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Antenatal depressive symptoms in Kenyan women living with HIV: contributions of recent HIV diagnosis, stigma, and partner violence

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Abstract

Depression among pregnant women living with HIV (WLWH) in sub-Saharan Africa leads to poor pregnancy and HIV outcomes. This cross-sectional analysis utilized enrollment data from a randomized trial (Mobile WAChX, NCT02400671) in 6 Kenyan public maternal and child health clinics. Depressive symptoms were assessed with the Patient Health Questionnaire-9 (PHQ-9), stigma with the Stigma Scale for Chronic Illness, and intimate partner violence (IPV) with the Abuse Assessment Screen. Correlates of moderate-to-severe depressive symptoms ("depression", PHQ-9 score ≥10) were assessed using generalized estimating equation models clustered by facility. Among 824 pregnant WLWH, 9% had depression; these women had more recent HIV diagnosis than those without depression (median 0.4 versus 2.0 years since diagnosis, p=0.008). Depression was associated with HIV-related stigma (adjusted Prevalence Ratio [aPR]:2.36, p=0.025), IPV (aPR:2.93, p=0.002), and lower social support score (aPR:0.99, p=0.023). Using population-attributable risk percent to estimate contributors to maternal depression, 81% were attributable to stigma (27%), recent diagnosis (24%), and IPV (20%). Integrating depression screening and treatment in prevention of mother-to-child HIV transmission programs may be beneficial, particularly in women recently diagnosed or reporting stigma and IPV.

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Disclosure of potential conflicts of interest

The authors declare that they have no conflict of interest.

Research involving Human Participants and/or Animals

Ethical approval was obtained from the University of Washington and Kenyatta National Hospital/University of Nairobi institutional review boards.

Informed consent

All participants gave written informed consent prior to participating in the study. Pregnant women age 14 or older are emancipated by pregnancy according to local regulations and guidelines and were able to provide consent independently.

Keywords

Depression; pregnancy; HIV; women; Kenya; Sub-Saharan Africa

Introduction

Depression during pregnancy is the most common complication of childbearing, affecting one in ten pregnant women worldwide (Fisher et al., 2012; Woody, Ferrari, Siskind, Whiteford, & Harris, 2017), which is elevated from 4% prevalence among the general population (World Health Organization, 2017). Changes in reproductive and stress hormones during pregnancy influence depressive symptoms, as do genetic factors, prior adverse life experiences, history of depression or anxiety, adolescent age, lack of social support, and other stressors (Biaggi, Conroy, Pawlby, & Pariante, 2016; Stein et al., 2014). Depression in pregnancy may negatively influence fetal development (Van den Bergh, Mulder, Mennes, & Glover, 2005), and increases the risk of adverse pregnancy outcomes such as preterm birth and low infant birthweight (Christodoulou et al., 2019; Grigoriadis et al., 2013; Grote et al., 2010), and is a strong predictor of postpartum depression (Redshaw & Henderson, 2013). The burden of antenatal depression is particularly high in low- and middle-income countries (LMICs) where a quarter of childbearing women suffer from depression (Fisher et al., 2012; Gelaye, Rondon, Araya, & Williams, 2016).

Beyond the influence of pregnancy-related physical and social changes on mental health, comorbid health conditions like HIV also increase depressive symptoms. People living with HIV (PLWH) experience five times the frequency of depression than the general population (World Health Organization, 2017) and women living with HIV (WLWH) are even more burdened, with up to one third depressed (Yousuf, Musa, Isa, & Arifin, 2020). Depression risk may be elevated among PLWH through psychosocial influences, including HIV-related stigma, isolation, or HIV-associated disability, as well as biological pathways of HIV infection (Arseniou, Arvaniti, & Samakouri, 2014). Depression among PLWH negatively impacts adherence to HIV care and treatment (Uthman, Magidson, Safren, & Nachega, 2014), which may prevent viral suppression, increasing disease progression and risk of mother-to-child transmission of HIV (Kapetanovic, Dass-Brailsford, Nora, & Talisman, 2014; Shacham, Nurutdinova, Satyanarayana, Stamm, & Overton, 2009).

