otherwise during the process of your participation in this study. Where necessary, an appropriate referral will be made to a suitable professional for further assistance or intervention.

What are the benefits of this research?

This research is not designed to help you personally, but the results may help the investigator learn more about depression and its psychosocial risk factors during pregnancy. We hope that, in the future, other pregnant women might benefit from this study through improved understanding of what pregnant women with depression experience. This may help health professionals to develop effective interventions for depression which affect women during pregnancy

Do I have to be in this research and may I stop participating at any time?

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. In the event that the researcher notices that you cannot withstand the interview due to your emotional or physical state, your participation will be terminated by the investigator without regard to your consent.

What if I have questions?

This research is being conducted by Genesis Chorwe-Sungani of School of Nursing at the University of the Western Cape. If you have any questions about the study itself, please contact Genesis Chorwe-Sungani at: School of Nursing, University of the Western Cape, Private Bag X 17, Bellville 7535, South Africa, Cell: 0768868858, Email: 3568867@myuwc.ac.za or

Kamuzu College of Nursing, P. O. Box 415, Blantyre. Cell: 0991167079.

Email:genesischorwe@kcn.unima.mw

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Prof Karien Jooste

Head of Department

School of Nursing, University of the Western Cape

Private Bag X17, Bellville 7535

Prof José Frantz

Dean of the Faculty of Community and Health Sciences

University of the Western Cape

Private Bag X17, Bellville 7535

chs-deansoffice@uwc.ac.za

This research has been approved by the University of the Western Cape's Senate Research Committee. (REFERENCE NUMBER: 15/6/3)

Appendix 10: Information sheet (Chichewa Version)

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 3482 Fax: 27 21-959 2679

E-mail: 3568867@myuwc.ac.za

Revised: September 2014

INFORMATION SHEET (Chichewa version)

Research study Title: Kukonza ndondomeko yoyezera matenda okhumudwa msikelo za amayi oyembekezera ku Malawi.

Kodi kafukufukuyi ndi wotani?

Kafukufukuyi akupangidwa ndi Genesis Chorwe-Sungani wa kusukulu ya ukachenjede ya University of the Western Cape. Tikupemphani kuti mutenge nawo gawo pakafukufukuyi chifukwa choti muli ndi pathupi ndipo muli pa chiopsezo chokhala ndi matenda okhumudwa. Cholinga chakafukufukuyi ndi kukonza ndondomeko yoyezera matenda okhumudwa msikelo za amayi oyembekezera ku Malawi.

Kodi ndidzafunsidwa kuchita chiyani ndikavomereza kutenga nawo gawo pa kafukufuku?

Mudzafunsidwa mafunso muli mchipinda moduka mphepo pachipatala pompano. Kufunsidwa kwa mafunsowa kudzatenga mphindi zokwana makumi atatu. Mukhozanso kusankhidwa kukafunsidwa mafunso ena otsatira kwa mphindi zina makumi atatu. Mudzafunsidwa zokhudza zizindikiro za matenda okhumudwa. Kuonjezera apo mudzafunsidwa zokhudza zinthu zomwe mmakumana nazo zomwe zimakuyikani pachiwopsezo cha matenda okhumudwa.

Kodi kutenga nawo gawo kwanga pakafukufukuyu kudzakhala kwa chinsinsi?

Opanga kafukufuku akuvomereza kuteteza umunthu wanu ndi zinthu zomwe mudzatiuze. Pofuna kuwonetsetsa kuti musadziwike, mkafukufukuyi simudzakhala zinthu zomwe zingapangitse kuti mudziwike. Dzina lanu siridzakhala gawo la zomwe kafukufuku adzatolere; (2) dzina lodzimbayitsa (nambala) lidzayikidwa pa khweshoniya ndi zina zomwe zizatoleredwe; (3) kudzera munjira yodziwira amene wayankha khweshoniya, opanga kafukufuku adzatha kudziwa khweshoniya yanu; ndi (4) opanga kafukufuku yekha ndi amene adzakhale ndi njira yodziwira amene wayankha khweshoniya. Mayankho anu mkafukufukuyi sadzalumikizidwa ndi zinthu zomwe zingapangitse kuti inu mudziwike polemba zotsatira zomwe ziri zophatikizana ndi za ena mu lipoti la kafukufukuyi kapena zotsatira zina zones zochokera mkafukufukuyi zomwe zizatsindikizidwe. Otenga gawo pakafukufuku adzadziwitsidwa kuti zonse zolembedwa papepala zokhudza kafukufukuyi zidzasungidwa mukabati yokiyidwa kusukuku ya ukachenjede ya University of the Western Cape ndipo zidzaotchedwa ndi moto pakadzadutsa zaka zisanu. Kwazonse zokhudza kafukufuku zomwe zidzasungidwe pa komputa, zidzatetezedwa ndi dzina lotsekulira la chinsinsi (pasiwedi) lomwe lidzakhala lodziwika kwa opanga kafukufuku yekha ndipo zidzafufutidwa muzida momwe zidzasungidwe pakadzadutsa zaka zisanu.

