

## **Factors associated with non-disclosure of HIV status in a cohort of childbearing HIV-positive women in Ukraine**

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Running Head: Non-disclosure of HIV status among childbearing women in Ukraine

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### Supplementary EuroCoord Appendix

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**Abstract**

Ukraine has one of the largest populations of persons living with HIV in Europe. Data on 2,019 HIV-positive married or cohabiting women enrolled in a postnatal cohort from 2007-2012 were analysed to investigate prevalence and factors associated with self-reported non-disclosure of HIV status. Median age at enrolment was 27.5 years, with two-thirds diagnosed during their most recent pregnancy. Almost all had received antenatal antiretroviral therapy and 24% were taking it currently. One-tenth (n=198) had not disclosed their HIV status to their partner and 1 in 20 (n=93) had disclosed to no-one. Factors associated with non-disclosure were: unmarried status (AOR 2.99 95%CI 1.51-5.92), younger age at leaving full-time education (AOR 0.41 (95% CI 0.19-0.88) for  $\geq 19$  years vs  $\leq 16$  years) and lack of knowledge of partner's HIV status (AOR 2.01 95%CI 1.09-3.66). Further work is needed to support disclosure in some groups and to explore relationships between disclosure and psychological factors in this setting, including depression, lack of support and perception of stigma.

Key words: HIV, Eastern Europe, Disclosure, Women, Pregnancy

## Introduction

Ukraine has one of the largest populations of persons living with HIV in Europe – 230,000 according to UNAIDS 2012 estimates, of whom 95,000 are women, most of childbearing age (1). There is a growing body of work on the HIV epidemic in Ukraine, which includes research on people who inject drugs (PWID)(2-7), and on the rates and prevention of mother-to-child transmission (MTCT) (8-10). Disclosure of HIV status by HIV-positive individuals to their partners, family and friends may have important implications for onward transmission of HIV, health-seeking behaviour and treatment adherence (11-15), but disclosure behaviours among HIV-positive people living in Ukraine have not yet been characterised.

Although HIV testing and counselling for couples, with support for mutual disclosure, is recommended by the World Health Organization, both in and outside the context of pregnancy, rates of partner testing within PMTCT programmes globally have generally been low (16). In Ukraine, half of HIV-positive people in a 2011 survey reported having experienced stigma or discrimination from other people as a result of their HIV status (17) and stigma-related barriers to disclosure may be particularly salient for pregnant women, who may fear that disclosure could result in abuse, rejection, discrimination and loss of a partner's or spouse's support (18-21). Factors previously associated with higher likelihood of disclosure among childbearing women in sub-Saharan Africa include younger age, knowing someone with HIV, being in a stable and long-term partnership, and higher educational status of partner, while financial dependence on partner and low-wage employment were among factors associated with lower likelihood of disclosure (22). In Ukraine, intolerance of lifestyles or behaviour associated with

HIV transmission is reported as one of the main causes of stigma by people living with HIV (23) fear of which could be a barrier to disclosure; women with a history of injecting drugs may face the “double disclosure” of HIV-positive status and drug use if their partner, friends and family are unaware of their history of injecting drugs, and are particularly vulnerable to HIV and IDU-related stigma in the context of pregnancy (24, 25).

Of around 4000 HIV-positive pregnant women delivering annually in Ukraine, the majority (around 60% in a recent study (8)) have been diagnosed with HIV via antenatal screening during that pregnancy. Disclosure (particularly to partner and other household members) within a short time frame may be an important factor influencing access to HIV-related care during pregnancy and uptake of interventions to prevent MTCT.

Our aim was to determine the prevalence of non-disclosure within a cohort of HIV-positive married / cohabiting women who had recently delivered in Ukraine and to explore factors associated with non-disclosure, in order to identify groups of childbearing women who may need additional support with the disclosure process.

