

SCREENING FOR ANTENATAL DEPRESSION IN WOMEN ATTENDING THE CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL ANTENATAL CLINIC

Alexandra Stephanie Maisto

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DECLARATION

I Alexandra Stephanie Maisto declare that this Research Report is my own, unaided work. It is being submitted for the Degree of Masters of Medicine in the branch of Psychiatry at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

(Signature of candidate)

_____ day

of _____ 20_____ in _____

DEDICATION

This work is dedicated to my amazing husband, Keith, whose unending support, love and patience get me through every day. You are my everything; my best friend and I wouldn't have been able to do it without you.

To my sister, Steve and your three precious children, thank you for your support and guidance and bringing me so much happiness and laughter.

To my parents whose love and encouragement got me to where I am today, you made me who I am today.

To my second family and all my friends, thank you for treating me like one of the family and always being there for me.

PRESENTATIONS

- WITS Annual Psychiatry Research Day - Research oral presentation - 2017
- SASOP Biological Psychiatry Congress: Risk and resilience in mental health: Improving life through Science - Research oral presentation - 2017
- GDOH Research and Innovation Summit: Evidence and innovation for long and healthy lives: Confronting risks and unlocking Potentials - Research poster presentation - 2018
- WPA World Congress of Psychiatry – Oral and poster abstract presentation - 2018

ABSTRACT

BACKGROUND: Antenatal Depression is very common in South Africa, resulting in a significant burden to those affected and potentially resulting in long term negative outcomes for their children. Multiple associated risk factors exist amongst the vulnerable socio-economically disadvantaged population. Screening for antenatal depression and associated risk factors may assist with the identification of cases and in the development of treatment interventions that serve to alleviate the burden. Interventions need to be population specific in order to be effective. Further South African studies are required to determine the prevalence and determine region specific risk factors.

AIMS: To establish the prevalence of depressive symptoms and describe the associated socio-demographic features in a sample of women attending the Antenatal clinic at Chris Hani Baragwanath Hospital.

OBJECTIVES: To screen for antenatal depression, using the EPDS in the antenatal clinic at the Chris Hani Baragwanath Hospital. To describe the results of the screening and demographic factors and compare biographical information and a positive screen on the EPDS to establish associations, and to describe the attitude of these women towards information and treatment options for depression.

METHODS: A cross sectional and descriptive research design was used. Primipara and multipara pregnant women were recruited from the CHBAH antenatal clinic. The interview consisted of a biographical questionnaire, review of the antenatal card as well as completion of the EPDS. The prevalence of depressive symptoms were calculated, as determined by EPDS cut off scores of 13 or greater and 10 or greater, together with their 95% confidence intervals. The Relative Risks for an elevated

EPDS score (of 13 or greater) for each significant risk factor was determined using binomial regression

RESULTS: 32% of the sample had a score of greater than 10 on the EPDS and 23,5% scored greater than 13. There were strong associations between certain variables: not having tertiary education (RR 0.46; 95% CI 0.23-0.90), an unwanted pregnancy (RR 2.78; 95% CI 1.89-4.07) and the presence of life stressors during pregnancy (RR 2.03; 95% CI 1.39-2.96). Most participants favoured treatment at their local clinic; individual talk therapy (51.9%) was the first choice of treatment and only 23,8% would accept medication as an option.

CONCLUSIONS: Antenatal depression is highly prevalent in South Africa. The detection of associated factors is important in determining high-risk groups for targeted interventions can be put in place. Screening should be introduced into routine antenatal care to improve the pick up rate of depressive symptoms in women at risk and population specific, accepted, targeted interventions be put in place.

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DECLARATION	I
DEDICATION	II
PRESENTATIONS	III
ABSTRACT	IV
ACKNOWLEDGEMENTS.....	VI
LIST OF FIGURES	IX
LIST OF TABLES	X
NOMENCLATURE	XI
DEFINITIONS.....	XII
1.0 INTRODUCTION	1
1.1 PROBLEM STATEMENT	5
2.0 LITERATURE REVIEW	6
2.1 DEFINITION	6
2.3 PREVALENCE	8
2.4 IMPACT	10
2.5 RISK FACTORS	13
2.5.1 Mental illness history.....	15
2.5.2 Socio-economic characteristics.....	15
2.5.3 Relationships and social support	16
2.5.4 Pregnancy Circumstances	17
2.5.5 Substance use	18
2.5.6 Personal Resources	18
2.6 DETECTION AND TREATMENT.....	19
2.7 IN CONCLUSION	23
3.0 AIM	25
3.1 OBJECTIVES	25
3.2 HYPOTHESIS	25
4.0 METHODOLOGY.....	26
4.1 STUDY DESIGN.....	26
4.2 STUDY SITE.....	26
4.3 STUDY SAMPLE.....	26
4.4 SAMPLE SIZE	27
4.5 MEASURES	27
4.5.1 Biographical questionnaire.....	27
4.5.2 Participant preference	28
4.5.3 Antenatal card review.....	29
4.5.4 Edinburgh Postnatal Depression Scale.....	29
4.6 PROCEDURE.....	29
4.7 DATA ANALYSIS	30
4.8 BUDGET	31
4.9 ETHICS	32
5.0 RESULTS.....	33
5.1 ENROLLMENT IN THE STUDY	33

5.2 SOCIO-DEMOGRAPHIC CHARACTERISTICS.....	33
5.3 RELATIONSHIP STATUS AND SOCIAL SUPPORT.....	35
5.4 LIFE STRESSORS	35
5.5 MEDICAL / PREGNANCY RELATED VARIABLES.....	36
5.5.1 <i>Trimester</i>	36
5.5.2 <i>Pregnancy Circumstances</i>	37
5.5.3 <i>Previous pregnancy outcomes</i>	37
5.6 MEDICAL ILLNESS COMORBIDITY	38
5.7 SUBSTANCE USE.....	39
5.8 PAST HISTORY OF DEPRESSION	39
5.9 FAMILY PSYCHIATRIC HISTORY	40
5.10 PARTICIPANT PREFERENCE	40
5.11 EPDS SCORE	41
5.12 UNIVARIATE ANALYSIS	42
5.12.1 <i>Socio-demographic Characteristics</i>	42
5.12.2 <i>Socio-economic circumstances</i>	43
5.12.3 <i>Relationship status</i>	44
5.12.4 <i>Social support</i>	44
5.12.5 <i>Life stressors during pregnancy</i>	46
5.12.6 <i>Pregnancy circumstances</i>	47
5.12.7. <i>Substances</i>	49
5.12.8 <i>Comorbidity</i>	49
5.13 BINOMIAL REGRESSION	52
6.0 DISCUSSION.....	53
6.1 SUMMARY OF RESULTS.....	53
6.2 SOCIO-DEMOGRAPHIC CHARACTERISTICS.....	53
6.3 PREVALENCE	54
6.4 ASSOCIATED FACTORS	56
6.5 PARTICIPANT PREFERENCE	62
6.6 LIMITATIONS.....	64
7.0 CONCLUSION AND RECOMMENDATIONS.....	69
8.0 REFERENCES	72
9.0 APPENDICES	79
9.1 APPENDIX 1.....	79
9.2 APPENDIX 2.....	80
9.3 APPENDIX 3.....	81
9.4 APPENDIX 4.....	84
9.5 APPENDIX 5.....	85
9.6 APPENDIX 6.....	86
9.7 APPENDIX 7.....	87

LIST OF FIGURES

Figure 1: Participants enrolled in the study

Figure 2: Social support from partner amongst study population

Figure 3: Presence of life stressors during pregnancy amongst study population

Figure 4: Parity of study population

Figure 5: Alcohol use amongst study population

Figure 6: Patient preference for depression treatment amongst study population

Figure 7: Depression information and treatment location preference amongst study population

Figure 8: Distribution of EPDS score

Figure 9: Association between relationship status and probable depression

Figure 10: Association between partner support and probable depression

Figure 11: Association between life stressors and probable depression

Figure 12: Association between pregnancy circumstances and probable depression

LIST OF TABLES

Table 1: Budget items and cost

Table 2: Socio-demographic characteristics of study population

Table 3: Medical comorbidity amongst study population

Table 4: Risk factors associated with Probable depression (EPDS>13)

NOMENCLATURE

CHBAH: Chris Hani Baragwanath Academic Hospital
DSM-5: Diagnostic and Statistical Manual for Mental Disorders, Fifth Edition
HIV / AIDS: Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome
HLOE: highest level of education
WHO: World Health Organisation
CPMD: Common perinatal mental disorder
ARV: Anti-retrovirals Therapy
HAART: Highly active antiretroviral treatment
CHBAH: Chris Hani Baragwanath Academic Hospital
EPDS: Edinburgh Postnatal Depression Scale
ICD 10: International Classification of Diseases
DSM-5: Diagnostic and Statistical Manual for Mental Disorders, Fifth Edition
MDD: Major depressive disorder
PMPH: The Perinatal Mental Health Project
MOU: midwifery obstetric units
Wits: University of the Witwatersrand
RR: Relative risk
CI: Confidence Interval
RDC: Research Diagnostic Criteria
DSM IV: Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition
SASH study: South African Stress and Health study
HIC: High income countries
LMIC: Low to middle income countries
AUC: Area under the curve
PPV: positive predictive value
SD: Standard deviation
DF: Degree of freedom
 χ^2 : Chi Squared test
P: P value
SAPMTCTE: South African parent to mother to child transmission evaluation
WHO: World Health Organisation
PRIME-D: Primary Care Evaluation of Mental Disorders classification System
PPRQ: Psychosocial Pregnancy Risk Questionnaire
PHQ- 9: Patient Health Questionnaire
K10: Kessler Psychological Distress scale
K6: Shortened Kessler Psychological Distress scale
GAD-2: Generalised Anxiety Disorder scale
CSG: Child support Grant
CDG: Child dependency grant
PG: pension grant

DEFINITIONS

Peri-natal depression: Minor and major episodes of depression from time of conception and within 12 months of delivery.

Antenatal depression: Minor and major episodes of depression from time of conception until birth.

1.0 Introduction

Depression is a common mental illness, affecting women twice as often as men. It is also the principle cause of disease-related disability among women in low- and middle- income countries (1). The perinatal period is considered a high-risk time for the development of depression in women. Pregnancy represents a unique period of vulnerability due to the potential enduring impact of depression on the child's early development and long-term outcomes, in addition to the impact on the woman's health. Significant research has focused on the post-natal period, but the importance of depression during pregnancy is increasingly understood.

An increased incidence in the new onset of mood disorders has been reported during pregnancy (2) and in childbirth (3). Antenatal depression often predates postnatal depression, and has been found to be the most significant predictor for the development of postnatal depression (4) (5) (6) (7) (8) (9) (10) (11) (12) as well as acting as a mediator for multiple other risk factors in the development of postnatal depression (1) (4) (5) (7).

The antenatal period has in addition been found to be a more sensitive period than the post-natal period in terms of the risk for long term adverse effects on children. (13) Antenatal depression may be associated with poor pregnancy outcomes including preterm labour (14) (15), low birth weight (16) as well as possible longer term impact on cognition (13) and internalizing and externalizing behaviours in children (17) (18). The longer term consequences of prolonged illness and extension into the post-natal period may hence be prevented by addressing depression and its risk factors during the pregnancy period.

Antenatal depression occurs in 8–20% of women globally (4) (5) (6) (7). The great majority of studies have been performed in high income countries. The prevalence of antenatal depression amongst the available studies in low to middle income countries has consistently been found to be higher, when compared with the prevalence in high income countries (19) (20).

In South Africa, current research confirms this trend, with prevalence rates as high as 32-47% (21) (22) (23) (24) (25). The increased vulnerability to depression may result from the multiple socio-demographic risk factors which exist among South African women. These include high numbers of unplanned pregnancies (26), high rates of domestic violence (27), extreme poverty (28), significant comorbid alcohol use and the highest rate of HIV infection in the world (28) (29) (30).

The South African population is very diverse in terms of race, culture and socio-economic status, in addition, there are significant inequities in access to quality care (26). The available South African studies indicate that although there is a universally high prevalence of antenatal depression, there is significant variation in prevalence according to geographic location, which may be explained by the variable social circumstances and presence of risk factors with these populations.

Gauteng is the smallest, but most densely populated province in South Africa, many residents have migrated from their rural homes around the country to live and work in this urban region, which contains a combination of urban, and peri-urban “squatter camps” with more limited resources. Gauteng may therefore represent a unique environment, with a heterogenous population. This environment may result in a diverse set of stressors for women, including separation from family support

structures and partners, as a result of migration and poor living conditions with overcrowding. In addition to the stressors common across South African women.

Perinatal depression follows a complex pattern of aetiology with an interaction of genetic vulnerabilities, biological factors and environmental factors, with no single risk factor contributing to the presentation of the disorder (31). Multiple risk factors have been examined. The prevalence and relative contribution of individual risk factors may differ according to prevailing contextual factors and social circumstances in the population studied, consequently targeted research which evaluates the particular population of interest is needed. The identification of these risk factors may serve as areas for targeted intervention and may assist in targeting the most vulnerable, high risk population groups, where the benefits of intervention may be maximized (20) (32) (33).

Despite the fact that antenatal depression is common, causes significant morbidity and is treatable; the detection and treatment rate are very low (28). Evidence from several studies indicate that the rates of detection and treatment of depressive disorders may be improved with formal screening and the follow up of identified cases (34) (35). The Edinburgh Depression Scale (EPDS) has been found to be a reliable tool for detecting antenatal as well as postnatal depression (4) (6). It has been widely studied and is easy to use, cheap to administer and has a high sensitivity in the detection of perinatal depression. Tools need to be locally tested and culturally appropriate in order to correctly identify cases, and intervention projects must be designed to meet expectations and consequently result in better treatment acceptance rates and response (36).

The U.S. Preventive Task Force recommends an integrated approach to screening for depression within a primary care setting in order to improve the rates of detection and treatment of Depression (37). In South Africa the National Mental Health Policy Framework and Strategic Plan of 2013-2020 (38) has also made this recommendation, although this has not yet been adopted at a practical level. The integration of maternal mental health into antenatal care is proposed as a strategy to improve access to services by working within available resources (33). In South Africa 97% of pregnant women access antenatal care at least once during their pregnancy (26) .The perinatal period represents a useful opportunity for screening, prevention and intervention as there are regular visits with health care providers and women are highly motivated to ensure the wellbeing of their child (20). There are currently no formal screening measures, referral mechanisms or treatment guidelines in place, within the Gauteng public sector and very limited information is available about this particular province's prevalence rates and pertinent risk factors.

1.1 Problem statement

Antenatal depression is highly prevalent in South Africa. Untreated illness results in a significant psychological, social, physical and economic burden on both the sufferer as well as their child and family (30) (31) (35). The identification and treatment of depression during pregnancy may improve negative pregnancy outcomes and the mother and infants' well-being. The integration of screening and risk assessments into routine antenatal care is integral to addressing this unmet health need. Further studies to identify region specific prevalence rates and risk factors are needed, in order to inform evidence-based strategies that will allow for the maximum benefit.

2.0 Literature review

2.1 Definition

Perinatal depression is defined as major and minor episodes of depression that occur during pregnancy or within twelve months of delivery (4). Perinatal depression is not seen as a distinct phenomenon from depression that occurs in women at other times. Depression has its initial peak of onset during the childbearing years (20-40 years) and; therefore, it is not surprising that women in the perinatal period would be at risk. Perinatal depression may indicate a new onset of depressive symptoms, a relapse of previous depression or a continuation of preexisting depressive symptoms into the perinatal period. Two meta analyses found that symptoms of depression in pregnancy often continue into the post-natal period, and that a past history of depression increases the risk of perinatal depression (8) (10).

There are two classification systems used in psychiatry that ensure the criteria for defining common mental conditions are standardized across clinical and research settings. They consist of the American Psychiatric Association's Diagnostic & Statistical Manual of Mental Disorders now in its fifth edition (39) and the 10th edition of the International Classification of Diseases (40) published by the World Health Organization. The DSM 5 is used in clinical practice in South Africa. The DSM (39) defines major depression as a period of 2 weeks in which 5 or more symptoms occur; including a low mood or loss of interest/ pleasure; alterations in sleep, appetite and energy levels; changes in psychomotor activity and in memory or concentration; feelings of worthlessness or inappropriate guilt and suicidal ideation. Episodes are categorized as mild, moderate or severe according to the number and severity of symptoms. Depression can become recurrent and chronic and result in significant impairments in an individual's capacity to function (39).