Molingana ndi mmene malamulo akunenera ndiponso ndondomeko zogwirira ntchito mwaukadaulo, tidzaulula kwa anthu oyenerera kapena adindo zomwe tizadziwitsidwe zokhuza khanza zochitirana anthu amene ali mchikondi kapena chiopsezo choti mutha kuvulazidwa kapena ena. Izi zikadzachitika, tidzakuuzani kuti ife sitisunga chinsinsi kuti tikwaniritse undindo omwe tili nawo mmalamulo podziwitsa adindo oyenerera.

Kodi ndi zovuta ziti zomwe zingadze ndi kafukufukuyi?

Pakhoza kukhala zovuta zina chifukwa chotengapo gawo pakafukufukuyi chifukwa kuchezerana kwa anthu kwina kuli konse ndipo kuyankhula za iwe mwini kapena ena kumakhalabe ndi zovuta zina. Tidzayetsetsabe kuchepetsa zovutazo ndi kupereka thandizo lapompopompo ngati mudzamve kutsautsidwa kwina kulikonse, mmalingaliro kapena zina, panthawi imene mukupanga nawo kafukufukuyi. Pamene padzafunikire, mudzatumizidwa moyenerera kwa akadaulo woyenera kuti mukalandire thandizo.

Kodi kafukufukuyi ali ndi phindu lanji?

Kafukufukuyi sanakonzedwe kuti inu mupindule panokha, koma zotsatira zikhodza kuthandiza opanga kafukufuku kuphunzira zambiri zokhudza matenda okhumudwa komanso zinthu zomwe zimayika pachiopsezo cha matendawa kwa a mayi omwe ali ndi pathupi. Tili ndi chiyembekezo kuti mtsogolomu amayi ena omwe adzakhale ali ndi pathupi akhodza kudzapindula ndi kafukufukuyu kudzera mukumvetsa mozama zomwe amayi apathupi omwe ali ndi matenda okhumudwa amakumana nazo. Izi zikhoza kudzathandiza akadaulo kuti akonze njira zodalirika zochizira matenda okhumudwa omwe amagwira amayi amene ali ndi pathupi.

Kodi ndikhoza kukhala mkafukufukuyi ndipo ndikhoza kusiya kutengapo gawo mkafukufukuyi nthawi ina ili yonse?

Kutenganawo gawo kwanu pa kafukufukuyi ndimwakufuna kwanu mopanda kukakamizidwa kwina kuli konse. Mukhoza kusankha kusatenga nawo gawo. Ngati mungasankhe kutenga nawo gawo pakafukufukuyi, mukhoza kusiya kutenga nawo gawo nthawi ina ili yonse. Ngati musankhe kusatenga nawo gawo mkafukufukuyi kapena ngati mungasiye kutenga nawo gawo pakafukufukuyi nthawi ina ili yonse, simudzalandira chilango kapena kuluza phindu lina liri lonse lomwe liri lokuyenerani. Zikadzachitika kuti opanga kafukufuku waona kuti

simungathe kupitiliza kuyankha mafunso chifukwa mmene mukumvera mumtima mwanu kapena mthupi, kutengapo gawo kwanu kwa pakafukufuku kudzayimitsidwa ndi opangitsa kafukufukuyi popanda kuganizira chirolezo chanu.

Kodi nanga ngati ndiri ndi mafunso?

Kafukufukuyi akupangidwa ndi Genesis Chorwe-Sungani wa kusukulu ya ukadaulo ya anamwino ya University of the Western Cape. Ngati muli ndi funso liri lonse lokhudza kafukufukuyi, chonde lankhulani ndi a Genesis Chorwe-Sungani aku: School of Nursing, University of the Western Cape, Private Bag X 17, Bellville 7535, South Africa, Cell: 0768868858, Email: 3568867@myuwc.ac.za kapena

Kamuzu College of Nursing, P. O. Box 415, Blantyre. Cell: 0991167079. Email: genesischorwe@kcn.unima.mw

Ngati mungakhale ndi mafunso ena ali onse lokhudzana ndi kafukufukuyi ndi ufulu wanu ngati otenga nawo gawo pakafukufuku kapena ngati mukufuna kuneneza za mavuto amene mwakumana nawo kukhudzana ndi kafukufuku, chonde lankhulani:

Prof Karien Jooste
Head of Department
School of Nursing, University of the Western Cape
Private Bag X17, Bellville 7535