## Methods

The Ukraine Cohort Study of HIV-infected Childbearing Women enrolled HIV-positive women who had recently given birth and were receiving HIV care at one of five participating regional HIV/AIDS Centres (situated in Odessa, Donetsk, Kiev, Kriviy Rig and Mykolaiv) between 2007 and 2012 (26). This postnatal cohort was nested within the European Collaborative Study (ECS) in EuroCoord ([www.eurocoord.net](http://www.eurocoord.net)), a multisite observational cohort study which has enrolled HIV-positive pregnant women and their infants in Ukraine since 2000 (8).

Linked anonymous data were collected following informed consent on study-specific questionnaires, using study serial numbers. At postnatal cohort enrolment (usually within 12 months of delivery), questionnaires were completed by the women (including questions on socio-demographics, substance use, contraception and partner's HIV status) and the clinician (including questions on treatment, WHO clinical stage, CD4 count, and clinician-assessed substance use). Information was also available from the ECS on previous live and stillbirths, age at leaving full-time education, the date of HIV diagnosis, history of injecting drug use (IDU), and partner's IDU history.

Maternal HIV disclosure status was based on self-report at enrolment: women reported whether they had disclosed to any of the following four groups: husband / current partner or boyfriend; parents; other close family member(s); friend(s). We decided to focus our analyses on married or cohabiting women (mothers) because we were interested in patterns of disclosure among women in stable partnerships, including to the father or father-figure of the

woman's infant. Non-disclosure to a cohabiting partner may be particularly likely to impact on health behaviours including attendance for HIV care, adherence to ART during pregnancy and avoidance of breastfeeding (27) as compared with non-disclosure to non-cohabiting partners (a category which may include casual or commercial sexual partners).

### **Variables**

Sociodemographic data collected included age at enrolment, age at leaving full-time education, and marital status. Whether or not the woman could afford contraception (self-reported) was used as a proxy of socio-economic status. Age at enrolment was categorised into four groups (16-23, 24-26, 27-30,  $\geq 31$  years), and age at leaving full-time education was divided into three categories ( $\leq 16$ , 17-18, and  $\geq 19$  years). Data on smoking and alcohol consumption and partner's HIV and IDU status were self-reported by the woman. The woman's own IDU status (current or history) was based on the woman's and the clinician's reports as well as presence of neonatal abstinence syndrome in the infant (available from the ECS). CD4 count was categorised as  $< 200$ , 200-349, 350-499 and  $\geq 500$  cells/mm<sup>3</sup>; disease stage was reported using WHO staging and parity was categorised as 1, 2 or  $\geq 3$  previous live and still births. Timing of HIV diagnosis was categorised as before or during the woman's most recent pregnancy in the main analysis, to capture qualitative differences in disclosure circumstances and opportunities in these time periods which may extend beyond simply the duration of time in which to disclose (22). Time since HIV diagnosis was categorized into quartiles for a sub-analysis on disclosure among women without an IDU history.



## Statistical analyses

Univariable and multivariable logistic regression models were fitted to estimate odds ratios (OR), adjusted odds ratios (AOR) and 95% confidence intervals (CI) in analyses investigating factors associated with non-disclosure of HIV status to anyone, or to a husband / cohabiting partner. All variables significantly associated ( $p < 0.10$ ) with non-disclosure in univariable analyses were included in the multivariable logistic regression model, in addition to year of enrolment which was included a priori to account for calendar variation in the HIV-positive childbearing population, and IDU history, current ART and WHO stage which were included a priori as the literature suggests that issues with delay or concealment of treatment, and risk of inadvertent disclosure linked to these factors might affect disclosure status (28-30). Centre was included as a random effect to account for clustering. As timing of diagnosis was confounded by IDU history, we conducted a sub-analysis restricted to women without an IDU history to explore the association between disclosure of HIV status and duration of diagnosed infection by the time of postnatal cohort enrolment. Statistical analyses were conducted using Stata version 11.0 (StataCorp, Texas, USA).

