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Probable perinatal depression and social support among women enrolled in Malawi's Option B+ Program: a longitudinal analysis

Nivedita L. Bhushan[1], **Melissa A. Stockton**[2], **Bryna J. Harrington**[3], **Bethany L. DiPrete**[1], **Madalitso Maliwichi**[4], **Allan N. Jumbe**[4], **Kazione Kulisewa**[5], **Maganizo B. Chagomerana**[4], **Brian W. Pence**[1], **Bradley N. Gaynes**[1], **S4 Study Team**[4], **Mina C. Hosseinipour**[1,4]

[1]University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA

[2]Columbia University, New York, New York, USA

[3]Johns Hopkins University, Baltimore, Maryland, USA

[4]UNC Project, Lilongwe, Malawi

[5]University of Malawi, Blantyre, Malawi

Abstract

Background: Malawi's PMTCT Option B+ program has expanded the reach of ART services amongst pregnant and breastfeeding women, but retention in lifelong HIV care remains challenging. Given that depression can undermine retention, it is important to understand how depression changes over the perinatal period, varies across treatment and retention groups, and could be buffered by social support.

Methods: Data are from an observational study conducted among women enrolled in Malawi's PMTCT Option B+ program. We used multilevel generalized linear models to estimate the odds of probable depression by time, treatment and retention group, and social support. Probable depression was assessed with the Edinburgh Postnatal Depression Scale and Patient Health Questionnaire-9.

Results: Of 468 women, 15% reported probable depression at antenatal enrollment and prevalence differed across newly diagnosed individuals, second line therapy users, and previous defaulters (18%, 21 %, 5%, p = 0.001). Odds of probable perinatal depression decreased over time (OR per month: 0.87, 95% CI: 0.82–0.92) but were higher among those newly diagnosed (OR:

CORRESPONDING AUTHOR: Nivedita L. Bhushan, Institute for Global Health and Infectious Diseases, University of North Carolina at Chapel Hill, 130 Mason Farm Road, Chapel Hill, North Carolina 27599-7030, Telephone: +1-814-404-5406, nbhushan@live.unc.edu.

CONTRIBUTIONS:

NLB and MAS led the conception, design, and writing of the paper. NLB did the analyses and interpretation for the paper. BJH, BLD, MM, ANJ, KK, MBC, MCH and the S4 Study Team were involved in the data collection and study management of the parent study. MCH acquired funding for and designed the parent study. All authors have reviewed the paper, provided comments and edits to the manuscript, and have read and approved the final manuscript.

CONFLICT OF INTEREST:

All authors declare that they have no conflict of interest.

3.25, 95% CI: 1.59–6.65) and on second line therapy (OR: 3.39, 95% CI: 1.44–7.99) as compared to previous defaulters. Odds of probable postpartum depression were lower for participants with high social support (OR: 0.19, 95% CI: 0.09–0.39).

Limitations: Lack of diagnostic psychiatric evaluation precludes actual diagnosis of depression.

Conclusions: Probable depression varied across the perinatal period and across treatment and retention groups. Social support was protective for postpartum depression among all participants. Depression screening and provision of social support should be considered in PMTCT programs.

Keywords

perinatal depression; HIV; social support

INTRODUCTION

In sub-Saharan Africa (SSA), women living with HIV (WLWH) experience a high burden of depression during the perinatal period, which includes both pregnancy and the year following childbirth(Dadi et al., 2020; Gavin et al., 2005; James et al., 2018; Sawyer et al., 2010; Sowa et al., 2015; Stringer et al., 2014). The prevalence of antenatal and postnatal depression in the region may be as high as 49% and 36%, respectively (Mokhele et al., 2019; Peltzer et al., 2018; Sowa et al., 2015). Depressive symptoms among WLWH are associated with HIV disease progression and are strong predictors of non-adherence to antiretroviral therapy (ART) (Evans et al., 2002; Ickovics et al., 2001; Nakimuli-Mpungu et al., 2012; Stringer et al., 2014). Depressive symptoms during the perinatal period can additionally undermine engagement in antenatal care (ANC), prevention-of-mother-to-child-transmission (PMTCT), and attainment of optimal child outcomes (Grede et al., 2014; Psaros et al., 2014; Stein et al., 2014; Stringer et al., 2014). Taken together, these findings suggest a crucial need to address perinatal depression amongst this population and minimize downstream effects on HIV transmission, maternal health, and child development.

Existing literature suggests heterogeneity in how women experience depression during pregnancy and postnatal months, particularly in the onset and progression of symptoms. A recent systematic review of perinatal depression in high-income countries identified three common trajectories across studies: 1) a low risk trajectory, characterized by stable low depressive symptoms throughout the perinatal period; 2) a moderate-high trajectory, with persistently elevated depressive symptoms throughout the perinatal period; and 3) transient trajectories with either increasing, decreasing, or episodic depressive symptoms (Baron et al., 2017). The few studies conducted in SSA have documented similar trajectories, but have rarely investigated patterns of perinatal depression among WLWH (Barthel et al., 2016; Familiar et al., 2019; Fellmeth et al., 2017; Garman et al., 2019; Gelaye et al., 2016; Pellowski et al., 2019; Sawyer et al., 2010; Sowa et al., 2015).

