

# Antiretroviral Therapy Based Hiv Prevention Targeting Young Female-Sex Workers: A Mixed Method Approach to Understand the Implementation of Prep in a Rural Area of Kwazulu-Natal, South Africa

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## Research

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# Abstract

**Introduction:** Pre-exposure prophylaxis (PrEP) has the potential to alter the HIV epidemic in South Africa. Between 2016 and 2018 PrEP was rolled-out for 18-24 year-old female-sex workers (FSW) in a rural KwaZulu-Natal subdistrict with very high HIV incidence among adolescent girls and young women (AGYW). Using a 'framework of access' model, we describe PrEP access, awareness and uptake for AGYW, including community members' attitudes towards PrEP for young people.

**Methods:** We enrolled a cohort of 2184 AGYW aged 13-22 living within the subdistrict and quantitatively measured their eligibility, awareness and uptake of PrEP and other HIV prevention interventions in 2017 and 2018. We supplemented this insight with in depth exploration by conducting 19 group discussions with young people and community members, nine stakeholder key informant interviews, 58 in-depth interviews with 15-24 year-olds and 33 with implementing partners, and participatory observations. All interviews were recorded, transcribed and analysed using thematic analysis.

**Results:** PrEP awareness increased from 2% to 9% from 2017 to 2018. Among 965 AGYW sexually-active by 2018, 13.4% (95%CI: 11.4-15.7%) reported transactional sex and 10.6% (95%CI: 8.8-12.7%) sex for money. Of these latter 194 PrEP-eligible AGYW, 21 were aware of PrEP, but none had ever used it. Wider community members were generally unaware of PrEP but imagined it would benefit young people, HIV-serodiscordant couples and those in long-distance relationships. Youth saw PrEP as a positive alternative to condoms since it *"will be in their system"* and not get in the way of sex. Teachers and healthcare providers were more apprehensive: worrying that PrEP would lower personal responsibility for sexual health.

**Conclusions:** Although PrEP awareness increased and it was generally acceptable, uptake was low even among eligible AGYW, i.e., who reported FSW activity. Condom use remained undesirable suggesting a need to include PrEP in offers of alternative HIV prevention technologies to condoms. The targeted nature of public-sector PrEP for FSW may have limited the reach, and the future broader roll-out, of PrEP in this setting. Inclusive approaches to PrEP provision integrated with wider sexual health may help improve demand and access to PrEP.

## Background

South Africa has an estimated 7.2 million people living with HIV (1), the highest globally; HIV remains the leading cause of death (1, 2). HIV incidence has remained high, with little movement over time, especially in KwaZulu-Natal with an annual incidence of 8% amongst females aged 20-24 in some communities (3). There has, however, been considerable progress in developing efficacious and cost-effective HIV prevention tools. These tools include daily oral tenofovir/emtricitabine for Pre-Exposure Prophylaxis (PrEP), use of which can reduce HIV-acquisition risk by >90% (4); and antiretroviral therapy (ART), which reduces mortality and eliminates onward transmission to sexual partners (5, 6).

HO recommended use of tenofovir-based PrEP in individuals at substantial risk of HIV, e.g., female-sex workers (FSW), men-who-have-sex-with-men (MSM) and vulnerable populations such as adolescent girls and young women (AGYW), particularly those engaged in transactional sex (7-9), as part of a combination prevention strategy (10). The South African National Department of Health subsequently rolled-out oral PrEP to select FSW sites in 2016 and approved of PrEP and universal test and treat (UTT) for HIV prevention in MSM, serodiscordant couples and AGYW in 2017 (11).

The potential of biomedical HIV prevention interventions, such as PrEP, to have a substantial impact on the epidemic depends on uptake and use by those at substantial risk of HIV acquisition and transmission (12). Low levels of adherence resulted in no observed benefit in PrEP trials among women, particularly young women in South Africa (13, 14). Poor PrEP uptake and adherence in South African trials has been attributed to the difficulty of disclosing to partners, drug-safety and side-effect concerns and negative clinic experiences (15). However, several potential facilitators have been identified, including belief that PrEP works, feelings of community duty/responsibility to prevent HIV, and social support for use from partner, friends and family. Most data to date come from trials in selected populations who are well-supported and often reimbursed (13, 16)

The current strategy in South Africa is to start by rolling-out PrEP as an intervention that targets the most vulnerable and powerless populations, e.g., self-identifying FSWs (operationally defined as women who sell sex) specifically young FSWs, who already face stigma from communities and an absence of effective healthcare delivery systems models (11). We have limited evidence of how targeted roll-out of newer biomedical interventions will be received and experienced by wider communities, and specifically how this impacts on the population-wide HIV prevention cascade, i.e., PrEP eligibility, and awareness among AGYW including uptake in those AGYW reporting FSW activity such as transactional sex and sex for money (12, 17, 18).