## Results

A total of 2,019 married ( $n=1,195$ ) or cohabiting ( $n=824$ ) women were enrolled between September 2007 and January 2012, representing 83% of the total 2,432 women enrolled in this time period. These 2,019 women had a median age of 27.5 years at study enrolment (interquartile range (IQR) 24.5, 31.1), a median of 5.0 months (IQR 1.2-10.5) after delivery. One third had been diagnosed as HIV-positive before and two-thirds during their most recent pregnancy. Approximately half (47%) were primiparous (Table I). The median number of months between date of HIV diagnosis and completion date of the women's study questionnaire was 16.1 months (IQR 8.6 and 32.1); 45.1 months (IQR 29.6-70.6) for the group diagnosed before and 10.8 months (IQR 7.0-16.3) for the group diagnosed during their most recent pregnancy.

A fifth of women had left full-time education aged 16 or younger (Table I), and 17% ( $n=327$ ) reported that they were unable to afford contraceptives. Less than a third had a CD4 count  $\leq 350$  cell/mm<sup>3</sup> and 13% had WHO stage 3 or 4 HIV disease (Table I). A quarter of women were on ART postnatally at cohort enrolment increasing from 17% (47/278) in 2007-2008 to 36% (216/598) in 2011-2012 ( $\chi^2=67.64$ ,  $p<0.01$ ), and almost all (96%) had received ART during their most recent pregnancy (either zidovudine monotherapy or combination antiretroviral therapy). With respect to current substance use, 42% (846/1992) of women were current smokers (only 32% had never smoked), 12% (230/1,977) used alcohol postnatally and 20% (356/1,785) had a history of IDU. Women in the oldest age group (aged  $\geq 31$  years) were more likely to have a history of IDU than other women (31% (142/463) vs 9% (31/363) aged 16-23 years,  $p<0.01$ ), and

were more likely to have left education at  $\leq 16$  years (24% (80/340) vs 18% (51/286) respectively,  $p=0.02$ ). Of the 71% of women who reported knowing their partner's HIV status, 60% (850/1,416) reported that their partners were HIV positive, and 22% (275/1,260) said their partners were PWID (Table I).

### Disclosure

A total of 1,926 (95%) women had disclosed their HIV status to at least one person (husband/current partner, parent(s), another family member or friend), with only 93 women having not disclosed to anyone. Most women ( $n=1,821$ , 90%) had disclosed to their husband or cohabiting partner, 58% ( $n=1,172$ ) to at least one parent, 8% ( $n=154$ ) to a family member other than their parents and only 2% ( $n=38$ ) to friends. Figure 1 presents the overlapping patterns of disclosure.

### Factors associated with non-disclosure

In univariable analyses, women who were cohabiting (vs. married) had higher odds of not having disclosed their HIV status to anyone, while those who had remained in full-time education for longer (until  $\geq 17$  and particularly  $\geq 19$  years vs.  $\leq 16$  years) and those reporting that they could afford family planning were more likely to have disclosed (i.e. lower odds of non-disclosure) (Table II). Women who reported not knowing their partner's HIV status were twice as likely not to have disclosed as those who did know their partner's HIV status (regardless of whether this was positive or negative), but there was no association between partner's HIV status (positive vs. negative) and disclosure among women who reported knowing

their partner's HIV status (OR 1.48 (95% CI 0.80-2.76) for HIV-positive partner vs. HIV-negative). Women aged  $\geq 31$  years were more likely not to have disclosed than those in the youngest age group (16-23 years). Behavioural factors (i.e. IDU history, alcohol use and smoking), clinical or immunological status and ART use were not significantly associated with disclosure (Table II).

The multivariable model was additionally adjusted for age at enrolment, marital status, age at leaving full-time education, whether family planning was reported to be affordable, timing of HIV diagnosis, knowledge of partner's HIV status, and year of enrolment. Centre of enrolment was included as a random effect to account for clustering by HIV/AIDS centre. Older age groups had higher odds of non-disclosure compared with women aged 16-23 years, but these were not statistically significant (Table II). Cohabiting women remained at significantly higher odds of non-disclosure than married women, as did those who reported not knowing their partner's HIV status. Remaining in full-time education until 17-18 and  $\geq 19$  years (vs.  $\leq 16$  years) was associated with lower odds of non-disclosure. Affordability of family planning was no longer associated with disclosure after adjusting for confounders.

