

Predictors and Occurrence of Antenatal Depression in Galle,

Sri Lanka

by

Sage Wyatt

Global Health Program
Duke Kunshan and Duke University

Date: _____

Approved:

Qian Long, Advisor

Truls Ostbye

Lijing Yan

Thesis submitted in partial fulfillment of
the requirements for the degree of Masters of Science in the Department of
Global Health in the Graduate School
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ABSTRACT

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Abstract

Antenatal depression is a serious mental health issue that can affect both mother and baby. Risk factors across a biopsychosocial model for antenatal depression are still inconsistent across context. The purpose of this study is to explore individual and health system factors associated with antenatal depression in Sri Lanka using a cross-sectional mixed methods approach. The quantitative portion included 505 patients from Galle, Sri Lanka, with health record data and responses to psychometric questionnaires. For the qualitative portion, public health midwives working in this district were interviewed about their experiences and typical clinical practices with antenatal depression patients. The estimated prevalence of antenatal depression in this region was 7.5%, with 4.4% reporting self-harm ideation (depression assessed using Edinburgh Postpartum Depression Scale). Prevalence was highest in patients who were over the age of 30 ($n = 184$, $OR = 3.88$, $95\%CI = 1.71 - 9.97$), diabetic ($n = 32$, $OR = 3.99$, $95\%CI = 1.50 - 9.56$), or pre-eclamptic in a previous pregnancy ($n = 31$, $OR = 3.32$, $95\%CI = 1.17 - 8.21$). Lower prevalence was observed in the primiparous ($n = 211$, $OR = 0.29$, $95\%CI = 0.12 - 0.64$) employed ($n = 197$, $OR = 0.33$, $95\%CI = 0.13 - 0.72$), or lower-middle class ($n = 172$, $OR = 0.17$, $95\%CI = 0.04 - 0.56$). Anxiety levels were elevated in depressed patients ($OR = 1.13$, $95\%CI = 1.07 - 1.20$), while perceived social support was lower ($OR = 0.91$, $95\%CI = 0.89 - 0.93$). Risk factors elucidated by qualitative data were consistent with the quantitative

findings. Additionally, interviewed public health midwives described poor inadequate education and no official clinical guidelines for antenatal depression within their practice, leaving diagnosis up to the midwives' discretion based on subjective measures. The prevalence of antenatal depression is low in this community compared to other communities in Sri Lanka and the global average. Biological, psychological, and social factors are all involved and must be considered to improve antenatal mental healthcare.

Dedication

Thank you to my advisors Dr. Qian Long, Dr. Truls Ostbye, and Dr. Vijitha De Silva for being so wonderful and supportive through the entire duration of my master's program.

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1. Introduction

Depression is a psychological disorder with heterogenous symptomology and causes still being investigated. Currently, depression is estimated to be the third biggest cause of disability worldwide (Park & Zarate, 2019). The postnatal and antenatal periods are especially high-risk times for onset of mental illness. While postnatal depression has received more public awareness and attention within the scientific community, antenatal depression has been shown to be a very strong risk factor. Globally the prevalence of antenatal mental illness varies between 7% to 20% in high income countries, with a wider range from 5% to 50% in low-or-middle-income countries (LMICs). Overall, LMICs have higher rates of antenatal depression on average, but information about antenatal depression in LMICs is still crucially lacking (Biaggi et al. 2016).

Screening and prevention of any antenatal health issue is urgent because of the possible adverse consequences for the fetus. Some studies have explored a relationship between antenatal depression and poor fetal outcomes, such as increase in stillbirth, low birth weight, and major congenital anomalies (Raisanen et al 2014). More frequent obstetric visits and overuse of elective caesarean sections are both common in depressed women (Andersson et al. 2004). Furthermore, antenatal depression is a very strong indicator of post-partum depression, leading to further maternal morbidity after birth (Leigh and Milgrom, 2008).

Evidence on risk factors of antenatal depression is very heterogenous. While some studies demonstrate significant associations of social determinants, the results are not necessarily replicable in different contexts. Age, parity, and ethnicity have all demonstrated different associations in different studies. Socioeconomic status and education have not been widely shown to be associated with antenatal depression (Lancaster et al. 2010). Support and connection with friends, spouses, and family has been widely characterized as playing a protective role against depression in both general and pregnant populations (Milgrom et al. 2019). Antenatal anxiety is also highly associated with antenatal depression and considered to be a common comorbidity (Falah-Hassani et al. 2017). Chronic health conditions and previous pregnancy complications have also demonstrated a significant association with depression during pregnancy in previous research (Brown et al. 2019).

Sri Lanka is an LMIC with very strong maternal health indicators. Currently, maternal healthcare is provided free of charge in local public clinics. Antenatal care is provided in public clinics that are open once every two weeks or by checkup visits at home. There is an organized referral system for patients who require specialized care beyond what PHMs are trained to provide. Healthcare is organized by the “pregnancy record” system, where health records are personally kept by the patient so vital health information is always available regardless of the facility or provider. Each clinic is

supervised by a medical doctor and some other healthcare professionals, but much of the frontline care is done by Public Health Midwives (PHMs). PHMs are the primary caretakers for pregnant women not only during the antenatal care process, but also provide care and education from pre-conception through the post-partum period. Nearly 100% of all pregnant women nationally receive antenatal care and deliver institutionally, with 95% at public facilities.

Currently, there is no official protocol for screening and treatment for antenatal depression, but there is for postpartum depression. Regular screening by Edinburgh Postpartum Depression Scale is administered in the weeks following birth and are given referrals to a psychiatrist at a district hospital (Hemachandra, 2011). A nationwide mental health policy was first adopted in Sri Lanka in 2005, with the goal of developing mental health services at a primary care level. Psychiatrists and other specialized mental health providers are assigned to district hospitals, in addition to overseeing care at community outreach clinics. However, as of 2015, there were only 0.4 psychiatrists per 100,000 people, most concentrated in urban areas. Nonetheless, these specialists are available for referral from the community and can dual practice in the private and public sector (Minas et al. 2017).

There has been very little research concerning antenatal depression in Sri Lanka. One previous study found no significant social determinants of antenatal depression

based on demographic factors. However, this study did not outline the important mitigating factor of social support or current community interventions for antenatal depression. Importantly, the prevalence of depression in this group of women was lower than estimated by post-partum depression rates, at only 16.2 %. Suicidal ideation in pregnancy was also found to be a significant factor in Sri Lanka, with suicide attributed to 5% of maternal deaths from 2005 – 2013 (Arachchi et al. 2013).

The overall objective of this study is to further investigate prevalence of antenatal depression in Sri Lanka and related individual and health system factors. Specific objectives include 1) understanding local prevalence of depression, 2) characterizing its associations with demographic, socioeconomic, health, and other psychological factors, and 3) understanding the current knowledge, attitude and practices of public health midwives concerning antenatal depression.

2. Methods

This was a mixed methods study conducted in clinics of Bope-Poddala Medical Officer of Health (MOH) division. For the quantitative portion, data was collected from pregnancy health records and psychometric questionnaires were administered to the clinic population. For the qualitative portion, midwives working at the clinics were interviewed about their knowledge and experiences concerning patients suffering from antenatal depression.

2.1 Setting

This cross-sectional study was performed in the Bope-Poddala MOH division of Galle district, Sri Lanka. The Bope-poddala MOH holds four field clinics to deliver maternal and child health services to the community. They are namely Kuruduwatta clinic, Ukwatta clinic, Meepawala clinic, and Bope clinic. Each clinic hosts one medical doctor and four to five public health midwives in charge of antenatal care.

Demographics of each clinic varied, as Ukwatta and Kuruduwata clinics serve a majority Muslim population, while Meepawala and Bope clinics serve a majority Sinhalese Buddhist population. As Muslims are considered an ethnic and religious minority in Sri Lanka, this community is an outlier demographically.