For pregnant WLWH, the effects of both pregnancy and HIV-infection compound to make this group particularly vulnerable to antepartum depression, especially in LMICs of sub-Saharan Africa SSA, where pregnancy, depression, and HIV infection are common and access to mental health services is limited (Sankoh, Sevalie, & Weston, 2018; Sowa, Cholera, Pence, & Gaynes, 2015b; Udedi et al., 2019). Gaps remain in our understanding of who is most at risk for antenatal depression and the magnitude of influence of associated cofactors among WLWH in SSA. To contribute to filling these gaps, we evaluated the prevalence and correlates of depression, as well as the population attributable risk percent (PAR %) of those correlates on depression among pregnant WLWH in Kenya.

Methods

Study design

This was a cross-sectional analysis of baseline data from the Mobile WAChX study, a randomized controlled trial (RCT) conducted at 6 maternal and child health (MCH) clinics in the Nairobi and Nyanza regions of Kenya (clinical trial NCT02400671) (Drake et al., 2017). Nairobi study sites were Mathare and Riruta Health Centres; Nyanza sites were Ahero, Rachuonyo, Siaya County and Bondo sub-county Hospitals. The RCT compares the impact of 1-way SMS, 2-way SMS and control (no SMS) on antiretroviral therapy (ART) adherence, viral suppression and retention in care among pregnant and postpartum women receiving Option B+ prevention of mother-to-child HIV transmission (PMTCT) services.

Study participants

Women were eligible to participate in the study if they were pregnant (any gestational age), HIV-infected, aged ≥14 years, receiving MCH and HIV care at the study clinic, had daily access to a mobile phone, and were not participating in another research study. All women who attended antenatal care (ANC) at study clinics between November 2015 and May 2017 were screened for study eligibility.

Data collection procedure and measures

This analysis used data collected at study enrollment. Data were collected using a tablet-based Open Data Kit questionnaire administered by a study nurse in either English, Kiswahili, or Dholuo. The questionnaire ascertained demographic characteristics and psychosocial factors including depressive symptoms, HIV-related stigma, social support, and intimate partner violence (IPV).

We assessed depressive symptoms using the Patient Health Questionnaire-9 (PHQ-9) screening scale which asks respondents to indicate the frequency in the last 2 weeks that they experienced each of 9 proposed problems (Kroenke, Spitzer, & Williams, n.d.; Sidebottom, Harrison, Godecker, & Kim, 2012). Each ranked response corresponds to a score 0-3; higher total scores describe higher severity of depressive symptoms (range: 0-27). We defined “moderate-to-severe depressive symptoms” (”depression”) as PHQ-9 score ≥10 and compared those with depression to those without depression (PHQ-9 score <10).

We evaluated HIV-related stigma using a 4-question version of the Stigma Scale for Chronic Illness (SSCI) among participants who had been diagnosed with HIV prior to enrollment (Rao et al., 2009, 2012). We defined endorsement of any items as experience of any stigma, endorsement of embarrassment or feeling left out as internalized stigma, and experience of being avoided or faulted as enacted stigma. Due to a data collection error, stigma questions were not asked of all eligible women in the study. Social support was assessed using the Medical Outcomes Study (MOS) survey social support scale, where higher scores indicate higher social support (range: 18-90) (Sherbourne & Stewart, 1991). We administered the Abuse Assessment Screen to participants to evaluate IPV (“Abuse Assessment Screen - ACOG,” n.d.), and defined experience of IPV in the last 12 months as a response of “yes” to the question, “Within the last 12 months, have you been hit, slapped, kicked, or otherwise

physically hurt by someone in the past year?" Clinical data including plasma HIV viral load (VL) and ART initiation date were abstracted from patient clinical files. Viral failure was categorized as having a VL ≥1000 copies/ml after being on ART for at least 4 months.