We use the opportunity of a PrEP intervention targeting young FSW (aged 15-24) in a rural KwaZulu-Natal setting with high HIV incidence (19) and no prior PrEP availability. PrEP was implemented as part of PEPFAR-funded Determined Resilient Empowered AIDS-free Mentored and Safe (DREAMS), a multi-level package of interventions to reduce multiple-causes of HIV vulnerability among AGYW (20) in a DREAMS impact evaluation (21) setting. We use a mixed methods approach based on a theoretical framework of access (22) to describe PrEP access, awareness and uptake for AGYW, including community members' attitudes towards PrEP for young people.

## Methods

### Study site

The Africa Health Research Institute (AHRI) is located in Hlabisa sub-district in uMkhanyakude district, northern KwaZulu-Natal, in an area selected for DREAMS implementation (20). The study area is a health and demographic surveillance system site (23), predominantly rural, with high levels of unemployment and an HIV incidence rate of >5% per annum among AGYW (3). There were few targeted HIV prevention

interventions for adolescents and youth in this area prior to DREAMS, and no sex worker programmes until 2016.

## Population, data collection and measures

We used data from the mixed-method process evaluation for the implementation of DREAMS in this area (21). The evaluation collected qualitative data from a range of stakeholders (service users, service providers and community members) during participatory community-mapping and quantitative data from a population-representative cohort of AGYW in 2017 and 2018.

The quantitative aspect of the evaluation consisted of a random sample of 2184 AGYW aged 13-22 years, stratified by age and residential location, to measure the level of access to PrEP, PrEP awareness and uptake at population level in those who are eligible and followed them up in 2018 (21). We assessed PrEP awareness based on a question asking if the respondent had ever heard of PrEP and uptake based on two questions asking if they have ever been offered or were currently taking PrEP. Transactional sex and sex work were evaluated using three validated questions:

- *In the past 12 months, have you ever had sex with anyone because you needed (or your partner provided) a material item that was important to you, such as clothing, telephone, money for rent, transportation in their car?;*
- *In the past 12 months how many different people have you become sexually involved with because they provided you or you expected that they would provide you with money?;*
- *Some people have sex with other people for a living; would you consider yourself to be such a person? (24)*

Data were collected electronically using RedCap software (25) and self-completed by the participant on a tablet computer to improve privacy.

The qualitative aspect of the evaluation included several components. First, a participatory community-mapping of four purposively sampled communities (one semi-urban, two rural and one deep-rural) to recruit key informants for interview. These informants included DREAMS implementing partners (n=33), community-based group discussions (n=17) and natural group discussions (n=2). Second, the evaluation also captured structured observation data to understand the context and processes through which PrEP was delivered in uMkhanyakude (n=2). Third, we conducted in-depth interviews with 15-24 year-olds (n=58) and stakeholder interviews with local and district municipality, government departments including health and social development (n=9). All interviews and group discussions were conducted in the local language isiZulu by a team of native Zulu-speakers, five females and four males, who have worked and resided in the study area for at least five years. All interviews were audio-recorded, transcribed verbatim, translated into English. Data were managed using Nvivo version 11 (26).

## Analysis

We used the Standards for Reporting Implementation Studies (StaRI) checklist (Additional File 1) for reporting our findings (27). We use the HIV prevention cascade framework (12) to monitor PrEP roll-out and broader impact, informed by the 'framework of access' developed by McIntyre et al. (22) to guide our analysis and evaluate general healthcare access. We describe population-level awareness and uptake of PrEP among two populations: AGYW and AGYW reporting transactional and sex for money. The framework of access provides a lens to understand what the drivers of uptake are and the extent they affect uptake. We define access to PrEP as a healthcare intervention as follows: availability in terms of awareness or knowledge of PrEP and the way in which it was delivered; acceptability in terms of perceived benefit of PrEP, community attitudes around PrEP and support for optimal use of PrEP and last affordability in terms of costs, including indirect costs of accessing PrEP (12, 17, 22).

We thematically coded the qualitative data on the community, young people and stakeholders perceptions of PrEP to identify the underlying drivers of uptake and awareness of PrEP demand for and access to PrEP and the associated challenges (availability); community attitudes and perceived benefits or harms of PrEP, and optimal use of PrEP in terms of who should be prioritised and likely to benefit most from PrEP (acceptability); and last affordability in terms of costs, including indirect costs of accessing PrEP and perceived "costs" to the health system.