In 2001, Malawi launched “Option B+”, a prevention-of-mother-to-child-transmission (PMTCT) program which offers pregnant and breastfeeding women free lifelong ART at diagnosis, regardless of CD4 count or clinical stage (Rosenberg and Pettifor, 2018; Schouten et al., 2011). The program has been largely considered a success, having achieved high

rates of ART initiation and a reduction in mother-to-child transmission of HIV (Haas et al., 2017; Hoffman et al., 2017; Kim et al., 2015). Despite this progress, retention in HIV care has been suboptimal: nearly 25% of women are lost to follow-up within one year of initiating ART (Haas et al., 2016, 2016). In addition, Option B+ has resulted in a range of HIV treatment groups as pregnant women presenting for ANC are at varied stages of their HIV treatment course, from newly diagnosed to second and advanced lines of therapy. These stages have serious implications for depression as women are navigating the perinatal period as well as the potential distress of receiving an HIV diagnosis, managing a chronic illness, disease exacerbation, or treatment failure. Understanding patterns of perinatal depression across treatment groups can further inform how and when to identify subgroups of WLHW who are at high risk as well as opportunities to increase ART adherence amongst this population.

Social support is a well-established protective factor for both perinatal depression and ART adherence (Biaggi et al., 2016; Bisetegn et al., 2016; Elwell, 2016; Garman et al., 2019; Gelaye et al., 2016; Grede et al., 2014; Kelly et al., 2014; Ncama et al., 2008a; Pellowski et al., 2019; Peltzer et al., 2018; Psaros et al., 2014; Sawyer et al., 2010; Stewart et al., 2015; Umuziga et al., 2020). Social support is the provision of tangible, emotional, instrumental, or informational assistance leading one to perceive that they are cared for and an accepted member of a network of mutual obligations (Cobb, 1976). Social support may directly protect against perinatal depression or function by buffering the impact of stressful life circumstances that lead to perinatal depression (Cobb, 1976; Cohen and Wills, 1985; Ozbay et al., 2007). Taken together, effectively addressing the burden of perinatal depression among WLWH in Malawi requires an improved understanding of the progression of perinatal depression, identifying the women at heightened risk for depression, and an investigation into social factors – such as social support – that may buffer depression.

In this secondary analysis, we utilize longitudinal data from pregnant women enrolled in Malawi's Option B+ program to investigate three research aims. First, we examine perinatal depression trajectories among three HIV treatment and retention groups (newly diagnosed, those on second line therapy, and previous defaulters). Second, we describe levels of social support among the HIV treatment and retention groups. Third, we investigate the association between social support and perinatal depression and how the association varies across the HIV treatment and retention groups.

METHODS

Study Overview

Data are from the Safety, Suppression, Second-Line, Survival (S4) study, an observational cohort study conducted among pregnant women living with HIV enrolled in Malawi's Option B+ prevention of maternal to child transmission of HIV program. Participants were recruited from a government antenatal clinic in Lilongwe, Malawi from 2015 to 2018 (ClinicalTrials.gov identifier: NCT02249962). Per Malawi standard of care for opt-out HIV testing, all women who seek antenatal care are offered HIV testing with two rapid tests. A convenience sample of women who tested positive for HIV at their first antenatal visit, in any trimester of pregnancy, were invited to enroll in the S4 study. Eligibility criteria included

being pregnant, 18 years (or 16–17 and married), and planning to give birth in Lilongwe. Women who chose not to participate or were ineligible received routine antenatal and HIV care through the government clinic. Additional details on recruitment and enrollment have been previously published (Harrington et al., 2020, 2019b, 2019a, 2018).

Mirroring HIV standard of care in Malawi, S4 study visits after enrollment occurred monthly for 6 months and then quarterly thereafter. At each S4 study visit, clinical data were collected and S4 nurses conducted one-on-one interviews with participants in Chichewa, the local language. Interview questions examined demographics, HIV care, infant health, and mental health. Study nurses received training on how to administer all study questionnaires, including the mental health assessments, but none of the nurses had mental health backgrounds. All women received ART through the study, as well as primary care for themselves and their infants. S4 participants were divided into three cohorts: Cohort A) women newly diagnosed with HIV and initiating standard first line ART with tenofovir/lamivudine/efavirenz (TDF/3TC/EFV); Cohort B) women on ART during a subsequent pregnancy requiring second line therapy due to unsuppressed viral load; and Cohort C) women who experienced a gap in ART care but returned for subsequent pregnancy management (Figure 1). The same demographic characteristics and mental health outcomes were collected for each cohort.

The S4 study enrolled 545 pregnant women with HIV across three cohorts (Cohort A: N = 300, Cohort B: N = 95, Cohort C: N = 150). Given our interest in examining both antenatal and postpartum depression, we excluded participants who did not have an antenatal depression measurement (N = 23) or a postpartum depression measurement (N = 54). Thus, our analytical sample included 468 women with HIV (Cohort A: N = 268, Cohort B: N = 77, Cohort C: N = 123).