2.2 Quantitative Study

2.2.1 Participants

Participants were recruited over a period of 6 months from March to August 2020. Eligibility criteria included all individuals who were pregnant, at an antenatal clinic, and willing to participate. Any person at the clinic who was not currently pregnant was not included in the study.

2.2.2 Procedures

Data was collected by a research assistant employed by the University of Ruhuna, who administered three psychometric scales orally. The assistant also copied information from the patient's pregnancy record, the portable health records carried by the patient. Because information about ethnicity and religion was not included in the health record, patients were directly asked for this information. All participants signed a form to give written informed consent before any data was collected. Ethical approval was obtained by both Duke Kunshan University in China and University of Ruhuna in Sri Lanka.

2.2.3 Measures

2.2.3.1 Dependent Variables

The primary outcome of the study was depression measured by the Edinburgh Postpartum Depression Scale (EPDS), a 4-point Likert scale (0 – 3) questionnaire

designed to detect postpartum depression. EPDS is currently used clinically in Sri Lanka to assess postpartum depression but has also been used in many prior studies for antenatal depression (Fan et al. 2020). There are 10 questions, for potential score range from 0 – 30. A score of >9 is generally accepted as the cut-off point indicating depression, and it is reported as a continuous variable (Kabir et al. 2020). Prevalence of depression in the population was determined by individuals scoring >9 on this scale, reported as a dichotomous variable.

2.2.3.2 Independent Variables

The independent variables used in this study were anxiety, social support, demographic characteristics, and health characteristics. Some variables were originally recorded as continuous but then categorized during the analysis.

The Pregnancy Related Anxiety Questionnaire (PRAQ) is a 10-item questionnaire which uses a 7-point scale to assess anxiety due to pregnancy. The score can range from 10 – 70. There are three subscales for different sources of anxiety: fear of delivery, worry about child's health, and concern about appearance. Fear of delivery and concern about appearance include three questions each and have a total score range from 3 – 21. Worry about child's health contains four questions, and hence can range from 4 – 28. The scale used in this study is PRAQ-R2, a revision of the original PRAQ-R remodified for all

pregnant women regardless of parity (Huizink et al. 2016). There is no widely accepted cut-off to assess clinical anxiety for this questionnaire.

The Multidimensional Scale of Perceived Social Support (MSPSS) is a 12-item questionnaire intended to assess social support during life stressors. There is a 7-point scale, and scores can range from 12 – 84. In addition to the summary score, there are three subscales for support by family, support by friends, and support by a special person. The special person questions are intended to target social support of a spouse or partner. Each subscale contains four questions and has a range of 4 – 28 (Dahlem et al. 1991).

For demographic and socioeconomic characteristics, Information was gathered about religion/ethnicity (Buddhist Sinhala, Other), education (Primary or below, Junior Secondary, Senior Secondary, College or Above), social class (1, 2, 3, 4) employment (Yes, No), parity (Primiparous, Multiparous), age (≤ 25 , 26 – 30, > 30), and trimester (first, second, third). Age and parity were originally reported as continuous variables, but categories were developed during analysis to create approximately equal populations in each group. Religion was initially recorded as Catholic, Muslim, Hindu, Buddhist, or Other. Ethnicity was separately recorded as Sinhala, Muslim, Tamil, Burger, or Other. The variable “religion/ethnicity” was generated with participants who were both Buddhist and Sinhala, the ethnic and religious majority, were categorized as “Buddhist

Sinhala.” Those who were either ethnic or religious minorities were categorized as “Other.” Social class was determined by subjective judgement on reported occupation, 1 being the lowest class and 4 being the highest. Trimester was extrapolated from the date of data collection and the reported due date, then categorized into first (0 – 13 weeks), second (14 – 26 weeks), and third (26 – 41 weeks). Age was also separated into the respective categories based on reported continuous data, grouped into categories with approximately equal size.

For health characteristics Information was gathered about subfertility (Yes, No), diabetes mellitus (Yes, No), history of low birthweight baby (Yes, No), history of abortion (Yes, No), Body Mass Index (Low, Normal, High), and history of pre-eclampsia (Yes, No). Body Mass Index (BMI) was categorized from a continuous scale into low (≤ 19), normal (20 – 25), and high (≥ 26).

2.2.4 Data Analysis

The intended sample size was 627 participants. In order to perform individual analysis of risk factor by each of the three trimesters, 209 participants per trimester would be required. However, due to rising concerns of the SARS-CoV-2 pandemic, the study was halted at 505 participants, and no trimester stratification was performed due to the low number of participants from the first trimester ($n = 53$). There was no missing data.

All statistical analysis was performed in Rstudio version 1.3. Associations between each of the factors and depression was investigated by bivariable and multivariable analysis.

Due to the low sample size, a Fischer's Exact test was used to assess bivariable associations between depression (EPDS score >9) and each subject characteristic. Due to the non-parametric, continuous nature of the results for PRAQ and MSPSS, a Kruskal Wallis test was performed to assess associations between these two psychometric scales and EPDS-indicated depression. Relationships were considered statistically significant if the p-value was less than 0.05.

All variables were considered important to the outcome in the exploratory study and included in multivariable regression models. Three models were analyzed, progressively adding demographic characteristics, health characteristics, and anxiety plus social support. Coefficients and odds ratios for depression are presented for each variable.

2.3 Qualitative Study

2.3.1 Participants

This study was conducted from June to October 2020. The study team conducted semi-structured interviews with 12 PHMs from the four public clinics in the Bope-Poddala MOH division. Three PHMs were selected by convenience sampling from each

clinic depend on availability during the data collection. Any midwife currently employed at a clinic was eligible for participation. Participant selection was performed by convenience sampling, with any midwife not currently busy asked to join the study. During the data collection period, there were a total of 18 PHMs in the MOH jurisdiction, and 6 were not selected due to unavailability or lack of interest.

2.3.2 Procedures

Two general practice medical doctor experienced in conducting in-depth interviews and proficient in both Sinhala and English led the recruitment process as moderators. Midwives were approached by one of the moderators during their work shift and informed about the goal of the study. If they were willing, they met the moderators later that day after their shift ended. A total of 12 midwives were interested in participating, so 12 interviews were conducted. The semi-structured interviews took place in a place in or around the clinic. All interviews were conducted in Sinhala. Interviews typically lasted approximately 1 hour. Participants signed a written informed consent form given by the moderator before the interviews began and 6 USD (1000 Rs) were paid to each midwife to compensate their time and travelling expenses after the interview. Ethical approval was granted by both Duke Kunshan University in China and the University of Ruhuna in Sri Lanka.

The moderator's guide was developed in English by a research associate outside of Sri Lanka on three exploratory themes: knowledge of antenatal mental health, mental health care practices at the clinic, and suggestions for improvement in protocol or policy. The content of the guide was informed by existing literature and reviewed by the corresponding author, a physician, and an experienced researcher within Sri Lanka. The guide was translated into Sinhala by the moderators before the interviews. Initial questions about the prevalence and importance of mental health issues warranted short responses, while all other questions were open-ended. Knowledge about antenatal mental health issues was investigated by probes into how social support and physical health impacted the condition.

Recordings were transcribed directly into English while listening to the Sinhala recording by the moderator who performed the interviews. The moderator then wrote a summary of each transcript in addition to the verbatim translation. The second moderator then verified the translation by reading the transcript and listening to the recording simultaneously. English transcripts and summaries were then shared by a secure REDcap network with the external research associate for further analysis.

2.3.3 Analysis

One analyst read the transcripts line by line to identify key concepts and developed a coding scheme. Coding was guided by the theories of applied thematic

analysis. After familiarization with the transcripts, structural codes were developed based on the moderator's guide and emergent themes were identified. This coding scheme was further refined after memo writing on uncoded data, preliminarily coded data, and re-coded data. There was no inter-coder verification process performed. All transcripts were coded in NVivo 12.