Quantitative data were analysed using STATA version 15 (28) to present the PrEP cascade, i.e., reach, awareness and uptake of PrEP by the target group (young women who exchange sex for money). We described characteristics of AGYW at baseline in 2017 using proportions and 95% confidence intervals (CI), and used chi-square test to test for differences between proportions. By triangulating insights from indepth community participatory data with quantitative measures of awareness and uptake in those eligible for PrEP, we incorporate insights into the social-structural factors that affected awareness and uptake of PrEP at community-level.

## Results

The flow chart below (Figure 1) shows participation in the AGYW cohort at baseline and after 12 months (2017-2018).

A total of about 100 interviews with implementing partners, young people, and key stakeholders were conducted, and 19 group discussions including two natural group discussions (total n=112 participants) were conducted with the community, in 2017.

# Implementation of PrEP for young female-sex workers in a rural community

## 1. Introduction of PrEP

PrEP was introduced in July 2016 to uMkhanyakude district as a new intervention targeting young FSW through the DREAMS partnership. PrEP was provided by an organisation which was experienced in delivering sex work interventions but new to this rural setting. The implementer conducted a situational analysis of the area to identify 'hot-spots' and started enrolling clients for PrEP in August 2016 from these sites; actual PrEP roll-out began in November 2016. For the DREAMS programme, the implementer's target was to reach approximately 100 AGYW aged 18-24 years who self-identified as sex workers and met the criteria on the PrEP screening tool (including HIV risk assessment, screening and testing), in the two year period that DREAMS was rolled-out.

## Challenges of delivering PrEP

Initially, the sex worker programme was not well-received by community gatekeepers and owners of bars/taverns, who did not want to be associated with the programme. Implementers described difficulties in engaging young sex workers in long-term PrEP or HIV related-care given that sex workers were highly mobile, constantly changing their identity i.e names and contact details and did not see HIV treatment and prevention as a priority:

*"Yes, it happens, someone gets lost, many of them. When they get lost they sometimes say why are you bothered with me because I am not sick? Just leave me alone I will take treatment when I get HIV. It happens a lot."* (Professional Nurse)

A key obstacle to programme implementation was the very tight target age and gender eligibility criteria set by funders (females aged 18-24). FSWs who were underage, or over 24 (the majority), were often eligible for PrEP based on the PrEP screening tool but did not meet the funders' age criteria. Implementers struggled to recruit eligible FSW aged 18-24 as they were either not interested or did not self-identify as sex workers. In practice the implementers also engaged with FSWs aged over 24 years.

## Facilitators of delivering PrEP

The use of peer workers (former and current sex workers) for recruitment and follow-up helped start-up and continuity of the programme in the study area *because "they understand the language spoken by sex workers, another sex worker knows how they greet each other"* (Professional nurse) and they could identify with the sex workers. Implementers described that sex workers were initially not sure of the

programme and hesitated to join but they would later reconsider. Mobile services were available and reached the sex workers where they were and offered them education and services without a long wait time at clinics. One of the HIV counsellors highlighted that this resulted in an increase in treatment of sexually transmitted infections and suppressed HIV viral loads.

## 2. Uptake of PrEP at a population level for young women who exchange sex for money and transactional sex

Table 1 below shows the characteristics of the AGYW at baseline. The majority of the AGYW were from the rural (64.1%) areas, most still currently in school (75.3%) and about a fifth (18.5%) having migrated before. Among the 2184 AGYW in the nested cohort, HIV testing in the last 12 months increased from 45.0% (95%CI:42.9-47.1%) in 2017 to 53.5% (95%CI:51.3-55.8%) in 2018 ( $p < 0.001$ ), while condom use at last sex among the 965 sexually active AGYW did not (53.7%; 95%CI:50.3-54.0% in 2017 vs. 55.1%; 95%CI:51.6-58.6% in 2018,  $p = 0.559$ ).