In contrast, the current definition of perinatal depression used in clinical research includes both major and minor episodes of depression (4). Minor episodes are less distinct and of equivocal clinical significance. They may represent a prequel to the development of major episodes, or a less severe episode with only 2-4 symptoms present. Women may experience significant distress and functional decline without meeting the criteria for a Major depressive episode, therefore the identification of minor episodes may represent a potential opportunity for early intervention, with prevention of progression to more serious symptoms (41). However; it may be difficult to devise appropriate intervention strategies for minor episodes, and the financial implications of treating these episodes in resource constrained settings needs to be considered.

The wide variation in prevalence rates found in studies may result from the variable definition of antenatal depression that was used. In the systematic review by Gaynes et al there was a nearly two-fold higher prevalence of antenatal depression when studies which defined depression as minor and major episodes were included; compared to the studies with only major episodes (4). The prevalence ranged from 8.5- 11% (at different times in pregnancy) when studies using both minor and major episodes were analyzed; compared to 3.1% to 4.9% when using studies defining only major episodes (4). The use of self-reported screening tests may also result in higher prevalence rates compared with the use of clinical criteria (19). The results are also impacted on by the particular screening test used as well as the cut off score (4). When evaluating the available literature, focus on how depression was defined may be important in evaluating the comparability of findings and explaining the variation.

2.2 Cultural construct

Concerns have been raised regarding the construct of depression as a diagnosis within different cultures; however, differences in the rates of perinatal depression in cross-cultural comparisons have not been identified (22). In the aforementioned South African qualitative study on women's descriptions of depressive symptoms within a rural population there was little evidence to support a culturally distinct presentation of depression (22). This was also found in a study in Tanzania which illustrated that local idioms are important in women's descriptions of depression; however, the construct in depression was similar to bio-medical criteria for depression (42). There may; however, be differences in the attribution of meaning to the presentation and interpretation of its cause. As a result the acceptability of various treatment options may vary according to context and underlying illness beliefs of the population (36). The sensitivity of screening and diagnostic assessments which were designed and tested in western settings requires further investigation in order to assess if they are applicable across different cultural settings (43).

2.3 Prevalence

A recent Cochrane meta-analysis, which included 21 studies (19,284 participants) reported a mean prevalence rate of antenatal depression as defined by major and minor episodes of 10,7%. The rates varied from 7.4% in the first trimester to 12.8% in the second trimester of pregnancy (6). The rates were similar in a systematic review of 30 studies by Gaynes et al; the point prevalence rate for minor and major episodes of depression was 8,5-11% (4). These studies were performed in primarily high-income countries.

Data regarding the prevalence in lower income countries is not as widely available. The average prevalence of common antenatal mental disorders was 15,9% in a systematic review conducted by the World Health Organisation in low to lower - middle income countries (19). Common perinatal mental disorders are defined as non-psychotic disorders including depression, anxiety, adjustment and somatic disorders. The systematic review found that the available studies only represent 8 - 12% of low and lower- middle-income countries and that most studies had only examined depression (19). The available studies were primarily performed in tertiary or academic hospitals within major cities and may thus not include a truly representative sample of the population studied. The more rural and impoverished population groups within these communities may experience the greatest disparities in terms of socio-economic status and rank in society and have limited access to tertiary hospital resources and may thus be under-represented. The large disparities in prevalence estimates between low- middle income and high income countries cannot be explained by individual and biological factors alone, and are postulated to be a result of social determinants of health (19) (44).

The prevalence in South Africa is high when compared with both developed countries and estimates from other low to middle income countries (19). Similarly the highest burden is experienced by women from more impoverished conditions. In a study on peri-urban informal settlements in the Western Cape Province, the prevalence of symptoms of depressed mood (identified using the EPDS) during pregnancy was 39% (21). A similar study in urban Kwa Zulu Natal found 38% of a sample of 387 had symptoms of depression (EPDS) (25) and a study in a rural Kwa Zulu Natal population found the rates of antenatal depression using a structured clinical interview method and DSM IV Diagnosis was as high as 47% (22).

There may be a variable risk during pregnancy. A recent meta-analysis found that first trimester rates are similar to those seen in non-pregnant women ;however, the rate of depression in the second and third trimester were double those observed in the general population (6). This finding has not been replicated in all studies, a study by O'Hara et al found no significant difference in prevalence rates between late pregnancy and the early postpartum period and non-pregnant women of comparable childbearing age (8). Some studies have; however, found an increased risk of first episode and more severe presentation within the perinatal period (12) (45). It is often difficult to determine if the identified cases are evidence of new onset symptoms within pregnancy or represent a continuum of pre-existing depression as the incidence data is lacking in most studies (4) (46).

2.4 Impact

Antenatal depression has health implications for the affected individual and their child as well as a negative impact on the family (34). Depression may negatively impact on a woman's quality of life as measured by her capacity to engage in social activities, employment and capacity to perform activities of daily life. This impacts on feelings of wellbeing, social and family functioning as well as having a significant economic impact on her dependants and the community (47). Depression may be associated with relationship conflict and violence, and this mediates the association with externalising behaviours (aggressive, delinquent behaviour and hyperactivity) in children (18) (48).

Severe depression may lead to self-harm, impulsive acts and the development of psychosis, which in addition to the risk of suicide, may put the foetus at risk .Suicide

represents one of the leading causes of maternal deaths amongst women in the perinatal period (34) (49). Untreated depression is associated with a 25 times increased risk of suicide compared to the general population (50).

In addition, antenatal depressive symptoms are associated with poor birth outcomes including preterm delivery (14) (15) and low birth weight (16). This effect may continue into the infant period, resulting in underweight infants with stunting up to the age of five (51). In low to middle income groups the negative impact appears to extend to the physical health of the child (34). Risks to the physical health of the child include an increased risk of diarrhoeal diseases (Rahman2006), malnutrition and reduced adherence with immunization schedules (12) (52). This association has not been replicated in higher income groups (53); which may indicate the role of social factors; including poverty, overcrowded living circumstances and poor sanitation, in moderating the risk to the physical health of the child (16) (54).

The mechanisms underlying the associations with negative child outcomes are multifactorial and include genetic, environmental and biological factors (54,55).

Antenatal depression symptoms both from self-report as well as interview assessment infer a risk to the developing foetus; however, the effect sizes appear to increase with worsening symptom severity (16).

A direct impact of maternal depression on the intrauterine environment is postulated. One such mechanism may include increased maternal cortisol levels during pregnancy which may affect the responsiveness of the foetus' developing neuroendocrine system to stress which may lead to impaired foetal growth, prematurity and low birth weight as well as the risk of psychopathology in later life (55) (56). The role of epigenetic factors in determining the long lasting effect of early

life experience within children is also being investigated. Children's inherited genotype may explain individual differences in their susceptibility to environmental effects (55).

Maternal bonding with the infant may be disrupted in antenatal depression, which results in reduced responsiveness towards the infant once it is born. The impaired attachment relationship between the mother and infant has consequences for the child's psychological well-being and future social interactions (17) (57). The risk of depression in offspring continues in adolescence and adulthood (58) (59). The Avon Longitudinal Study of Parents and Children (n =8937) found that Antenatal depression was independently associated with an increased risk of depression at 18 years, and was not determined by the continuation of depression into the post-natal period (58). A further longitudinal prospective UK birth cohort study (SLCDS) confirmed these findings, they found a 3,4 times increased risk of adulthood depression in offspring who's mother's experienced antenatal depression. Childhood maltreatment which was also statistically more likely with depression in pregnancy mediated this effect. This result was independent of the presence of post-natal depression (59).

The contribution of antenatal and postnatal symptoms to child outcome are in fact cumulative and interactive. The negative consequences are greater in the presence of chronic depression extending into the post-natal period as well as the recurrence of episodes in vital developmental periods of the child's life (59). Persistence of postnatal symptoms is especially associated with delayed milestones; difficulties with learning, language, attention as well as reduced cognitive development (13). These symptoms are mediated by the effect of poor and unresponsive parenting which may

result from ongoing depression post-natally and during important developmental periods of childhood (57).

The co-occurrence of unhealthy behaviours amongst depressed pregnant women complicates the investigation into the impact of antenatal depression on foetal development. Evidence suggests that women with depression may present to antenatal care later and struggle to adhere to health care provider recommendations. They may have greater difficulties with maintaining healthy diets and lifestyle practices and make use of unhealthy coping mechanisms such as smoking, alcohol and drug use (1).

These behaviours mediate negative birth outcomes (16) (54). Smoking may be associated with reduced birth weight; alcohol use with preterm birth, impaired fetal growth and delayed childhood development and, illicit substance use has a variable impact on fetal growth, and long term cognitive development (60).

The exposure to antidepressants in pregnancy further complicates the picture, as it is unclear whether antidepressant use mitigates the adverse impact of maternal depression on the fetus; or if exposure increases the risks to fetal development (61). Studies have also produced mixed results when looking at the relationship of antenatal depression with a risk of preeclampsia, apgar scores (61), and neonates requiring admission to neonatal intensive-care units (14) (53) which may be explained by the variable controlling for contributing factors.

2.5 Risk factors

The development of antenatal depression results from the interaction of multiple factors including biological, psychological and social factors (19). The recognition of relevant risk factors helps to determine an individual's vulnerability to develop mental

illness. Identified psychosocial risk factors may be potentially modifiable and may thus represent an area for primary and secondary intervention (33). The incorporation of a psychosocial assessment of risk factors to screening procedures may in addition improve the rate of detection of clinically relevant cases (62).

In a study by Austin et al the classification of pregnant participants into high and low risk categories on the basis of psychosocial risk factors (using the Psychosocial Pregnancy Risk Questionnaire) was associated with improved pick up rates of post-natal depression (63). The positive predictive value for psychosocial screens to identify future depression as an outcome is low, nonetheless, the identification of 'at risk' individuals prior to the development of symptoms may offer opportunities to maintain their mental health status and prevent the progression to mental illness (62). High risk individuals may require more intensive monitoring and follow up.

There are no universally accepted Psychosocial assessment tools. The risk factors investigated in post-natal depression may be similar; albeit with certain factors being unique to the pregnancy period (5). Relevant risk factors may also be variable according to the trimester of pregnancy (45). Various studies have used different conceptual models and measures when assessing risk and protective factors, as a result there may be difficulty in comparing results and reliably detecting all factors. The predictive validity of risk factors may also vary according to cultural context and the population group assessed (64). This highlights the importance of identifying region specific risk factors and using locally measured screening tools (33).

A systematic review by Lancaster et al examined 57 studies from high income countries of USA, Canada, Europe, Australia and New Zealand and found the most

consistently significant risk factors for the development of antenatal depression in their multivariate analysis included maternal anxiety, life stress, lack of support and domestic violence (65). The above risk factors were also identified in 2 systematic reviews which included studies from low to middle income countries (19) (64).

2.5.1 Mental illness history

A past history of depression was found to be significantly associated with Antenatal depression in the above mentioned systematic reviews (19) (65) and in a cross sectional study of 3472 pregnant women; which found it to be the most significant predictor in antenatal depression (66). Maternal anxiety also shows a medium to large correlation with antenatal depression (65).

2.5.2 Socio-economic characteristics

Socio-economic disadvantage is often associated with an increased risk of mental health difficulties. Dimensions of poverty include unemployment, low income and poor education and they often occur together. Some studies have evaluated composite scores which address occupation and education together. Lancaster et al found 5 studies which addressed the composite score and found no significance in the bivariate and multivariate analyses; however, the included studies had little variability in their population demographics which could have diminished the power to pick up these effects (65). The variability in the prevalence of antenatal depression between high income and low-income settings is postulated to be due to the contribution of multiple social risk factors amongst these women (19). The systematic review by Fisher et al which evaluated low to middle income countries found socio-demographic factors of a low level of education, low income and single marital status were significantly associated with antenatal depression. In addition, the systematic review by Biaggi et al also found evidence for low income and lower educational attainment but equivocal evidence for unemployment (64). A local study

by Hartley et al found a trend with low income reaching significance in the univariate analysis but not in the multivariate analysis (21).

2.5.3 Relationships and social support

The perception of social support is protective in both international and national reports, a lack of social support from any source was found to have a medium correlation with depression in 17 studies included in the systematic review by Biaggi et al. Specifically, a lack of support from an intimate partner showed medium to large effects in the multivariate analyses (64). Interpersonal violence perpetrated by the partner consistently increases the risk of depression. The studies included in Lancaster et al showed a small to medium correlation in multivariate analysis (65), this association was also found in multiple individual studies. (5) (12) (19) (20) (45). In a study of 128 African American and Caucasian women there was a 2.5 times increased risk of antenatal depression if domestic violence occurred (67). A meta-analysis of domestic violence including both cross sectional and longitudinal studies found a bidirectional relationship with probable perinatal depression, Antenatal depression was associated with a 3-5 fold increased risk of having experienced domestic violence in the past and a 3 fold increased risk of domestic violence in the year following pregnancy (48).

The availability of alternative sources of support may be important in mitigating the impact of adverse life events on mental health (9) (65). This may be particularly pertinent in South Africa where the extended family has a significant role and where people often don't live with their partners but have access to resources from extended family.

2.5.4 Pregnancy Circumstances

Explorations into the circumstances in which pregnancy occurred have revealed that unwanted and unplanned pregnancy are also associated with an increased risk of depression (36) (65). However, unplanned or unwanted pregnancies do not necessarily indicate the woman's feelings toward the growing fetus or child, this effect may be more significant early in pregnancy, as an adjustment reaction to a stressful, unexpected event which wanes over time as the pregnancy is accepted. A study by Lee et al, found that this effect was most significant in the first trimester and decreased over time (45).

2.5.5 Life adversity

There is a well-established link between life adversity and depression (5) (64) (65) (68), there appears to be a cumulative risk with an increasing number of exposures to adverse life events increasing the risk of depression (19). No specific definition of life adversity has been used throughout the literature but negative life experiences such as the death of loved ones; relationship conflict (19) and financial difficulties are consistently found to trigger depression in general and have been explored in the perinatal period (45) (64). The exposure to early life abuse or childhood maltreatment has also been associated with an increased risk of depression (59) as well as increasing the risk of experiencing abuse later in life (69). Pregnancy related stressors such as previous negative birth outcomes were found to be significant in the above mentioned systematic review by Biaggi et al (64), however, it was not significant in the Lancaster systematic review (65). They found miscarriage, fetal deaths and abortion were not significant in both univariate and multivariate analyses (65)

Other stressors may include the diagnosis of another medical condition. Comorbidity with medical conditions can worsen the outcome of both conditions, impacting on diagnosis, and illness outcomes (70) (71). In HIV the poor uptake and adherence to ARV's is especially concerning as it may be associated with worsening progression and functional outcomes, as well as increase the risk of vertical transmission to the fetus. Study results have been inconsistent in terms of an association with HIV and antenatal depression, some finding an association (25), whilst others have not found this association (21).

2.5.5 Substance use

Other behavioural risks include associated substance use. Alcohol and cigarette use have been associated with worse pregnancy outcomes and higher risk of antenatal depression (1) (45). In a South African peri urban setting despite the high prevalence of both alcohol and cigarette use, both were only significant in the bivariate analysis, but failed to reach significance in the multivariate analysis (21). Both the above mentioned systematic reviews also found the results to be inconsistent (64) (65), the failure of this factor to show consistency in reports may indicate its role as a potential mediator of other risks of depression, as opposed to it being a causative factor. The identification of substance use is particularly important during pregnancy as it may be associated with worse child outcomes (60).

2.5.6 Personal Resources

The impact of personal resources including measures of self-esteem and negative cognitive attributional styles are difficult to measure. These factors would have to be measured prospectively prior to the onset of depression as over reporting may occur in the context of current depression, which directly impacts on these measures. This is a limitation of the analysis by Leigh et al where they were measured concurrently

with assessment of depression (5), similarly in Marcus et al a poorer self-reported health was found to be associated with depression; however, this was also measured cross-sectionally and may thus not represent an independent risk factor for depression but a symptom of depression (66).

2.6 Detection and treatment

A large treatment gap exists for mental health disorders universally, with limited resources further exacerbating the access to treatment of those affected in developing countries. The vast treatment gap is a significant concern due to the long-term consequences of mental disorders. In the South African national epidemiological survey, the annual prevalence of common mental health disorders amongst adults was estimated to be 16,5%; however, only 1 in 4 of these individuals had received any treatment in the last year (72).

