

# **We carried her in a wheelbarrow to the clinic”: Process evaluation of the AMETHIST intervention combining microplanning with self-help groups to improve HIV prevention and treatment among female sex workers in Zimbabwe**

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## Research Article

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# Abstract

## Background

The Adapted Microplanning to Eliminate Transmission of HIV in Sex Transactions (AMETHIST) randomized controlled trial tested a combination of Microplanning (peer-led risk-differentiated support) and self-help groups (SHGs) to reduce the proportion of female sex workers (FSW) at risk of acquiring or transmitting HIV infection in Zimbabwe. The trial found overall high levels of FSW engagement with treatment which further improved in intervention sites. HIV prevention uptake, however, was low and not affected by AMETHIST.

## Methods

We conducted a mixed methods process evaluation to assess implementation, explore FSW perceptions, and understand the trial's outcomes. We integrated routine programme statistics, qualitative data, and an endline respondent driven sampling survey among 4444 FSW to consider fidelity of implementation, feasibility of delivery, and acceptability. We also examined whether the intervention triggered changes hypothesised in its programme theory.

## Results

Microplanning was successfully introduced, with peers effectively providing risk-differentiated support. Early difficulties related to mapping sex work “hotspots”, maintaining contact with mobile FSW, and some resistance to regular risk assessments, but double the number of new FSW registered at intervention clinics compared to comparison sites (8443 v 3824), and significantly more HIV tests were performed (11882 vs 6808).

SARS-COV2S disrupted the intervention, particularly SHG. Fewer groups were established than planned, and lockdowns prevented group members meeting in person and participating in collective activities. Nonetheless, 30 of 65 established SHG remained active after two years, and more SHG members registered with clinics than those reached by microplanning alone (82 cv 76% p,0.001). Increased service use did not increase effective prevention. Over 80% FSW reported condomless sex and PrEP adherence was insufficient to achieve protection. Qualitative data show FSW prefer to “wait” until HIV seroconversion before taking daily medication. They feared conflation of ART with PrEP and resulting stigma. Concerns about side effects and immediate financial priorities undermined perceived future benefits of PrEP and condoms.

## Conclusions

Strengthening HIV prevention should consider how to improve FSW's hope and agency alongside reducing stigma and supporting collective rights and action.

## Trial Registration

The Pan African Clinical Trials Registry registered the trial 2<sup>nd</sup> July 2020 (PACTR202007818077777) which was after randomisation but before any research data were collected.

## Background

Sex workers continue to be disproportionately affected by the global HIV pandemic, with an estimated overall prevalence of 40% among female sex workers (FSW) across Africa (1). Persistent barriers to FSW's engagement with health services include criminalisation and stigmatisation of sex work, their vulnerability to violence and poor mental health, and underlying poverty and gender inequalities (2). Nonetheless, many successful examples of programmes to support FSW's health and well-being exist, and those that are underpinned by community-led and community-based strategies to empower FSW to work collectively toward shared goals have consistently shown advantages over provision of biomedical tools or individual behaviour change messages alone (3–5).

In Zimbabwe, the Centre for Sexual Health, HIV and AIDS Research (CeSHHAR) has offered integrated clinical and psychosocial services to FSW since 2009, using a community mobilisation model. The Key Populations (KP) programme operates nationally in 86 static and mobile clinics, reaching over 30,000 FSW annually; it expanded to include male and transgender sex workers from 2018. The programme takes a rights-based approach and has increased its focus on “upstream” social determinants of FSW health over time. While clinical care remains at its core, *The KP programme* has shifted from peer education to community mobilisation and supports and trains FSW in violence response and legal case work. Tailored programmes work to reach the most neglected FSW such as adolescents and young women who sell sex and young sex workers experiencing pregnancy or struggling with early parenthood (6–8). Trials and other evaluations of these programmes have demonstrated that a network of sex worker “friendly” clinics supported through peer-led social support can steadily increase coverage of treatment and prevention at national scale (9–11).