Characteristic	N	% (95%CI)
<b>Age group</b>		
13-17	1148	52.6 (50.5-54.7)
18-22	1036	47.4 (45.3-49.5)
<b>Location</b>		
Rural	1388	64.1 (62.1-66.1)
Peri-urban	660	30.5 (28.6-32.5)
Urban	117	5.4 (4.5-6.4)
<b>Currently in school (Yes)</b>	1644	75.3 (73.4-77.0)
<b>Socio-economic status</b>		
Low	727	35.1 (33.0-37.1)
Middle	747	36.0 (34.0-38.1)
High	600	28.9 (27.0-30.9)
<b>Ever migrated in the past years* (Yes)</b>	403	18.5 (16.9-20.1)
<b>Food insecurity (Yes)</b>	682	31.2 (29.3-33.2)

\*Defined as moving away from the surveillance area and subsequently returning

Table 1. Characteristics of AGYW at baseline in 2017 (N=2184)

PrEP awareness increased from 2.0% (95%CI:1.5-2.7%) in 2017 to 9.0% (95%CI: 7.3-9.8%) in 2018 in all AGYW, a substantively small but statistically significant increase ( $p < 0.001$ ). About a tenth of sexually-active AGYW, 13.4% (95%CI:11.4-15.7%) reported transactional sex and 10.6% (95%CI:8.8-12.7%) sex for money.

A total of 194 AGYW reported either transactional sex or sex for money and were therefore PrEP-eligible (Figure 2). Of these,  $n=166$  85.6% (95%CI:79.8-89.9%) knew their HIV status and of these,  $n=113$  68.1% (95%CI:60.5-74.8%) were HIV negative. Only  $n=12$  10.6% (95%CI:6.08-17.9%) were aware of PrEP, but none had used PrEP.

Figure 2 below shows the HIV prevention cascade for PrEP-eligible AGYW from 2017-2018

### **Figure 2: PrEP utilization cascade among eligible AGYW involved in transactional sex/sex work in 2017-2018 (n=194)**

#### **3. Community and young people's awareness, demand and perceptions of PrEP uptake**

##### **Availability: Awareness of PrEP**

PrEP was available and implemented in this area through a peer-delivered sex worker programme to self-identifying FSW. Respondents in qualitative interviews, who did not self-identify as FSW, were generally unaware of and lacked information about PrEP. Some young people indicated it was their first time to hear about PrEP and could not attach meaning to the term since they did not have an isiZulu word for it. Lack of awareness was heightened by PrEP not being available through public-sector health clinics. Most older community members – including community health champions such as community caregivers (CCGs) – were also not aware of PrEP, with some people confusing it with post-exposure prophylaxis (PEP). However, respondents said there was a lot of sex work in the community and some identified FSW hot-spots.

##### **Acceptability: Demand and perceived benefit of PrEP**

Whilst generally unaware of PrEP, many respondents could imagine it would benefit young people, often because it could be an alternative to condoms. Condoms were generally seen by young people as

unacceptable both for HIV prevention and contraception, as it resulted in *“killing your babies”* or *“eating sweets in a wrapping paper”* (group discussion young men). One young person indicated that PrEP would probably be more helpful than condoms because people do not like wearing condoms, but with PrEP *“it will be in their system”* and hence more likely to be effective as it does not obstruct sex. PrEP was seen by young people as an option for men who were scared of HIV and did not like condoms. Older community members liked PrEP because even though they provided condoms to young family members, they could not guarantee whether the condoms were being used; in contrast PrEP is taken orally and seen to be easier to use than condoms. Staff at FSW clinics reported that PrEP had only minor side-effects and so FSWs were able to adhere to it, as confirmed by drug-level blood tests. However, teachers and other healthcare providers were more ambivalent about PrEP. While acknowledging PrEP’s effectiveness and usefulness for young people who were *“rushing to have sex”*, they worried it would lower personal responsibility for sexual health and lead to unprotected sex, promiscuity and increases in already high teenage pregnancy rates.

The perceived benefits of PrEP were strongly gendered. Most young people thought PrEP would be more beneficial to boys or young men than girls or women because men were believed to *“love sex more than women”* and had multiple partners. Further, PrEP was seen to help keep circumcised men negative for a longer time as they were worried about the 40% residual risk not covered by medical circumcision:

*“since the availability of PrEP, we have discovered that those who are circumcised are negative...that is why they say they do not want to be on risk and request PrEP”* (Professional nurse)

Similarly, an implementing partner from another organisation indicated that PrEP was mainly beneficial for boys because their alcohol use could result in them engaging in unsafe sex. However, some young people thought girls would have greater access to PrEP because they are more likely to go to the clinic for other reasons, while boys associate clinics with sick people so they would not uptake PrEP from healthcare facilities.

PrEP was seen as giving hope to people who are in discordant relationships indicating that someone’s HIV status would not need to be a barrier in forming or remaining in sexual relationships:

*“I think it is a good thing because those who are in relationships with older people who are infected, they can be able to get treatment beside leaving him because of his HIV status.”* (Young person)

Also, young people thought PrEP would benefit women in long-distance relationships with their husbands as *“they cannot be certain of their husbands”* other relationships while away from home.