A sensitivity analysis assessing factors associated with non-disclosure to a partner was conducted, to see whether the patterns observed when considering disclosure to anyone were the same as those observed when only considering disclosure to a partner. After adjusting for all confounders included in the main multivariable model (Table II), broadly similar patterns were observed where women who were not married and those who did not know their partner's HIV status had higher odds of non-disclosure to their partner (AOR 2.35 95% CI 1.40-

3.93 for cohabiting vs. married, and AOR 2.73 95% CI 1.68-4.44 for partner's HIV status unknown vs. known respectively). However, education was not associated with non-disclosure in this analysis.

Women with a history of injecting drugs had been diagnosed HIV-positive for significantly longer than other women at the time of data collection on disclosure (24.7 months versus 14.5 months,  $p < 0.01$ ); 54% (170/315) had been diagnosed pre-pregnancy vs only 32% (447/1,397) of those without an IDU history ( $\chi^2 = 53.83$   $p < 0.01$ ). A sub-analysis was therefore carried out to further explore the relationship between time since HIV diagnosis (categorized into quartiles) and disclosure among women without an IDU history. Compared to those most recently diagnosed (<8.6 months before questionnaire completion), women diagnosed 8.6 to 15 months and 16 to 31 months before had significantly lower odds of non-disclosure (OR 0.29, 95% CI 0.13-0.64 and 0.43, 95% CI 0.21-0.88, respectively). Women diagnosed more than 32 months prior to questionnaire completion were no more likely to have disclosed than those in the most recently diagnosed group (OR 1.06, 95% CI 0.59-1.88).

## Discussion

In our study population of HIV-positive married and cohabiting women living in Ukraine, most of whom had received their HIV diagnosis within the past 2 years following antenatal testing, the vast majority (95%) had disclosed their HIV status to at least one person in the groups of interest (partner, parents, other family and friends). All women included in the analysis were either married or cohabiting, and one in ten had not yet disclosed their HIV status to their partner. Factors associated with significantly increased probability of non-disclosure in adjusted analyses were older age, not being married and the woman's lack of knowledge of her husband or cohabiting partner's HIV status, whilst higher educational level was associated with lower probability of non-disclosure.

Levels of HIV status disclosure to sexual partners vary depending on setting, with one review documenting average rates of 71% in resource-rich countries and around half in lower income settings (31). Our finding of a high frequency of disclosure here is consistent with other studies in HIV-positive pregnant or recently delivered women in both resource-rich and poor countries (32, 33), but was substantially higher than the range reported in several African studies of 17% to 65% (18, 34). A number of studies have identified lower rates of disclosure by women identified through antenatal screening compared with those seeking testing outside pregnancy (18).

The prevalence of disclosure reported here is consistent with generally higher levels seen among married women or those in stable relationships in European and African studies (32, 33,

35) and our finding that cohabiting women were less likely to disclose their status than those who were married has been reported elsewhere (32, 33, 35). Marriage here and in these studies may serve as a proxy for better partner support or a higher level of confidence in a relationship; concerns regarding break-up of a relationship and withdrawal of financial support have been cited as barriers to disclosure in other studies (28, 36, 37). While some studies have shown that financial dependence on a partner might prevent women from disclosing their status to their partner, others cite financial concerns as a reason for disclosure (35, 38, 39). Here we had data on one proxy variable for socioeconomic status (ability to afford family planning), with higher socioeconomic status associated with lower probability of non-disclosure in unadjusted analysis, but not after adjusting for confounders.

We found that a significant association between non-disclosure and older age was only apparent where any disclosure was considered, but not where the analysis was restricted to disclosure to partner. In a study carried out in several African countries younger women were found to be at lower risk of non-disclosure (40), whilst in another study in South Africa, younger women more likely to disclose to others but not to their partners (35). Similar to our findings, Jasserson et al found a non-statistically significant increased odds of non-disclosure at older ages in a cohort of women living in France (33, 35).