Prof José Frantz

Dean of the Faculty of Community and Health Sciences
University of the Western Cape
Private Bag X17, Bellville 7535
chs-deansoffice@uwc.ac.za
Kafukufukuyi anavomerezedwa ndi komiti yoona zakafukufuku ya kusukulu ya zaukadaulo ya University of the Western Cape's Senate Research Committee. (REFERENCE NUMBER:15/6/3)

Appendix 11: Consent form

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 3482 Fax: 27 21-959 2679

E-mail: 3568867@myuwc.ac.za

CONSENT FORM

Title of research study: Development of a screening protocol for depression in antenatal clinics in Malawi

The research study has been described to me in language that I understand. My questions about the study have been answered. I understand what my participation will involve and I agree to participate of my own choice and free will. I understand that my identity will not be disclosed to anyone. I understand that I may withdraw from the study at any time without giving a reason and without fear of negative consequences or loss of benefits.

Participant's name……..

Participant's signature…….

Date……

Appendix 12: Consent form (Chichewa Version)

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 3482 Fax: 27 21-959 2679

E-mail: 3568867@myuwc.ac.za

CONSENT FORM (Chichewa Version)

Mutu wa kafukufuku: Kukonza ndondomeko yoyezera matenda okhumudwa msikelo za amayi oyembekezera ku Malawi

Kafukufukuyu amufotokoza mchilankhulo chomwe ndimamva bwino. Mafunso anga okhudza kafukufukuyu ayankhidwa. Ndikuzindikira zomwe zizachitike potenga nawo gawo pa kafukufuku ndipo ndavomereza kutenga nawo gawo mwakufuna kwanga ndipo mosakakamizidwa. Ndikuzindikira kuti zinthu zomwe zingapangitse kuti ndidziwike sizidzaululidwa kwa wina ali yense. Ndikuzindikira kuti ndikhoza kusiya kutenga nawo gawo pakafukufuku nthawi ina iliyonse popanda kupereka chifukwa ndipo mopanda mantha a zotsatira zovuta kapena kuluza phindu.

Dzina la otenga nawo gawo pa kafukufuku…….

Sayini ya otenga nawo gawo pa kafukufuku …….

Tsiku……

Appendix 13: Editor's decision on Paper 3

genesis chorwe <genesischorwe@kcn.unima.mw>

Malawi Medical Journal - Decision on Manuscript ID MMJ-2017-09-0207.R2

15 messages

Malawi Medical Journal <onbehalfof@manuscriptcentral.com> 30 January 2018 at 06:56
Reply-To: mandal@medcol.mw
To: genesischorwe@kcn.unima.mw
Cc: editors@mmj.mw, fmbickton@stud.medcol.mw, genesischorwe@kcn.unima.mw, jchipps@uwc.ac.za

30-Jan-2018

Dear Mr. Chorwe-Sungani:

It is a pleasure to accept your manuscript entitled "Performance of the 3-item screener, Edinburgh Postnatal Depression Scale, Hopkins Symptoms Checklist-15, Self-Reporting Questionnaire and Pregnancy Risk Questionnaire in screening of depression in antenatal clinics in Blantyre district, Malawi" for publication in the Malawi Medical Journal.

Before we can proceed further with this manuscript, you could help facilitate the accurate publication of your manuscript by completing the following:

1. Ensuring that the references are correctly cited in accordance with the Journal requirements
2. Review the language content and correct any grammatical errors. At this stage we do not accept any changes to scientific content (including graphs and tables). Any changes to the scientific content (including graphs and tables) will require editorial review and approval.
3. Please check the author/editor names very carefully to ensure correct spelling, correct sequence of given and family names and that the given and family names have been correctly designated

Please submit your corrections within 14 working days

The MMJ editorial team is working to highlight our published articles through social media. In your email to the mmj@medcol.mw, please include a shortened version of the manuscript's title (a maximum of 60 characters, including spaces) for use in MMJ's Twitter posts. Please also include, if available, the Twitter username of each author.

As your article is open access, readers will be able to download and print the PDF, and access the full-text HTML as usual. We encourage you to click the sharing buttons at the bottom of your manuscript as sharing your paper is a great way to improve the visibility of your work.

Thank you for your fine contribution. On behalf of the Editors of the Malawi Medical Journal, we look forward to your continued contributions to the Journal.