2.3.4 Ethical Review and Clearance

Ethical clearance was granted both in China by the Institutional Review Board at Duke Kunshan University and in Sri Lanka by the Ethical Review Committee at Faculty of Community Medicine of University of Ruhuna.

3. Results

3.1 Quantitative Results

A total of 505 pregnant women were recruited. All participants had complete records. Figure 1 shows the distribution of positive responses to each EPDS item, scored from 0 – 3. Participants who responded at least “1” to the question were included as affirmative responses, indicating they experienced the symptom sometime in the past seven days. A large portion of participants (n = 112) responded “0” to every item, i.e. the data was nonparametric with a strong right skew. The item with a most frequent affirmative response was item 2 (n = 177, 35.0%), “I have looked forward with enjoyment to things.” The item with the least frequent positive response was item 10 (n = 22, 4.4%), “the thought of harming myself has occurred to me” (Figure 1)

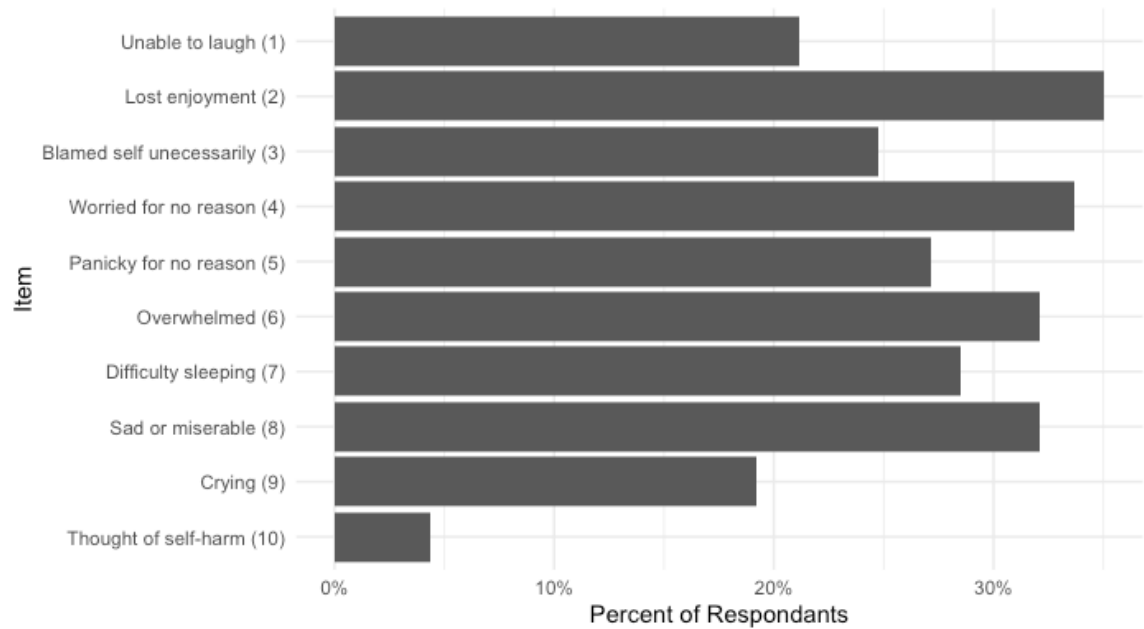


Figure 1: Percent of respondents with affirmative response by EPDS item

The overall prevalence of depression was 7.5%, as 38 out of the 505 women scored above the diagnostic cutoff (>9) on EPDS, indicating depression. Sample characteristics are shown in Table 1. The majority were Buddhists and Sinhalese, between the ages of 26 and 30. The proportion of recruited women in the first trimester of pregnancy was 35% lower than those in the second or third trimester. The Cronbach's Alpha for the EPDS score was 0.664. Women who were upper-middle class, multiparous, unemployed, over the age of 30, had diabetes, or had a history of pre-eclampsia had higher prevalence of depression. There was a lower prevalence in second trimester women, though this was not statistically supported ($p = 0.092$) (Table 1).

Table 1: Sample characteristics and outcome and bivariable analysis (n = 505)

	Total n(%)	Depression prevalence n(%)	<i>p-value*</i>
Total	505(100)	38(7.5)	
Religion/Ethnicity			1.000
Buddhist Sinhala	391(77.4)	30(7.7)	
Other	114(22.6)	8(7.0)	
Education			0.076
Primary or Below	23(4.5)	3(13.0)	
Junior Secondary	252(49.9)	25(9.9)	
Senior Secondary	171(33.9)	8(4.7)	
College or Above	59(11.7)	2(3.4)	
Social Class			0.003
1	73(14.3)	5(6.8)	
2	172(34.1)	4(2.3)	
3	195(38.6)	21(10.8)	
4	65(12.9)	8(12.3)	
Employed			0.009
Yes	197(39.0)	7(3.6)	
No	308(61.0)	31(10.1)	
Parity			0.002
Primiparous	211(41.8)	7(3.3)	
Multiparous	294(58.2)	31(10.5)	
Age			0.002
≤25	133(26.3)	7(5.3)	
26 – 30	188(37.2)	7(3.7)	
>30	184(36.4)	24(13.0)	
Trimester			0.092
1	53(10.5)	5(9.4)	
2	229(45.3)	11(4.8)	
3	223(45.2)	22(9.8)	
Subfertility			0.516
Yes	38(7.5)	4(10.1)	
No	467(92.5)	34(13.7)	
Diabetes Mellitus			0.006
Yes	32(6.3)	7(21.9)	
No	473(93.7)	31(6.6)	
History of LBW baby			0.055

Yes	38(7.5)	6(15.8)	
No	467(92.5)	32(6.9)	
History of abortion			<i>0.201</i>
Yes	61(12.1)	7(11.5)	
No	444(87.9)	31(7.0)	
BMI			<i>0.234</i>
Low BMI	130(25.8)	7(5.4)	
Normal BMI	288(57.1)	21(7.3)	
High BMI	86(17.1)	10(11.6)	
History of pre-eclampsia			<i>0.022</i>
Yes	31(6.1)	6(19.4)	
No	474(93.9)	32(6.8)	

*Fischer's Exact Test

Anxiety levels reported via PRAQ (alpha = 0.715) were higher among women with depression (mean = 19.3, SD = 6.4, $p < 0.001$) than among those without (mean = 15.2, SD = 4.8, $p < 0.001$). Mean PRAQ subscore for concern about appearance differed by depression status to a smaller extent than the other subscales ($p = 0.189$). Social support measured by MSPSS (alpha = 0.861) was overall lower in the depressed (mean = 56.9, SD = 18.9) than other women (mean = 73.9, SD = 10.0). This association was robust for all subscales ($p < 0.001$) (Table 2).

Table 2: Anxiety and social support by depression status (bivariable analysis, n = 505)

	Depressed mean(SD)	Not Depressed mean(SD)	p-value*
Anxiety total	19.3(6.4)	15.2(4.8)	<0.001
Anxiety about delivery	7.8(3.6)	6.4(3.3)	0.013

Worry about baby's health	6.7(3.0)	4.9(1.5)	<0.001
Concern about appearance	4.4(2.2)	4.0(1.9)	0.189
Social support total	56.9(18.9)	73.9(10.0)	<0.001
Support from family	21.4(6.3)	26.3(3.0)	<0.001
Support from friends	16.1(8.7)	21.9(7.7)	<0.001
Support from a special person	19.5(8.4)	25.8(3.6)	<0.001

*Kruskal-Wallis Test

Relative odds of depression by characteristic are presented in Table 3. The strengths of association between subject characteristics and depression were reduced, relative to the bivariable model, for all variables in Models 1 and 2, which adjusted for all demographic variables and all demographic and health variables respectively. In the fully adjusted model, Model 3, PRAQ and MSPSS subscale scores were added to Model 2. Only parity (OR = 0.20, 95%CI = 0.05 - 0.74) and social support from a special person (OR = 0.94, 95%CI = 0.77 – 0.95) remained significantly associated with depression (Table 3).