The woman's knowledge of her partner's HIV status and her own disclosure status were closely linked. Here, women who reported not knowing their partner's status had higher odds of non-disclosure to anyone and were more likely not to have disclosed to their partner than women

who knew their partner's HIV status. However, our cross-sectional assessment of disclosure means that among the 70% women who reported knowing their partner's status, we do not know whether this knowledge preceded or followed their own HIV disclosure (or whether their knowledge was accurate). Other studies have reported similar associations and have suggested that in many cases, the woman's disclosure may be a pre-requisite for knowledge of her partner's status (33, 34, 40). Increased availability of couples HIV testing and counselling within PMTCT programmes could increase knowledge of partner status and disclosure rates in HIV-positive women but have proved challenging to implement (16, 32, 41). Disclosure of HIV status to a sexual partner alerts them to the need to seek HIV testing and counselling, to access HIV treatment and care if HIV-positive and to reduce risk of transmission if serodiscordant (16). In our cohort, around 40% of women were in serodiscordant partnerships among those reporting their partner's status, and we have previously shown that most women in our cohort in serodiscordant relationships use condoms (26).

Disclosure has both potential risks and benefits for the individual, as well as possible consequences for public health, for example, with respect to onward transmission. Benefits may include increased social support, fewer stressors with respect to managing their health and lower risk of depression, whilst risks may include intimate partner violence, experience of stigma and discrimination and abandonment, with concerns regarding such risks being well documented as barriers to disclosure for HIV-positive pregnant women (31, 42). Given the association between perceived HIV-related stigma and disclosure and the high rates of stigma (external and internal) reported by people living with HIV in Ukraine (17), it was reassuring that



disclosure levels were so high in our study. We did not find an association between injecting drug use and disclosure, in contrast to studies which have found PWID to have lower rates of disclosure of HIV status to their sexual partners (43, 44). This may be because women who injected drugs here had been diagnosed for significantly longer than other women, as reported here and previously in the same cohort (45), or because the most marginalised PWID were not included in our study population, which included only women engaged in HIV care postnatally. Of note, we also found that women whose partners injected drugs were significantly more likely to know their partner's HIV status than other women (data not shown).

WHO Option B+ is not part of the current national PMTCT programme in Ukraine and only a quarter of women in this study were on ART at postnatal cohort enrolment, although this proportion has increased over time, reflecting improvements over time in ART coverage in the general HIV-positive population in Ukraine (46). Of women remaining on treatment postnatally, non-disclosure to partners or family members (particularly those living in the same household) might prevent optimal adherence (47, 48). A study in France found that disclosure to partner was positively associated with better PMTCT practices, and lower rates of transmission (33), while an adherence survey recently conducted within the Ukraine ECS indicated that, although disclosure was not associated with adherence overall, women living with their families (a factor inter-related with youth and unplanned pregnancy) were more likely to report poor adherence if they had not disclosed their HIV status to a family member (49). For all women, non-disclosure might be associated with lower retention in care (50), which is already well-recognised as a challenge among postnatal women in this and other settings (51-53). As we

collected disclosure data postnatally we were not able to explore any relationship between uptake of PMTCT interventions and disclosure. In France, non-disclosure did not affect overall MTCT rates, but was associated with late initiation of antenatal ART and lack of neonatal prophylaxis (33, 35).

A recent qualitative study of pregnant women in Ukraine highlighted concerns about inadvertent disclosure of a woman's HIV status to other patients in a healthcare setting (and the possibility of this leading to community disclosure), as well as "moral pressure" from clinical staff to disclose HIV status to sexual partners and medical staff (54). Although not practically implemented, there is a legal obligation for HIV-positive people in Ukraine to inform sexual partners of their HIV status, which raises concerns around criminalisation of non-disclosure among patients including pregnant women (54). Healthcare providers reported lack of time and skills to conduct post-test counselling and a need for psychologists to support them in this, but none of the women who received a psychological referral had taken this up (54). This may partly reflect the fact that mental health services are widely stigmatised in Ukraine (55). Peer counselling and support groups are a potentially valuable alternative source of support for women embarking on the disclosure process, but may not be available to all women who need them or at the most relevant time, as provision is predominantly on an ad hoc basis by non-governmental organisations and accessed by HIV-positive women after delivery(49).