Statistical methods

We used descriptive statistics to determine the prevalence of depression symptoms. Correlates of depression were assessed using univariable and multivariable generalized estimating equation models (GEE) with Poisson link and exchangeable correlation structure clustered by facility. This approach was used to account for potential within-facility correlation (Supplementary Table 1). Variables with p-value ≤0.1 in univariable analysis were considered for inclusion in multivariable analyses. Three multivariable analyses were conducted. The first included variables significant at p-value ≤0.1 that had complete information from all study participants (unintended pregnancy, HIV diagnosis within the prior 2 years, IPV, social support score). The second model included those participants with data on HIV-related stigma, and evaluated the association between HIV-related stigma and depression, adjusted for unintended pregnancy, HIV diagnosis within the prior 2 years, IPV, and social support score. In the third model, we hypothesized that virologic failure as an outcome may be influenced by depression as an exposure, thus we evaluated virologic failure as the dependent variable with depression as the main independent variable of interest, adjusted for unintended pregnancy, HIV diagnosis within the prior 2 years, IPV, and social support score. We estimated PAR% from adjusted effect sizes of dichotomous factors significantly associated with depression at p-value ≤0.1 in multivariable models. Analyses were conducted using Stata version 15.

Results

Overall, 824 pregnant WLWH were recruited from the 6 study sites. The median age was 27 years (interquartile range [IQR] 23-31), 115 (14%) were primigravida, and about half (452, 55%) had intended pregnancies (Table 1). Most women (694, 84%) were married or cohabiting, and over three quarters (633, 77%) reported completion of at least primary education. The median time since HIV diagnosis was 2 years (IQR 0.1-5.0), most participants (660, 80%) had disclosed their HIV status to another person, 183 (41%) reported experiencing any HIV-related stigma, and 92 women (11%) reported IPV in the last 12 months.

One in 10 women (71, 9%) had depression; about one third had at least mild depressive symptoms (PHQ-9 score ≥5, 30%). Prevalence of depression differed between study sites ranging from <1% to 35% (Supplementary Table 1). To determine correlates of depression among pregnant WLWH, we compared frequency of depression by levels of multiple demographic, partnership, and psychosocial characteristics. We contextualized potential correlates within a conceptual model to ground hypothesized relationships as distal, intermediate, and proximal factors contributing to depression in this group (Figure 1). This model was adapted from Pearlin and colleagues' 1981 conceptual model for the stress process (Pearlin, Menaghan, Lieberman, & Mullan, 1981) and the Leigh and Milgrom (Leigh & Milgrom, 2008) conceptual model for risk factors for peripartum depression.

Demographic factors:

Maternal age, educational attainment, marital status, household income, and household crowding were considered distal factors; we found no statistically significant relationships between these characteristics and depression (Table 2).

HIV-related factors:

We hypothesized that HIV-related factors would function as intermediate influencers in the pathway leading to antenatal depression. Pregnant WLWH diagnosed with HIV within the last 2 years had 70% higher frequency of depression compared to those who had received their HIV diagnosis more than two years ago (prevalence ratio [PR]: 1.68 [1.01-2.80]) (Table 2). This effect size remained after adjustment for potential confounders (adjusted PR [aPR]: 1.67 [0.99-2.78], p-value: 0.05). Pregnant women who experienced any type of HIV-related stigma had nearly three times the frequency of depression than those not reporting stigma (PR: 2.70 [1.16-6.34]) and this effect was maintained after adjustment (aPR: 2.36 [1.11-5.01]). When deconstructed into “enacted” and “internalized” stigma, we found that both domains were associated with depression. Those experiencing enacted stigma had double the frequency of depression (PR: 1.99 [1.17-3.39]) compared to those not experiencing enacted stigma. Those experiencing internalized stigma had 2.5-times the frequency of depression (PR: 2.48 [1.27-3.39]) compared to those without internalized stigma. Disclosure of one’s HIV status to another person was not associated with depression among this population.

Pregnancy-related factors:

We also conceptualized pregnancy-related factors as intermediate influencers of depression. Women who indicated their current pregnancy was unintended experienced depression at 30% higher frequency than those reporting the pregnancy was intended (PR: 1.27 [1.01-1.59]). When adjusted for potential confounders, this effect was not sustained (aPR: 1.24 [0.94-1.62], p=0.13). Other pregnancy-related factors (gestational age, primigravida) were not associated with depression.

Psychological factors:

IPV and social support were conceptualized as those most proximal to antenatal depression among this population. Correspondingly, we found women who had experienced violence from a partner within the last year had over three times the frequency of depression compared to those not reporting IPV (PR: 3.11 [1.66-5.83]). This large effect size was sustained after confounding adjustment (aPR: 2.93 [1.49-5.75]). Further, pregnant WLWH with depression had lower social support scores than those without depression (55 [IQR: 36-66] versus 64 [IQR: 51-72], p<0.001), which remained in multivariable analysis (p=0.05).