To build on previous work, the Adapted Microplanning to Eliminate Transmission of HIV in Sex Transactions (AMETHIST) trial tested the addition of a multi-component intervention to the regular *KP* programme. The intervention combined Microplanning, a formalised peer-led outreach and referral model, with creation of self-help groups (SHG). It aimed to increase coverage of the FSW population across Zimbabwe with risk-differentiated HIV prevention and care and sought to create an enabling environment for greater FSW engagement with the services to which they were referred (12). The ultimate goal of AMETHIST was to contribute to virtual elimination of HIV in sex transactions by strengthening FSW use of prevention and treatment thereby reducing their risk of acquisition and transmission of HIV. A cluster randomised controlled trial (RCT) was conducted across 11 intervention and 11 comparison sites with outcomes measured in an endline respondent driven sampling survey (RDS) administered to 4444 FSW to measure the effect of the intervention on a composite primary outcome of risk of HIV acquisition (in HIV negative women) or HIV transmission (in women living with HIV) and several secondary outcomes.

Although the trial found no significant difference between arms in the composite primary outcome, among FSW living with HIV, risk of HIV transmission was significantly lower in the intervention arm compared to the standard of care arm (13) with 93% of women living with HIV virologically suppressed. Among HIV-negative women, however, risk of HIV acquisition remained high in both groups due to low levels of consistent condom use. Furthermore, despite higher self-reported PrEP initiation and use in the intervention arm, biomarkers suggest very few of the sampled women reporting current PrEP use had protective levels of Tenofovir diphosphate. Thus, the intended outcome of the AMETHIST trial was not achieved due to lack of effect on risk of acquisition among HIV-negative FSW rather than on transmission risk among those living with HIV.

This paper reports findings from the process evaluation conducted within the AMETHIST trial to help explain its outcomes. It focuses on the strengths and weaknesses of the intervention's implementation, how FSW perceived and engaged with each component, and implications for key behaviours and their determinants. We specifically examine the programme theory underpinning the AMETHIST intervention and seek to understand where hypothesised changes occurred as expected and through what means, and where they did not, and to what extent this was due to challenges during delivery versus flaws in our guiding logic.

## Intervention and Study Methods

### Intervention

The AMETHIST intervention grew out of the SAPPHIRE trial (10, 14) and other formative work conducted by CeSHHAR that showed gaps in coverage for the FSW population in Zimbabwe in both prevention and treatment cascades (15, 16). To bring about a step change in service engagement and reduce risk of HIV acquisition and transmission, the intervention integrated two programmatic approaches, each based on its own theoretical rationale and evidence base. First, *microplanning* is a formalised approach to peer outreach and referral. A cadre of community peer FSW were trained to identify concentrations of sex workers, estimate their number, and take responsibility for a caseload of 50–80 individuals.

Microplanners approach other FSW through community outreach, conduct risk assessments, and provide risk-differentiated support based on each individual's vulnerability. Microplanners "track" their caseload by collecting routine data on changes to the sex work environment and individual levels of risk, which they interpret during regular supervision meetings to ensure they continue to prioritise more vulnerable individuals. Figure 1 summarises the microplanning process.

#### Figure 1: Steps in microplanning

Microplanning combines utilitarian concepts such as peer expertise and knowledge of "hotspot" locations with high concentration of sex workers with ideologically-driven efforts to shift ownership of health programming and its leadership to those most affected (3, 17, 18). Prior to AMETHIST, it was successfully used in large-scale, national programmes for FSW in India and Kenya, from which our model

was adapted (19, 20), although to our knowledge, AMETHIST was the first time that levels of provided support were differentiated by women's assessed risk.