Table 3: The relationship of demographic characteristics, anxiety, and social support with depression (logistic regression, n = 505)

	Bivariable	Model 1: Demographic	Model 2: Demographic + Health	Model 3: Demographic + Health + Psychological
Religion/ Ethnicity				

Buddhist Sinhala	1	1	1	1
Other	0.91(0.38,1.95)	0.72(0.26,1.81)	0.70(0.25,1.80)	0.75(0.22,2.29)
Education				
Primary or below	4.28(0.66,34.28)	2.11(0.22,23.5)	2.86(0.29,33.69)	0.29(0.02,5.37)
Junior Secondary	3.14(0.90,19.86)	1.12(0.22,8.58)	1.28(0.24,10.11)	0.55(0.09,5.02)
Senior Secondary	1.40(0.34,9.45)	0.53(0.10,4.14)	0.64(0.12,5.19)	0.40(0.06,3.46)
College or Above	1	1	1	1
Social Class				
1	0.52(0.15,1.66)	0.60(0.15,2.32)	0.66(0.15,2.73)	0.57(0.09,3.26)
2	0.17(0.04,0.56)	0.27(0.06,1.14)	0.33(0.07,1.49)	0.48(0.08,2.94)
3	0.86(0.37,2.16)	0.91(0.33,2.82)	1.02(0.35,3.35)	1.09(0.30,4.71)
4	1	1	1	1
Employed				
Yes	0.33(0.13,0.72)	0.38(0.13,0.98)	0.40(0.13,1.06)	0.45(0.13,1.39)
No	1	1	1	1
Parity				
Primiparous	0.29(0.12,0.64)	0.43(0.15,1.07)	0.41(0.14,1.14)	0.20(0.05,0.74)
Multiparous	1	1	1	1
Age				
≤25	1.43(0.48,4.29)	1.07(0.32,3.54)	1.31(0.38,4.76)	2.02(0.49,8.38)
26 – 30	1	1	1	1
>30	3.88(1.71,9.97)	3.15(1.31,8.53)	2.65(1.05,7.35)	1.65(0.56,5.32)
Trimester				
1	1	1	1	1
2	0.48(0.17,1.60)	0.63(0.20,2.24)	0.58(0.18,2.11)	0.43(0.11,1.95)
3	1.05(0.41,3.26)	0.91(0.46,4.48)	1.24(0.42,4.28)	1.07(0.31,4.44)
Subfertility				
Yes	1.50(0.43,4.04)		1.78(0.43,5.87)	1.70(0.35,6.56)
No	1		1	1
Diabetes Mellitus				
Yes	3.99(1.50,9.56)		1.81(0.58,5.23)	1.72(0.44,6.21)
No	1		1	1
History of LBW baby				
Yes	2.55(0.91,6.18)		1.10(0.35,3.06)	1.56(0.42,5.21)
No	1		1	1

History of abortion				
Yes	1.73(0.67,3.91)		1.03(0.35,2.70)	0.84(0.24,2.61)
No	1		1	1
BMI				
Low BMI	0.72(0.28,1.67)		0.82(0.29,2.14)	0.62(0.17,1.97)
Normal BMI	1		1	1
High BMI	1.67(0.72,3.62)		1.19(0.47,2.83)	1.66(0.56,4.71)
History of pre-eclampsia				
Yes	3.32(1.17,8.21)		1.96(0.60,5.76)	2.67(0.58,10.54)
No	1		1	1
Anxiety total	1.13(1.07,1.20)			
Delivery	1.12(1.02,1.22)			1.28(0.98,1.30)
Baby's health	1.48(1.29,1.71)			1.14(0.92,1.41)
Appearance	1.09(0.93,1.24)			0.94(0.72,1.16)
Social support total	0.91(0.89,0.93)			
Family	0.79(0.74,0.85)			0.94(0.92,1.02)
Friends	0.93(0.89,0.96)			1.13(0.83,1.06)
Special person	0.83(0.79,0.87)			0.94(0.77,0.95)

3.2 Qualitative Results

All of the 12 public health midwives were actively employed at the time of the interview. While Galle, Sri Lanka, has a higher Muslim population than Sri Lanka overall, the only demographics represented in the participants were Sinhalese Buddhists. All were female, all had children, and 9 (75%) were multiparous. They varied in age from 35 to 64 years old. The length of time working as a midwife ranged from 6 to 30 years, while the time of working at the particular clinic where each midwife

was interviewed varied from 2 years to 30 years. The majority of midwives (83%) had worked at their current clinic for less than half of their career, though two had worked there for all or almost all of their careers (Table 4).

Table 4: In-Depth Interview Sample characteristics

	Average(Range)
Age	46(35 – 64)
Duration of total career	17(6 – 30)
Duration of career at current clinic	9(1 – 30)
	n(%)
Parity	
Primiparous	3(25%)
Multiparous	9(75%)

3.2.1 Midwife Perceptions and Knowledge of Depression

3.2.1.1 General Observations

Perceived prevalence of depression in pregnant patients varied greatly across the sample, with some claiming 1 in 25 pregnant women experience such problems, while others only seeing this kind of issue once in their entire careers. When asked about the symptoms of depression, all midwives said that mental illness could be identified by talking with and observing their patients. Descriptions of typical symptoms were very heterogeneous, for example some said they are alerted to a problem when patients are “overtalkative and ask numerous questions from us” while others described patients as

"not talking anything, even when we ask a question they give us very short answers or do not answer at all." There was a consensus that depressed patients had mood changes, were "unhappy without good reason" and had poor concentration. Some midwives said they could identify depression by other factors during home visits such as "their homes are messy, not cleaned, the care for the children at home is not satisfactory."

Of the 8 midwives who were asked, half said they believed antenatal depression was an important issue, and half said they did not. Despite importance, many expressed that "these mothers are often helpless. We feel very sad about these mothers" and believe that "we as health care workers have a responsibility to take care of these mothers as much as possible." The attitude among most of the participants was hopeful, in that "If they are identified early and treated well along with good social support, they'll be able to lead a normal life with a sound mind, soon."

3.2.1.2 Social Factors

Generally, participants believed mental health problems are connected to poor social support, as "having someone's help is mandatory. Having no one to help her is also a major challenge." Good care from the family comes in the form of both practical and emotional support, as "antenatal mothers expect emotional support as well as support in carrying out day to day activities." Midwives observe the main sources of support coming from female family members, and increasingly husbands:

“Compared to the old days when mother was the main caretaker of the pregnant woman, recently husbands have been more caring and more interested in their pregnant wives’ health problems.”

Finances and employment were heavily intertwined with relationship issues between the husband and wife as the husbands have a major role as financial supporters of their wives, and “unemployment of husbands contributes and also makes this issue worse.” Many challenges relating to the husband-wife relationship were mentioned, including extra-marital affairs, substance use disorders, heavy workload, disrespect during decision making, or even domestic violence. Midwives observe in their practice that patients with lack of money are often depressed, especially in extreme circumstances when “some do not have enough money to get a proper nutritious diet. Some face difficulties in buying their needs even the vitamin tablets we prescribe.” However, pregnant women who work in addition to their husbands also have poorer mental health:

“One main thing is if the pregnant mother has elder children at home mother has difficulty in attending to clinics or visit hospitals... If the woman is employed that is also a challenge to the pregnant woman.”

Some of the participants noted cultural differences in the causes of depression between Sinhala and Muslim communities. In some cases, it is "the dominating nature of

the husband" or "poor birth spacing between children" that leads to depression in Muslim women within this community. However, because Muslims typically have larger family sizes according to the observation of the participants, they "together with their extended family face the challenges successfully" compared to Sinhala women. The opinions were mixed on which ethnic group had a higher prevalence of depression.