In addition, despite the high prevalence of mental health disorders an investigation of the service utilization of mental health outpatient facilities only 1,7% of the general population had attended and received any treatment (28). The current national primary care guidelines do not address screening for common mental disorders specifically (73).

The diagnosis of depression may be particularly difficult to assess in pregnancy. There is a long-held belief that pregnancy represents a period of happiness where a woman's mental health is protected (6). Due to this expectation women may feel guilty and be reluctant to disclose their feelings and difficulties (1). This may interfere with help seeking behaviour as women fear judgement and stigmatisation if they discuss negative symptoms during pregnancy (74). The overlap between the neurovegetative features of depression and the "normal" physiological symptoms of

pregnancy may lead to an under diagnosis of depression and misattribution of fatigue, poor sleep, changes in appetite, reduced libido and poor energy levels to pregnancy (45).

A lack of health care provider awareness and training has been shown to account for the deficits in detection as well as treatment of antenatal depression (75). The use of informal enquiry into a pregnant woman's mental state has a very low pick up rate of depressive symptoms. In a review of 186 pregnant women attending prenatal care, the obstetric health professional's recognition of psychiatric disorders and at risk substance use was assessed; only 43% of those who screened positive had any recorded symptoms on their obstetric charts, only 18% were given a diagnosis, and only 23% had received treatment. (76) . A further study evaluated a sample of 1465 pregnant women in the 3rd trimester with the Primary Care Evaluation of Mental Disorders (PRIME-MD) classification system, 13,9% of the sample had a psychiatric diagnosis yet only 5.4% of those (204) had received any form of treatment during their pregnancy (53). While detection is complicated by these factors, research indicates that the rate of antenatal depression is high with substantial consequences, suggesting that improved detection could hold significant opportunities to effectively treat antenatal depression and to prevent postnatal depression.

The use of a standardized screening tool may assist in overcoming the above-mentioned barriers and aid in improving the detection of antenatal depression. The ideal opportunity for routine and longitudinal screening for antenatal depression may be during routine antenatal visits. Perceived structural barriers are commonly cited barriers to accessing care. These include difficulty finding time to attend

appointments, no support structures to care for children, poor access to transport and long waiting periods at referral treatment centers (74).

In a systematic review, the individual randomized controlled studies demonstrated the use of screening with feedback increased the detection and recognition of depression by 10% to 47%. In the meta-analysis screening decreased the relative risk of persistent depression by 13% and the absolute risk by 9% (77). The Edinburgh Post-natal Depression Scale has been found to be a reliable tool for detecting antenatal as well as postnatal depression, in western contexts and in Africa and South Africa (78) (79).

In a systematic review, 16 different African studies found it reliably and validly measures symptoms of perinatal depression in African populations (79). A South African study on 376 participants in an antenatal clinic compared the performance of 5 screening tools and found the EPDS had the best overall performance (AUC 0,83) compared with the Patient Health Questionnaire (PHQ-9), Kessler Psychological Distress scale (K10) and its shortened version (K6), Whooley questionnaire and the two-item Generalised Anxiety Disorder scale (GAD-2) (80).

The EPDS focuses on emotional symptoms of depression and does not evaluate somatic symptoms, in contrast to various screening tools that aren't specific to the perinatal period. This is useful as it helps to discriminate the symptoms of depression from those commonly occurring in pregnancy.

Ethical concerns about the utility of universal screening have cited the lack of follow up mechanisms for newly identified cases, especially in resource constrained

settings. Other concerns include the time and cost of treating false positive cases, on already overburdened systems (33). Contrary to this, is the risk of failing to identify cases and the longstanding impact as elaborated above. Variable cut off scores of the EPDS have been used in the various studies. The original validation by Cox et al was a score of >10 (78). However, this score was suggested to be too low in a South African Validation study in a post-natal population, resulting in 15 more false positive cases for each additional correctly identified case (81). In a further South African study of 112 pregnant women, the EPDS was also compared against the structured clinical interview for depression, a score of >13 was found to correctly identify the highest number of cases (73%) and showed a sensitivity of 69 % and specificity of 78 % (82).

Screening may offer a benefit of raising awareness of psychiatric illness and offer opportunities to intervene appropriately (83). Considerations need to be given to developing treatment guidelines which meet patients' expectations and overcome previously identified barriers in order to ensure better treatment uptake and outcomes (84) (85).

Illness beliefs pertaining to the cause, time course, consequences and perceived benefit of available treatments may determine help seeking behavior. Individual beliefs as well as contextual and cultural background shape health perceptions and attitudes towards the treatment of depression (86). As a result, interventions which are felt to address the perceived contributing factors would be considered most appropriate and acceptable. The treatment efficacy and patient outcomes is also predicted by the individual's expectation (87) .

The underlying perception that psychosocial determinants are responsible for the development of depression dictates a preference for psychotherapy as a treatment choice. (86). A qualitative study performed in a sample of mothers from poor socio-economic circumstances in South Africa found that socio-economic factors, unwanted pregnancy and interpersonal conflict were perceived as the cause for the development of maternal depression (36).

As a result, psychosocial interventions focused on addressing these factors were felt to offer the greatest benefit (36). This result was replicated in a similar qualitative study, which examined the perceptions of a sample from an underserved community of both White and African American pregnant women in the United States. The study participants expressed the greatest preference for psychosocial treatments and were most skeptical about antidepressant treatment (85).

Furthermore, the question of antidepressant safety to a developing fetus and in breastfeeding may act as a deterrent to medication acceptance as a treatment option in the perinatal period. A high proportion of women on antidepressant medication for depression prior to pregnancy stop antidepressants due to these concerns, and fears of addiction (88) despite an increased risk of relapse following discontinuation (89).

2.7 In conclusion

Due to the high prevalence and significant short and long-term consequences of antenatal depression, early identification and intervention is important. Screening for antenatal depression and describing the associated risk factors can potentially allow for the identification of women at a high risk and in need of treatment. Proposed interventions need to be culturally appropriate and acceptable to the particular

population in order to be fully utilized, and potentially halt the suffering and long-term negative consequences on the woman and child.

3.0 Aim

The purpose of the study was to establish the prevalence of a positive screen for depressive symptoms in a sample of women attending the Antenatal clinic at Chris Hani Baragwanath Hospital and determine whether any socio-demographic characteristics were associated with an increased risk of depressive symptoms. I further sought to assess the willingness of these women to receive information about and treatment for depression.

3.1 Objectives

- To describe the socio-demographic characteristics of the study population
- To assess for antenatal depressive symptoms, using the EPDS in the antenatal clinic at the Chris Hani Baragwanath Hospital
- To compare biographical information in those with a positive screen and a negative screen (On EPDS) to evaluate if associations occur.
- To describe the attitude towards receiving depression education and various treatment options and settings.

3.2 Hypothesis

Antenatal depression is highly prevalent within the population attending CHBAH and multiple psychosocial risk factors may be associated with its presence.

4.0 Methodology

4.1 Study design

A cross sectional and descriptive research design was used.

4.2 Study Site

The study was undertaken at the antenatal clinic at Chris Hani Baragwanath Academic Hospital. The hospital is an academic institute associated with the University of the Witwatersrand. The hospital services the greater Soweto, Orange Farm and Lenasia areas. It services of a population of approximately two million people. The maternity unit has 336 maternal beds and approximately 100-150 pregnant women are seen in the antenatal clinic daily. This antenatal clinic serves as a referral centre for seven midwifery obstetric units (MOU's) in Soweto. The patients consist of both walk in, or self-referral patients and referrals from primary and secondary settings with obstetric or medical complications.

4.3 Study Sample

Consecutive primi-para and multi-para pregnant women were recruited sequentially from the antenatal clinic at Chris Hani Baragwanath Academic Hospital.

Inclusion criteria for this study were women:

- Attending the antenatal clinic at CHBAH
- 18yrs and older
- Able to communicate through the medium of English
- Willing to participate and who signed informed consent (Appendix 1 and 2)

4.4 Sample size

The sample size was calculated based on a prevalence of antenatal depression of 32% (23). Sample size for prevalence was determined using the formula from (90):

$$n = Z^2 P(1-P) / d^2$$

n = sample size,

Z = Z-statistic for the chosen level of confidence,

P = expected prevalence or proportion

d = precision

A sample of 335 participants was thus calculated to provide a 95% confidence interval with a 5% precision.

4.5 Measures

The interview consisted of a biographical questionnaire, review of the antenatal card as well as administration of the Edinburgh Postnatal Depression Scale.

4.5.1 Biographical questionnaire

(Appendix 3)

The biographical Questionnaire was used to collect information about demographics, social and economic variables, as well as other previously established risk factors for antenatal depression. The risk factors included past psychiatric history, past and current medication use, medical comorbidity, family psychiatric history, substance use, obstetric history and previous pregnancy outcomes, current life stressors and perceived social support.

The history of depression was subjectively reported by asking:

“In the past have you experienced a low/sad mood for most days, almost every day for a period of two weeks and have you felt uninterested in activities you previously enjoyed such as social and work activities.” The presence of the episode in relation to previous pregnancies was established as “having occurred during pregnancy or in the 6 months after delivery” or “outside of this (perinatal) period”. Treatment for the episode was defined as “medication”, “therapy” or “nil”.

Support was divided into emotional, instrumental and financial support.

Emotional was defined as having: “someone to talk to, to discuss problems with and who provide encouragement”.

Instrumental support was defined as “clear and definite support with physical things such as housework, cleaning, childcare or transport”.

Financial support was defined as “assisting with money to provide for you and your children”.

4.5.2 Participant preference

Participants were asked their preferences in terms of which treatment they would prefer if they experienced depression and where they would like to receive this care and/or information about depression. This included the antenatal clinic, the local clinic, mental health clinic or non-medical sources such as religious leaders or family members

Information regarding it is included in Appendix 3

4.5.3 Antenatal card review

The antenatal card was reviewed to confirm the trimester of the current pregnancy, confirm the presence of comorbidity, number of previous pregnancies and losses of pregnancies in terms of stillbirths or miscarriage.

4.5.4 Edinburgh Postnatal Depression Scale

The Edinburgh Depression Scale is a ten-item scale, where each item describes a common mood symptom of depression, present over the past seven days. Each item is scored on a continuum of 0-3. A total score is calculated between 0 and 30. A higher score correlates with worsening distress. In the present study a cut-off score of 13 or greater was used to represent probable Major depression and a score of 10 or greater representing possible minor depression as in the original study by Cox et al when the tool was first validated (78). (See appendix 4) The EPDS was validated in South Africa previously where questions were read out to assist in overcoming problems of literacy (81), this was also done in this study.

4.6 Procedure

The researcher introduced the study, with the assistance of the clinic sisters. Patients were invited to participate. They were given the opportunity to read the information sheet, ask questions and sign the informed consent if they were willing to participate. Patients were sampled consecutively and maintained their place in the queue. Their appointment times were not affected by their involvement in the research, as all data collection occurred before the start of the clinic. Ten participants were recruited daily over a period of three months until the study sample size was reached. The questionnaires and EPDS were administered verbally in English to all participants.

If a score of 10 to 13 was attained, they were referred on a non urgent basis for follow up at the local clinic mental health services, calculated on the basis of ease of access for the patient. A referral letter was provided (Appendix 6). All the clinics are serviced by the University of the Witwatersrand Department of Psychiatry.

Immediate referral to the psychiatry department at CHBAH was made in consultation with the psychiatry registrar on duty for participants with:

- Acute suicidal ideation identified by a response of 1,2,3 to item 10 on the EPDS
- Scores > 13 on the EPDS
- Psychological distress as a result of participation in the study

4.7 Data analysis

An Excel data file was created. SAS was used for data analysis. A descriptive analysis of all the study variables was done. Categorical variables were summarised and tabulated by frequency and/or percentage, and illustrated in bar charts. Continuous variables were summarised by the mean, standard deviation, median and interquartile range, and their distribution illustrated by means of histograms.

The prevalence of AND was calculated from EPDS cut off scores of no risk and possible (≥ 10) and probable (≥ 13) risk, together with their 95% confidence intervals. The scores were plotted on a frequency distribution graph and then compared between no risk and risk using a Chi-squared test.

Association between variables and AND. Univariate analyses of relationships between socio-demographic variables and AND were analysed using a logistic regression with a binomial error structure and logit link function. The socio-

demographic variables were fixed factors and risk of Antenatal depression was the binomial dependent variable. Analyses were conducted based on the EPDS cut off scores: 1) no risk and probable risk. In these analyses, χ^2 statistics were used for overall model significance. Z statistics, including estimate and SE values and confidence intervals (CI), were generated for specific components of fixed factors. Here, reference categories were selected using sequential entry and/or were based on logically meaningful categories to obtain Z statistics for each component. Relative Risks (RR) for an elevated EDS score for each of the risk factors was also calculated by dividing the % risk per component of a factor by the % risk of the reference category.

Socio-demographic risks for AND. Socio-demographic variables which were significant in the univariate analysis (above) were included in a multiple binomial regression model. The selected variables, which were all categorical, were tested for pairwise confounding effects using the χ^2 test or a Fisher's exact test (where the requirements for the χ^2 test could not be met). The strength of the associations was measured by Cramer's V and the phi coefficient respectively. Strong (i.e. problematic) association was regarded as having a coefficient in excess of 0.50, and problematical variables were selectively removed from the statistical analyses.

Model significance was set at 5% and two-tailed tests were used throughout therefore p-values <0.05 indicate significant results.

4.8 Budget

Private funding was provided by the principal researcher.

Table 1: Budget items and cost

ITEMS	COST
Travel and petrol	R 2 000
Photocopies and stationery	R 1750
Printing and binding	R 1750
Other	R 500
Total cost	R6000

4.9 Ethics

The Human Research Ethics Committee at the University of the Witwatersrand approved the protocol for this study (protocol number M 151131). Approval was also granted by the Chief Executive officers at CHBAH, the head of the Obstetrics and Gynaecology department, and the Head of the Psychiatry department at the site. Written informed consent was obtained for each participant. Participation in the study was completely voluntary and participation and refusal did not impact on the obstetric care received. Consent could be withdrawn at any time without prejudice and referral systems were put in place if any psychological distress was experienced during the interview.

No identifying information was recorded.

- Arrangements were made for participants who were found to have a risk of probable or possible antenatal depression on the EPDS as well as those who had suicidal ideation.

5.0 Results

5.1 Enrollment in the study

All of the women approached were willing to participate in the study, four had to be excluded as they were under the age of eighteen and three were foreign immigrants and were unable to understand English fluently. Three hundred and sixty-two pregnant women were therefore included in the study population.

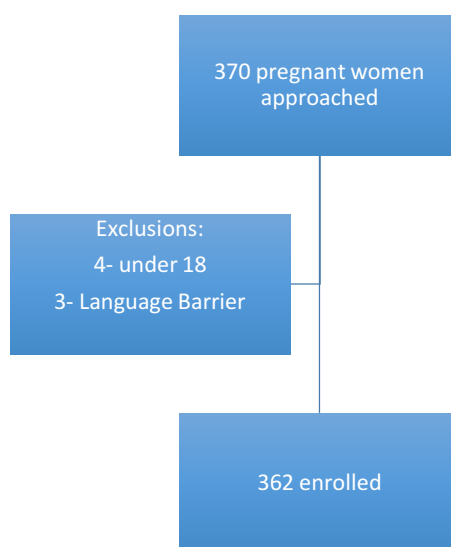


Figure 1: Participants enrolled in the study

5.2 Socio-demographic characteristics

The sample population was predominantly aged 26-35 years (51,4%). The vast majority of the sample was African (94,8%). The majority of the sample were unemployed (n= 225, 62,2%) and 62,7% fell into the lowest income bracket (< R5000 per month). Of those who were employed only 26,4% had permanent employment.

The majority of the participants had reached secondary level of education (n= 277, 76,5%) with 153 of these having completed their senior certificate (42,3% of the total). Tertiary education was completed in only 19,9% of the sample, and included

certificates, diplomas and degrees. More than half of the research subjects were dependent on social welfare, in the form of social grants (n=212, 58,6%).

The majority of households were receiving child support grants which varied in number from 1 to 10. The number of grants received exceeds 212 (the number of participants receiving grants) as some households receive more than one grant of varying types.

With regards to living circumstances, 50,8% of the participants were living with their partners; 45,1% were living with family and only 1,1% were living alone. Only 33,1% lived with their children.