The second approach was establishment of Self Help Groups (SHG) in which FSW would come together into groups of 13–15 for mutual support, identification of shared priorities and goals, and collective action to address these. Each microplanner was expected to set up and run at least two SHG among microplanned FSWs who expressed interest in taking part, reaching an estimated 30–40% of microplanned FSW. SHG would meet fortnightly and go through a 6-month cycle of building trust and cooperation, identifying a shared project, and implementing it. Some external support was offered including occasional facilitation by an outreach worker (ORW), provision of snacks, and referrals to local organisations that could enrol group members in financial schemes such as funeral saving plans, vocational training, and internal savings and loans (ISALS). After six months, the microplanner would disengage from the group and form a second SHG to increase participation among the FSW population.

SHG are part of a community development and empowerment tradition, where overcoming interpersonal conflict and going through a process of consciousness raising are seen as precursors to broader social mobilisation, particularly for marginalised and excluded populations (21, 22). SHG have been successfully used to improve maternal and child health outcomes (23), tackle gender-based violence and improve condom use among female sex workers (24, 25). The use of SHG is underpinned by theoretical constructs relating to social support (26, 27), primarily social cohesion (the degree of social connectedness, trust and solidarity) and social capital (norms, networks and active cooperation that enable striving for mutual benefit) (28, 29). The exact mechanisms through which SHG lead to positive health outcomes differ across programmes and are not always made explicit (30). Figure 2 presents the AMETHIST logic model, showing the change pathways through which the combination of microplanning and SHG sought to trigger changes in the determinants of health behaviours.

### Figure 2: Programme logic model

In the AMETHIST intervention, microplanning was introduced as a more systematic and rigorous outreach approach to the pre-existing peer education model. Microplanners, locally referred to as Empowerment Workers (EW), sought to optimise coverage of FSW and offer risk-differentiated HIV prevention and treatment support. EW were trained to conduct detailed mapping of local hotspots by identifying specific venues and enumerating sex workers found there. Resulting population size estimates (PSE) were validated by supervising outreach workers (ORW)) and repeated every six months. EW approached FSW in their assigned "hotspot" venues, conducted a rapid risk assessment, and subsequently tracked their caseload once a month, fortnightly, or weekly, depending on level of risk (see Fig. 3).

### Figure 3: Instrument for guiding differentiated support

"Tracking" consisted of providing counselling, condoms and lubricants based on need, registering FSW with the *KP Programme*, and encouraging FSW to attend the clinic immediately upon registration and

quarterly thereafter. FSW received regular check-ups, HIV testing followed by ART or PrEP initiation, and follow-up monitoring. Much of the role of the EW was to informally “check-in” with FSW to see how they were doing, what their concerns were, and offer general encouragement regarding uptake of services and participation in different community activities. The programme adopted a “status neutral” approach, meaning that EW were not necessarily aware of individual FSW’s HIV status.

Together, microplanning and SHG were hypothesised to increase awareness of, trust in, and motivation to engage with services above those in the standard care sites that did not have these additional social support mechanisms. Specific focus was on catalysing HIV testing and supporting initiation of and adherence to ART and PrEP. Risk differentiated support was also hypothesised to lead to increased use in interventions sites of other biobehavioural resources available at all *KP* clinics e.g., condoms and STI syndromic management, further reducing risks of HIV acquisition and transmission.

## **Process evaluation**

We nested a mixed methods process evaluation within the AMETHIST RCT, following an adapted version of the MRC Guidance for Process Evaluations of Complex Interventions (31) to identify domains relevant to our study, defined in Table 1, with corresponding data collection tools.