The S4 study received approval from both the National Health Science Research Committee in Malawi and the University of North Carolina at Chapel Hill Institutional Review Board. All participants provided informed consent.

Measures

Probable depression was defined as screening positive on the Edinburgh Postnatal Depression Scale (EPDS-10) or the Patient Health Questionnaire-9 (PHQ-9) at a study visit. The EPDS-10 is a 10-item instrument designed to identify probable depression among women who are pregnant or postpartum (Cox et al., 1987; Gibson et al., 2009; Kozinszky and Dudas, 2015; Stewart et al., 2013). Each item in the EPDS-10 asks about depressive symptoms in the past 7 days, is scored from 0 to 3, for an overall score range of 0 to 30. The EPDS-10 has been previously validated in *Chichewa* among pregnant women in Malawi. A score threshold of 6, rather than the typical 13, was recommended as a dichotomous cut-point to indicate probable depression.(Stewart et al., 2013) Accordingly, participants who scored ≥6 on the EPDS-10 screened positive for probable depression in our analyses. The PHQ-9 is a 9-question instrument designed to assesses probable depression in adults. Responses to each item range from 0 (symptom occurred zero days in the past two weeks) to 3 (nearly every day), for an overall score range of 0 to 27. The PHQ-9 has been validated in Malawi among persons with diabetes and has been extensively utilized (including translation

and back-back translation in *Chichewa*) in published studies among antenatal populations in Malawi and neighboring countries (Cholera et al., 2014; Hanlon et al., 2015; Pence et al., 2012; Udedi et al., 2019). Traditionally, a PHQ-9 score of 10 or more is indicative of major depression that requires treatment and a score of 5–9 is suggestive of mild depression (Yawn et al., 2009; Zhong et al., 2014). In this analysis we utilized a PHQ-9 score of 5 or greater to be consistent with the lower threshold used for the EPDS-10 and previous analyses among S4 study participants (Harrington et al., 2018). Participants who scored above the threshold on one instrument but not the other were still included in our analysis as having probable depression.

Social support was measured using the positive social interaction subscale of the Medical Outcomes Study Social Support Survey instrument, which has been previously utilized in studies among people living with HIV in Sub-Saharan Africa (Bajunirwe et al., 2009; Casale et al., 2014; Epino et al., 2012; Gaede et al., 2006; Ncama et al., 2008b; Sherbourne and Stewart, 1991). At each postpartum visit, the three subscale items asked participants how often they had someone to “have a good time with”, “get together with for relaxation”, and “do something enjoyable with”. Responses to each item ranged from 0 (none of the time) to 2 (all of the time), for an overall score range of 6. Based on preliminary descriptive analyses, a binary variable was created to indicate high social support (score of 6) versus low social support (lower than 6) for each study visit.

Our covariates included age (in continuous single years), primary school completion (standard 8), ever being married, sufficient monthly income to support one’s family, and self-reported history of depression. These variables were measured at baseline and have been shown to be associated with perinatal mental health in Malawi (Harrington et al., 2019b; Stewart et al., 2014).

Data Analysis

We first examined demographic characteristics and probable depression at baseline and compared across cohorts using chi-square tests. We then used multilevel generalized linear models (MLM) with a binomial distribution and logit link function to examine the odds of probable depression by time in months, cohort, and levels of social support. MLM was chosen for two main reasons (Singer et al., 2003). First, our hierarchical data structure included multiple assessments nested within participants and MLM accounts for interdependencies in repeated measures data by specifying a random intercept for each person in the sample. Second, MLM can simultaneously model between-person differences and within-person differences across assessments. Between-person differences are estimated using variables that do not change across assessments (level one, fixed effects, baseline covariates) and within-person differences are estimated using variables that can change across assessments (level two, random effects, time (months) and social support) (Kwok et al., 2008).

We fit two models. In our first model, we examined the odds of probable depression across the entire perinatal period with regard to time and cohort. The model was fit to time since enrollment (in months, mean centered at child’s birth month) at Level 2 and cohort and covariates at Level 1. The model included the main effects of each independent variable

as well as a cross-level interaction (cohort*time) to examine whether cohort modified the relationship between time and probable depression. In the second model, we examined the odds of probable postpartum depression with regard to time, social support, and cohort. The model was fit to time (in months, mean centered at birth month) and high social support (vs. low) at Level 2 and cohort and covariates at Level 1. The model included main effects of each independent variable as well as cross-level interactions (cohort*time and cohort*social support) to examine whether cohort modified the relationship between time and probable postpartum depression and the relationship between social support and probable postpartum depression. All models were fit using a maximum likelihood approach in XTMELOGIT in StataSE version 14.2 (College Station, TX).