3.2.1.3 Biological Factors

Midwives perceived that physical health conditions during pregnancy can negatively impact mental health "if their disease condition isn't under control the worries become worse and can end up in depression." This can mean either a pre-existing chronic condition or a complication that develops after conception. Unplanned and unwanted pregnancies add additional stress:

"if the pregnancy was expected and planned, that means the mother is aware of the impact of the disease on her as well as the baby... and therefore it won't have a significant impact on her mental status."

However, many midwives explained that worry does not necessarily stem from the condition or complication itself, rather misconceptions about the disease. Often, after getting a diagnosis, mothers "use internet and find details" or "receive various informal or lay inputs from friends," and become misinformed about the severity of their condition. In this case, more educated women are more vulnerable, "as they are very

attentive and knowledgeable about the consequences of the complication." Increased professional support could act as an intervention:

"I think that if these pregnant women are properly acknowledged about their medical condition these misconceptions won't occur and the influence on her mental health would be minimal."

Side effects of medications or the treatment process itself also contributes to depression. Many participants used gestational diabetes patients, "the most disturbed ones," to exemplify this phenomenon:

"For an example if a pregnant mother has gestational diabetes, that mother have to control the diet, do frequent blood investigations, and they need to admit to the hospital several times for checkups, sometimes they have to take medicines or insulin. All these situations are stresses for them and can lead to mental health issues."

One midwife recognized that pre-existing "mental disease also contribute and result in mental health problems during pregnancy." While not a cause of pregnancy-related anxiety and depression per se, existing conditions may persist during pregnancy. Anxiety was generally not a familiar concept to the participants, with 6 out of 12 becoming confused or responding they had never heard of anxiety before when asked about the prevalence and typical symptoms. However, many described anxiety as a

symptom of depression, when pregnant women are “worried and anxious about every little thing” and “they constantly think something wrong would happen to their baby.”

3.2.2 Typical Diagnostic Process

Currently, there is no psychometric screening used for antenatal women, and midwives’ knowledge is based solely on their own experiences. Some midwives cited questions about the family history of mental health as a kind of screening process. However, the initial diagnosis of depression is most often determined subjectively, as one midwife described, “I can identify such mothers by looking at their eyes.” In cases where patients seek out care themselves, they “excessively complain about their kids being disobedient and troublesome, but later come to find that ‘The Issue’ is elsewhere, in the woman’s mind.” Talking with family is also an important part of the diagnostic process, to “ask whether they have noted any changes” or “find more information.”

The majority of the time, participants say that the family reacts well to a mental health diagnosis and continues to support the pregnant woman in all ways. In many cases, her “family notices changes in behavior before [midwives] do,” and diagnosis is comforting as “the family is more tolerant as they know that she’s not in sound mind.”

However, bad reactions can also occur. Some families initially “do not accept the diagnosis, and sometimes they complain that [the pregnant woman] is pretending these symptoms.” Direct mistreatment can also happen when relatives “label her as a

'psychiatric patient' and make her feel left out." There is still a strong sense of stigma against mental illness in this community, and even if the family does not deny the problem, "they do not want the neighbors to get to know that there's a psychiatric patient in the family."

Because of these negative reactions, the midwives worry that if a mental health diagnosis is directly revealed to the patient or family, this would cause harm. Instead, they believe it is better to "reveal the diagnosis in a healthy manner," for example:

"She needs a bit of special attention and that's why we need her to meet a special doctor and talk to her regarding her 'worries'."

Workload for the health workers posed a major challenge during the diagnostic process "If more midwives can be recruited, we can meet them more frequently and the chance of identifying mothers with mental health issues will be high." Adding preventative measures to the healthcare system could also increase recognition of patients who need help, for example, "if we had a screening test like in postpartum depression... we arrange a time in each trimester and do a screening test we can pick these mothers efficiently." Currently, midwives "miss these mothers at the initial stages and mothers come with full-blown depressive symptoms even with suicidal thoughts," so midwives are only able to seek treatments for patients with more severe or dangerous issues at the moment.

3.2.3 Typical Treatment Process

After their initial identification of depressive symptoms all midwives had very consistent descriptions of treatment procedure:

“When we find any clue of a pregnant mother being affected by a psychiatric condition we refer her to the MOH [Minister of Health] via whom she will be referred to the psychiatrist assigned to our MOH. There after we pay follow up visits to her residence to observe her improvement, compliance to the treatment, whether she attends to the follow up visits at the MOH/ hospital and extend our support where necessary.”

The midwives aid in the treatment process, communicating with the psychiatrist, monitoring patients, and sometimes they “visit them along with the psychiatrist when we check her improvement decide on further treatments.” Midwives continue follow-up care with

“more frequent home visits to ensure her compliance, to make sure whether she takes her medications at the correct time, to check her improvement and to educate the family members and gain their support.”

This extra attention from midwives is essential because when “attention from the family reduce along with the improvement of her condition, her compliance gradually become poor.” Generally, most of the participants assured that treatment compliance in

their communities is satisfactory, especially when family support is strong. In their experiences, no one or few have rejected the treatments outright.

A major barrier to treatment is visiting the district hospital, because when seeing other patients with more severe mental illness, “some mothers get frightened whether they too will ultimately end up like seriously ill patients that they see.” Also, attendance may be very inconvenient because “attendance of large number of patients which consumes their time.” One participant suggested that quality of care could be improved if midwives “arrange home visits to the places of these mothers we can solve the problem while she is in her comfortable environment than managing her at clinic or at the hospital.”

Many participants suggested that changing the role of the psychiatrist would improve patient experience and increase diagnosis. Instead of the current system, it would be better if then they could "recruit a psychiatrist to each central dispensary, enabling the mothers to receive care within the village itself" and ensure the psychiatrists visiting days are consistent. By being more open to direct contact or if she "herself can visit patients with poor family support and financial difficulties who are reluctant to visit MOH clinic or the hospital for consultations, it would be of much help to these innocent mothers.”

Generally, participants report their patients are “very impressed” and “very much grateful that we could identify and direct her to medical attention, when even, she herself had no clue of an illness.” In some cases, the close midwife bond to a patient means “rather than a service they perceive it as a help that we do for a friend.”

4. Discussion

4.1 Main Findings

The results from this survey showed that prevalence of depression among pregnant women in Galle, Sri Lanka, was 7.5%. The proportion of depressed women was elevated in older, middle social class, unemployed, or multiparous women. Depression was also associated with medical history, especially with diabetes and with pre-eclampsia in a previous pregnancy. Further, depressive symptoms were also associated with poor social support or anxiety about delivery and the health of the baby.

The qualitative results were consistent with the findings from the survey, again indicating more depression in certain demographic groups and among those with pre-existing conditions or complications during pregnancy. Midwives further emphasized the essential role of the family and partner to provide social support for pregnant women in this community. Currently they have no official guidelines for diagnosing antenatal depression, though they perceive treatment to be effective. The diagnostic and treatment process around depression could be improved by using psychometric diagnostic tools, improving the conditions of the mental health wards at the specialist hospital, and allowing midwives, general practitioners and psychiatrists spend more time with these women.

4.2 Interpretations

The prevalence of antenatal depression reported here was lower than many previous reports from other countries, which indicate between 15% to 65% (Dadi et al. 2020). The prevalence found in this area of Sri Lanka was also lower than a previous prevalence estimate in Anuradhapura, North Central Province, Sri Lanka, of 16.2% (Agampodi et al. 2013). There may be regional differences in the experience and frequency of mental health issues, as prevalence of postpartum depression found in a previous study conducted in the Bope Podalla district was 7.8%, only 0.3% higher than the prevalence in this study (Fan et al. 2020). Suicidal ideation was slightly more common in the current study than in a previous report of pregnant women in the North Central Province, where suicide is one of most common causes of maternal death (Arachchi et al. 2019)

Demographic risk factors were consistent with findings from other studies in LMICs (Biaggi et al. 2010). One previous study supported current observations that prevalence of depression is lower in the second trimester than the first and third (Gavin et al. 2005), though this was not statistically significant in the present findings. The results from this study also contrast with the one earlier study on antenatal depression in Sri Lanka which suggested no differential prevalence by sociodemographic status (Agampodi et al. 2013).