## **Affordability: Financial and social cost of taking PrEP**

The organisation that delivered PrEP used a peer outreach approach with a mobile unit to *‘get the clients where they are’*, with peer educators mobilizing and recruiting from taverns and bars. This approach assisted with recruitment as sex workers felt less stigmatised or fearful of being identified. This approach meant FSW incurred little or no transport costs to access PrEP. Further, the mobile unit offered a range of services free of charge, including syndromic screening and treatment of sexually transmitted infections and tuberculosis, HIV testing, ART and PrEP.

However, several social barriers were highlighted for uptake of PrEP. One challenge was stigma as a barrier to HIV testing, the entry point for PrEP:

*“I think that the reason that prevent people from testing is that this disease [HIV] was introduced badly, that if you are suffering from it you are sleeping with many people so that can lead to people not wanting to test and your peers will talk behind your back.”* (interview with CCGs)

Moreover, clinics were seen as stigmatised spaces, places for *“gossip”* and associated with being HIV-positive, suggesting PrEP delivery to young people through primary health care clinics would be difficult.

Another challenge for PrEP delivery was that some young people were *“ashamed of taking pills”* and would not use them until *“the situation forces”* it, i.e., when they get sick. Pill-taking in this setting is associated with being unhealthy, especially in the context of high HIV prevalence. Furthermore, women felt they could not take PrEP for occasional sexual encounters as they were often not in regular partnerships and therefore not having regular sex. Lack of information on PrEP availability, effectiveness and side-effects created ambivalence in some young respondents, *“because we don’t have a guarantee of 100% that this thing works.”*

## **Discussion**

The targeted provision to FSW, excluding other groups at high risk of HIV limited the early effectiveness of a public-sector PrEP programme in this rural South African setting. In this setting where HIV prevalence is high, condoms are undesirable and use remains low, as seen across South Africa (3, 29) there is a clear need for alternative HIV prevention methods. The introduction of PrEP through a sex worker programme was feasible, with PrEP awareness among AGYW rising over time, and PrEP was seen to be desirable for young men and women, discordant couples, and people with long distant sex partners. Despite the acceptability, uptake of PrEP remained low, even amongst eligible and targeted AGYW – those who reported transactional sex or sex worker activity. The narrow focus of the PrEP programme, including targeting based on age, gender and risk group, may have contributed to low uptake. Stigma around HIV testing and PrEP (30), negative experiences of young people using primary health care clinics (31), and community norms fearing the permissive effect of PrEP on young people’s sexuality were identified as social costs and potential barriers to PrEP roll-out.

Many of the groups that the community described as potentially wanting PrEP – men and older women in long distance relationships – are not currently part of the South African PrEP target groups of key populations and women aged 15–24 (11). This could potentially hamper PrEP roll-out (32). Clinical PrEP trials in South Africa have had challenges engaging young women at high risk of HIV, showing high uptake but poor retention and adherence over time, and therefore failed to show effectiveness (13, 16). In contrast, the Partners demonstration project involving older serodiscordant heterosexual couples proved effective (33). Alongside our findings, this suggests that narrow PrEP targeting by demographic or risk group may limit population-level coverage of people at risk for HIV acquisition, and additionally strengthen existing stigma. Community-led approaches to delivery that can adapt to the context may overcome some of the challenges of targeted approaches in high HIV-prevalence settings (34, 35).

Healthcare providers and key stakeholders acknowledge the effectiveness and importance of PrEP, but worry about young people not taking responsibility of their sexuality (36, 37). Such attitudes will potentially fuel the internalised and enacted stigma towards PrEP (30, 36, 37), much as they have around HIV testing in rural settings(36). To minimize such risks, PrEP could be integrated within wider strategies to improve adolescent and youth sexual health, rather than leaving it as a vertical HIV prevention intervention, and be offered as an option within a wider choice of HIV prevention modalities, as is done with contraception methods (32).

## **Conclusion And Implications For Policy And Practice**

The targeting of provision to FSW, excluding other AGYW, limited the early effectiveness of a public-sector PrEP programme in this rural setting. Although PrEP awareness increased, uptake was low, even among eligible AGYW who reported behaviours that constituted FSW activity but did not necessarily self-identify as FSW. PrEP was widely perceived to be potentially beneficial (acceptable), however the social cost (i.e., stigma) of PrEP access and uptake may have been too high for young people (affordability). Inclusive, community-based PrEP education and provision, including engagement of youth and key stakeholders, may help improve demand for and access to PrEP.