RESULTS

Demographics at Baseline

The sample include 468 women living with HIV in three cohorts: newly diagnosed participants (Cohort A: N = 268, 57%), second line therapy participants (Cohort B: N = 77, 16%), and previously defaulting participants (Cohort C: N = 123, 26%). Overall, participants had a median age of 27 years (IQR 23–32 years) and primarily presented to antenatal care during their third trimester (57%, N = 269). Most women were ever married (90%, N = 421) and completed primary school (51%, N = 240) while less than a quarter reported having enough monthly income to support their families (21%, N = 97). Many women had a self-reported history of depression or anxiety (40%, N = 185) (Table 1).

Perinatal Depression

The prevalence of probable perinatal depression decreased from the antenatal period to the postnatal period. At antenatal enrollment, 15% of women (N=69) reported current probable depression and prevalence differed across Cohorts A, B, and C (18%, 21 %, 5%, p = 0.001). Postpartum, the prevalence of probable postpartum depression was 4% (N=21) at the first postnatal visit and 3% (N=13) at the second postnatal visit. Reported probable depression was lower at all postpartum time points than at antenatal enrollment (Table 2).

Table 3 contains the results of the model examining the odds of probable depression across the entire perinatal period in regard to time and cohort. We found a decreasing time trend for probable depression across our sample. The odds ratio 0.87 (95% CI: 0.82, 0.92) represents the effect of time on the likelihood of probable depression and there was a decrease of 13% in the odds of probable depression for each additional month since study enrollment. Probable depression was higher in Cohort A (OR: 3.25, 95% CI: 1.59, 6.65) and Cohort B (OR: 3.39, 95% CI: 1.44, 7.99) as compared to Cohort C. Study cohort significantly modified the relationship between time and probable depression (β: −0.09, 95% CI: −0.15, −0.02) and is illustrated in Figure 2. The three lines differ in both intercept and slope, as is indicated by the parameter estimates in Table 3. The difference in intercepts suggests that participants in Cohort A and B were more likely to have probable depression during the antenatal period as compared to Cohort C. The difference in slopes indicates that depression declined more rapidly in Cohort A and B as compared to Cohort C.

Postpartum Depression and Social Support

At the first postnatal visit, 4% of women (N=21) reported current probable depression and prevalence differed across Cohorts A, B, and C (4%, 9 %, 2%, p = 0.046) (Table 2). Table 5 contains the results of the model examining the odds of probable postpartum depression in regard to time, social support, and cohort. There was a very small decreasing time trend for probable postpartum depression, the odds of probable postpartum depression decreased by 3% for each additional month since giving birth (OR: 0.97, 95% CI: 0.94, 0.99). However, there were no differences in probable postpartum depression between Cohort A (OR: 1.87, 95% CI: 0.69, 5.06) and Cohort B (OR: 2.72, 95% CI: 0.82, 9.05), as compared to Cohort C. As such, study cohort did not moderate the relationship between time and probable postpartum depression (β: 0.01, 95% CI: −0.03, 0.05) (Table 4)

In terms of social support, half of all participants reported having someone to have a good time with (N= 307, 66%), do something enjoyable with (N = 221, 47%), and get together with (N = 239, 51%) at most times. When aggregated, 66% of participants reported high levels of social support at the first postnatal visit but high social support did not differ across Cohort A, B, and C (66%, 62%, 67%, p = 0.757) (Table 2). Figure 3 illustrates the change in probable depression during the postpartum period by level of social support. The odds of probable postpartum depression were 81% lower for participants who had high social support as compared to those who had low social support (OR: 0.19, 95% CI: 0.06, 0.64). Study cohort did not moderate the relationship between social support and probable postpartum depression (β: 0.06, 95% CI: −0.10, 0.85) (Table 4).

DISCUSSION

Among our observational cohort, we found probable perinatal depression to significantly decrease from the antenatal period to the postpartum period. Probable depression differed across cohorts during the antenatal period with those newly diagnosed and those on second line therapy more likely to have probable depression when compared to previous defaulters. During the postpartum period, there were no significant differences between cohorts. At the first postnatal visit, most women reported high levels of social support. Yet, those with high social support were less likely to have probable postpartum depression than those with low social support.

The prevalence of antenatal depression (15%) and postpartum depression (3–4%) differed from other published estimated in sub-Saharan Africa. A literature review of studies in the region produced higher weighted mean prevalence estimates of antenatal depression (23.4%), suspected antenatal depression (43.5%), postnatal depression (22.5%), and suspected postnatal depression (31.1%) among women living with HIV (Sowa et al., 2015). A meta-analysis including studies from the United States and sub-Saharan Africa estimated a mean 36% (95% CI: 27, 45%) prevalence of antenatal depression and a mean 21% (95% CI: 14, 27%) prevalence of postpartum depression among women living with HIV (Zhu et al., 2019). The primary analysis of this observational cohort data posited several hypotheses to explain the low prevalence in our data including: loss-to-follow-up of more depressed women, remarkable resilience of women who chose to participate and stay engaged in the study, social desirability bias, and possible poor performance and understanding of

the EPDS and PHQ-9 (Harrington et al., 2019b). A qualitative investigation of these phenomena found that women from the study reported some confusion around the wording of the screening questions and concern that the tools failed to capture culturally relevant symptoms, such as ‘thinking too much (Harrington et al., 2020). There is a need to ensure that appropriate and valid measures are used to continue build understanding around the progression of perinatal depression in sub-Saharan Africa (Tsai et al., 2013).