We estimated PAR% of each factor identified as a correlate of depression in univariable analysis, finding that 37% of depression cases among this population of pregnant WLWH were attributable to experiencing HIV-related stigma (PAR%: 37.1 [−1.2-61.1]). The correlate with the next highest attributable risk for depression was HIV diagnosis within the last two years, accounting for 24% of depression cases among this population (PAR%:

24.5 [−3.1-44.7]). About 20% of depression burden was due to IPV within the last year [PAR%: 19.6 [2.3-33.7]).

Potential effects of depression on viral suppression:

Among pregnant women who had been on ART for at least 4 months, we observed a trend for the association between depression and viral non-suppression, where those experiencing VL ≥1000 copies/ml had about 60% higher frequency of depression than those virally suppressed (VL <1000 copies/ml) (aPR: 1.64 [0.98-2.74], p=0.06), adjusted for unintended pregnancy, HIV diagnosis, IPV, and stigma.

Discussion

In this study of Kenyan pregnant WLWH attending ANC, one in ten demonstrated depression. Depression was associated with recent HIV diagnosis (within the prior two years), experiencing HIV-related stigma, IPV within the past year, and lower social support.

The prevalence of 10% for depression and 30% mild or higher depressive symptoms observed in our study is consistent with previous studies among pregnant WLWH (Kapetanovic et al., 2014; Nyamukoho, Mangezi, Marimbe, Verhey, & Chibanda, 2019; Osok, Kigamwa, Stoep, Huang, & Kumar, 2018; Peltzer, Rodriguez, & Jones, 2016; Sowa, Cholera, Pence, & Gaynes, 2015a), though studies differ in the scale used to assess depression, making direct comparisons challenging. WLWH in SSA experience high levels of psychosocial and socioeconomic adversity, which may be exacerbated by hormonal changes experienced during pregnancy and the stressors associated with caring for a newborn (Madeghe, Kimani, Vander Stoep, Nicodimos, & Kumar, 2016). Our analysis adds to the sparse literature about antenatal depression among WLWH in SSA and supports previous reports that peripartum women in these regions have a substantial prevalence of depression (Chibanda et al., 2010; Chibanda, Psychiatry, Benjamin, Weiss, & Abas, 2014; Manikkam & Burns, 2012; Nyamukoho et al., 2019; Peltzer et al., 2016).

Our conceptual model contextualized factors assessed for their relationship with antenatal depressive symptoms into categories of demographics, HIV-related factors, pregnancy-related factors, and psychosocial factors. Multiple HIV-related factors were associated with depression during pregnancy among this population of WLWH. We found a significant association between depressive symptoms and experience of HIV-related stigma, an association also observed in other studies in SSA (Gelaye et al., 2013; Rao et al., 2012; Wong et al., 2017). Experiencing HIV-related stigma accounted for the highest PAR% for depression among this cohort of pregnant WLWH, compared to other factors associated with depression. Efforts to normalize HIV diagnosis and reduce societal stigma related to HIV could substantially reduce prevalence of antenatal depression.

We found that recent diagnosis with HIV within the past two years was significantly associated with depression, suggesting there is a need for close monitoring and surveillance of women newly testing positive for HIV during pregnancy to detect and address depressive symptoms. Effective treatment of depression among pregnant women may help prevent adverse pregnancy outcomes associated with depressive symptoms such as preterm birth,

low birthweight, maternal hypertension, and suboptimal infant feeding (Howard, Mehta, & Powrie, 2017; Madeghe et al., 2016; Sowa et al., 2015a).

Experiencing a pregnancy that was not intended was associated with antenatal depression, and about one in ten depression cases was attributable to this pregnancy-related factor. Improving access to family planning methods and promoting their use could reduce prevalence of antenatal depression by prevention of unintended pregnancies.