Interviewed midwives suggested that the level of depression differed by ethnicity and religion, but this could not be confirmed by pregnancy record data. One explanation participants gave for this effect was that Muslim women have more babies and larger family sizes. The implication that more multiparous women are depressed than primiparous women was validated both in this study and elsewhere, though findings differ across context (Biaggi et al. 2016).

An association between diabetes and major depression is well established (Sartorius et al. 2018). There is also very strong evidence for a relationship between gestational diabetes and antenatal mental disorders (Wilson et al. 2020). However, the relationship between chronic diabetes and antenatal depression is a novel finding and contrasts with previous findings of no association (Lara-Cinisomo et al. 2018, Katon et al. 2011). Qualitative data confirmed that diabetes is an especially difficult problem for pregnant women in this community. Pre-eclampsia has been also demonstrated correlation with antenatal depression in previous research both as a past complication and co-occurrence (Zegeye et al. 2018, Qiu et al. 2007).

The association between poor social support and antenatal depression has been widely reported (Rashid et al. 2017). Previous studies are consistent with present findings in that MSPSS score in pregnant women was lower for friends than any other source (Stewart et al. 2014). Social support from a special person remained statistically

significant even after adjustment for other factors; this is consistent with the qualitative results, as a special person is likely mostly understood to mean the husband. Midwives perceived support from the husband to be especially important during pregnancy.

Previously observed associations between antenatal depression and anxiety were confirmed in this study (Falah-Hassani et al. 2017). While there was a mild positive association between anxiety about body image (PRAQ subscale 3, Concern about Personal Appearance), the relationship in this population was not robust, consistent with previous studies (Roomruangwang et al. 2017). Despite this clear correlation with depression and anxious symptoms commonly reported in the patient population, the interviewed midwives had very little knowledge of anxiety during pregnancy and there are currently no official guidelines on treatment of anxiety during the maternal care period.

Reduced strength of association between depression and each variable in the multivariable models indicates that each of the reported associations may be due to some indirect effects, and the predictors investigated were likely interrelated. The survey showed that antenatal depression is associated with biological, psychological, and sociological factors. The qualitative results further elucidated that some demographic factors are associated with lack of crucial social support from the husband, such as social class, employment, and religion or ethnicity, and these more complex

connections should be explored further. More research should be conducted to clarify the causal links among social support, depression and other variables to further improve diagnosis and treatment of the disease.

Currently, the diagnostic process for antenatal depression is very subjective, depending mostly on hearsay and behavioral observations from midwives not officially trained to provide mental health services. Diagnostic habits are very heterogeneous across individuals, indicated by wide variation in perceived prevalence just among those interviewed for this study. As of 2020 there are no official clinical guidelines for antenatal depression, hence no official diagnostic procedure. However, the midwives interviewed were all very knowledgeable about the appropriate treatment and referral process for women facing mental health problems. It may be possible that because midwives have been specifically trained to screen and make referrals for postpartum depression, they may be applying this knowledge to mental health problems before birth (Hemachandra 2011).

4.3 Implications for Policy and Practice

This study outlined the current clinical practices for diagnosing and treating antenatal depression in the Bope Podalla district. Several areas where policy could be reformed were identified by the midwives and elucidated during qualitative analysis.

4.3.1 Diagnostic Tools

Currently, there are no clinical guidelines or diagnostic tools used specifically pertaining to antenatal depression in this community. A practical intervention to rapidly integrate mental health care into the antenatal process would be to adapt the existing guidelines for postpartum depression to be used in antenatal care visits. To improve health outcomes, many midwives suggested that the EPDS screening scale be administered during antenatal care visits throughout the pregnancy. As EPDS has already been validated in Sri Lanka and is currently used to screen for postpartum depression, this would be a very practical solution to improve diagnostic efficacy (Fan et al. 2020). The results indicate that these guidelines are already in use unofficially, and further officialization would not require major changes to training or staffing (Hemechandra 2011).

4.3.2 Antenatal Anxiety

In addition to antenatal depression, results suggested that many patients in this community also experience anxious symptoms, which go undetected and untreated within the current system. There are three items on EPDS which specifically target signs of anxiety, and EPDS has been effective in identifying probable anxiety using this subscale (Matthey 2008). Adding EPDS to the antenatal care procedure could suffice to detect both depression and anxiety. Including a second psychometric scale with capacity

to screen for more diverse symptoms and general anxiety disorders may be more efficacious, for example the Perinatal Anxiety Screening Scale (PASS) which has recently been validated in Sinhala (Priyadarshanie et al. 2020).

4.3.3 Education

Participants suggested that during the diagnosis and treatment process, there are many families who still have stigmatizing attitudes towards mental health. Further educational programs could be created within the community to promote self-awareness of mental health and encourage care-seeking behaviors. While there are some programs currently in existence, midwives interviewed in this study and previous assessments have shown they are not very effective (Fernando et al. 2017). With the rise of mHealth use in Sri Lanka, using personal technology may be more effective in promoting mental health education in Sri Lanka discreetly and cheaply (Senanayake et al. 2017).

4.3.4 Access

While there have been significant efforts to improve community-based mental healthcare in Sri Lanka, midwives in this study still reported issues with access to specialized treatment (Fernanado et al. 2017). Rather than training new healthcare professionals and sending them to the community level, a more effective intervention may be training existing public health midwives in providing mental health services. Combined with early diagnosis through objective screening measures, midwives could

be trained to deal with less severe cases of depression during their routine care visits, also reducing burden on the referral hospital and improving quality of care overall (Barnett et al. 2018)

4.4 Strengths and Limitations

This study adds to the literature on antenatal depression in a country where this health problem not been studied since 2013. The psychometric data in this study were complete for all participants due to the interview-style data collection, and there were no other missing data.

However, some of the data, especially relating to physical health, were inconsistently recorded, likely due to problems with the initiation of the pregnancy record. While a condition was considered to present if it was indicated anywhere on the record, there was potential for underreporting relating to the physical health variables. Also, because these data were collected during the SARS-CoV-2 pandemic, many women were more reluctant to attend the clinic and relied on home visits for antenatal care. This could have led to selection bias relating to differing attitudes and life conditions, as women were only recruited from the clinic, not through home visits. However, it should be noted that the occurrence of SARS-CoV-2 was very low compared to other countries at the time of the study.

As this was a cross-sectional study, it may be subject to incidence-prevalence bias. While depression is not a fatal condition by itself, given that suicide is responsible for 17.8% of recorded maternal deaths in the North Central Province, it is possible that women with the most severe cases of depression were not included in this population due to death (Hill et al. 2003, Arachchi et al. 2019).

While EPDS has been validated for use in Sinhala, PRAQ and MSPSS have not, so there is a possibility of bias in the language or cultural context. The EPDS also had a relatively low internal consistency, in fact, a previous study has suggested that the Sinhala translation of the EPDS is difficult to understand and may prompt inaccurate answers from the respondents (Fan et al. 2019). The multivariable logistic regression conducted in this study has relatively low events-per-variable (EPV) ratio (Peduzzi et al. 1995). The third model may show especially low statistical power because of the inclusion of the three subscores from each psychometric scale. These subscores are highly correlated with each other and subject to multicollinearity (Yoo et al. 2015). As studies in the North Central province have yielded different prevalence and risk factors for antenatal depression, the results from this study also may not be generalizable to other regions of Sri Lanka.

For the qualitative portion of the study, the sample of midwives interviewed may not be fully representative of this healthcare professionals' attitudes in this

community due to the small sample size. Because only one stakeholder type was interviewed, there was no data triangulation and the perspectives presented here may be limited. Future studies may benefit for further qualitative data from pregnant women, general practitioners and psychiatrists. Because no inter-coder reliability was attempted, there is a possibility of bias or misinterpretation for the analyst.