Our study found a higher likelihood of probable depression during the antenatal period among those newly diagnosed and on second line therapy than those who had previously defaulted, though these differences were attenuated over time. Few studies have compared perinatal depression between these groups, though one study in South Africa found a similar prevalence of antenatal depression between groups diagnosed during the current pregnancy and those who already knew their status (Peltzer et al., 2018). It is possible that the cohorts in our study experienced different psychological stressors. For example, those newly diagnosed must manage an HIV diagnosis during pregnancy and those on second line therapy might be experiencing concerns related to modifying their HIV medication during pregnancy (LeMasters et al., 2020). The low prevalence of probable depression among out previous defaulter cohort was unexpected given that depression has been associated with low engagement in care and adherence to ART among WLWH in SSA. It might be possible that previous defaulters in our study potentially had time to accept their status and may be driven to reengage in care to protect themselves and their future child. Fortunately, early mental health intervention has been shown to improve maternal mental and social wellbeing and positively impact birth outcomes and child development (Austin, 2004; Cena et al., 2020; Rahman et al., 2013). In settings such as Malawi where mental health resources are limited, it will continue to be essential to identify women at highest risk of perinatal depression.

During the postpartum period, the majority of participants reported high levels of social support and those with high levels of social support had lower odds of probable depression. Our results align with existing literature documenting the buffering effects of social support on perinatal depression among women living with HIV in Malawi and across sub-Saharan Africa (Harrington et al., 2019b; Kapetanovic et al., 2014; LeMasters et al., 2020; Stewart et al., 2013). However, we did not observe significant differences in social support among our three cohorts (newly diagnosed, second line therapy users, and previous defaulters) or significant changes in social support across the postpartum period. These findings might be due to our measure of social support and timing of when it was measured. The positive social interaction items of the Medical Outcomes Study Social Support Survey instrument assess the frequency of supportive interactions, but not the type or source of support provided. It is possible that cohorts varied in terms of their access to emotional, instrumental, informational, and appraisal support or support from social network members such as partners, family members, and peers. In addition, we did not measure social support during the antenatal period, a vulnerable time where there might be variation in perceptions and needs of support. Future work to understand social support amongst this population is important as social support, similar to perinatal depression, is a well-established correlate of adherence to PMTCT programs (Ambia and Mandala, 2016; Biaggi et al., 2016; Elwell, 2016; Grede et al., 2014). Taken together, interventions that improve depression and provide

social support have the potential to help women living with HIV cope with the stress of chronic illness as they navigate pregnancy, childbirth, and engagement in lifelong treatment.

Limitations

Despite the strengths of using longitudinal data there are several limitations that warrant discussion. First, depression assessments were intended to occur at enrollment (antenatal), week 6, and at months 3, 6, and 12 postpartum, but many participants' study visits did not align with this schedule. In addition, most women enrolled in the study towards the end of their second trimester or early in their third trimester. This limited our ability to measure depression in early pregnancy and it is possible that this variability in assessment impacted our results related to changes in probable depression over time. Second, we only included participants with antenatal and postnatal depression measurements in our sample. Participants who were missing these measurements or WLWH who chose not to enroll in our study, and thus excluded from our analysis, may be different across mental health, social support, and HIV treatment and retention outcomes. Third, the PHQ-9 and EPDS-10 thresholds used in our study were much lower than thresholds utilized in studies conducted in neighboring countries in SSA and limits comparability to other study populations. We used lower thresholds to be consistent with other papers published amongst our study population in Malawi (Harrington et al., 2020, 2019b, 2018; Udedi et al., 2019).

CONCLUSION

Our results suggest that amongst our sample of WLWH enrolled in Malawi's Option B+ program, the prevalence of probable depression was higher during the antenatal period than the postpartum period and decreased over time. In addition, probable depression significantly varied among women newly diagnosed with HIV, second line therapy users, and previous defaulters. Social support was protective for postpartum depression across all treatment and retention groups. This evidence serves as a starting point for developing and tailoring interventions that improve mental health outcomes and their HIV-related clinical correlates in WLWH during the perinatal period.