Pregnant WLWH who experienced IPV in the last 12 months had a substantially higher prevalence of depression than those who did not report IPV, and one in five depression cases were attributable to IPV. Studies in South Africa, Zimbabwe, Zambia, Tanzania, and Ethiopia similarly found that depression was elevated in participants reporting past-year physical and/or sexual IPV (Kidman, Violari, & Kidman, 2018; Wong et al., 2017). Interventions to address IPV are needed to holistically address maternal health, including mental health.

Our study highlights the need for mental health interventions to be integrated into routine MCH and HIV care to reduce depressive symptoms among pregnant WLWH in SSA. Potential interventions could include implementation of psychosocial support groups and counseling services for those newly diagnosed with HIV, which have been shown in SSA settings to improve psychosocial health (Brittain et al., 2017; Myers et al., 2018). Further, interventions that counteract the negative effects of HIV-related stigma may prevent or alleviate depressive symptoms (Kane et al., 2019; Pantelic, Sprague, & Stangl, 2019). Integration of IPV screening within routine MCH care could improve detection of IPV and allow for targeted counseling and monitoring to prevent and reduce associated depressive symptoms (Kidman et al., 2018).

Our conceptual model contextualizes the interconnectedness of demographic, HIV-related, pregnancy-related, and psychosocial factors which influence maternal mental health during pregnancy. Effect sizes of depression cofactors were observed to generally increase from distal, to intermediate, to proximal factors, suggesting the potential relative influence of interventions at each stage. The difference in PAR% across correlates of depression emphasizes the importance of considering prevalence of a cofactor within a population when designing interventions to optimize impact among prioritized high-risk groups.

Introduced in 2015, the Kenya Mental Health Policy 2015-2030 was developed with the goal of attaining the highest standard of mental health through mental health systems reform (“Kenya Mental Health Policy 2015 to 2030 - Health Publications,” n.d.). Specifically, the policy calls for integration of mental health training, records tracking and care into existing primary care settings, and calls for research focused on mental health to inform appropriate intervention. Our study provides such findings, highlighting the importance of reducing the burden of depressive symptoms among pregnant WLWH with specific focus on those reporting stigma, recently diagnosed with HIV, experiencing IPV, and those with lower social support.

As a cross-sectional study our study was limited by lack of information about temporality to assess relationships between depression and other factors. In the absence of clinical

diagnosis, we used the PHQ-9 to screen for depressive symptoms. While less definitive than diagnosis, the PHQ-9 has been validated for reliable use in diverse settings, including SSA (Bhana, Rathod, Selohilwe, Kathree, & Petersen, 2015; Cholera et al., 2014). We observed differences in prevalence of depressive symptoms by study site; this may represent meaningful regional differences, or it may reflect differences in administration of the PHQ-9 questions by study staff. We analytically accounted for clustering of the data by site in GEE models. In analyses adjusted for site, associations were retained (data not shown). We acknowledge that data were collected between 2015-2017, thus more recent data may be necessary to depict the current state of antenatal depression in this population.

Conclusion

Our findings highlight the need for improved depression screening and treatment for pregnant WLWH in routine ANC, particularly those reporting HIV-related stigma, diagnosed with HIV within the past two years, experienceing low social support, and IPV. We recommend further research on peripartum depression that utilizes longitudinal designs and development of community-based or clinical interventions to alleviate cofactors and ultimately reduce antenatal depression among WLWH.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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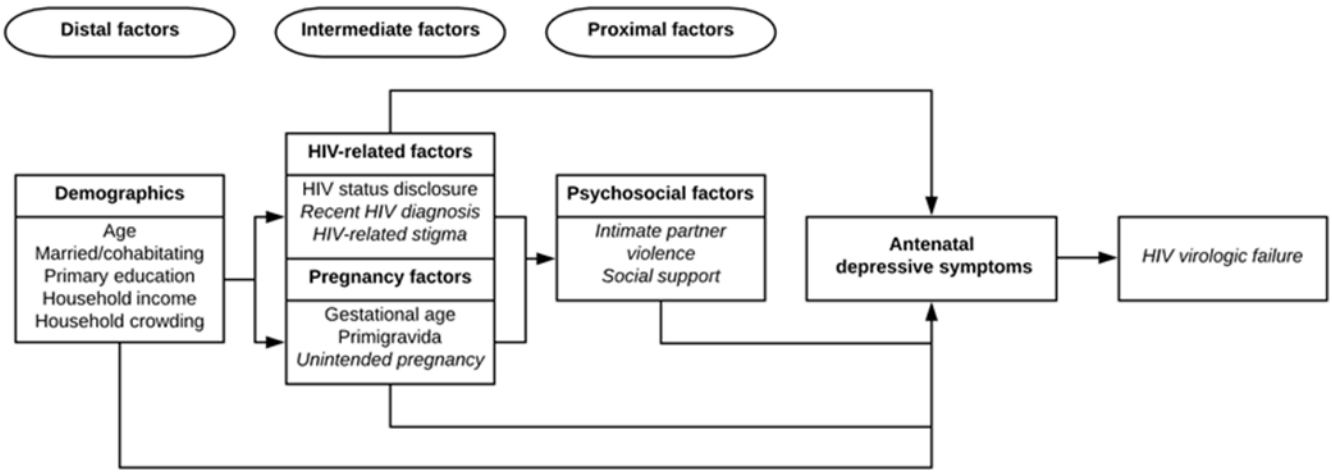

