Social Determinants Associated with Recent HIV Infection In Treatment-Naïve Pregnant Women in Malawi

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Shuntai Zhou[1], Rachel Burdorf[1], Nathan Long[1], Gerald Tegha[1], Maganizo B. Chagomerana[2], Allan Jumbe[2], Madalitso Maliwichi[2], Shaphil Wallie[2], Yijia Li[3], Ronald Swanstrom[1], Mina C. Hosseinipour[1,2]

[1] University of North Carolina at Chapel Hill, Chapel Hill, NC, [2]UNC Project-Malawi, Lilongwe, Malawi, [3]University of Pittsburgh, Pittsburgh, PA,

BACKGROUND

- Young women in sub-Sahara Africa face a high risk of acquiring HIV.
- Antiretroviral therapy (ART) is prioritized for pregnant women with HIV to treat the infection and prevent transmission to newborns.
- Assessing recency of infection in women who initiated ART during pregnancy and the associated social determinants are pivotal to monitor the epidemic in this vulnerable population.

METHODS

- ART-naïve participants were enrolled through an antenatal clinic in Lilongwe, Malawi, between 2015-2019.
- We used a multiplexed Primer ID next generation sequencing based recency assay to predict recent HIV infection on entry plasma specimens by measuring intra-host diversity on pol (RT) and env (V1V3).
- Both the qualitative recency using a 9-month cutoff and the quantitative days post infection (DPI) were reported for each participant.
- Demographics characteristics, clinical characteristics and social determinants were collected at study entry.

Table 1. Demographic characteristics of study participants

	recent (N=49)	chronic (N=154)	Total (N=203)	p value
participant's age in years				< 0.001
Median	23	27	27	
Q1,Q3	21.00, 27.00	23.00, 31.00	23.00, 30.00	
Age category				0.002
≤20 y/o	11 (22.4%)	9 (5.8%)	20 (9.9%)	
21-25 y/o	20 (40.8%)	53 (34.4%)	73 (36.0%)	
26-30 y/o	13 (26.5%)	52 (33.8%)	65 (32.0%)	
>30 y/o	5 (10.2%)	40 (26.0%)	45 (22.2%)	
Ethnic group				0.826
chewa	19 (38.8%)	55 (35.7%)	74 (36.5%)	
ngoni	9 (18.4%)	40 (26.0%)	49 (24.1%)	
yao	10 (20.4%)	26 (16.9%)	36 (17.7%)	
tumbuka	2 (4.1%)	5 (3.2%)	7 (3.4%)	
other African tribe	9 (18.4%)	28 (18.2%)	37 (18.2%)	

A majority of pregnant women in our study acquired HIV before the current pregnancy and did not initiate ART until second trimester.

Our data suggest that increasing access to HIV testing for the women and their partners, and initiating ART early in the pregnant women are pivotal in this study population.

Table 2. Clinical characteristics and current pregnancy of study participants.

	recent (N=49)	chronic (N=154)	Total (N=203)	p value
CD4 cell count (cells/uL)				< 0.001
Median	482	307	342	
Q1,Q3	326, 563	192, 477	225, 502	
viral loads (copies/mL)				0.381
Median	30111	20828.5	22662	
Q1,Q3	8710, 63216	6366, 52511	6897, 57122	
Participant's WHO stage				0.643
WHO stage I	47 (95.9%)	145 (94.2%)	192 (94.6%)	
WHO stage II	1 (2.0%)	7 (4.5%)	8 (3.9%)	
WHO stage III	1 (2.0%)	2 (1.3%)	3 (1.5%)	
Preexisting medical condition				0.408
no	42 (85.7%)	123 (79.9%)	165 (81.3%)	
yes	7 (14.3%)	31 (20.1%)	38 (18.7%)	
Pregnancy Stage				0.643
1st	3 (6.1%)	6 (3.9%)	9 (4.4%)	
2nd	38 (77.6%)	117 (76.0%)	155 (76.4%)	
3rd	8 (16.3%)	31 (20.1%)	39 (19.2%)	
Willness for for this pregnancy				0.102
I wanted to get pregnant then	30 (61.2%)	63 (40.9%)	93 (45.8%)	
I wanted to get pregnant later	13 (26.5%)	57 (37.0%)	70 (34.5%)	
I did not want any more children	6 (12.2%)	32 (20.8%)	38 (18.7%)	
I don't know/don't remember	0 (0.0%)	2 (1.3%)	2 (1.0%)	
Participant's willness for this pregnancy				0.014
Yes	30 (61.2%)	63 (40.9%)	93 (45.8%)	
No	19 (38.8%)	91 (59.1%)	110 (54.2%)	
Husband's willness for for this pregnancy				0.547
My partner wanted me to get pregnant then	36 (73.5%)	98 (63.6%)	134 (66.0%)	
My partner wanted me to get pregnant later	8 (16.3%)	33 (21.4%)	41 (20.2%)	
My partner did not want me to have any more	2 (4.1%)	14 (9.1%)	16 (7.9%)	
I don't know/don't remember	3 (6.1%)	9 (5.8%)	12 (5.9%)	
Partner's willness for this pregnancy				0.229
Yes	36 (73.5%)	98 (63.6%)	134 (66.0%)	
No	13 (26.5%)	56 (36.4%)	69 (34.0%)	
Prevention of this pregnancy				0.729
Yes	3 (6.1%)	8 (5.2%)	11 (5.4%)	
No	46 (93.9%)	146 (94.8%)	192 (94.6%)	