Sincerely,
Dr. Lucinda Manda-Taylor
Editor in Chief, Malawi Medical Journal

Appendix 14: Data from Nominal Technique study (Workshops 1and 2)

Workshop 1: List of ideas with scores assigned by participants on a scale of 1 to 10

No	IDEA	SCORE										TOTAL
		1	2	3	4	5	6	7	8	9	10	
1	Protocol will provide a systematic and uniform method for early detection of depression	-	2	6	4	-	-	7	-	9	10	**38**
2	Screening protocol will be cumbersome for staff to use without proper training	-	-	-	-	-	-	-	-	-	-	**0**
3	Idea 3-Proposed screening protocol is simple and easy to understand	-	2	-	-	5	6	-	-	9	10	**32**
4	Protocol will help in preventing miscarriages	-	-	-	-	-	-	-	-	-	-	**0**
5	History taking at initial antenatal visit is best time for screening	-	-	-	-	5	-	-	8	9	-	**22**
6	The 3-item screener should be included in the current assessment guide for antenatal women (Yellow woman's health passport book)	-	-	-	-	-	6	7	8	-	10	**31**
7	Screen for depression during preconception care	1	-	-	-	-	-	-	-	-	-	**1**
8	Midwives should administer the 3-item screener to all pregnant women at every visit	-	-	-	4	-	6	-	-	-	10	**20**
9	Midwives should administer the SRQ to all pregnant women who screen positive on the 3-item screener	-	4	3	4	5	-	-	8	-	-	**24**
10	Mental health specialists should attend to pregnant women who screen positive on SRQ or with confirmed depression within antenatal clinics	-	-	3	4	-	-	-	8	-	-	**15**
11	It is feasible to implement the screening protocol if midwives are trained in using the screening protocol for antenatal depression properly	-	-	3	4	10	6	7	8	9	-	**47**
12	Involve family members in the screening programme for antenatal depression	1	2	-	-	-	-	-	-	9	10	**22**
13	Additional staff to be assigned to screen for depression	-	-	-	-	-	6	7	-	-	-	**13**
14	Adequate space, time and stationery will be needed	3	-	-	-	-	-	-	-	-	-	**3**
15	Midwives should know risk factors, and signs and symptoms of depression	-	-	-	4	-	-	14	-	-	-	**18**
16	Midwives should refer to mental health specialists all pregnant women who screen positive on SRQ	-	2	-	-	-	-	-	8	-	10	**20**
17	Include screening for depression in the Malawi Sexual and Reproductive Health Policy	1	-	3	-	-	-	-	8	9	-	**21**
18	Government should deploy mental health specialists in antenatal clinics	-	-	-	-	5	6	7	8	-	-	**26**
20	Transportation for mental health specialists to visit antenatal clinics	-	-	-	4	-	-	-	-	-	-	**4**
21	It is feasible to implement the screening protocol if staff working in antenatal clinics are committed	-	-	3	4	-	-	-	-	9	-	**16**
22	Screen for depression before physical examinations is done on a woman	2	4	6	-	-	-	-	-	9	-	**21**

23	It is feasible to implement the screening protocol if the screening protocol will be integrated into routine antenatal care	-	2	3	4	-	-	7	-	-	-	**16**
24	It is feasible to implement the screening protocol if the screening protocol receives support from government	-	-	-		5	-	-	-	-	10	**15**
25	It is feasible to implement the screening protocol if supportive supervision and effective mechanisms for monitoring and evaluation are put in place	-	-	-	-	10	6	-	8	-	-	**24**
26	It is feasible to implement the screening protocol if curricula for pre-service training programmes of clinicians who work in antenatal clinics will have a strong component of maternal mental health	1	-	-	-	-	6	-	-	9	20	**36**
27	Protocol will improve treatment of women with depression	-	-	-	-	-	6	7	-	-	-	**13**

Key: - = No score

Workshop 2: List of ideas with scores assigned by participants on a scale of 1 to 10

No	IDEA	SCORE										TOTAL
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
1	Short screening instruments included in protocol can be ideal for our health facilities which have few midwives and heavy workload	1	-	-	8	5	-	-	-	18	-	**32**
2	The proposed screening protocol is good tool for detecting depressive symptoms during pregnancy	-	-	-	-	-	-	-	16	-	70	**86**
3	Include Chichewa versions of the screening instruments because assessments are conducted in vernacular language	3	6	6	-	-	6	-	-	-	-	**21**
4	Orient midwives on the use of protocol before it is implemented in a clinic	-	2	-	-	10	6	14	8	-	-	**40**
5	The protocol should be tested	-	-	-	12	5	6	21	-	9	-	**53**
6	Protocol is clear and simple tool to use with good management strategy	-	-	-	-	5	-	14	16	27	10	**72**
7	Teaching aids for psychoeducation of antenatal depression are needed	3	-	9	-	-	-	-	-	-	-	**19**
8	The implementation plan is detailed	-	2	-	4	5	12	7	16	-	10	**56**
9	Algorithm should reflect context in which screening for depression will be done	2	4	12	-	-	6	-	-	-	-	**24**
10	Protocol should be submitted to Ministry of Health in Malawi for approval	-	-	-	8	15	-	-	8	27	-	**58**
11	Integration makes screening for depression to be seen as an integral part of antenatal care assessment.	-	4	-	4	-	18	-	8	-	-	**34**

Key: - = No score