Table 2: Socio-demographic characteristics of study population

Sociodemographic characteristics		Total (362)	%
Age (years)	18-25	88	24,3
	26-35	186	51,4
	Older than 35	88	24,3
Race	African	343	94,8
	Coloured	18	5,0
	White	1	0,3
Employment status	Unemployed	225	62,2
	Permanent	96	26,5
	Informal employment	23	6,4
	Student	18	5,0
Monthly Household income (Rand: local currency)	< R5000	227	62,7
	R5001-10000	81	22,4
	R10001-15000	27	7,5
	R15001-25000	20	5,5
	R25001 +	7	1,9
Highest level of education	Primary	12	3,3
	High school incomplete	124	34,3
	High school complete	153	42,3
	Tertiary	73	20,2
Household access to Social Grants	Child support grant	181	50
	Child foster grant	1	0,3
	Child dependency grant	1	0,3
	Disability grant	5	1,4
	Pension grant	35	9,7
	Total (Any grant)	212	58,6
Living Circumstances	Living with partner	184	50,8
	Living with family	163	45
	Renting a room (tenant share)	11	2,8
	Living with children	120	33,1
	Living alone	4	1,1

N = number of subjects, % = percentage

5.3 Relationship Status and Social support

The vast majority of the sample (91,2%) was in a relationship. Of these (n=330), 88,2% felt their partners were emotionally supportive and 77,3% received financial support from them. In terms of instrumental support, 66% felt they could rely on their partners.

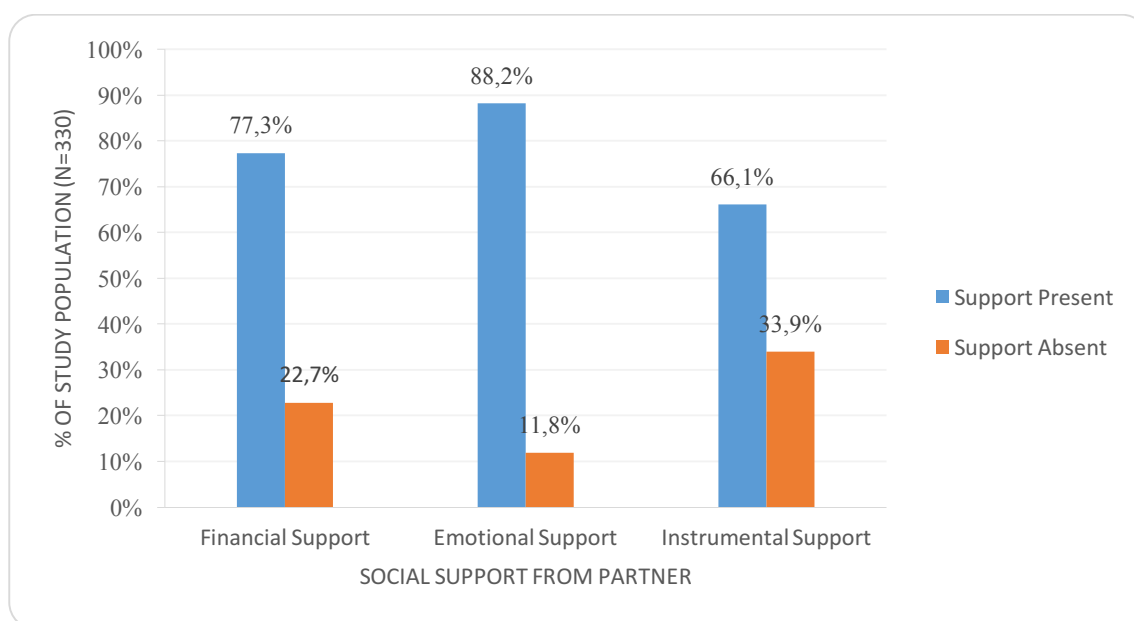


Figure 2: Social Support from partner amongst study population

Alternative sources of financial support were present in 17,9% of the sample. The majority (75%) felt they could rely on family for instrumental and emotional support and 39,5% could rely on the support of friends.

5.4 Life stressors

A significant number of participants had experienced a life stressor during the pregnancy (38,4%). For these 139 participants, the life stressors are shown below. The most common stressor was the occurrence of pregnancy complications (25,9%), followed by conflict with a partner (19,4%) and financial stress (16,5%).

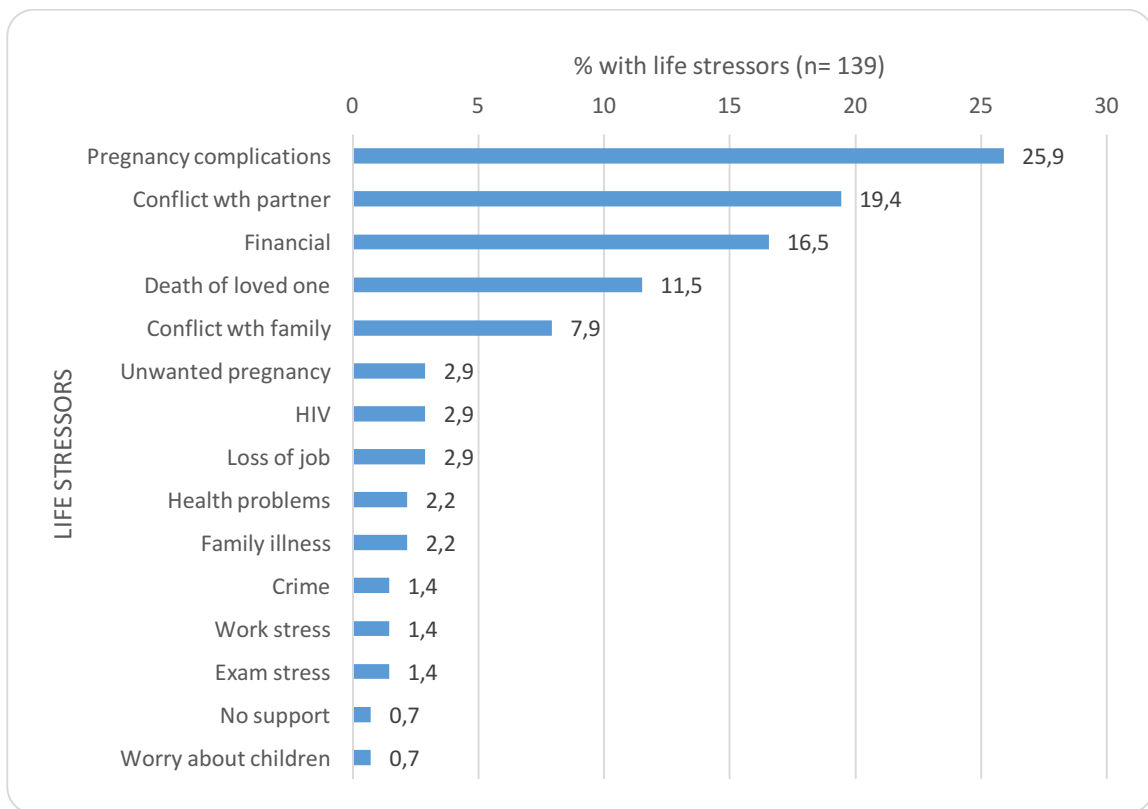


Figure 3: Presence of life stressors during pregnancy amongst study population

5.5 Medical / pregnancy related variables

5.5.1 Trimester

The majority of participants were in their third trimester (63%), 30,1% in the second trimester and only 6,9 % in the first trimester of pregnancy. This was the first pregnancy for 19,9% of the participants.

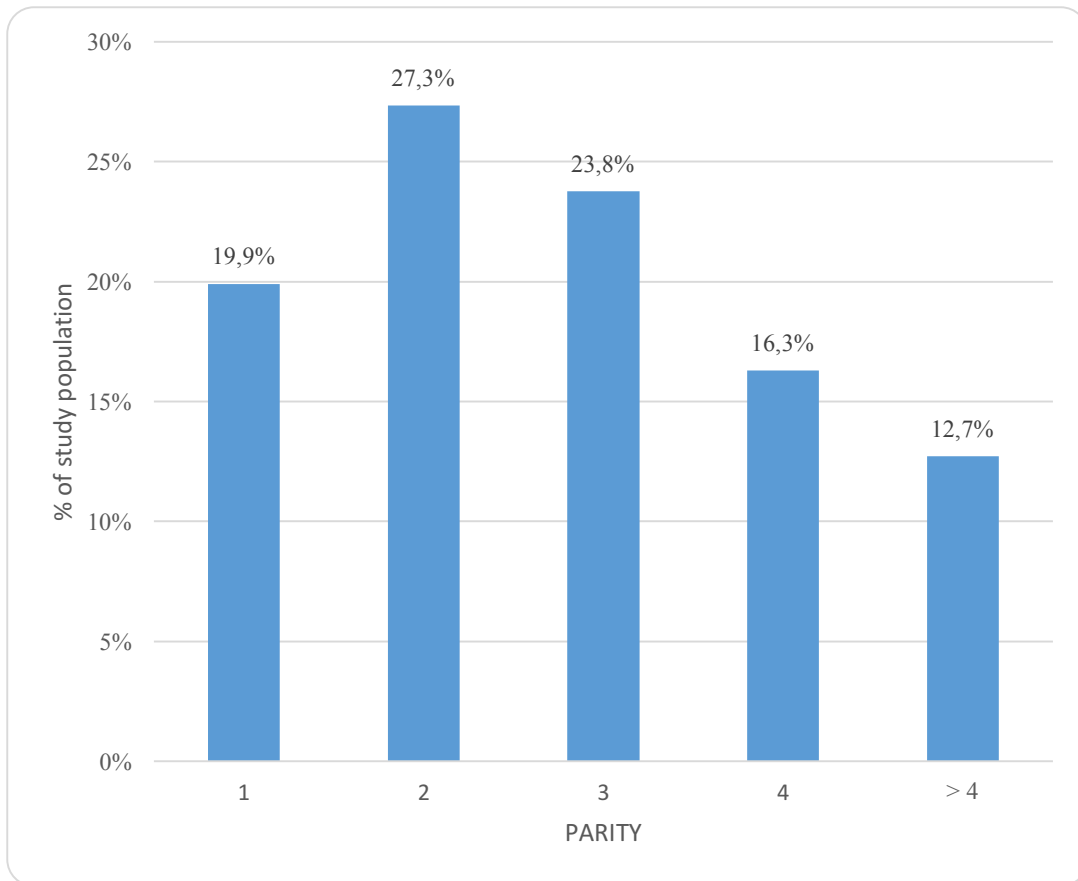


Figure 4: Parity of study population

5.5.2 Pregnancy Circumstances

Only 31.4% of the pregnancies were planned, but 68.6% were wanted. Despite an unwanted pregnancy occurring in just less than one third of the study population (31,2%), it was only considered a stressor by 2,9% of those with reported life stressors.

5.5.3 Previous pregnancy outcomes

The most common form of previous pregnancy loss was miscarriage (27,1%). Terminations, stillbirths and ectopic pregnancies had been experienced by 0.8%, 0.3% and 0.2% of the study group, respectively.

5.6 Medical Illness comorbidity

The participants were predominantly HIV-negative (67.4%). About a third were HIV-positive (30,1%) and only 2.5% were not aware of their HIV-status. Other comorbid medical illnesses, excluding a diagnosis of HIV were present in 29.8% of the participants. For these 109 participants, the prevalence of the various illnesses is shown below (note that percentages do not sum to 100% since some participants had more than one illness). The most common comorbidity was hypertension, which occurred in 18,8% of the total sample.

Table 3: Medical Comorbidity amongst Study population

Comorbidity		
N	362	%
HIV Positive	109	30,11
Hypertension	68	18,78
Asthma	12	3,31
Epilepsy	4	1,10
Heart Disease	3	0,83
Anaemia	4	1,10
Chronic Kidney Disease	1	0,28
Deep Vein Thrombosis	1	0,28
Diabetes Mellitus	6	1,66
Antiphospholipid Syndrome	1	0,28
Sexually Transmitted Infection	1	0,28
Systemic Lupus Erythematosus	1	0,28
Breast Mass	1	0,28
Pre-eclampsia	2	0,55
Metabolic Syndrome	1	0,28
Arthritis	1	0,28
Cardiac	1	0,28
Unknown Illness	1	0,28

5.7 Substance use

Alcohol use was defined as no use, occasional use (<1ce per month), and regular use (weekly or greater). The percentage of participants who used alcohol prior to the pregnancy was 30,6% for occasional use and 10,7% for regular use. Alcohol use during pregnancy showed a downward trend, with 96,2 % reporting nil use during their pregnancy, a small percentage (3,6%) admitted to occasional use during the pregnancy, and only 1 participant reporting regular use.

The percentage of participants who were smokers decreased from 10,8% prior to pregnancy to 5,2% during pregnancy. Only three participants (0.8%) reported illicit drug use (2 used cannabis and 1 was unspecified).

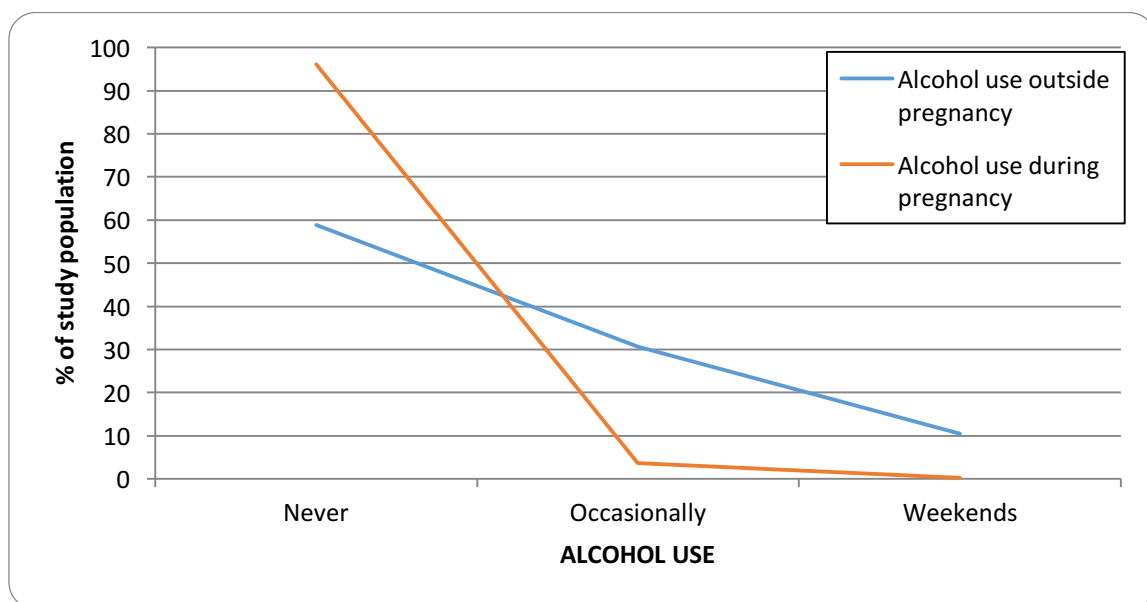


Figure 5: Alcohol use amongst study population

5.8 Past History of Depression

A self-reported history of depression was present in 11,5% of the participants unrelated to pregnancy, 3,6% had experienced depression in a previous pregnancy and 3% in the post-natal period. The majority (82%) had no known history.

Of the 64 participants who reported previous depression, 45% of them had received no treatment, 40,6% received therapy, 21,9% received medication and 1,38% received both medication and therapy. Only three participants (0.8%) were currently on treatment for depression.

5.9 Family Psychiatric History

Family psychiatric history was unknown for a large percentage of the sample (37.3%). Of the twenty-seven who reported a family psychiatric history, fifteen reported a history of depression, eight had relatives with psychotic illnesses, one reported substance induced psychotic disorder, one had a family member who committed suicide and one had a family member with bipolar disorder.

5.10 Participant preference

In terms of treatment preference, the majority of participants favoured individual talk therapy or counselling (51.9%) and 23,8% were willing to accept medication as treatment.