Table 1  
Process evaluation design

Measure & Definition	Indicators and Tools	Data Produced
<p><b>Fidelity</b></p> <p>Were intervention activities delivered as planned?</p>	<ul style="list-style-type: none"> <li>• Number of EW trained and retained in post</li> <li>• # FSW registered in EW hotspot diaries</li> <li>• Hotspot mapping completed every 6 months</li> <li>• # SHG established per site; # members</li> <li>• Frequency of supervision visits</li> <li>• Perceived quality of supervision by EW</li> </ul>	<ul style="list-style-type: none"> <li>• Project records &amp; monitoring forms</li> <li>• EW records of SHG delivery</li> <li>• Semi structured interviews with FSW &amp; EW</li> <li>• Context tracker</li> </ul>
<p><b>Feasibility</b></p> <p>What challenges were encountered in provision of key components and were adaptations made?</p>	<ul style="list-style-type: none"> <li>• Contextual facilitators and barriers</li> <li>• Adaptations made to intervention design</li> </ul>	<ul style="list-style-type: none"> <li>• Semi structured interviews with ORW</li> <li>• Context tracker</li> </ul>
<p><b>Coverage</b></p> <p>Numbers and proportion of FSW reached per site for each intervention activity?</p>	<ul style="list-style-type: none"> <li>• # and % women reached in each site per activity</li> <li>• Microplanning visits by differentiated risk</li> <li>• % microplanned women linked to care</li> <li>• % all FSW linked to care</li> <li>• Frequency of clinic attendance</li> <li>• # SHG established &amp; maintained/dissolved</li> <li>• % FSW in SHG</li> </ul>	<ul style="list-style-type: none"> <li>• 4 Programme Performance Indicators (PPIs)</li> <li>• RDS survey</li> <li>• Project records &amp; monitoring forms</li> </ul>
<p><b>Acceptability</b></p> <p>Levels of participation and attitudes to/ perceptions of each stage of microplanning and SHG</p>	<ul style="list-style-type: none"> <li>• Attitudes to/acceptability of microplanning and SHG to EW and FSW peers</li> <li>• Participation rates (outreach, SHG, clinic registration)</li> <li>• Perceptions of group trust by SHG &amp; EW</li> </ul>	<ul style="list-style-type: none"> <li>• 4 Programme Performance Indicators</li> <li>• Routine programme data</li> <li>• Semi structured interviews with EW &amp; FSW</li> <li>• Focus groups with SHG members</li> </ul>
<p><b>Quality</b></p>	<ul style="list-style-type: none"> <li>• Adherence to microplanning standards i.e. Mapping frequency; EW caseloads;</li> </ul>	<ul style="list-style-type: none"> <li>• Routine programme data</li> </ul>



Measure & Definition	Indicators and Tools	Data Produced
Did microplanning adhere to best practice standards? Were SHG sessions well conducted?	EW-ORW ratios <ul style="list-style-type: none"> <li>• Were SHG sessions well conducted?</li> <li>• Did supervision meet EW needs?</li> </ul>	<ul style="list-style-type: none"> <li>• Semi structured interviews with FSW</li> <li>• Focus groups with SHG members</li> </ul>
<b>Effectiveness</b>  How do participants respond to intervention components? Do activities lead to intermediate steps in the change pathway?	<ul style="list-style-type: none"> <li>• Changes in intended behaviour (regular service use, HIV testing, uptake of PrEP &amp; ART)</li> <li>• Changes in behavioural determinants (Increased perceived support by SHG members; increased norms supporting health-seeking)</li> </ul>	<ul style="list-style-type: none"> <li>• 4 Priority Performance Indicators</li> <li>• RDS survey</li> <li>• Semi structured interviews with FSW</li> <li>• Focus groups with SHG members</li> </ul>

## Quantitative data

Routine programme data were compiled into 4 Programme Performance Indicators (PPI) for microplanning. These measured the cumulative proportion of all sex workers estimated to live and work at a site registered for microplanning (#1), the frequency of microplanning contacts based on FSWs' assessed level of risk (#2), the cumulative proportion of FSW who attended the *KP* clinic at least once (#3), and the proportion of FSW who return for quarterly visits (#4). PPI were analysed quarterly throughout the trial but more frequently for use by ORW and EW to discuss and improve progress. SHG were monitored through attendance registers and activity summary forms. The RDS survey used for the outcome evaluation included questions on exposure to intervention activities, uptake of clinical services, and perceptions of change along our hypothesised pathway i.e., increasing support between FSW and willingness to work toward shared goals. The RDS survey is described elsewhere (12).