## Abbreviations

AGYW : Adolescent Girls and Young Women

ART : Antiretroviral Treatment

DREAMS : Determined Resilience Empowered AIDS-free Mentored Safe

FSW : Female Sex Worker

HIV : Human Immunodeficiency Virus

MSM : Men who have sex with men

PrEP : Pre-exposure prophylaxis

## Declarations

### Ethics approval and consent to participate

Ethics approval was received from the University of KwaZulu-Natal Biomedical Research Ethics Committee (BFC339/19) and the London School of Hygiene and Tropical Medicine (REF11835). Written informed consent was obtained from all participants prior to data collection.

### Consent for publication

Written consent was given by participants for data to be used in publications arising from this study.

### Availability of data and materials

The datasets used and or analysed during the current study are available from the corresponding author on reasonable request.

### Competing interests

The authors declare that they have no competing interests

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## Authors contributions

NC, MS, NM, JS conceptualised the study, NC, TZ, MS, SN, JD performed the research, MS, IB, SF designed the research study. NM, KB, MS, NC analysed the quantitative data and KB, GH, NMCG critically reviewed it. NC, TZ, MS, SN and IB analysed the qualitative data, and LS and JS critically reviewed it. NC and MS wrote the manuscript. All authors read, critically reviewed, edited and approved the final manuscript.

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## References

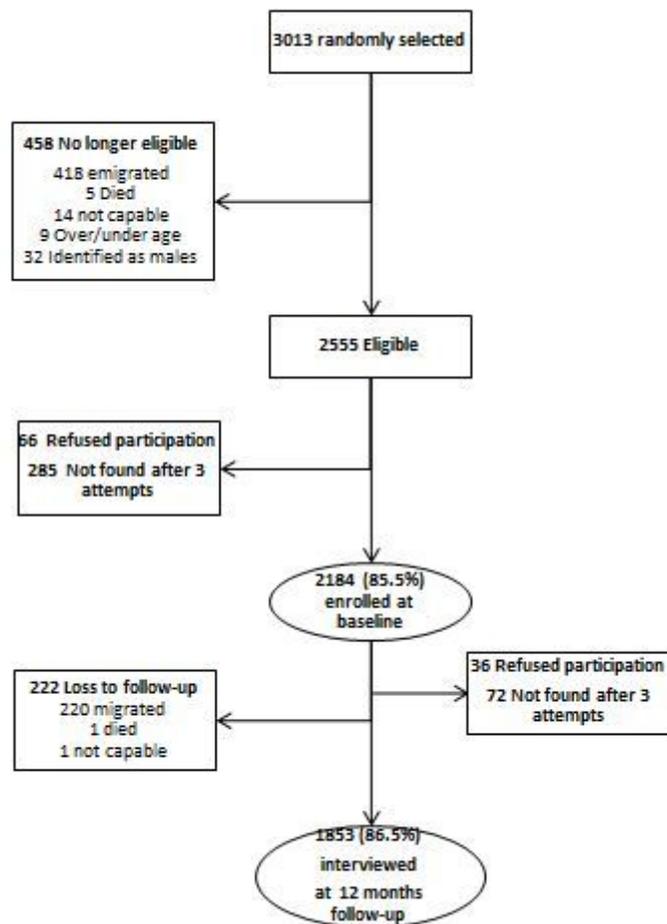
1. UNAIDS. UNAIDS Data 2018. Geneva; 2018
2. HSRC. The fifth South African National HIV prevalence, incidence, behaviour and communication survey.,. 2017.
3. Chimbindi N, Mthiyane N, Birdthistle I, Floyd S, McGrath N, Pillay D, et al. Persistently high incidence of HIV and poor service uptake in adolescent girls and young women in rural KwaZulu-Natal, South Africa prior to DREAMS. PLoS ONE 2018 13(10):e0203193.
4. McCormack S, Dunn DT, Desai M, Dolling DI, Gafos M, Gilson R, et al. Pre-exposure prophylaxis to prevent the acquisition of HIV-1 infection (PROUD): effectiveness results from the pilot phase of a pragmatic open-label randomised trial. Lancet. 2016;387(10013):53-60.
5. Rodger AJ, Cambiano V, Bruun T, Vernazza P, Collins S, van Lunzen J, et al. Sexual Activity Without Condoms and Risk of HIV Transmission in Serodifferent Couples When the HIV-Positive Partner Is Using Suppressive Antiretroviral Therapy HIV Transmission in Serodifferent Couples Using Suppressive ART. JAMA. 2016;316(2):171-81.