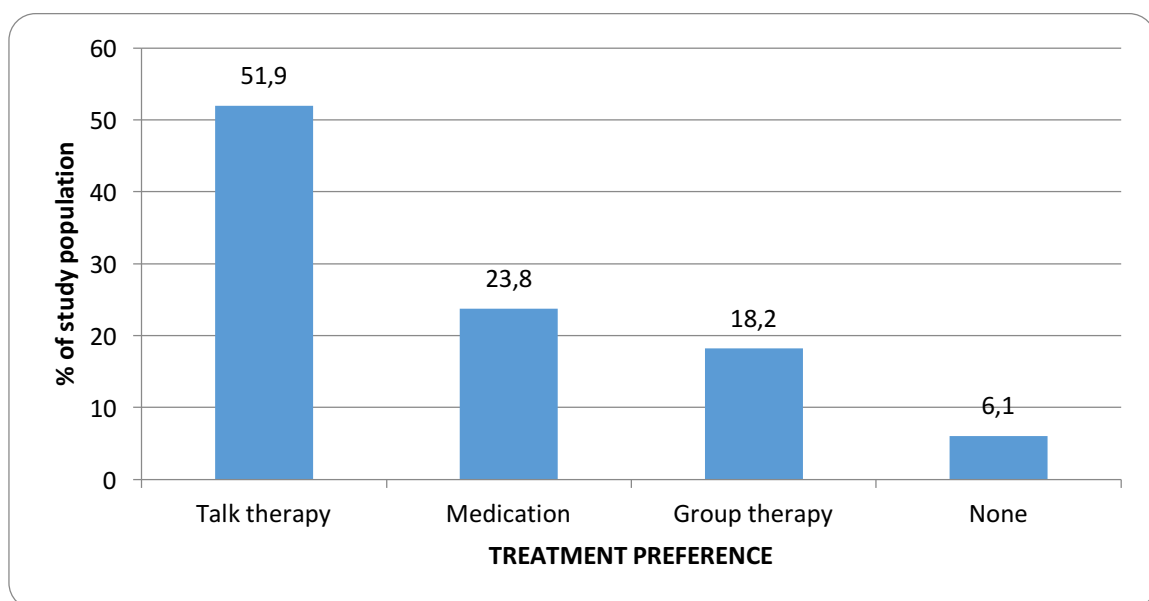


Figure 6: Patient preference for depression treatment amongst study population

6.1% indicated that they would not accept any form of treatment as they deemed it to be unnecessary. Less than a third (23,6%) preferred to use ‘non-medical’ sources to manage depression. These included relying on family members and church leaders (11,8% each) to help them.

Participants favoured receiving information about depression and treatment from their local clinic (53.3%). Only 4.4% of the participants indicated that they would be willing to go to a mental health clinic.

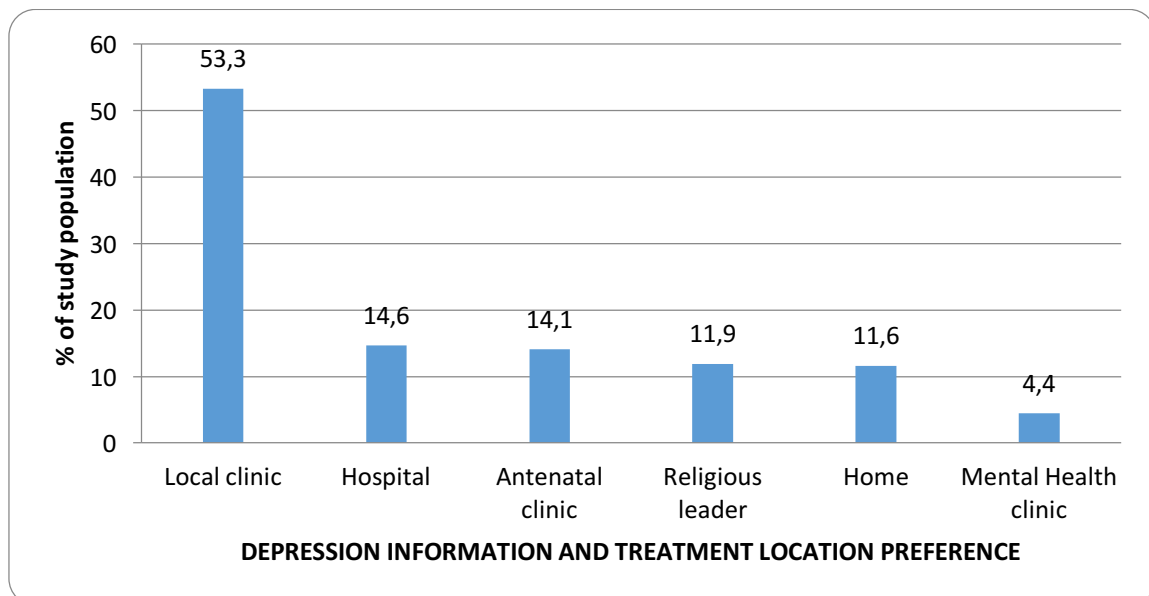


Figure 7: Depression information and treatment location preference amongst study population

5.11 EPDS score

A score of >10 on the EPDS was found in 32%, (95% CI: 27.4-37.0%) and 23.5% had an EPDS score $\geq$ 13 (95% confidence interval (CI): 19.4-28.1%).

The median score on the EPDS was 6 (interquartile range 2-12; range 0-27). The distribution of the scores is shown below; the distribution is skewed towards lower scores.

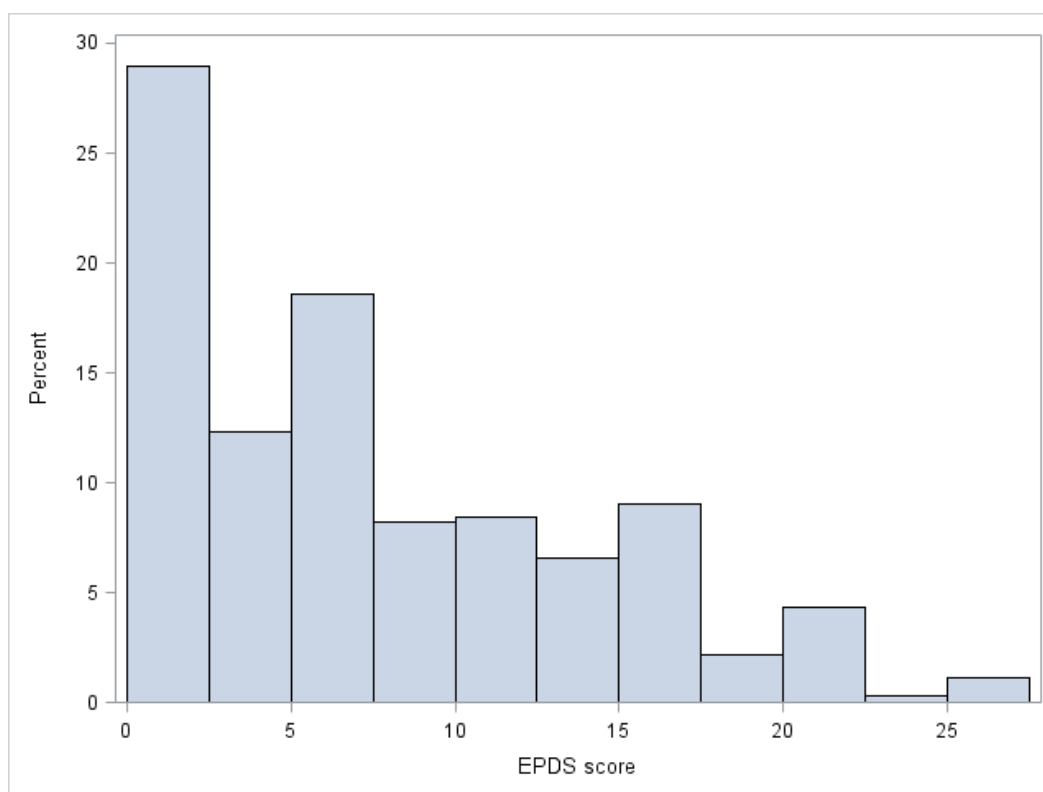


Figure 8: Distribution of EPDS score

5.12 Univariate Analysis

An association between the investigated variables and a positive screen of >13 on the EPDS (defined as probable depression) include:

5.12.1 Socio-demographic Characteristics

The age of participants did not predict probable AND risk in all three age categories ($\chi^2 = 2.68$, $df = 2$, $p = 0.262$). For all age categories, probable risk was lower than the no risk category.

The level of education (i.e. none/primary, secondary, matric tertiary) of participants significantly influenced probable depression ($\chi^2 = 10.97$, $df = 3$, $p = 0.012$).

Compared to the senior certificate (completed secondary education) reference category, having a tertiary education halved (RR = 0.48) the risk of probable AND (Estimate = -0.86, SE = 0.42, z = -2.05, p = 0.040; CI = 0.23, 0.98).

The presence of primary (Estimate = 0.39, SE = 0.27, z = 1.42, p = 0.157; CI = 0.62, 3.41) or incomplete high school education (Estimate = 0.52, SE = 0.64, z = 0.81, p = 0.416; CI = 0.90, 1.99) did not influence probable AND, compared to the senior certificate (completed secondary education) reference category.

Three race groups were represented in the sample: African, Coloured and White. As only one White patient (0.3% of the total sample) was considered during the screening, her data were excluded and data from only African and Coloured participants were used in the analysis. Race did not significantly influence probable ($\chi^2 = 0.21$, df = 1, p = 0.649) AND.

5.12.2 Socio-economic circumstances

Employment status did not significantly influence probable ($\chi^2 = 2.41$, df = 3, p = 0.493) AND.

Monthly income, divided into <R5000, R5000-R10000, R10001-R15000, and >R15000 bands, did not significantly influence probable ($\chi^2 = 4.27$, df = 3, p = 0.234) AND.

In addition, the receipt of social welfare grants did not significantly influence probable ($\chi^2 = 1.40$, df = 3, p = 0.236) AND. The receipt of pension grants ($\chi^2 = 11$, df = 1, p = 0.745) as well as child support grants ($\chi^2 = 3.26$, df = 1, p = 0.071) did not significantly influence AND when compared with not receiving them.

Living circumstances did not influence the risk for Antenatal depression.

Living alone ($\chi^2 = 0.01$, $df = 1$, $p = 0.943$), with children ($\chi^2 = 0.04$, $df = 1$, $p = 0.829$), with family ($\chi^2 = 1.87$, $df = 1$, $p = 0.172$), with partner ($\chi^2 = 3.00$, $df = 1$, $p = 0.084$) and living with tenants ($\chi^2 = 0.07$, $df = 1$, $p = 0.789$) did not significantly influence Probable AND.

5.12.3 Relationship status

The presence of a relationship was a significant predictor of probable AND risk ($\chi^2 = 5.13$, $df = 1$, $p = 0.024$). In particular, being in a relationship significantly decreased probable risk (Estimate = -0.90, SE = 0.38, $z = -2.34$, $p = 0.020$; CI = 1.17) by 1.86 times that of not being in a relationship (the reference category).

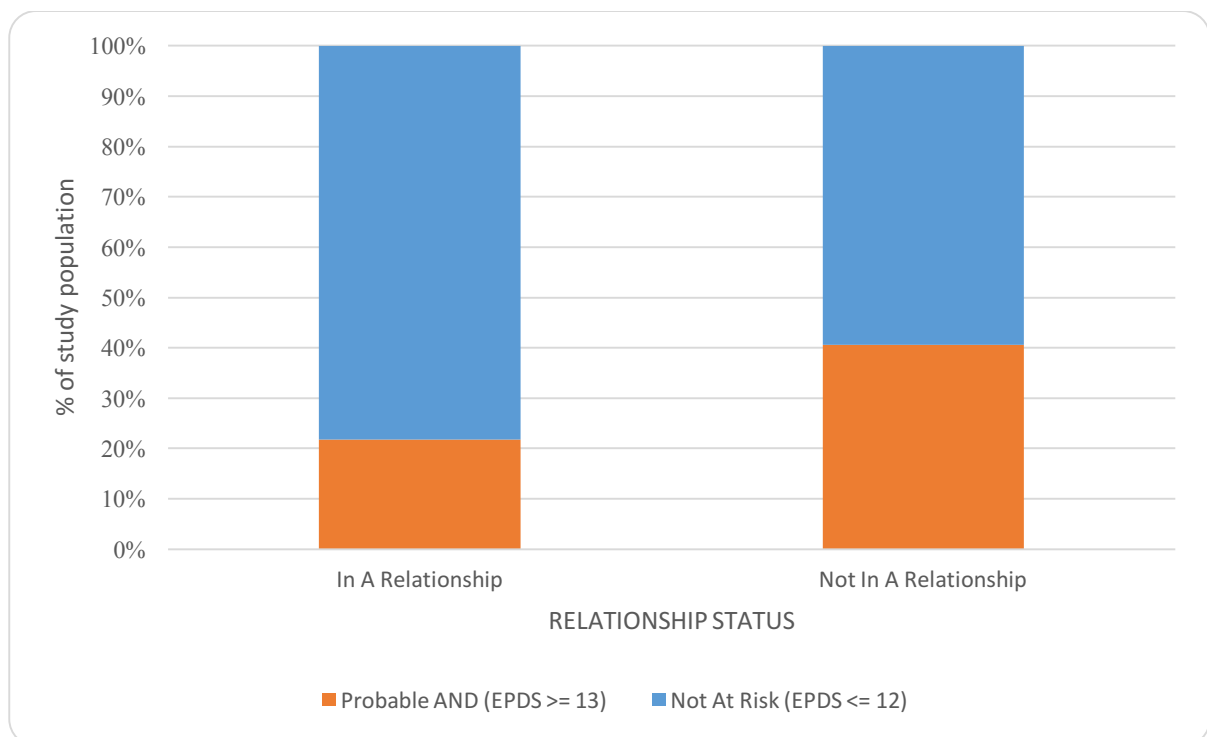


Figure 9: Association between relationship status and probable depression

5.12.4 Social support

5.12.4.1 Partner

Moreover, having an emotionally supportive partner decreased probable ($\chi^2 = 18.86$, $df = 1$, $p < 0.001$) AND. Specifically, an emotionally supportive partner reduced

probable AND by 2.43 (Estimate = -1.25, SE = 0.28, $z = -4.42$, $p < 0.001$; CI = 1.71, 3.48) compared to not having an emotionally supportive partner (reference category). In addition, having a reliable partner reduced probable AND (Estimate = -0.91, SE = 0.26, $z = -3.602$, $p < 0.001$; CI = 1.37, 2.89) by 1.99 times compared to having an unreliable partner.

The presence or lack of financial support from one's partner did not significantly influence probable ($\chi^2 = 0.01$, $df = 1$, $p = 0.976$) AND.

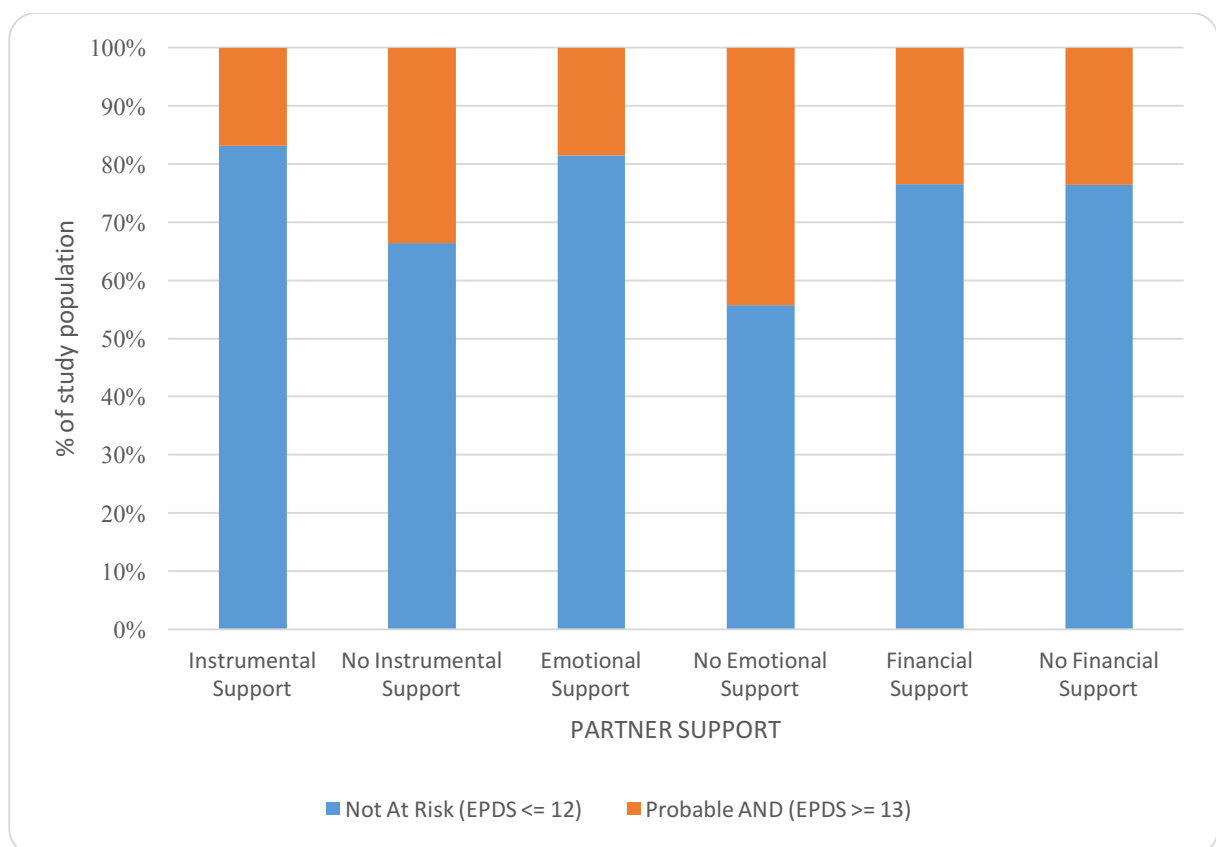


Figure 10: Association between partner support and probable depression.