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HIGHLIGHTS

- Probable depression was higher in the antenatal period than the postpartum period
- Probable depression varied across treatment and retention groups
- Social support was protective for postpartum depression among all participants
- Lack of diagnostic psychiatric evaluation precluded actual diagnosis of depression
- Depression screening and social support should be considered in PMTCT programs

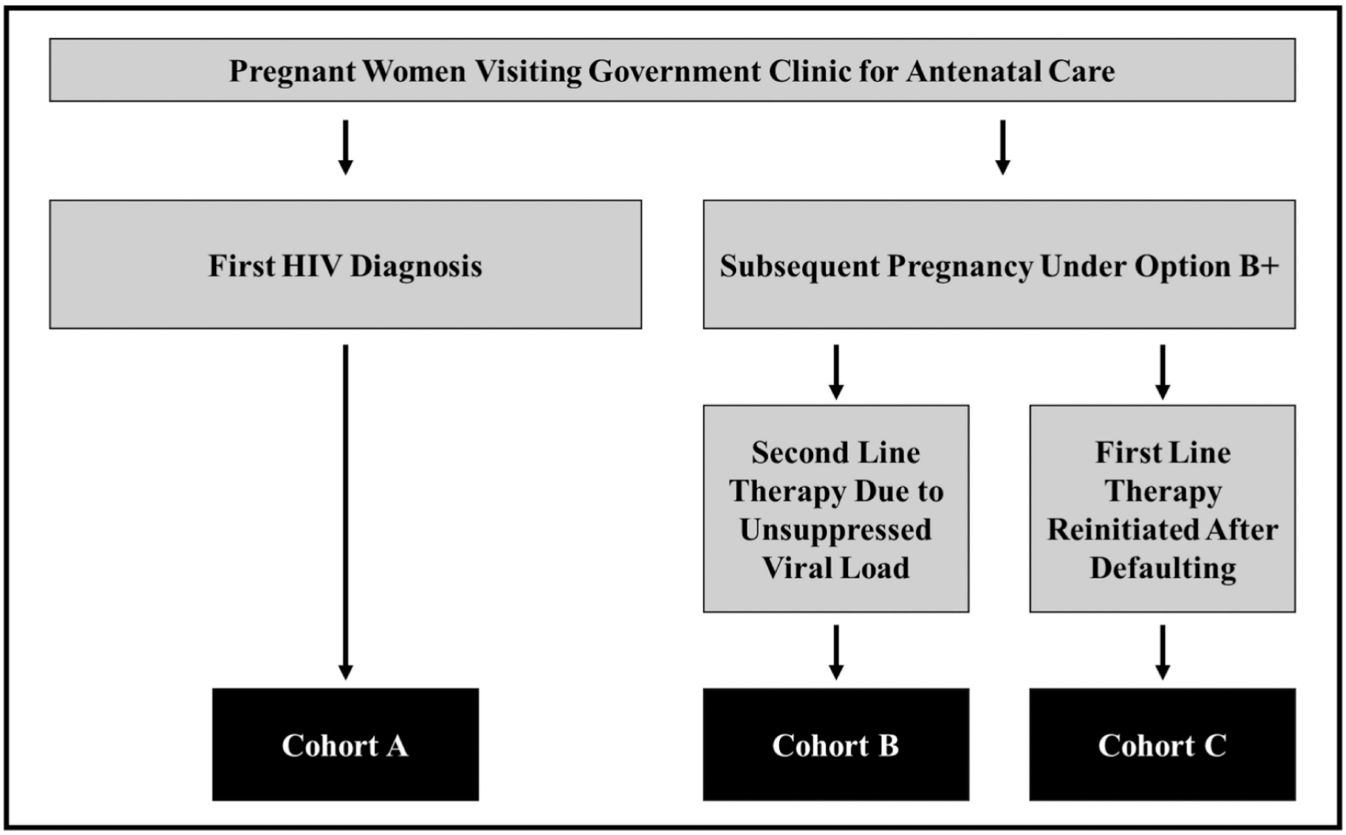

Figure 1.
Study Cohort Recruitment

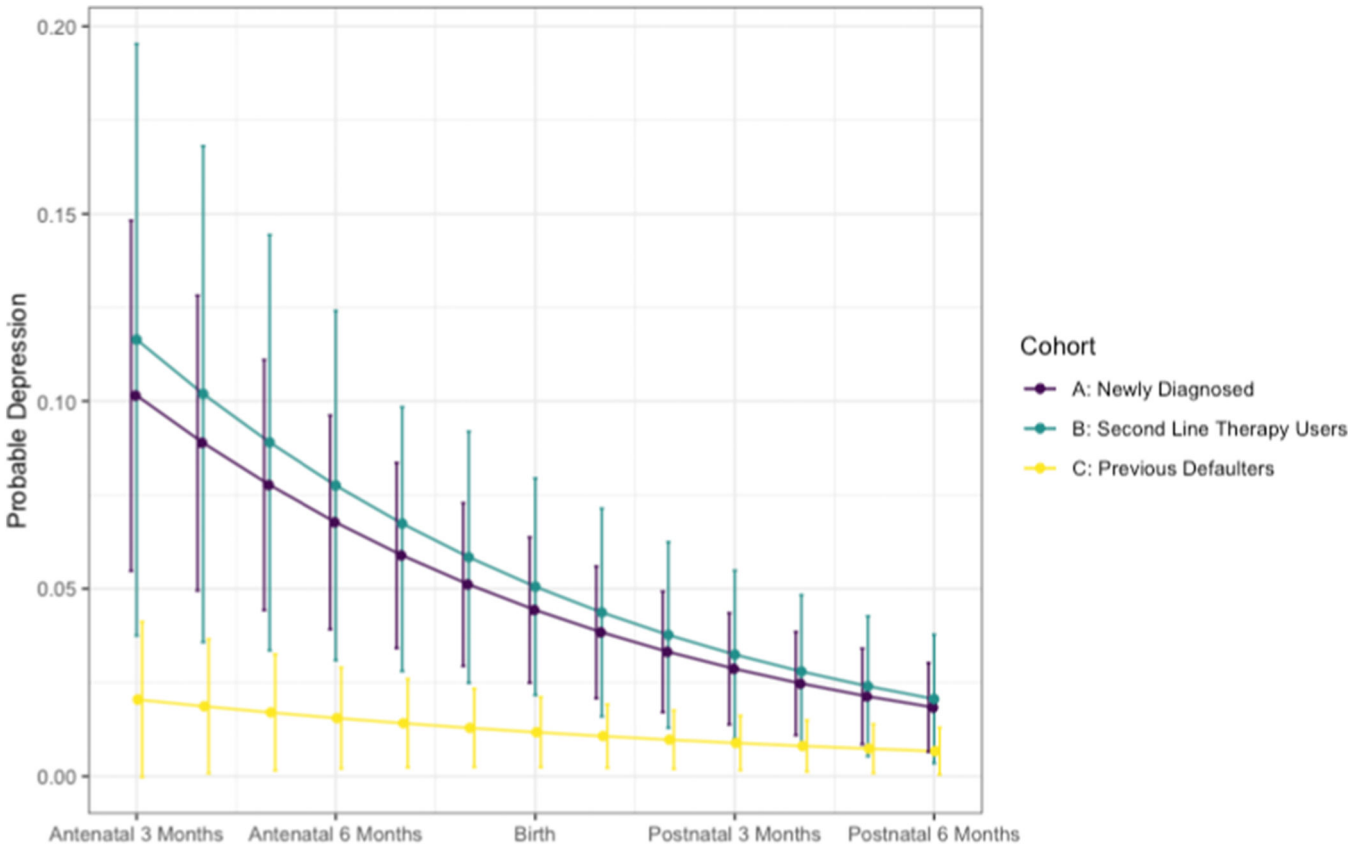

Figure 2.
Probable Perinatal Depression by Cohort

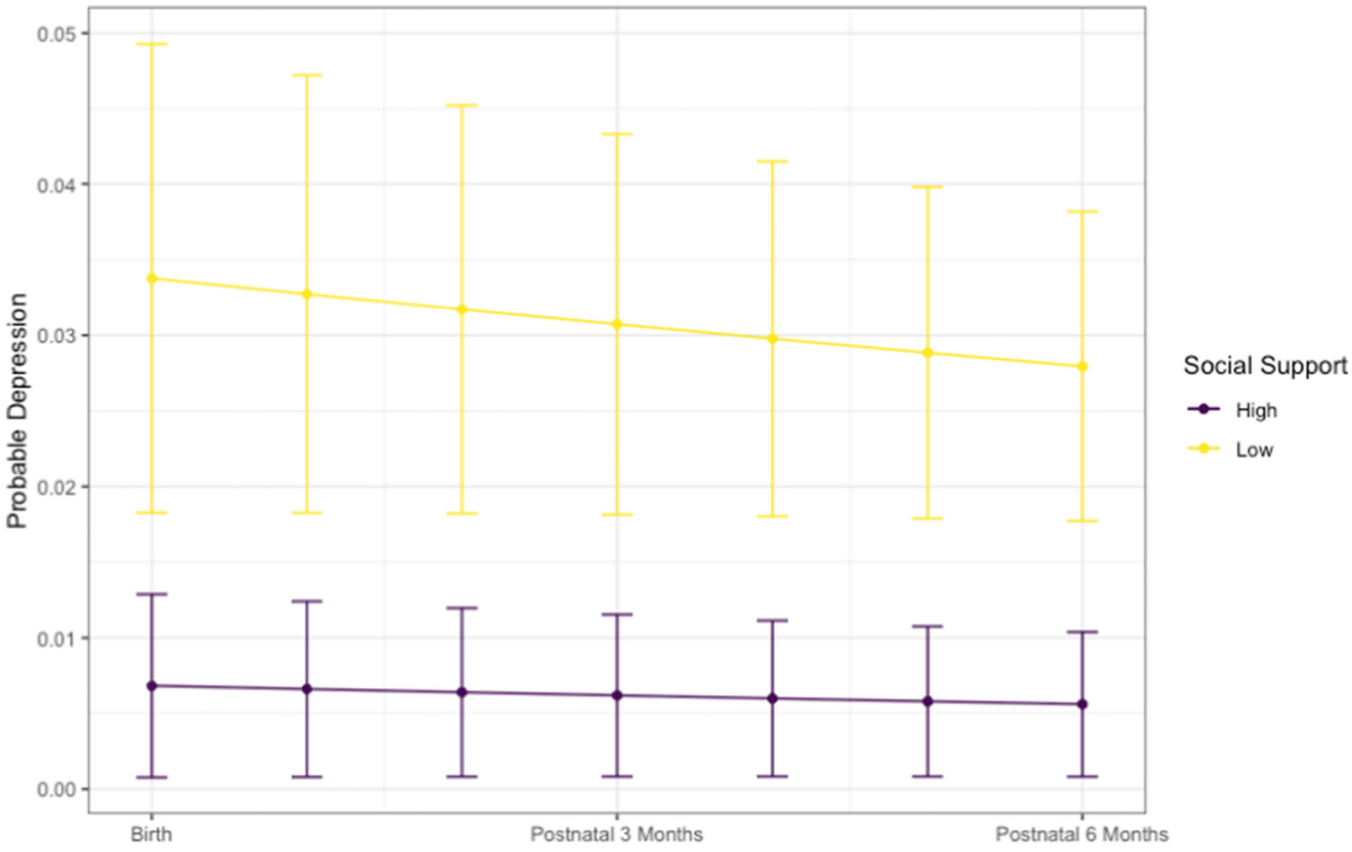

Figure 3.
Probable Postpartum Depression by Social Support

Table 1.

Demographics by Cohort at Enrollment

	Total (N = 468)		Cohort A: Newly Diagnosed (N = 268)		Cohort B: Second Line (N = 77)		Cohort C: Defaulters (N = 123)		Chi-Square
	N	%	N	%	N	%	N	%	p-value
Median Age (IQR)	27.0	(23–32)	26.6	(23–30)	29.8	(26–33)	26.1	(23–32)	0.00
Ever Married	421	90%	242	90%	68	88%	111	90%	0.87
Completed Primary School	240	51%	150	56%	39	51%	51	41%	0.03
Sufficient Monthly Income to Support Family	97	21%	66	25%	14	18%	17	14%	0.04