Table 3. Selected social determinants of health of study participants.

	recent (N=49)	chronic (N=154)	Total (N=203)	p value
current marital status				0.914
single (never married)	1 (2.0%)	2 (1.3%)	3 (1.5%)	
married (living together)	46 (93.9%)	138 (89.6%)	184 (90.6%)	
living with partner but not married	0 (0.0%)	2 (1.3%)	2 (1.0%)	
separated/married but living separately	2 (4.1%)	6 (3.9%)	8 (3.9%)	
divorced (and not living with any new partner)	0 (0.0%)	4 (2.6%)	4 (2.0%)	
widowed (and not living with any new partner)	0 (0.0%)	2 (1.3%)	2 (1.0%)	
household income where the infant will be				0.124
participant (infant's mother)	2 (4.1%)	18 (11.7%)	20 (9.9%)	
other family/household member	45 (91.8%)	134 (87.0%)	179 (88.2%)	
other	2 (4.1%)	2 (1.3%)	4 (2.0%)	
income sufficient				0.252
no	34 (69.4%)	120 (77.9%)	154 (75.9%)	
yes	15 (30.6%)	34 (22.1%)	49 (24.1%)	
Current source of income				0.042
employed	12 (24.5%)	63 (40.9%)	75 (36.9%)	
unemployed	37 (75.5%)	91 (59.1%)	128 (63.1%)	
Highest Education				0.601
no schooling	0 (0.0%)	6 (3.9%)	6 (3.0%)	
some primary school	22 (44.9%)	58 (37.7%)	80 (39.4%)	
completed primary school	6 (12.2%)	26 (16.9%)	32 (15.8%)	
some secondary school	17 (34.7%)	41 (26.6%)	58 (28.6%)	
completed secondary school	3 (6.1%)	17 (11.0%)	20 (9.9%)	
attended college or university	1 (2.0%)	5 (3.2%)	6 (3.0%)	
graduate/professional school	0 (0.0%)	1 (0.6%)	1 (0.5%)	
Main source of drinking water				0.287
piped water	40 (81.6%)	131 (85.1%)	171 (84.2%)	
unprotected well	0 (0.0%)	5 (3.2%)	5 (2.5%)	
protected well	5 (10.2%)	6 (3.9%)	11 (5.4%)	
borehole	4 (8.2%)	12 (7.8%)	16 (7.9%)	
Electricity at home?				0.119
no	42 (85.7%)	114 (74.0%)	156 (76.8%)	
yes	7 (14.3%)	40 (26.0%)	47 (23.2%)	
Travel time between this clinic to home				1
<1 hour	22 (44.9%)	70 (45.5%)	92 (45.3%)	
1-2 hours	27 (55.1%)	84 (54.5%)	111 (54.7%)	

RESULTS

- A total of 203 participants were successfully analyzed by the recency assay
- 8.9% were considered recent infection by 9-month cutoff, 15.3% were considered as borderline recent infection, and 75.9% were considered as chronic infection.
- In the quantitative assessment of DPI, 5% were within 6 months of infection at study enrollment, 18% within one year of infection, and 45% within two years of infection.
- A majority (76%) of the participants were in their 2nd trimester of pregnancy at enrollment.
- Recent and borderline recent infections were combined for the following analyses.
- Participants with recent infection were younger (median age 23 y/o vs. 27 y/o in chronic group, p<0.01), had higher CD4+ T cell counts (median 482 cells/uL vs. 307 cells/uL in the chronic group, p<0.01), had lower income (p=0.04), were more likely to be in their first pregnancy (p=0.002), and more likely to have a partner with confirmed HIV positive status (p=0.03).
- In the multivariant analysis, participant's age (OR: 0.9 per year, 95%CI: 0.83-0.97) and partner with HIV (OR: 3.3, 95%CI: 1.24-8.79) were associated with recent infection at ART initiation.
- We also identified a significant association between **self-reported domestic violence** and recent HIV infection (p=0.01).

CONCLUSIONS

- A majority of study participants acquired HIV before the current pregnancy and did not initiate ART until second trimester.
- Our data suggest that increasing access to HIV testing for the women and their partners, and initiating ART early in the pregnant women are pivotal in this study population.

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