5.12.4.2 Alternative sources of Support

The perception of having a family to rely on significantly reduced probable ($\chi^2 = 13.84$, $df = 1$, $p < 0.001$) AND. Having a reliable family reduced probable AND

(Estimate = -1.01, SE = 0.27, $z = -3.77$, $p < 0.001$; CI = 1.45, 2.98) by 2.08 times compared to not having a reliable family.

However, having access to instrumental support from friends (or not) did not significantly influence probable ($\chi^2 = 0.10$, $df = 1$, $p = 0.753$) AND.

In addition, the presence or absence of alternative sources of financial support did not significantly influence probable ($\chi^2 = 0.02$, $df = 1$, $p = 0.884$) AND.

5.12.5 Life stressors during pregnancy

Four life stressors were assessed in the univariate analysis as the other adverse events occurred in less than 10% of the population studied . These included interpersonal conflict, financial stress, pregnancy complications and the death of a loved one occurring during the current pregnancy.

The presence of life stressors as a composite score during pregnancy significantly affected probable ($\chi^2 = 26.39$, $df = 1$, $p < 0.001$) AND. Experiencing life stressors increased probable risk (Estimate = 1.30, SE = 0.26, $z = 5.03$, $p < 0.001$; CI = 1.81, 3.90) by 2.66 times compared with not experiencing stressors

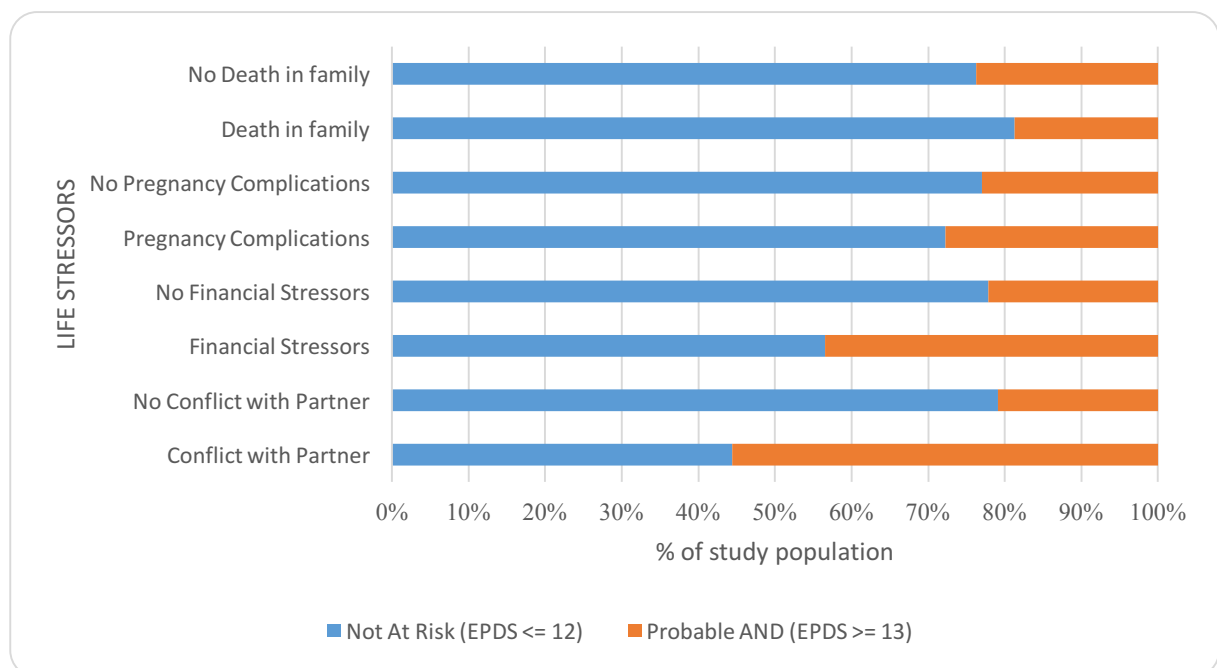


Figure 11: Association between life stressors and probable depression.

5.12.5.1 Financial stress

Financial stress significantly influenced probable ($\chi^2 = 4.80$, $df = 1$, $p = 0.029$) AND.

Being financially stressed increased probable AND (Estimate = 1.00, SE = 0.44, $z = 2.26$, $p = 0.024$; CI = 1.18, 3.26) by 1.96 times than not being financially stressed.

5.12.5.2 Conflict with a partner

Conflict with a partner also significantly affected probable ($\chi^2 = 14.08$, $df = 1$, $p < 0.001$) AND. Experiencing conflict with a partner increased probable risk (Estimate = 1.55, SE = 0.41, $z = 3.79$, $p < 0.001$; CI = 1.79, 3.95) by 2.65 times more than not experiencing conflict (the reference category).

5.12.5.3 Death in the family

In contrast, the death in the family did not significantly influence probable ($\chi^2 = 0.22$, $df = 1$, $p = 0.640$) AND.

5.12.5.4 Pregnancy complications

Complications of current pregnancy (as a stressor) did not significantly influence probable ($\chi^2 = 0.40$, $df = 1$, $p = 0.529$) AND.

5.12.6 Pregnancy circumstances

An unwanted pregnancy significantly influenced probable ($\chi^2 = 41.85$, $df = 1$, $p < 0.001$) AND. An unwanted pregnancy increased probable AND (Estimate = 1.68, SE = 0.27, $z = 6.34$, $p < 0.001$; CI = 2.32, 4.88) by 3.36 times compared to wanting to be pregnant.

Having an unplanned pregnancy significantly influenced probable ($\chi^2 = 22.83$, $df = 1$, $p < 0.001$) AND. In addition, an unplanned pregnancy increased probable AND (Estimate = 1.51, SE = 0.36, $z = 4.20$, $p < 0.001$; CI = 1.85, 6.42) by 3.45 times compared to having a planned pregnancy.

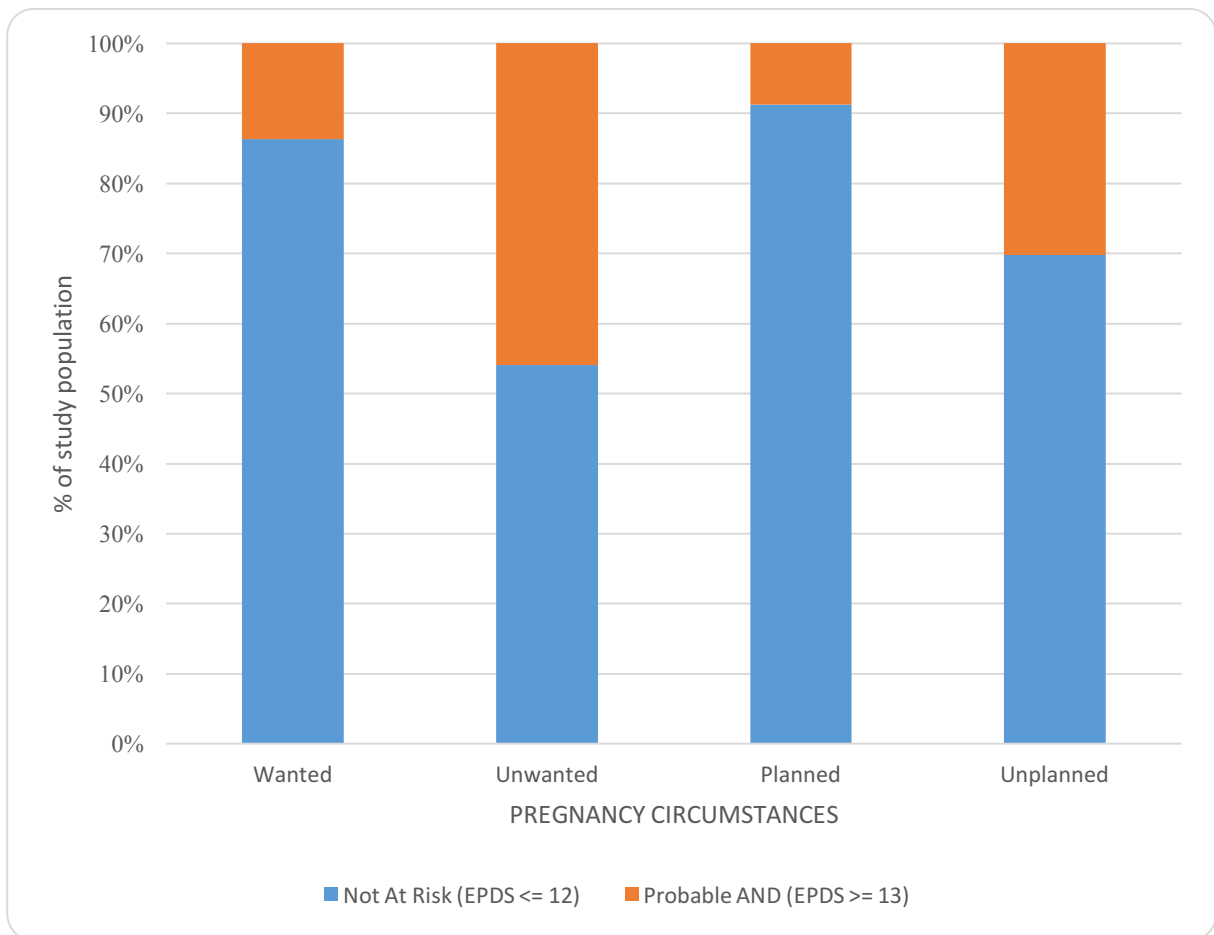


Figure 12: Association between pregnancy circumstances and probable depression.

In addition, the total number of pregnancies (i.e. 1, 2, ≥ 3) did not significantly influence probable ($\chi^2 = 2.37$, $df = 1$, $p = 0.307$) AND.

The trimester of pregnancy also did not significantly affect probable AND ($\chi^2 = 1.01$, $df = 1$, $p = 0.602$), neither did the experience of previous pregnancy losses (composite score: ectopic pregnancy, stillbirth, miscarriage and termination) ($\chi^2 = 0.01$, $df = 1$, $p = 0.930$). When looking at the individual pregnancy loss factors with sufficient numbers (>10 participants), which were included in the composite score: having miscarried previously ($\chi^2 = 0.07$, $df = 1$, $p = 0.783$) and having a child who died previously ($\chi^2 = 0.69$, $df = 1$, $p = 0.408$) did not significantly influence probable AND.

5.12.7. Substances

Whereas smoking during pregnancy did not significantly influence probable ($\chi^2 = 0.09$, $df = 1$, $p = 0.767$) AND, a history of smoking (outside pregnancy) did significantly influence probable ($\chi^2 = 4.95$, $df = 1$, $p = 0.026$) AND. Smoking prior to pregnancy increased probable risk (Estimate = 0.82, SE = 0.36, $z = 2.30$, $p = 0.022$; CI = 1.13, 2.77) by 1.77 times than not smoking outside pregnancy.

Similarly, alcohol use (scored as never, occasionally, regular) during pregnancy did not significantly influence probable ($\chi^2 = 2.91$, $df = 2$, $p = 0.234$) AND. However; a history of alcohol use (outside pregnancy) also did not significantly affect probable ($\chi^2 = 3.39$, $df = 2$, $p = 0.184$) AND.

5.12.8 Comorbidity

Comorbid illnesses (as composite of any illness, excluding HIV) did not significantly influence probable ($\chi^2 = 0.26$, $df = 1$, $p = 0.612$) AND. This was also true when considering HIV infection. The participants' HIV status (i.e. positive, negative or unknown) did not significantly influence probable ($\chi^2 = 0.96$, $df = 2$, $p = 0.620$) AND.

The depression history (i.e. none, during pregnancy, outside pregnancy, post-natal) of participants significantly influenced probable ($\chi^2 = 14.52$, $df = 3$, $p < 0.001$) AND. Depression unrelated to pregnancy increased probable AND (Estimate = 1.01, SE = 0.35, $z = 2.86$, $p = 0.004$ CI = 1.32, 3.20) by 2.06 times than never experiencing depression (reference category).

In addition, post-natal depression history increased probable AND (Estimate = 1.60, SE = 0.62, $z = 2.57$, $p = 0.010$; CI = 1.56, 5.04) by 2.80 times than never experiencing depression (reference category). In contrast, depression during a

previous pregnancy did not differ from no depression for probable (Estimate = 0.95, SE = 0.59, $z = 1.61$, $p = 0.106$; CI = 0.96, 4.08) AND.

Table 4: Risk factors associated with Probable depression (EPDS>13)

Factors		EPDS >13		
		Chi test	df	p-value
Socio-demographics				
Age		2.68	2	0.262
Race		0.21		0.649
Income		4.27	3	0.234
Grant		1.40	3	0.236
Level of education		10.97	3	0.012
employment status		2.41	3	0.493
Relationship Status				
In a relationship		5.13	1	0.024
Living circumstances				
Alone		0.01	1	0.943
Partner		3.00	1	0.084
Family		1.87	1	0.172
Children		0.04	1	0.829
Tenant		0.07	1	0.789
Support				
Partner	Emotional	18.86	1	<0.001
	Instrumental	13.15	1	<0.001
	Financial	0.01	1	0.976
Family	Instrumental	13.84	1	<0.001
Other	Instrumental	0.10	1	0.753
	Financial	0.02	1	0.884
Life Stressors				
Stressor present		26.39	1	<0.001
Conflict with partner		14.08	1	<0.001
Financial stress		4.80	1	0.029
Loss of a loved one		0.22	1	0.640
Complications of this pregnancy		0.40	1	0.529
Circumstances				
	Unwanted	41.85	1	<0.001
	Unplanned	22.83	1	<0.001
Pregnancy				
Parity		2.37	1	0.307
Trimester		1.01	1	0.602
Losses	Any loss present	0.01	1	0.930
	Miscarriage	0.07	1	0.783
	Death of Child	0.69	1	0.408
Habits				
Cigarette smoking	During Pregnancy	0.09	1	0.767
	Prior pregnancy	4.95	1	0.026
Alcohol use	During Pregnancy	2.91	2	0.234
	Prior pregnancy	3.39	2	0.184
Comorbidity				
Other		0.26	1	0.612
HIV		0.96	2	0.620
Past Psychiatric History	Depression	14.52	3	<0.001

P=<0.05

5.13 Binomial Regression

Of the 19 socio-demographic variables considered in the study, 11 were significant predictors of probable AND risk. From these, model selection was conducted to remove variables with strong association and confounding variables. For probable AND risk, two variable sets (A-B) were obtained, determined by the combinations of the two variables which cannot appear together in the regression.

Model A/B

The risk of probable AND was increased by not having tertiary education ($\chi^2 = 5.10$, $df = 1$, $p = 0.024$), an unwanted pregnancy ($\chi^2 = 7.13$, $df = 1$, $p < 0.001$) and life stressors during pregnancy ($\chi^2 = 13.07$, $df = 1$, $p < 0.001$). Relative risk of probable AND was reduced by almost half (0.46) if patients had tertiary education, increased 2.78 times if the pregnancy was unwanted and 2.03 times when patients experienced stress during pregnancy.