Current Trimester									
First	6	1%	4	1%	1	1%	1	1%	
Second	193	41%	118	44%	30	39%	45	37%	
Third	269	57%	146	54%	46	60%	77	63%	0.63
Previously Depressed	185	40%	104	39%	31	40%	50	41%	0.63

Table 2.

Probable Depression and Social Support by Cohort Across Perinatal Period

	Antenatal Care Visit 1		Postnatal Care Visit 1		Postnatal Care Visit 2	
	N	**%**	**N**	**%**	**N**	**%**
Probable Depression						
Total (N = 468)	69	15 %	21	4%	13	3%
Cohort A (N = 268)	47	18 %	12	4%	8	3%
Cohort B (N = 77)	16	21%	7	9%	3	4%
Cohort C (N = 123)	6	5%	2	2%	2	2%
Social Support Items						
Have Someone to Have a Good Time With						
Never			28	6%	33	7%
Some Times			133	28%	115	25%
Most Times			307	66%	300	64%
Have Someone to Do Something Enjoyable With						
Never			63	13 %	57	12 %
Some Times			184	39%	172	37%
Most Times			221	47%	219	47%
Have Someone to Get Together With						
Never			75	16 %	84	18 %
Some Times			154	33%	141	30%
Most Times			239	51%	223	48%
High Social Support						
Total (N = 468)			307	66 %	300	64 %
Cohort A (N = 268)			176	66 %	168	63 %
Cohort B (N = 77)			48	62%	52	68%
Cohort C (N = 123)			83	67%	80	65%