5. Conclusions

This study has added to a growing body of literature on the importance of mental health care in lower-middle income countries. Within Sri Lanka, antenatal depression remains an underrecognized and undertreated problem due to lack of education and official guidance within the antenatal care system. Future stakeholders should consider the biopsychosocial model of healthcare and risk factors elucidated in this study to develop most effective and efficient interventions.

Appendix A: Edinburgh Postpartum Depression Scale

Please select the answer that comes closest to how you have felt in the past 7 days:

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

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

2. I have looked forward with enjoyment to things.

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

3. I have blamed myself unnecessarily when things went wrong.

Yes, most of the time	3
Yes, some of the time	2
Not very often	1
No, never	0

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

No not at all	0
Hardly ever	1
Yes, sometimes	2

Yes, very often	3
-----------------	---

5. I have felt scared or panicky for no very good reason.

Yes, quite a lot	3
Yes, sometimes	2
No, not much	1
No, not at all	0

6. Things have been getting on top of me.

Yes, most of the time I haven't been able to cope at all	3
Yes, sometimes I haven't been coping as well as usual	2
No, most of the time I have coped quite well	1
No, I have been coping as well as ever	0

7. I have been so unhappy that I have had difficulty sleeping.

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

8. I have felt sad or miserable.

Yes, most of the time	3
Yes, sometimes	2
Not very often	1

No, not at all	0
----------------	---

9. I have been so unhappy that I have been crying.

Yes, most of the time	3
Yes, quite often	2
Only occasionally	1
No, never	0

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

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

Appendix B: Pregnancy Related Anxiety Questionnaire

1. I am anxious about the delivery

1	2	3	4	5
Definitely not true				Definitely true

2. I am worried about the pain of contractions during delivery.

1	2	3	4	5
Definitely not true				Definitely true

3. I am worried about the fact that I shall not regain my figure after delivery.

1	2	3	4	5
Definitely not true				Definitely true

4. I sometimes think that our child will be in poor health or will be prone to illnesses.

1	2	3	4	5
Definitely not true				Definitely true

5. I am concerned about my unattractive appearance.

1	2	3	4	5
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Definitely not true				Definitely true
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6. I am worried about not being able to control myself during labour and fear that I will scream.

1	2	3	4	5
Definitely not true				Definitely true

7. I am worried about my enormous weight gain.

1	2	3	4	5
Definitely not true				Definitely true

8. I am afraid the baby will be mentally handicapped or will suffer from brain damage.

1	2	3	4	5
Definitely not true				Definitely true

9. I am afraid our baby will be stillborn, or will die during or immediately after delivery.

1	2	3	4	5
Definitely not true				Definitely true

10. I am afraid that our baby will suffer from a physical defect or worry that something will be physically wrong with the baby.

1	2	3	4	5
Definitely not true				Definitely true

Appendix C: Multidimensional Scale of Perceived Social Support

1. There is a special person who is around when I am in need.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

2. There is a special person with whom I can share my joys and sorrows.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

3. My family really tries to help me.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

4. I get the emotional help and support I need from my family.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

5. I have a special person who is a real source of comfort to me.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

6. My friends really try to help me.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

7. I can count on my friends when things go wrong.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

8. I can talk about my problems with my family.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

9. I have friends with whom I can share my joys and sorrows.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

10. There is a special person in my life who cares about my feelings.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

11. My family is willing to help me make decisions.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

12. I can talk about my problems with my friends.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

Appendix D: Supplemental Demographic Survey

1. What is your ethnicity?

2. What is your religion?

Appendix E: Pregnancy Record Extraction Sheet

Blood Group	BMI	Height (cm)	Allergies

Identified antenatal risk conditions and morbidities

	Yes	No
Consanguinity		
Rubella Immunization		
Pre-pregnancy screening done		
On folic acid		
History of subfertility		

Gravidity	
No. of living children	
Age of youngest child	
Expected period	
Date of quickening	
POA at registration	
Contraceptive method last used	

	Wife	Husband
Age		
Highest education		
Occupation		

Family history of	
Diabetes mellitus	
Hypertension	
Haematological disease	

Other	
-------	--

Personal history of					
Diabetes		Psychiatric Illness		Bronchial Asthma	
Hypertension		Malignancies		Previous DVT	
Cardiac Disease		Haematological Disease		Surgeries other than LSCS	
Renal Disease		Tuberculosis		Other	
Hepatic Disease		Thyroid Disease		Social Risk Factors	

Pregnancy	Antenatal complications	Place and mode of delivery	Outcome	Birth weight	Postnatal complication	Sex and age
G1						
G2						
G3						
G4						
G5						
G6						

Appendix F: Semi-structured Interview Moderator's Guide

Aims:

- To describe the current knowledge and attitudes concerning antenatal mental health among healthcare workers
- To identify current practices and interventions concerning antenatal mental health in antenatal care clinics

Steps:

- Introduction of research goals
- Consent procedure and permission to record
- Warm up questions
- Research questions

Questions

Topic 1: Knowledge and Attitudes

1. Have you ever heard of “Antenatal Depression,” “Antenatal Anxiety” or mental health during pregnancy before now?
 - a. How often do you see mental health problems in pregnant women visiting the clinic?
 - b. What kind of depressive symptoms do they display, in your experience?
 - c. What kind of anxious symptoms do they display, in your experience?
 - d. What do you think of these women’s situation?

- e. Is mental health during pregnancy a serious issue in your community?
2. What do you think leads to depressive symptoms?
 - a. What kinds of pregnant women typically show depression or anxiety? Can you think of any specific examples?
 - b. What are some major challenges in the lives of pregnant women in your community in general?
 - c. How are depressive symptoms and anxiety related?
 3. What is the role of social support in caring for pregnant women?
 - a. How do family members adopt a care-taking role during pregnancy?
 - b. How do family members respond to depressive symptoms?
 - c. Who cares for pregnant women if they have trouble with their health?
 - d. How are husbands usually involved in the antenatal care process?
 4. Do any other health issues influence the depressive symptoms?
 - a. What are the most difficult pregnancy complications you see at the clinics?
 - b. How does past medical history influence mindset toward current pregnancy?
 - c. How do pregnancy complications impact mental health?

Topic 2: Practices

1. How do you diagnose a pregnant woman with mental health issues?
 - a. How do you know she has a mental health problem?

- b. What kinds of screening do you do?
2. What do you know about mental healthcare during pregnancy?
 - a. How do you usually care for women with depression? What about anxiety?
 - b. Whose job is it to treat them?
 - c. What challenges do you face to find good treatments for your patients?
3. What is the attitude of your patients regarding mental healthcare?
 - a. How do pregnant women respond to diagnosis?
 - b. How do family members respond to diagnosis?
 - c. Do pregnant women ever come to you specifically seeking help with mental health issues? What happens then?
 - d. How do pregnant women respond to treatment?
4. What do you think would be more helpful to screen and treat women with depression?
 - a. What would make it easier for you to do your job for this issue?
 - b. What do you think should be done differently?
 - c. What kinds of policies would be improve treatment of depression in pregnant women?

Interview summary and closing questions

1. Summarize the main points of the interview
2. Closing questions

- a. What additional information would you like to add?
- b. Do you have any questions for me?

Appendix G: Informed Consent Form – Pregnant Women



University of Ruhuna and Duke Kunshan University

This informed consent form is for health professionals working in Galle or Puttalam and who we are inviting to participate in research titled "Prevalence and correlates of antenatal depression in Sri Lanka".