Figure 1. A conceptual framework for correlates of antenatal depression among women living with HIV (adapted from Pearlin et al. and Leigh & Milgrom)

Italics indicate factor was associated with moderate to severe depressive symptoms (MSD) at alpha=0.1 in univariable analyses

Table 1.

Sociodemographic, clinical, and behavioral characteristics of HIV-infected

	No moderate-to-severe depressive symptoms		Moderate-to-severe depressive symptoms	
Characteristics	**N**	**n or median (% or IQR)**	**N**	**n or median (% or IQR)**
Depression score (PHQ-9)[a]	753	2 (0-4)	71	13 (11-15)*
Age (years)	753	27 (23-31)	71	25 (22-29)*
Gestational age (weeks)	746	24 (18-30)	71	25 (18-31)
Primigravida	753	103 (13.7)	71	12 (16.9)
Pregnancy intended	750	421 (56.1)	71	31 (43.6)*
Primary education completed	753	582 (77.3)	71	51 (71.8)
Married/cohabiting	753	638 (84.7)	70	56 (80.0)
Monthly household income (USD)	493	80 (40-150)	34	55 (30-120)
Household crowding (≥3/room)	753	273 (36.3)	71	17 (23.9)*
Time since HIV diagnosis (years)	749	2.0 (0.1-5.0)	71	0.4 (0.04-3.2)*
HIV status disclosed to anyone	737	609 (82.6)	69	51 (73.9)
Any stigma reported [b]	406	152 (37.4)	45	31 (68.9)*
Enacted stigma	406	47 (11.6)	45	13 (28.9)*
Internalized stigma	406	139 (34.2)	45	28 (62.2)*
IPV in the last 12 months[c]	753	69 (9.2)	71	23 (32.4)*
Social support score[d]	753	64 (51-72)	71	55 (36-66)*
VL (log_{10} copies) ≥4 months since ART initiation	437	1.3 (1.3-1.8)	33	2.1 (1.3-2.8)*
VL ≥1000 copies/ml ≥4 months since ART initiation	437	49 (11.2)	33	8 (24.2)*

[a] 27-point scale

[b] Stigma Scale for Chronic Illness (Any stigma = any scale item endorsed, Enacted = “Because of my illness, some people avoided me” or “Some people acted as though it was my fault I have this illness” endorsed, Internalized = “I felt embarrassed about my illness” or “Because of my illness, I felt left out of things” endorsed)

[d] 72-point scale

* P-values <0.05 from chi-squared tests for binary or categorical characteristics, t-tests for continuous characteristics; PHQ-9: patient health questionnaire-9, HIV: human immunodeficiency virus, VL: viral load, IPV; intimate partner violence, IQR: interquartile range

Table 2.