6.0 Discussion

6.1 Summary of results

The aim of our study was to establish the prevalence of probable antenatal depression using a screening tool (EPDS) and establish associated risk factors in this population. Antenatal Depressive symptoms were highly prevalent with a rate of 23,5% (EPDS > 13) and 32% with a score of >10. The factors that were significant in our univariate analysis included the presence of a relationship, access to emotional and instrumental support from one's partner, perception of instrumental support from family, the presence of stressors including financial stress and conflict with partner, a history of smoking, past history of depression and whether the pregnancy was planned and wanted. In the multiple binomial regression, there was an association with lack of tertiary education, unwanted pregnancy and life stressors during pregnancy. Most women were willing to receive information and treatment for depression in a medical setting, with a preference for individual psychotherapy at their local clinic.

6.2 Socio-demographic characteristics

The majority of the study population was Black African, followed by Coloured and White participants. This reflects the racial distribution of the Soweto area. The 2011 census figures for Soweto were Black African at 98.54%, White at 0.1%, Coloured at 1%, Asian at 2.5%, and Other/Unspecified at 0.5% (88) (91). This also represents a nationally representative sample, with 55,7 million people in the country, a majority (80.6%) are Black Africans, followed by Coloureds (8.7%), Whites (8%), and Indians/Asians (2.5%) (91).

Most of the individuals in this sample had some form of high school education, 41,8% had a senior certificate (matric) and 33,9% had some high school education. The

level of secondary as well as tertiary education in the sample is significantly higher than the country average of 21,3% completing matric and may reflect the higher access to education in Gauteng compared with more rural provinces (91), where access to education may be more limited. These findings are comparable to other LMIC studies, in these settings socio-economic status may have a direct bearing on available education systems. The level of education in HIC's is higher and our findings equate more closely to the level of education amongst minority groups, within these HIC populations.

The unemployment rate was very high at 62% of the study population. This figure is a reflection of the high level of unemployment present in South Africa. The figure is higher when compared with the expanded national average, in the female population between 15-64 years of age, recorded by Statistics SA of 41.2% unemployment (92), but is comparable to figures found in other South African studies (21) (25).

The poor socio-economic circumstances of the participants were reflected in the above-mentioned unemployment rates, as well as, the average household income of less than < 5000/month and the reliance on social grants (57,5% of the sample). The social welfare system in South Africa offers assistance in the form of social grants for those who are vulnerable and impoverished, with the aim of improving their standard of living.

6.3 Prevalence

The prevalence of probable depression (as defined by an EPDS score of ≥ 13) in our study population was 23,5%. The use of a lower cut off score of >10 increased the prevalence to 32%. In the study population ($n=362$), this would increase the number of identified cases by 32. In South Africa there isn't a specifically recommended cut off score for the EPDS and multiple studies have used different

scores, and differential scores have been validated across studies. The score of >10 was initially recommended for use in primary care settings, nevertheless it has previously been cited to be too low for a South African setting (81) and other low income countries (93). The use of a higher score (>13) may potentially reduce the risk of false positive findings and thus reduce costs; however, it does carry a risk of missing cases where intervention may have been beneficial. The score was not confirmed with a clinical diagnosis and as a result no inference can be made regarding which score performed the best in this study.

A high prevalence rate has been consistently reported in the South African Literature. The rates in South Africa may be up to three times greater than the rates that are found in High Income Countries (6) and are also higher than the rates found in other African countries; with estimated rates of between 4% and 17% (19).

Our results are comparable to the only other study performed in the same research area. The Soweto First 1000 Days cohort study evaluated 946 women, prospectively from 2014-2016 and found a prevalence of probable antenatal depression of 27% as measured by an EPDS of ≥ 13 (24). However, this study only evaluated women in their first trimester. A further Gauteng study performed at the Rahima Moosa hospital antenatal clinic found a similar rate of depression of 19,3%, using a Structured clinical interview. Their study was; however, limited to high risk pregnancies between 22-28 weeks (80). Our study included both low risk and high-risk pregnancies and the majority (63%) were in fact in their third trimester. No significant association was found between EPDS score and trimester in the present study.

The prevalence rates are slightly lower than those found in the afore mentioned studies performed in significantly more disadvantaged populations (21) (22). The variation may be explained by local differences in socio-economic risk factors. In a Cape Town peri-urban population the prevalence rate was 39% using an EPDS score of ≥ 14 (21). Their sample had high rates of interpersonal violence (38,2%) and poorer socio-economic circumstances as evidenced by a lower level of education (26% completed secondary school compared with the 42,3% in our study), higher rates of unemployment (80,7% compared with 62,2% in our study), lower household incomes and higher rates of alcohol and cigarette use. All these factors were significantly associated with depression in their bivariate analysis, with interpersonal violence remaining significant in the multivariate analysis.

The prevalence rate of antenatal depression was also very high at 47% in a rural sample of 109 women with a Structured clinical interview method and DSM IV Diagnosis (22), where the participants had a lower educational level (22,9% achieving secondary level) and less access to social support in the form of grants. The increased prevalence rates may be explained by the social determinants of health. Consequently, a lower prevalence rate in our comparatively less socio-economically deprived study population is not surprising.

6.4 Associated factors

Interestingly the only socio-demographic factor significantly associated with probable depression in the binomial regression after controlling for confounding variables was tertiary education. This result is comparable to other studies which have found a lower educational level to be associated with higher risk of depressive symptoms (64) (21). A higher level of education is strongly linked with Socio-economic status and has also been shown to be associated with a lower risk of unplanned pregnancy and HIV (26). This effect may be moderated by the potential increased access to

employment opportunities, financial security and improved socio-economic status amongst these women. Individual factors of unemployment, dependence on grants and lack of financial support may not have had sufficient power to elicit associations, as there wasn't significant variation in these variables within the population studied.

Further evidence of this is the finding that only 16,5% of the sample reported feeling stressed about their finances, despite a large portion of the sample being unemployed; with a household income of less than R5000/month and with no financial support from their partners or family members. The perception of financial stress was significantly associated with probable depression in the univariate analysis, and as a component of significant life stress composite score, when the stressors were combined in the regression analysis.

Another substitute to elicit the impact of socio-economic factors may be to evaluate living circumstances. In South Africa there is a significant diversity in family structure which often includes multiple extended family members living together without a typical nuclear pattern. Most participants (91,2%) were in a relationship, but only 50,8% were living with their partners. Not sharing a household may impact on opportunities for partners to assist with household tasks, caregiving as well as with emotional support. This may also reflect economic factors such as migrant work of partners and financial pressures limiting the ability of couples to buy their own homes and move out of the family home. Women who live with family members may share a household income amongst a greater number of extended family members. The household income measure didn't consider the number of dependents relying on the income, therefore the measure may not represent a good proxy for socio-economic status, and as a result wasn't sensitive enough to show significance. Socio-economic

circumstances may in fact not have direct effects on antenatal depression but may act as a moderator of over risk factors for antenatal depression, such as improving women's health, agency and access to care.

Both the presence of an intimate relationship and its quality were significant in the univariate analysis. The presence of both emotional and instrumental support was protective. This is consistent with the literature (5) (21) (36) (64). Our study also explored perceived support from alternative sources including family and friends, instrumental support from family was also significant in the univariate analysis. A significant number of the sample were not living with their children, in fact in South Africa many grandparents may act as primary caregivers to children as mothers seek employment. Therefore; the inclusion of various support structures in intervention strategies may be useful in enhancing maternal outcomes and also be necessary to engage in order to improve child outcomes.

Although the lack of financial support from both a partner as well as family was not significantly associated with depression, a woman's dependence on men for economic security may force them to remain in unsupportive, conflictual relationships. Partner conflict was associated with depression in the univariate analysis and as part of the composite score for life stressors in the regression analysis. Interpersonal conflict has been found to be associated with depression in multiple studies, both locally (21) (25) (36) and internationally (5) (12) (19) (20) (45) (65) (48). There may be considerable overlap with measures of perceived partner support and interpersonal conflict.

The definition of partner conflict was not elaborated on in our study. The association with interpersonal violence was therefore not specifically established in this study. Interpersonal violence is very prevalent in South Africa. In a study performed in a Sowetan antenatal clinic 87.9% of participants had a history of at least one type of interpersonal abuse, and 55% had a lifetime history of physical assault by their male partner (24). Howard et al found a link for causality of domestic violence in the development of antenatal depression, as well as a bidirectional relationship where antenatal depression may predispose to an increased risk of depression. Interpersonal conflict is also associated with increased risk of substance use, risky sexual behaviour (94) and worse child outcomes (18), thus it is an important factor to address.

As a result of gender inequality and male partner dominance South African women may have difficulty negotiating safe sex and the right to reproductive control (27). The consequences of which may be unplanned and unwanted pregnancies. The rate of unplanned pregnancy is very high in South Africa, with rates of 55,6% reported in a national household survey (26). In this study the percentage of pregnancies which were unplanned was 59,5%; however, 68,8% of the pregnancies were wanted. This finding is comparable to the study by Manikkam et al of 387 women in an urban area in Kwa-Zulu Natal which found that 55,1% had unplanned pregnancies but 57% wanted the pregnancy (25).

The culture of valuing fertility and motherhood is reflected in the proportion of these pregnancies that are wanted despite being unplanned. Our results also confirm this, as both unplanned and unwanted pregnancy were relevant in the univariate analysis; yet, only an unwanted pregnancy remained significant in the binomial regression.

In a systematic review of High-Income Countries by Lancaster et al, six of the included studies looked at unintended pregnancy and found a medium correlation with depressive symptoms (65). However, this measure may not be easily translatable to our setting. “Unintended pregnancy”, which includes both unplanned and unwanted pregnancy may be a more useful measure in High income settings where the rates of unplanned pregnancy are much lower and correlated more closely with unwanted pregnancy.

In a South African setting unplanned pregnancy may not necessarily delineate the feelings of a woman towards her developing child. Pregnancy may be unwanted due to interpersonal conflict, as well as the financial pressure imposed by a new baby in a home with significant financial burdens and thus may be moderated by various other risk factors. The Inability to negotiate safe sex may also have very serious implications for the risk of HIV transmission.

In South Africa women experience the highest burden of HIV due in part to the high rates of gender-based violence, with women of reproductive age suffering the worst. The South African Parent to Mother to Child Transmission Evaluation (SAPMTCTE) of 2012 found that nearly a third of pregnant women and girls in South Africa are living with HIV (95). The prevalence rate of HIV-seropositivity in the sample was 32.6%. The high prevalence found in this study is also comparable to the Manikkam study of 27,6% prevalence rate (25). However, the rate of unknown HIV status was significantly higher in their study at 19,3% compared with 2.5% in the present study. They found HIV to be significantly associated with antenatal depression (25), in contrast to this study which found no significant association.

The disparity may be secondary to the advances in the detection of HIV, and in the improved access to Highly Active Antiretroviral treatment from the year 2012 to the current period (96). The improved detection and access to care has possibly altered the participant's perception of HIV, and its previously negative prognosis. Thus, it may no longer be identified as a significant stressor. The higher level of education in urban populations may also increase education awareness, willingness to test, acceptance of the diagnosis and reduced fears of stigma when compared to rural communities (26).

Smoking outside of pregnancy was found to be significant in the univariate analysis. In other studies, alcohol and cigarette use has been associated with worse pregnancy outcomes and higher risk of antenatal depression; however, in our study the rate of both cigarette and alcohol use during pregnancy was very low, only nine individuals used alcohol and nineteen used cigarettes during pregnancy. The numbers may have been too small to find associations.

The prevalence may also have been influenced by the use of a self-report measure, in which there may have been underreporting of use. The low prevalence is in contrast to the rates of substance use in the Western Cape which are very high (21) (72). In Hartley et al smoking in pregnancy and alcohol were only significant in the bivariate analysis but failed to reach significance in the multivariate analysis (21). Results are inconsistent in systematic reviews across various settings (64) (65).

Most (82.3%) of the participants had no history of previous depression, while 11.0%, 3.6% and 3.0% reporting depression unrelated to pregnancy, during and after

pregnancy, respectively. The history of depression was a self-reported history of experiencing a significant duration (greater than 2 weeks) of low mood, loss of interest/ pleasure; and alterations in sleep, appetite, energy levels. The diagnosis did not have to be confirmed. Only sixty-four participants reported a history of depression, which is significantly lower than the high prevalence found in South African studies (21) (24) (25) and may thus reflect “missed cases” of depression. This low prevalence, particularly in the perinatal period, together with the poor reported treatment rates, is consistent with the mental health gap described throughout the literature (53) (75) (76), and further reiterates the importance of screening and assessment for mental health problems during this period. A self reported history of depression was associated with an increased risk of an elevated EPDS (>13) in the univariate analysis which is consistent with both local (25) and international reports (64) (65). This speaks to the chronic nature of depression as the association was not unique to the pregnancy period, the lack of association for depression in the perinatal period may also speak to the above mentioned difficulty in identifying depressive symptoms at this time and resulting low pick up rates in previous pregnancies.

6.5 Participant Preference

Women’s attitudes and beliefs about depression and its various treatment options are important to consider in terms of developing appropriate interventions which are culturally and contextually sensitive. Patient preference may impact on the acceptability of interventions and on their outcomes as a result. Very limited patient preference studies have been done in South Africa. Kathree et al explored the perceptions of a sample of women with post-natal depression and found their explanation for the cause of their maternal depression didn’t differ significantly from women globally. They described multiple socio-economic determinants of depression, which suggests the need for interventions to address social, household

and economic factors (36). This finding gives further support for the benefits of investigation into the psychosocial factors that may be associated with depression.

Most of the women interviewed expressed willingness to receive treatment if they experienced depression. Participants would be most willing to receive some form of counselling (51,9%), most would prefer individual based interventions. This is similar to the findings of Goodman et al, in which 508 women were interviewed, the majority of whom preferred psychotherapy as a first option (72,3%) (84). The preference for psychotherapeutic interventions was also found in the above mentioned South African study performed in a primary care setting (36).

The reluctance to engage in group-based therapy was similar in the above study, with only 14% considering group interventions as an option for treatment. They postulated that women in the perinatal period may be particularly susceptible to stigma, due to the pressure to express happy feelings, and thus may not be willing to open up in a group setting. The commitment to attend regularly scheduled groups may in addition represent a barrier to care, due to the responsibilities of child care and may thus impact on adherence and result in a high attrition rate (84).

Acceptance of medication was even lower in our study (23,8%) than in the above study. Although the underlying reason for preference was not explored in this study, a possible reason for the reluctance to accept antidepressants treatment may be explained by the failure of women to recognize a biological model of perinatal depression, or identify themselves as suffering from a mental illness, thus deeming them inappropriate. This may have played a role, In addition to, the well described fears regarding the perceived risks of pharmacotherapy to fetal and infant wellbeing (32).

Participants reported favouring the local clinic as a site for intervention in 53,3% of cases. This is not unexpected as local clinics are conveniently located close to communities and most people have easy access to them. Barriers that have been described in the past include not having adequate referral pathways in place and requiring travel to another center to receive care, as this may result in an extra transportation cost being incurred (74) (84) (85).

Smaller percentages preferred services within the hospital and antenatal clinic (14,1% each). The antenatal clinic may be a favourable option due to the fact that women are already receiving care in this setting, thus offering options for opportunistic care. The incorporation of assessment into routine antenatal care overcomes the stigma that may be associated with going to a mental health clinic and limits the above-mentioned structural barriers to seeking care.

Recommendations made in pregnancy may in addition, be more positively felt if received from familiar those who have a perceived expert knowledge of pregnancy. In Cook Kopelman et al the women described a distrust for health care providers, who treat them with disrespect and especially with regard to them prescribing medication that women fear will impact on the fetus' wellbeing (74). The integration of services has been found to offer advantages by minimising loss to follow up and perceived stigma of being labelled as mentally ill and referral onto specialized mental health services (33) (84) (85). This was further confirmed in our study where few participants were willing to attend mental health clinics.

6.6 Limitations

The study was cross sectional in design and thus does not provide any information as to the onset of illness (incidence) or its progression throughout pregnancy. Many South African women present to antenatal care late in their pregnancy as evidenced

in our study with 63% in the third trimester, at the time of the study, therefore it is difficult to assess if there are differences in risk across trimesters. Studies have had inconsistent finding whether particular trimesters may represent an increased risk period for depression (6).

It is also not possible to determine how the EPDS score develops over time. A prospective study which looks at repeat measurements over time may have be useful for those scoring above ten on the EPDS. The design also prevents any inferences to be made about causality and all socio- demographic findings are associated with, but not necessarily causally related to depression.