6. Cohen MS, McCauley M, Gamble TR. HIV treatment as prevention and HPTN 052. *Curr Opin HIV AIDS*. 2012;7(2):99-105.
7. Wamoyi J, Stoebeanu K, Bobrova N, Abramsky T, Watts C. Transactional sex and risk for HIV infection in sub-Saharan Africa: a systematic review and meta-analysis. *J Int AIDS Soc*. 2016;19(1):20992.
8. Stoebenau K, Heise L, Wamoyi J, Bobrova N. Revisiting the understanding of "transactional sex" in sub-Saharan Africa: A review and synthesis of the literature. *Social science & medicine* (1982). 2016;168:186-97.
9. Dunkle KL, Jewkes RK, Brown HC, Gray GE, McIntyre JA, Harlow SD. Transactional sex among women in Soweto, South Africa: prevalence, risk factors and association with HIV infection. *Social science & medicine* (1982). 2004;59(8):1581-92.
10. World Health Organization. Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV. 2015.
11. South Africa National Department of Health. PrEP implementation pack: South Africa 2016-2017. 2017.
12. Hargreaves JR, Delany-Moretlwe S, Hallett TB, Johnson S, Kapiga S, Bhattacharjee P, et al. The HIV prevention cascade: integrating theories of epidemiological, behavioural, and social science into programme design and monitoring. *Lancet HIV* 2016;3:e318-22.
13. Marrazzo JM, Ramjee G, Richardson BA, Gomez K, Mgodhi N, Nair G, et al. Tenofovir-based Preexposure Prophylaxis for HIV Infection among African women. *The New England Journal of Medicine*. 2015;372:509-18.
14. Yun K, Xu JJ, Zhang J, Li JM, Hu QH, Chu ZX, et al. Female and younger subjects have lower adherence in PrEP trials: a meta-analysis with implications for the uptake of PrEP service to prevent HIV. *Sex Transm Infect*. 2018;94(3):163-8.
15. Amico KR, Wallace M, Bekker L-G, Roux S, Atujuna M, Sebastian E, et al. Experiences with HPTN 067/ADAPT study-provided open-label PrEP among women in Cape Town: Facilitators and barriers within a Mutuality Framework *AIDS Behav*. 2017;21:1361-75.
16. Van Damme L, Corneli A, Ahmed K, Agot K, Lombaard J, Kapiga S, et al. Preexposure Prophylaxis for HIV Infection among African Women. *New England Journal of Medicine*. 2012;367(5):411-22.
17. Cowan FM, Delany-Moretlwe S, Sanders EJ, Mugo NR, Guedou FA, Alary M, et al. PrEP implementation research in Africa: what is new? . *Journal of the International AIDS Society*. 2016;19(Suppl 6)(21101 ).
18. Krakower DS, Mayer KH. The role of healthcare providers in the roll out of preexposure prophylaxis. . *Curr Opin HIV AIDS*. 2016;11(1):418.
19. Vandormael A, Akullian A, Siedner M, de Oliveira T, Bärnighausen T, Tanser F. Declines in HIV incidence among men and women in a South African population-based cohort. *Nature Communications*. 2019;10(1):5482.
20. UNAIDS: DREAMS initiative for adolescent girls and young women in South Africa 2015 [