## Qualitative data

We purposively selected 3 out of the 11 intervention sites in which to conduct in-depth qualitative data collection. These were selected based on the following criteria: one per CeSHHAR programmatic region, diversity in size of FSW population and typology of sex work, and range of programme size (e.g., number of EW employed). These sites were visited twice, within first 6 months of the intervention's initiation, and after 12–18 months of implementation; they offer qualitative case studies on how microplanning and SHG group components interacted with each other, were responded to by the FSW community, and also highlight how local circumstances and site characteristics influenced delivery and uptake of the intervention.

1. **Chinhoyi:** Large town, roughly 1.5 hours' drive from Harare, with a university and local mining industry, with sex work activity focused around the student population, mining camps, as well as along the highway, in bars, and entertainment venues. Northern Region (managed out of Harare). There are 2 ORW and 10 EW.
2. **Rusape:** Smaller town, roughly 2 hours' drive from Harare, with sex work available in street, bar/entertainment, and brothel locations near a local military base. Eastern Region (managed out of Mutare). There are 2 ORW and 17 EW.
3. **Ngundu:** Largely rural, truck stop along a major highway on the way to South Africa, roughly 4 hours' drive from Harare. Southern Region (managed out of Bulawayo). There is 1 ORW and 5 EW.

Qualitative data collection comprised semi-structured interviews and natural group discussions. At each location, 1 ORW, 5 EW and 5 FSW (including active participants, drop-outs and those who never participated) were interviewed at both time periods and discussions held with 4 SHG. Finally, 2 participatory workshops were held with 40 EWs. Trained qualitative fieldworkers conducted all interviews and group discussions, which were held in Shona, and took place at the *KP* clinic, the SHG meeting location, or, during SARS-COV2 related restrictions, in an outdoor space agreed by participants where privacy could be assured. Interviews were audio-recorded and transcribed into English, anonymised, and uploaded into the NVIVO software analysis package.

For this paper, we analysed the transcripts from the second round of data collection, after at least 12 months after the start of the intervention. This was to ensure enough time for respondents to reflect on later stages of implementation, to ensure we captured how earlier “teething difficulties” had been overcome and understood effects of SARS-COV2 restrictions and lockdowns.

Ethical approval was granted by the Medical Research Council of Zimbabwe (MRCZ/A/2559) and the Liverpool School of Tropical Medicine (Ref 19-115RS), the UK. Written informed consent from participants was obtained before enrolment.

## Results

We first provide a narrative summary of microplanning and SHG separately, drawing on our multiple sources of data to understand strengths and weaknesses of implementation and challenges encountered. We describe where the intervention was changed or adapted and whether this was in response to observed weaknesses of the activities as designed or as a result of SARS-COV2 and related restrictions, which we consider to be anomalous and universal in terms of disrupting health services and thus adaptations as practical necessities and emergency responses rather than “course corrections”. Figure 4 illustrates the overlap of SARS-COV2 restrictions with programme implementation.

We then consider evidence for whether and how the activities delivered as an integrated package triggered expected responses as identified in the programme logic model. In this section, we attempt to understand the trial's outcome findings by scrutinising achievements and gaps in each step across our hypothesised change pathway. Illustrative excerpts from our qualitative data are presented in Table 2 by each key component of the intervention and domain from our process evaluation framework.

Figure 4: SARS-COV2 restrictions during the Intervention

## Microplanning

Microplanning was implemented as intended, although there were some early difficulties while EW familiarised themselves with the system and adjusted to having a formalised “caseload” and additional reporting forms. In total, 104 EW were recruited, 84 of whom attended the initial training and others received on-the-job training and/or attended refresher training after 1 year. EW were compensated more than peer educators (\$50 vs. \$15 per month) and expected to devote 20 hours per week. There were some early complaints about increased burden of work and confusion about the microplanning process, which refresher training helped alleviate.