The EPDS is a screening test and indicates the presence of depressive symptoms but cannot be used to diagnose depression or accurately confirm a diagnosis of depression. No confirmatory test was used in our study; therefore, it is not possible to know the number of false positive or negative cases identified at each cut off score and therefore not possible to make recommendations in this regard. The use of clinical interviews is costly and time consuming and was beyond the scope of this study. Certain studies have however demonstrated that significant distress requiring intervention may be experienced despite not meeting the full criteria for a major depressive disorder as defined by the DSM 5 (41).

The study was performed at a hospital which serves both tertiary as well as primary care functions, some women are self-referred whilst others may have been referred due to pregnancy complications and comorbid illnesses; thus it includes a varied population. The results may not be generalizable to a primary care setting.

The drainage area for the hospital is urban and peri-urban, and thus the level of education and perceptions of these participants may be different from other socio-economic groups in the country, such as rural populations. It is also difficult to compare our study to the populations examined in high-income country studies. The level of education, income and socio-economic status in our population is much lower. Comparison to LMIC studies may be more appropriate but these are lacking.

The study sample size was significant; however, certain risk factors were present in only a small number of participants. The associations between depressive symptoms and the risk factors represented in a smaller number of participants may not have been found, as they may have been too small to pick up. Information was also not available for a large number of participants regarding family history and thus an association could not be inferred. This has been identified as a common limitation in similar studies, as knowledge of family psychiatric history has been found to be low across various settings. Medical comorbidities had to be grouped together as there weren't high enough numbers of each condition to be evaluated independently (excluding HIV which was represented in larger numbers).

The questionnaire relied on patient self-report, in terms of previous history of depression, substance use patterns and access to support and thus may have been subject to recall and memory bias. It may have been useful to use a standardized measure of alcohol and substance use in order to better compare this risk factor to other studies which have explored this risk factor. The cross-sectional design may also affect the reporting of significant life events and perceptions of support, in the presence of depression the salience of negative events may be altered and result in

over-reporting their significance. For this reason, measures of self-esteem and coping were not assessed.

Standardised measures of life stress and support were not used and thus these measures represent the women's perception of support, as opposed to more objective measures. These included direct questions about perceived emotional support from family, friends and partners as well as instrumental support including financial and practical reliance on a partner or others. Indirect measures included single parenthood and living circumstances.

Certain risk factors, which have previously been identified to be associated with depression, were not included in our questionnaire. Of particular importance is the presence of interpersonal violence. The ethics committee declined for IPV to be included at the risk of causing undue distress in study participants, however, an indirect measure included was the presence of conflict with a partner and an open question of "other" life stressors experienced. The extent of the experienced conflict can; however, not be elucidated.

The exclusion criteria may have limited the number of people who could participate by excluding those who are not able to understand English. This was due to the nature of the screening tool being in English. The tool has been validated in Xhosa however this is not a highly spoken language in the Soweto area and would have only accounted for 7,9% of patients in the study. The exclusion of participants who were unable to speak English may potentially have skewed the results towards those with a higher level of education, as well as exclude foreign immigrants who may represent a particularly high-risk group. However, only 0,008% of people approached to

participate in the study declined on the basis of language. The urban nature of the population, higher overall education level (where the medium of teaching is often English) and the fact that most medical services are currently provided in English may have mitigated this limitation. The interviewer being of a different culture may have impacted on participant confidence in answering questions about support or preference, however the results are in keeping with studies from various cultural groups which were explored with culturally similar researchers. The dynamic of the doctor patient relationship between the interviewer and participant may have played a role in participants providing answers they felt would be more favourable and would thus impact on the accuracy of the information provided. These effects may ,however; be more substantial in a qualitative research design.

7.0 Conclusion and Recommendations

Antenatal depression is highly prevalent in South Africa, as evidenced in our study and numerous others. South African women suffer a significant burden of socio-economic risk factors. Multiple of these risk factors have been found to be associated with depression (19), which may contribute to adverse maternal and child outcomes. Significant risk factors consistently found to be associated with antenatal depression include conflict with a partner, adverse financial circumstances and unwanted pregnancy.

This research further adds to the available South African data. It highlights the extent of the problem and gives an indication of the region-specific concerns and risk factors. Good demographic data aids in the development of appropriate intervention strategies. Research needs to be context specific, but also comparable to other studies within South Africa and worldwide, in order to accumulate the data and make better conclusions. Larger national samples are needed in order to advocate for the rights of the mentally ill and vulnerable and to ensure government and policy makers prioritise this highly prevalent condition.

Further research is needed that pays particular attention to specific high-risk groups that were not included in this study, such as adolescent pregnancy, immigrant and marginalized groups, and rural populations.

In resource poor settings such as South Africa, the cost of identifying cases and developing interventions needs to be weighed up against the potential benefits of preventing/treating the illness. This includes consideration of the available human

and other resources, as well as competing health needs. Interventions thus need to be simple, easy to implement and cost effective.

The use of the screening tool in this study was highly acceptable to this study population. The introduction of screening into routine antenatal care may improve the pick-up rate of depressive symptoms in women at risk and thus provide significant opportunities to effectively treat antenatal depression and potentially prevent long term negative consequences. The development of South African guidelines may be useful to guide practice and to ensure that the results of ongoing monitoring and treatment could be compared across different settings.

The inclusion of a risk factor assessment may further increase the accuracy of screening for clinically relevant depressive symptoms. The detection of associated factors may also determine high-risk groups in order for targeted interventions to be put in place. Women's health is unlikely to improve in the context of significant comorbidity with HIV, difficulty negotiating reproductive independence and high rates of intimate partner violence and thus these social determinants also need attention. Social, psychological and educational interventions may address important targets in the prevention of the development of depression and potentially improve overall health and wellbeing.

Very few studies have evaluated South African women's feelings about depression and preferences for treatment. South African women may differ substantially from those in high income countries, therefore adoption of interventions designed on these populations may not be appropriate in our setting and may require significant adaptation. The women in this study expressed willingness to receive care within a

primary care setting and most felt that psychological interventions would be the most useful.

There is an overwhelming deficit of mental health care providers in the country and thus task shifting to primary care resources may increase access to vitally needed services. Training community care workers in identifying cases and offering counselling services may help to reduce the treatment gap. This strategy has been successfully applied in other health areas including HIV care and chronic illness management. An evaluation of these services and how they could be applied in the context of maternal mental illness may assist in improving the care of women with antenatal depression.

8.0 References

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9.0 Appendices

9.1 Appendix 1 PARTICIPANT INFORMATION SHEET

Dear Participant,

My name is Dr. Alexandra Maisto, and I am a registrar in the department of psychiatry. I am registered as a MMED student at the University of the Witwatersrand.

I am working on a research project to screen women for depression during pregnancy and to identify who is at risk and may need treatment.

This letter gives you the information to help you to decide if you want to take part in this study.

I will be providing a questionnaire for women in the clinic to fill out, asking them some details about themselves such as age, obstetric history, psychiatric history to name a few.

It will also include a 10 question Screening test which is designed to pick up symptoms of depression in the last seven days. If you have signs and symptoms of depression and you would like to go to your nearest clinic, I will refer you for further help.

Each questionnaire should only take 15 minutes of your time and I will be available to answer any questions at this time.

You are not obliged to participate in this study. It is purely voluntary and will not affect the treatment you get at the antenatal clinic.

You only need to participate if you want to, and you fully understand what is being asked of you.

None of your personal identifying information will be included. No one will be able to see or access your answers other than me.

The results of this study may be published; however, none of your personal details will be made known. Your confidentiality will be protected at all times.

You may stop participating at anytime if you start to feel uncomfortable.

The Research Committee of the University of the Witwatersrand and the Faculty of Health Sciences have granted written approval for this study.

Should you have any questions with regard to this study or about depression during pregnancy, you are welcome to contact me at any time via email: alex.maisto@gmail.com or call me on 082 839 8682.

May you be truly blessed with all the joys of motherhood.

Thank you kindly for your time,

Dr. Alexandra Maisto

I hereby confirm that I have been informed about the study by

.....

I understand what is expected of me and what the study "Screening for antenatal depression in women attending the Chris Hani Baragwanath Academic Hospital Antenatal Clinic", is about.

- I have also read and understood the patient information leaflet with regard to this study.
- I am aware that the results of the study, including personal details such as age, date of birth, diagnosis and my test scores will be anonymously processed into a research report.
- I agree that the data collected during this study can be processed in a computerised system by the researcher or on their behalf.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had enough time and opportunity to ask questions and of my own free will, I have decided to participate in the study.

PARTICIPANT NAME:

SIGNATURE

.....

DATE:

.....

.....

PLACE:

.....

I, herewith confirm that the above participant has been fully informed about the nature, procedure and potential outcomes of the above study.

Dr Alexandra Maisto

SIGNATURE

.....

DATE:

.....

.....

PLACE:

.....

WITNESS NAME:

SIGNATURE

.....

DATE:

.....

.....

PLACE:

.....

9.3 Appendix 3		QUESTIONNAIRE		
1. How old are you?				
<18 (To exclude)	18-24	25-34	35+	
2. What is your race?				
African	Coloured	Indian	White	Other?_____
3. Are you employed?				
Permanent	Temporary	unemployed	Student	
4. What is your household income per month? In South African Rands				
<R5000	R5001-10000	R10001-15000	R15001-25000	25001+
5. Do you depend on social welfare (Social grants)?				
No	CSG no:_____	CDG no:_____	PG no:_____	Other?_____
6. What is your highest level of education (highest grade passed)?				
No schooling	Primary school-Grade:___	High school-Grade:___	Passed Matric	Tertiary
7. Are you in a relationship currently?				
Yes		No		
8. Do you feel your partner is there for you emotionally? "someone to talk to, to discuss problems with and who provide encouragement".				
Yes		No		
9. Does your partner help you financially?				
Yes		No		
10. Do you have alternative sources of financial support? "assisting with money to provide for you and your children".				
Yes		No		
11. Do you have people who you can count on to help you? "clear and definite support with physical things such as housework, cleaning, childcare or transport."				
Partner	Family	Friends		

12. Who do you live with?				
Alone	partner	family	tenants	children
13. Have you experienced any significant life stressors during your pregnancy?				
Death of a loved one	Financial stress	Pregnancy complications	conflict with partner	Other? _____
14. Was the pregnancy planned/wanted?				
Planned	unplanned	wanted	unwanted	
15. How far are you in your pregnancy?				
1st trimester	2nd trimester	3rd trimester		
16. How many times have you been pregnant?				
first	2	3	4+	
17. How many live births have you had?				
1	2	3	4+	
18. How many children do you have who are still living?				
1	2	3	4+	
19. Poor pregnancy outcomes? (from Antenatal card)				
Miscarriage	stillbirth	Ectopic	Termination	
20. Do you know your HIV status?				
Positive	Negative	Unknown		
21. Do you have any illnesses?				
Yes? _____		No		
22. Have you ever had depression before?				
No	Post partum	During pregnancy	Unrelated to pregnancy	

23. Did you receive treatment for depression?				
Yes- Psychotherapy	Yes- medication	No		
24. Are you on treatment for depression at the moment?				
Yes- _____		No		
25. If you ever suffered from depression, where would you like to access information and treatment?				
Local clinic	Antenatal clinic	Mental health clinic		
Hospital	Religious leaders	Home (family members)		
26. If you suffered from depression, what type of treatment would you be willing to accept?				
Medication	Talk therapy	Group therapy	Refuse all treatment	
27. Prior to pregnancy how much alcohol did you drink?				
Nil	Occasional	regular use	Daily use	
28. During pregnancy, how much alcohol are you drinking?				
Nil	Occasional	regular use	Daily use	
29. Prior to pregnancy did you smoke?				
Yes		No		
30. Are you smoking during your pregnancy?				
Yes		No		
31. Do you use any other substances?				
Cannabis	Stimulants	Heroin, Nyaope	Other: _____	
32. Do you have any relatives who suffer/ed from mental illness				
Depression	Suicide	Other: _____		

9.4 Appendix 4 EDINBURGH POSTNATAL DEPRESSION SCALE

CLINICIAN SCORING GUIDE



BLACK DOG INSTITUTE

EDINBURGH POSTNATAL DEPRESSION SCALE

INSTRUCTIONS:

TOTAL
SCORE

ADD THE NUMBER NEXT TO EACH CIRCLE THAT HAS BEEN FILLED IN. THIS IS THE TOTAL SCORE.
SEE ALSO RANGE OF SCORES ON THE EDS.

1. I have been able to laugh and see the funny side of things:

- { 0 As much as I always could
- { 1 Not quite as much now
- { 2 Definitely not so much now
- { 3 Not at all

2. I have looked forward with enjoyment to things:

- { 0 As much as I ever did
- { 1 Rather less than I used to
- { 2 Definitely less than I used to
- { 3 Hardly at all

3. 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

4. I have been anxious or worried for no good reason:

- { 0 No, not at all
- { 1 Hardly ever
- { 2 Yes, sometimes
- { 3 Yes, very often

5. 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

6. Things have been getting on top of me:

- { 3 Yes, most of the time I haven't been able to cope at all
- { 2 Yes, sometimes I haven't 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

7. 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

8. I have felt sad or miserable:

- { 3 Yes, most of the time
- { 2 Yes, quite often
- { 1 Not very often
- { 0 No, not at all

9. 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

10. The thought of harming myself has occurred to me:

- { 3 Yes, quite often
- { 2 Sometimes
- { 1 Hardly ever
- { 0 Never

Scores 1,2 or 3 on Item 10
IF ANY THOUGHTS OF
SELF HARM ENQUIRE
FURTHER and ensure
SAFETY

* Murray and Cox 1990 * Cox, Holden & Sagovsky 1987

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9.5 Appendix 5 HUMAN RESEARCH ETHICS CLEARANCE CERTIFICATE



R14/49 Dr Alexandra Stephanie Maisto

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M151131

NAME: Dr Alexandra Stephanie Maisto
(Principal Investigator)

DEPARTMENT: Psychiatry
Chris Hani Baragwanath Academic Hospital

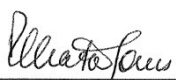
PROJECT TITLE: Screening for Antenatal Depression in Women Attending
the Chris Hani Baragwanath Academic Hospital
Antenatal Clinic

DATE CONSIDERED: 27/11/2015

DECISION: Approved unconditionally

CONDITIONS: Title change (08/04/2016)

SUPERVISOR: Dr Carina Marsay

APPROVED BY: 
Professor P. Cleaton-Jones, Chairperson, HREC (Medical)

DATE OF APPROVAL: 08/04/2016

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 10004, 10th floor, Senate House/2nd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand. I/We fully understand the conditions under which I am/we are authorised to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in November and will therefore be due in the month of November each year.


Principal Investigator Signature

Date

8/04/2016

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Dear Research Participant

You have been found to be suffering from some symptoms of depression. If you would like to be followed up please take this to your local clinic /CHBH mental health services to book an appointment

Dear Colleague,

The following individual participated in my MMED research project titled Screening for antenatal depression in women attending the CHBAH Antenatal Clinic
The Edinburgh Perinatal Depression scale was performed on _____(date)

It was found to have a score of:

- A. 10-12 Which indicates possible depression
- B. >12 which indicates probable depression
- C. 1,2,3 on item 10 which indicates acute suicidal ideation

Please can you do a clinical interview to identify for the presence of antenatal depression in this individual and treat accordingly?

Please can you email this form back to alex.maisto@gmail.com or SMS on 0828398682 with the score (A,B,C) and yes for a positive diagnosis of Antenatal depression or no for absence of diagnosis,

Please circle the following:

Diagnosis antenatal depression: yes / no

Treatment given:

Nil / follow up review only/ anti-depressant medication / referral to individual psychotherapy / referral to group psychotherapy

Thank you, Kind regards
Dr. Alexandra Maisto

For any information please contact me on alex.maisto@gmail.com or sms on 0828398682

a0006629:Thesis_incorp_31_03_2019_1800_for_turn_it_in.do..

ORIGINALITY REPORT

5%	3%	4%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Alessandra Biaggi, Susan Conroy, Susan Pawlby, Carmine M. Pariante. "Identifying the women at risk of antenatal anxiety and depression: A systematic review", Journal of Affective Disorders, 2016 Publication	1%
2	www.researchgate.net Internet Source	1%
3	Submitted to University of Witwatersrand Student Paper	1%
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5	Alan Stein, Rebecca M Pearson, Sherryl H Goodman, Elizabeth Rapa et al. "Effects of perinatal mental disorders on the fetus and child", The Lancet, 2014 Publication	<1%
6	www.ncbi.nlm.nih.gov Internet Source	<1%