This Informed Consent Form has two parts:

- **Information Sheet (to share information about the study with you)**
- **Certificate of Consent (for signatures if you choose to participate)**

You will be given a copy of the full Informed Consent Form

Part I: Information Sheet

Introduction

Dr. Vijitha De Silva at the University of Ruhuna and graduate student Sage Wyatt of Duke Kunshan University in China are doing research on antenatal depression in this country and in this region. I am going to give you information and invite you to be part of this research. You must decide now if you want to participate in this research. Before you decide, you can talk to anyone you feel comfortable with about the research. This consent form may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them of me or of another researcher.

Purpose of the research

Mental health problems of women at child-bearing ages have been identified as a major public health problem. Depression during pregnancy occurs commonly among women. Sri Lanka has been held up as an example for its record in maternal and child health care. However, the situation regarding antenatal depression remains unknown in

your district. We are giving you this survey to better understand who uses the antenatal care clinics and how is your mental health.

Type of Research Intervention

This research will involve your participation in some questionnaires that will take you about 30 minutes.

Participant Selection

You are being invited to take part in this research because you are a pregnant woman, and we want to learn more about your situation and experiences in this region.

Voluntary Participation

The choice that you make will have no bearing on the healthcare services you receive.

Procedures

- A. We are asking you to help us learn more about antenatal depression in your community. We are inviting you to take part in this research project. If you accept, you will ask you a few short survey questions, around 30 minutes long. We will also write down some information from your pregnancy record

Risks

There is a risk that you may share some personal or confidential information by chance, or that you may feel uncomfortable talking about some of the topics. However, we do not wish for this to happen. If you change your mind, and no longer wish to complete the survey, just say so. We can stop at any time.

Benefits

There will be no direct benefit to you, but your participation is likely to help us find out more about how to better help women with antenatal depression in the future.

Reimbursements

We will give you Rs 200 as compensation for your time.

Confidentiality

The research being done in the community may draw attention and if you participate, you may be asked questions by other people in the community. We will not be sharing information about you to anyone outside of the research team. The

information that we collect from this research project will be kept private. Any information about you will have a number on it instead of your name. Only the researchers will know what your number is and we will lock that information up with a lock and key. It will not be shared with or given to anyone except Duke Global Health Institute and University of Ruhuna.

Sharing the Results

Nothing that you tell us today will be shared with anybody outside the research team, and nothing will be attributed to you by name. In a few months, we will publish the overall results of our research so that both you and other interested people may learn from the research.

Right to Refuse or Withdraw

You do not have to take part in this research if you do not wish to do so, and choosing to participate will not affect your job or job-related evaluations in any way. You may stop participating in the interview at any time that you wish without your job being affected. If you choose to withdraw the research, any audio or paper data will be immediately destroyed.

Who to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact Professor P.Vijitha. De Silva, 0777609703, pvijithadesilva123@yahoo.com

This proposal has been reviewed and approved by Institutional Review Board in Duke Kunshan Univeristy and University of Ruhuna, which is a committee whose task it is to make sure that research participants are protected from harm. If you wish to find about more about the IRB, contact 077609703. You can also ask me any more questions about any part of the research study, if you wish to. Do you have any questions?

Part II: Certificate of Consent

I have been invited to participate in research about antenatal depression and health practices.

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Print Name of Participant _____

Signature of Participant _____

Date _____

Day/month/year

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that a 15 minutes' survey will be done.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant.

Print Name of Researcher/person taking the consent _____

Signature of Researcher /person taking the consent _____

Date _____

Day/month/year

Appendix H: Informed Consent Form – Midwives



University of Ruhuna and Duke Kunshan Univeristy

This informed consent form is for health professionals working in Galle or Puttalam and who we are inviting to participate in research titled "The prevalence, risk factors and strategies for antenatal depression in Sri Lanka: a mixed-methodological study".

This Informed Consent Form has two parts:

- **Information Sheet (to share information about the study with you)**
- **Certificate of Consent (for signatures if you choose to participate)**

You will be given a copy of the full Informed Consent Form

Part I: Information Sheet

Introduction

I am Sage Wyatt, a graduate student at Duke Kunshan Univeristy, and I am doing research on antenatal depression in this country and in this region. I am supervised by Dr. Vijitha de Silva at the University of Ruhuna. I am going to give you information and invite you to be part of this research. You do not have to decide today whether or not you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with about the research. This consent form may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them of me or of another researcher.

Purpose of the research

Mental health problems of women at child-bearing ages have been identified as a major public health problem. Depression during pregnancy occurs commonly among

women. Sri Lanka has been held up as an example for its record in maternal and child health care. However, the situation regarding antenatal depression remains unknown in your district. We want to know the reasons that may cause antenatal depression in your district and understand what health professionals do here to help women who are depressed during pregnancy. We believe that you can help us by telling us what you know about the situation, the screening and treatment methods and your suggestions for future work.

Type of Research Intervention

This research will involve your participation in an individual interview that will take you about 60 minutes.

Participant Selection

You are being invited to take part in this research because we feel that your experience as a health professional can contribute much to our understanding and knowledge of local health practices.

Voluntary Participation

The choice that you make will have no bearing on your job or on any work-related evaluations or reports. You may change your mind later and stop participating even if you agreed earlier.

Procedures

- B. We are asking you to help us learn more about antenatal depression in your community. We are inviting you to take part in this research project. If you accept, you will be asked to participate in an interview with an interviewer or myself.

During the interview, I or another interviewer will sit down with you in a comfortable place at the clinic. If you do not wish to answer any of the questions during the interview, you may say so and the interviewer will move on to the next question. No one else but the interviewer will be present unless you would like someone else to be there. The information recorded is confidential, and no one else except Sage Wyatt and the research assistant will access to the information documented during your interview. The entire interview will be audio-recorded, but no-one will be identified by name. The audio will be kept with password and code. The information recorded is confidential, and no one else except Sage Wyatt and the research assistant will have access to the audios. The audios will be destroyed after 3 months.

Risks

There is a risk that you may share some personal or confidential information by chance, or that you may feel uncomfortable talking about some of the topics. However, we do not wish for this to happen. You do not have to answer any question or take part in the interview if you feel the questions are too personal or if talking about them makes you uncomfortable.

Benefits

There will be no direct benefit to you, but your participation is likely to help us find out more about how to better screening and treating antenatal depression among women.

Reimbursements

We will give you Rs 1000 as compensation for your time.

Confidentiality

The research being done in the community may draw attention and if you participate, you may be asked questions by other people in the community. We will not be sharing information about you to anyone outside of the research team. The information that we collect from this research project will be kept private. Any information about you will have a number on it instead of your name. Only the researchers will know what your number is and we will lock that information up with a lock and key. It will not be shared with or given to anyone except Duke Global Health Institute and University of Ruhuna.

Sharing the Results

Nothing that you tell us today will be shared with anybody outside the research team, and nothing will be attributed to you by name. In a few months we will publish our research, and we might use some quotes from what you say today. It will not be associated with your name, and it will be translated into English.

Right to Refuse or Withdraw

You do not have to take part in this research if you do not wish to do so, and choosing to participate will not affect your job or job-related evaluations in any way. You may stop participating in the interview at any time that you wish without your job being affected. If you choose to withdraw the research, any audio or paper data will be immediately destroyed.

Who to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact Professor P.Vijitha. De Silva, 0777609703, pvijithadesilva123@yahoo.com

This proposal has been reviewed and approved by Institutional Review Board in Duke Kunshan Univeristy and University of Ruhuna, which is a committee whose task it is to make sure that research participants are protected from harm. If you wish to find about more about the IRB, contact 077609703.

You can ask me any more questions about any part of the research study, if you wish to.

Do you have any questions?

Part II: Certificate of Consent

I have been invited to participate in research about antenatal depression and health practices.

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Print Name of Participant_____

Signature of Participant _____

Date _____

Day/month/year

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that a 60 minutes' interview will be done.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant.

Print Name of Researcher/person taking the consent _____

**Signature of Researcher /person taking the
consent** _____

Date _____

Day/month/year

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