Table 3.

Probable Perinatal Depression*

	β	SE	OR	95% CI	p-value
Level 2 Effects					
Time (Months)	−0.14	0.03	0.87	(0.82, 0.92)	< 0.001
Level 1 Effects					
Cohort					
Cohort A (Initiating ART)	1.18	0.36	3.25	(1.59, 6.65)	0.001
Cohort B (Second Line Therapy)	1.22	0.44	3.39	(1.44, 7.99)	0.002
Cohort C (Defaulters) - Reference					
Cross Level Interaction					
Cohort *Time	−0.09	0.02	0.91	(0.86, 0.98)	0.048

*Adjusted for age, marital status, primary school completion, sufficient monthly income, and depression history

Table 4.

Probable Postpartum Depression*

	β	SE	OR	95% CI	p-value
Level 2 Effects					
Time (Months)	−0.03	0.02	0.97	(0.94 ,0.99)	0.038
High Social Support	−1.65	0.61	0.19	(0.06 ,0.64)	< 0.001
Level 1 Effects					
Cohort					
Cohort A (Initiating ART)	0.63	0.51	1.87	(0.69 ,5.06)	0.237
Cohort B (Second Line Therapy)	1.00	0.61	2.72	(0.82 ,9.05)	0.096
Cohort C (Defaulters) - Reference					
Cross Level Interaction					
Cohort*Time	0.01	0.02	1.01	(0.97 ,1.05)	0.691
Cohort*High Social Support	0.06	0.40	1.06	(0.49 ,2.33)	0.876

*Adjusted for age, marital status, primary school completion, sufficient monthly income, and depression history