21. Birdthistle I, Schaffnit SB, Kwaro D, Shahmanesh M, Ziraba A, Kabiru CW, et al. Evaluating the impact of the DREAMS partnership to reduce HIV incidence among adolescent girls and young women in four settings: a study protocol. *BMC Public Health*. 2018;18(1):912.
22. McIntyre D, Thiede M, Birch S. Access as a policy-relevant concept in low- and middleincome countries. *Health Econ Policy Law*. 2009;4:179-93.
23. Herbst K, Law M, Geldsetzer P, Tanser F, Harling G, Barnighausen T. Innovations in health and demographic surveillance systems to establish the causal impacts of HIV policies. *Curr Opin HIV AIDS* 2015;10(6):483-94.
24. Wamoyi J, Ranganathan M, Kyegombe N, Stoebenau K. Improving the Measurement of Transactional Sex in Sub-Saharan Africa: A Critical Review. *J Acquir Immune Defic Syndr*. 2019;80(4):367-74.
25. University V. REDCap (Research Electronic Data Capture). 1207 17th Avenue South, Suite 105, Nashville, Tennessee 37212.,. 2006.
26. QSR International Pty Ltd. NVIVO version 11.,. 2018.
27. Pinnock H, Barwick M, Carpenter C, Eldridge S, Grandes G, Griffiths CJ, et al. Standards for Reporting Implementation Studies (StaRI) statement. *BMJ*. 2017;356(i6795).
28. StataCorp. Stata Statistical Software: Release 15. College Station, TX: StataCorp LLC. 2017.
29. Human Sciences Research Council (HSRC). The Fifth South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, 2017: HIV Impact Assessment Summary Report. Cape Town; 2018.
30. Golub SA. PrEP Stigma: Implicit and Explicit Drivers of Disparity. *Curr HIV/AIDS Rep* 2018;15(2):190-7.
31. Zuma T, Seeley J, Sibiyi LO, Chimbindi N, Birdthistle I, Sherr L, et al. The changing landscape of diverse HIV treatment and prevention interventions: experiences and perceptions of adolescents and young adults in rural KwaZulu-Natal, South Africa. *Frontiers in Public Health*. 2019;7(336).
32. Bekker L-G, Gill K, Wallace M. Pre-exposure prophylaxis for South African adolescents: What evidence?2015.
33. Baeten JM, Donnell D, Ndase P, Mugo NR, Campbell JD, Wangisi J, et al. Antiretroviral prophylaxis for HIV prevention in heterosexual men and women. *The New England journal of medicine*. 2012;367(5):399-410.
34. Hatzold K, Gudukeya S, Mutseta MN, Chilongosi R, Nalubamba M, Nkhoma C, et al. HIV self-testing: breaking the barriers to uptake of testing among men and adolescents in sub-Saharan Africa, experiences from STAR demonstration projects in Malawi, Zambia and Zimbabwe. *J Int AIDS Soc*. 2019;22 Suppl 1:e25244.
35. Cambiano V, Johnson CC, Hatzold K, Terris-Prestholt F, Maheswaran H, Thirumurthy H, et al. The impact and cost-effectiveness of community-based HIV self-testing in sub-Saharan Africa: a health economic and modelling analysis. *J Int AIDS Soc*. 2019;22 Suppl 1:e25243.

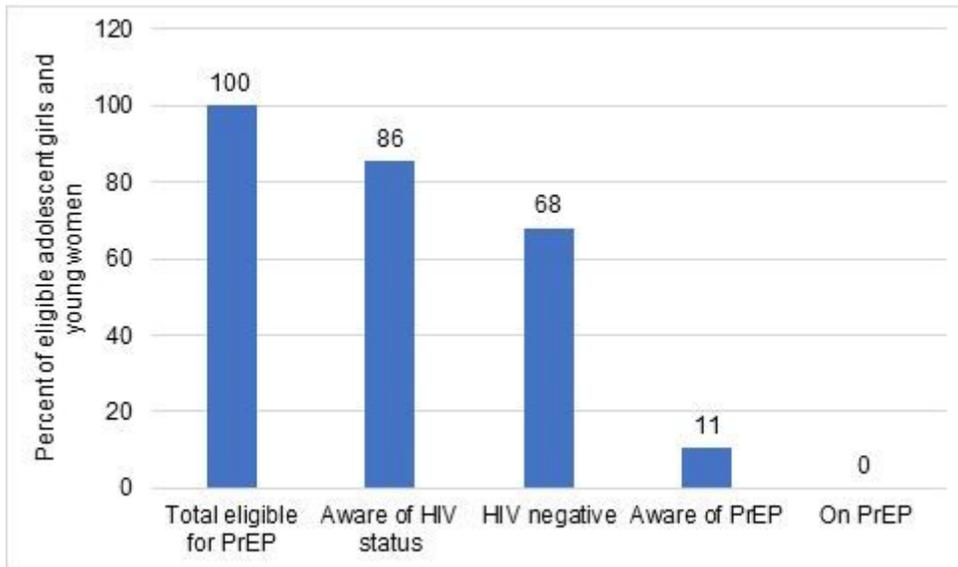
36. Camlin CS, Koss CA, Getahun M, Owino L, Itiakorit H, Akatukwasa C, et al. Understanding Demand for PrEP and Early Experiences of PrEP Use Among Young Adults in Rural Kenya and Uganda: A Qualitative Study. *AIDS and Behavior*. 2020.
37. Bekker L-G, Gill K, Wallace M. Pre-exposure prophylaxis for South African adolescents: What evidence? *J SAMJ: South African Medical Journal*. 2015;105:907-11.

## Figures



**Figure 1**

Flow chart showing baseline and follow-up in the two survey years 2017-2018 for cohort of AGYW



**Figure 2**

PrEP utilization cascade among eligible AGYW involved in transactional sex/sex work in 2017-2018 (n=194)

## Supplementary Files

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