EW's average case load was 60 FSW, within the 50–80 target, although in some sites EW microplanned more than 80, which stretched their capacity for regular tracking. The first step of the microplanning process involves mapping hotspots where sex work occurs in a given site to produce PSE. Three out of four scheduled rounds of mapping were completed in all sites, with increasing PSE over time as EW identified new or changing hotspots. However, cumulative registration of FSW for microplanning frequently achieved higher than 100% coverage of the estimated population, suggesting that either the mapping process missed eligible hotspots or individuals, or that high turnover meant some FSW listed on caseloads were no longer present or active. The RDS survey found lower contact with microplanning (59.0%) and clinic use in the past 12 months (69.7%) than recorded in PPI, which might also suggest incomplete mapping. Scarce resources meant prioritising larger hotspots; sites with smaller, scattered hotspots were harder to cover.

The use of a basic risk assessment tool to classify FSW into three risk categories that determined frequency of microplanning contact proved feasible. The scoring tool could be administered through casual conversation, offering EW flexibility in how they approached the process. Some FSW considered risk assessment questions invasive, judgmental, and complained the assessment was conducted too frequently. Over time, however, EW developed trust with most FSW whom they tracked, but challenges related to frequent FSW mobility remained. Overall, including periods when outreach was curtailed by pandemic restrictions, EW achieved an average of 2.2 monthly visits out of an intended 4 for the most vulnerable (high-risk) FSW, 1.4 out of 2 for medium-risk, and 0.9 out of 1 for low-risk.

PPIs show that EW were good at locating FSW and initiating contact with them, although it proved harder to ensure registered FSW attended routine clinic visits, which were recommended on a quarterly basis. However, routine clinic visits were suspended between September 2020 and June 2021 as a result of SARS-COV2 restrictions if FSW were asymptomatic and had no medication to collect. Nonetheless, 83% of FSW listed on EW caseloads ever attended a *KP* clinic and intervention clinics registered over twice as many new FSW than those in control sites over the trial period (8443 v 3824) and administered many more HIV tests (11882 vs 6808). Clinic data also show higher uptake of PrEP and ART in the intervention sites. Microplanning appeared to increase the frequency and coverage of clinic visits across the FSW

population as intended. Among the RDS sample, 68.1% reported that they had ever visited a *KP* clinic and those who also reported being microplanned were significantly more likely to report having ever visited compared to those who did not (90.5% v 39.4%  $p < 0.001$ ). When asked about clinic attendance in the previous 12 months, again those who reported having been microplanned were significantly more likely to have attended (79.6% v 28.9%  $p < 0.001$ ).

Microplanning as a monitoring tool proved useful for identifying implementation problems, identifying appropriate solutions and testing their effectiveness. For example, restrictions on travel during SARS-COV2 lockdowns interrupted face-to-face outreach and caused clinic closures on three occasions while other, shorter interruptions occurred due to funding delays, lack of petrol or phone credit. In all of these, the extent of the disruption could be tracked with PPIs, which also provided evidence of progress once solutions were introduced such as replacing in-person meetings with phone-based outreach and simplifying ART and PrEP prescription refill procedures. Making service provision more community-based led to considerable increases in PrEP initiations, as previously reported (32).

## Self help groups

The 104 EW founded 65 SHG, with a total of 1361 participants. After 28 months, 30 SHG remained active, with varying degrees of intensity in terms of regular meetings and/or attendance of members. The RDS data show that among all surveyed FSW, 26.1% in intervention sites reported belonging to a group for mutual benefit, compared to 20.9% in control arms ( $p < 0.001$ ). In addition to meeting regularly for discussions and sharing problems, some SHG tried *mukando*, a traditional saving system where members take turns receiving an agreed amount from the others on a weekly or monthly basis, while others pooled money toward the purchase of bulk goods for resale or to distribute among themselves (i.e., taking advantage of wholesale prices for large quantities of cooking supplies or household goods).