This observational study is limited by the potential for bias, including social desirability bias in the self-reporting of key behavioural variables including our outcome of interest, disclosure of

HIV status. Disclosure is often seen as a process rather than a single event and our disclosure data were limited by their cross-sectional nature; we also lacked data on the women's intentions to disclose, whether disclosure had been deliberate or inadvertent and, for women who had disclosed, the consequences of this (e.g. uptake of partner HIV testing and use of barrier contraception). We were also lacking information on specific timing of disclosure; however, two-thirds of women were diagnosed as HIV-positive during their most recent pregnancy (a median of 10 months prior to reporting their disclosure status), narrowing the window of disclosure to pregnancy or the first year postpartum for the majority in this group. Our focus was on disclosure as the outcome of interest, and thus we are not able to situate these results within a theoretical framework that considers the antecedent factors, processes and outcomes of disclosure of HIV status, as has been addressed in other studies (56).

Our results may not be generalizable to all recently delivered women, as our cohort excludes women who were not retained in HIV care after delivery. We were not able to assess the proportion or characteristics of women lost to follow-up after delivery because both the pregnancy and postnatal cohorts are consented studies, and we lacked data to ascertain non-participation versus loss-to-follow-up. However, only 4% in the postnatal cohort had not received antenatal ART in their most recent pregnancy compared with 10% overall in the Ukraine ECS in this time period (8), indicating that women who did not receive PMTCT interventions were under-represented. Those disengaged from HIV services in either time period may have had higher rates of non-disclosure overall, making our prevalence of non-disclosure an under-estimate.

In conclusion, overall there was a high frequency of disclosure of their HIV status by women in this study, all of whom had recently delivered and half of whom had received their HIV diagnosis within the previous 16 months. One in ten women had not disclosed their status to their husband or cohabiting partner and one in 20 had not disclosed their status to anyone at all. Our results indicate that older, unmarried and less educated women may need additional support with disclosure. Further work needs to be conducted to explore relationships between disclosure and psychological factors in this setting, including depression, lack of support and perception of stigma which are all likely to play an important role with respect to disclosure and resulting behaviours.

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**Table I Participants' Baseline Characteristics**

	n (%)
<b>Age, years (n=1,997)</b>	
16-23	438 (22%)
24-26	468 (23%)
27-30	585 (29%)
≥31	506 (25%)
<b>Age at leaving full-time education (n=1,377)</b>	
≤16 years	270 (20%)
17-18 years	401 (29%)
≥19 years	706 (51%)
<b>Marital status (n=2,019)</b>	
Married	1,195 (59%)
Cohabiting	824 (41%)
<b>History of IDU (n=1,785)</b>	
Yes	356 (20%)
<b>Woman's report of partner's HIV status (n=2,006)</b>	
Negative/Positive	1416 (71%)
Don't know	590 (29%)
<b>Partner is PWID (n=1,744)</b>	
Yes	325 (19%)
<b>Parity (n=1,624)</b>	
1	759 (47%)
2	636 (39%)
≥3	229 (14%)
<b>Timing of HIV diagnosis (n=1,726)</b>	
Before last pregnancy	622 (36%)
During last pregnancy	1,104 (64%)
<b>WHO stage (n=1,994)</b>	
I	1456 (73%)
II	269 (13%)
III	240 (12%)
IV	29 (1%)
<b>CD4 count, cells/mm<sup>3</sup> (n=1,820)</b>	
<200	173 (10%)
200-349	368 (20%)
350-499	563 (31%)
≥500	716 (39%)
<b>Year enrolled in Women's Study (n=2,016)*</b>	

2011-2012	603 (30%)
2010	554 (27%)
2009	581 (29%)
2007-2008	278 (14%)

\*2007-2008 and 2011-2012 are grouped because enrolment began mid-way through 2007 and ended mid-way through 2012.