Correlates of moderate-to-severe depressive symptoms (“depression”) among pregnant women living with HIV

	Depression	No Depression	Depression vs No Depression						PAR %	
	N (%)	N (%)	PR	95% CI	p-value	aPR	95% CI	p-value	PAR %[d]	95% CI
Adolescent (≤19 years old)										
No	66 (8.3)	725 (91.7)	ref							
Yes	5 (15.2)	28 (84.9)	1.56	(0.43-5.71)	0.50					
Gestational age (weeks)										
No	34 (8.5)	367 (91.5)	ref							
Yes	37 (8.8)	386 (91.3)	0.93	(0.71-1.21)	0.59					
Primigravida										
No	59 (8.3)	650 (91.7)	ref							
Yes	12 (10.4)	103 (89.6)	1.22	(0.83-1.79)	0.31					
Pregnancy unintended										
No	31 (6.9)	421 (93.1)	ref			ref				
Yes	40 (10.8)	329 (89.2)	1.27	(1.01-1.59)	0.04	1.24[a]	(0.94 – 1.62)	0.13		
Primary education completed										
No	20 (10.5)	171 (89.5)	ref							
Yes	51 (8.06)	582 (91.9)	0.93	(0.54-1.59)	0.79					
Married/cohabiting										
No	14 (10.9)	115 (89.2)	ref							
Yes	56 (8.1)	638 (91.9)	0.81	(0.42-1.59)	0.55					
Household income above median (≥80 USD)										
No	13 (4.87)	254 (95.1)	ref							
Yes	21 (8.1)	239 (91.9)	0.94	(0.58-1.54)	0.82					
Household crowding (≥3/room)										
No	54 (10.1)	480 (89.9)	ref							
Yes	17 (5.9)	273 (94.1)	0.88	(0.65-1.20)	0.41					
HIV diagnosis <2 years ago										
No	27 (6.3)	404 (93.7)	ref			ref				

	Depression	No Depression	Depression vs No Depression						PAR %	
	N (%)	N (%)	PR	95% CI	p-value	aPR	95% CI	p-value	PAR %[d]	95% CI
Yes	44 (11.3)	345 (89.7)	1.68	(1.01-2.80)	0.05	1.67[a]	(0.99-2.78)	0.05	24.46	(−3.07-44.65)
Disclosed to anyone										
No	18 (12.3)	128 (87.7)	ref							
Yes	51 (7.7)	609 (92.3)	0.72	(0.40-1.27)	0.26					
IPV in the last 12 months										
No	48 (6.6)	684 (93.4)	ref			ref				
Yes	23 (25.0)	69 (75.0)	3.11	(1.66-5.83)	<0.001	2.93[a]	(1.49-5.75)	0.002	19.55	(2.33-33.73)
Social support score	64 (51-72)	55 (36-66)	0.99	(0.97-1.00)	0.02	0.99[a]	(0.98-1.00)	0.05		
Any stigma reported										
No	14 (5.2)	254 (94.8)	ref			ref				
Yes	31 (16.9)	152 (83.1)	2.70	(1.16-6.34)	0.02	2.36[b]	(1.11-5.01)	0.03	37.07	(−1.91-61.14)
Enacted stigma										
No	32 (8.2)	359 (91.8)	ref							
Yes	13 (21.7)	47 (78.3)	1.99	(1.17-3.39)	0.01					
Internalized stigma										
No	17 (5.9)	267 (94.0)	ref							
Yes	28 (16.8)	139 (83.2)	2.48	(1.27-4.84)	0.01					
VL ≥1000 copies/ml ≥4 months since ART initiation										
No	25 (6.1)	388 (93.9)	ref			ref				
Yes	8 (14.0)	49 (85.9)	1.62	(0.81-3.27)	0.18	1.64[c]	(0.98-2.74)	0.06		

Depressive symptoms (PHQ-9 score ≥10); PR: Prevalence ratio; aPR: adjusted Prevalence Ratio; PAR %: Population Attributable risk percent

[a]Dependent variable: Depression; Independent variables: unintended pregnancy, HIV diagnosis (<2 years vs. ≥2 years), intimate partner violence, social support score

[b]Dependent variable: Depression; Independent variables: unintended pregnancy, HIV diagnosis (<2 years vs. ≥2 years), intimate partner violence, social support score, any stigma reported

[c]Dependent variable: virologic failure (>1000 copies/ml, ≥4 months since ART initiation failure); Independent variables: Depression, unintended pregnancy, HIV diagnosis (<2 years vs. ≥2 years), intimate partner violence, social support score, any stigma reported

[d]PAR % estimated from adjusted PRs for dichotomous factors associated with depression at p-value ≤ 0.1