**Table II: Factors associated with non-disclosure of HIV status to anyone**

	Proportion not disclosed	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)* n=1,224	p-value
<b>Sociodemographic characteristics</b>					
<b>Age, years (n=1997)</b>					
16-23	12/438 (3%)	1.00		1.00	
24-26	23/468 (5%)	1.83 (0.90-3.73)	0.09	2.64 (0.96-7.26)	0.06
27-30	26/585 (4%)	1.65 (0.82-3.31)	0.16	2.33 (0.85-6.34)	0.10
≥31	29/506 (6%)	<b>2.16 (1.08-4.28)</b>	<b>0.03</b>	2.60 (0.96-6.99)	0.06
<b>Marital status (n=2,019)</b>					
Married	36/1195 (3%)	1.00		1.00	
Cohabiting	57/824 (7%)	<b>2.39 (1.56-3.67)</b>	<b>&lt;0.01</b>	<b>2.99 (1.51-5.92)</b>	<b>&lt;0.01</b>
<b>Age at leaving full-time education (n=1,377)</b>					
≤16 years	27/270 (10%)	1.00		1.00	
17-18 years	19/401 (5%)	<b>0.45 (0.24-0.82)</b>	<b>0.01</b>	<b>0.47 (0.22-0.99)</b>	<b>&lt;0.05</b>
≥19 years	22/706 (3%)	<b>0.29 (0.16-0.52)</b>	<b>&lt;0.01</b>	<b>0.41 (0.19-0.88)</b>	<b>0.02</b>
<b>Can afford family planning (n=1,971)</b>					
No	22/327 (7%)	1.00		1.00	
Yes	62/1644 (4%)	<b>0.54 (0.33-0.90)</b>	<b>0.02</b>	0.95 (0.45-1.99)	0.89
<b>Timing of HIV diagnosis (n=1,726)</b>					
Before pregnancy	39/622 (6%)	1.00		1.00	
During pregnancy	49/1104 (4%)	0.69 (0.45-1.07)	0.10	0.76 (0.41-1.38)	0.37
<b>Behavioural characteristics</b>					
<b>History of injecting drug use (n=1,785)</b>					
No	70/1429 (5%)	1.00		1.00	
Yes	15/356 (4%)	0.85 (0.48-1.51)	0.59	0.47 (0.18-1.18)	0.11
<b>Alcohol use postnatally (n=1,977)</b>					
No	73/1747 (4%)	1.00			
Yes	12/230 (5%)	1.26 (0.67-2.36)	0.47		
<b>History of smoking (n=1,998)</b>					
No	24/633 (4%)	1.00			
Yes	62/1365 (5%)	1.21 (0.75-1.95)	0.44		
<b>Current smoking (n=1,992)</b>					
No	45/1146 (4%)	1.00			
Yes	41/846 (5%)	1.25 (0.81-1.92)	0.32		
<b>Other characteristics</b>					
<b>WHO stage (n=1,994)</b>					
I	62/1456 (4%)	1.00		1.00	
II	13/269 (5%)	1.14 (0.62-2.11)	0.67	0.99 (0.41-2.34)	0.98
III	11/240 (5%)	1.08 (0.56-2.08)	0.82	1.36 (0.52-3.54)	0.53
IV	3/29 (10%)	2.59 (0.76-8.8)	0.13	2.77 (0.63-12.1)	0.18

<b>CD4 count cells/mm<sup>3</sup> (n=1,820)</b>					
<200	8/173 (5%)	1.00			
200-349	21/368 (6%)	1.25 (0.54-2.88)	0.60		
350-499	24/563 (4%)	0.92 (0.40-2.08)	0.84		
≥500	26/716 (4%)	0.78 (0.35-1.75)	0.54		
<b>Currently on ART (n=2,019)</b>					
No	65/1535 (4%)	1.00		1.00	
Yes	28/484 (6%)	1.39 (0.88-2.18)	0.16	1.31 (0.64-2.65)	0.45
<b>Partner's HIV status (n=2,006)</b>					
Negative/Positive	48/1416 (3%)	1.00		1.00	
Don't know	40/590 (7%)	<b>2.07 (1.35-3.19)</b>	<b>&lt;0.01</b>	<b>2.01 (1.09-3.66)</b>	<b>0.02</b>
<b>PWID Partner (n=1,744)</b>					
No	72/1419 (5%)	1.00			
Yes	12/325 (4%)	0.72 (0.38-1.33)	0.296		

\*adjusted for year of enrolment, age, marital status, age at leaving full-time education, family planning affordability, timing of HIV diagnosis, knowledge of partner's HIV status, with centre included as a random effect

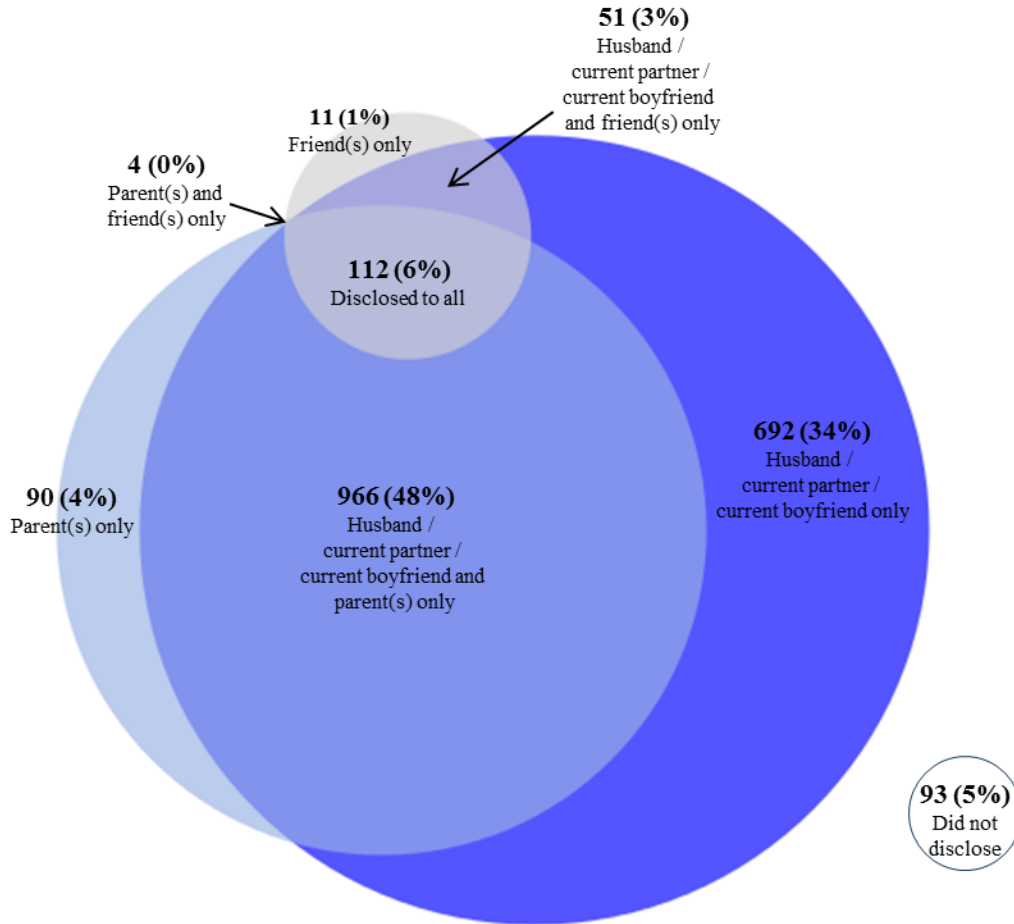


Figure 1: Number and proportion of women disclosing their HIV status to a partner, parent(s) or friend(s) (family members other than parents were grouped with friends), and the overlap in disclosure to these three groups (n=2,019)