Implementation of SHG faced the greatest challenges within the programme because SARS-COV2 restrictions not only made it difficult for group members to meet in person, but also altered the sex work environment. Qualitative data show that as FSW lost business and therefore income, they were unable to contribute to saving schemes or investments. While some groups tried to maintain momentum through remote means (e.g., WhatsApp groups), they felt frustrated at the inability to address their economic difficulties at the time of greatest hardship and their inability to meet in person reduced their ability to form bonding social capital and strengthen trusting relationships.

Nonetheless, women who were both microplanned and joined SHG had slightly higher rates of clinic registration than those who were microplanned alone (82.7% vs 76.1%  $p < 0.001$ ). Group members discussed health issues during meetings, actively encouraged FSW to attend the clinics, and accompanied one another to test for HIV, collect medication or seek STI treatment. However, selection of SHG members depended on their willingness to join as well as EW's recruitment approach. EW identified differences between those interested in building relationships and those who felt friendships between FSW were impossible or undesirable, suggesting coverage was likely to be selective.

Table 2  
Illustrative quotes on implementation

Domain	Microplanning	SHGs
<p><b>Fidelity</b></p>	<p>In discussion, we would get along and understand that we are in the same trade. ... I would say we will meet at the clinic, and I will look for your [ID] number for you, and we would also remind each other of clinic days. I would tell them that if they wanted condoms I could give them, they should not just wait for the clinic since it came on Monday and Wednesday only. <b>EW, 31 years, HTR, Rusape</b></p> <p>My meetings (tracking visits) with [EW]... usually we meet twice per month... whenever we meet, we usually talk about condom use, and she gives us condoms and lubricants...we also talk about adherence to my medication... <b>FSW, ≥ 35 years, TR, Rusape</b></p> <p>As I am talking to her, I am already doing risk assessment and ... I will be entering the data on my phone. ... I will just be looking at my phone acting like I am not doing anything. <b>ERW, 23 years, LPSHG, Chinhoyi</b></p> <p>Nothing else [beside COVID-19 lockdowns] disturbed how we did our work from the start to the end. In Chinhoyi, there was never a time when we stopped tracking, we just had to find alternative ways of tracking our clients." <b>ORW, 48 years, Chinhoyi</b></p>	<p>I will be telling them that we are organising an SHG, would they be interested in joining? Some will not show any interest while others will show interest. Then I set up a meeting...I told everyone that we had a meeting and those that were interested should come to this place. The people that attended the meeting then joined the SHG (EW in a struggling SHG). <b>EW, 37 years, SHG &gt; 5 members, Chinhoyi</b></p> <p>[The EW meets me] at least once a week. We also get to meet her as a group on Thursday.... We talk about safety issues of our work, to always wear condoms, get tested regularly and, she encourages us to do projects as groups. <b>FSW, 31 years, TR, Ngundu</b></p>
<p><b>Feasibility</b></p>	<p>Some of them are hard to talk to. Sex workers have different characters. Someone might know that I'm an empowerment worker at CeSHHAR, if she sees me coming to her house, she will lock the door. <b>EW, 28 years, LPSHG, Rusape</b></p> <p>[FSW] can be tracked because if you miss them for face to face tracking you can talk to them over WhatsApp or talk to them on the phone. <b>EW, 37 years, LPSHG, Ngundu</b></p>	<p>I have learnt as I plan for my third group that we should not do anything that will involve contributing money. Therefore, I am foreseeing that group will survive. We will then decide on what else we could do later. <b>EW, 37 years, HTR, Ngundu</b></p> <p>The 1st group we were 12, it broke up then we formed a new one with 10 girls. This group broke up then we formed a new group with 10 girls and bought pots for each other, and this group broke up last month, that's when 3 girls left because</p>
<p>*HTR: High tracking rate *TR: Tracked routinely *LPSHG: Low performing self-help group *HPSHG: High performing self-help group *HCW: Health care worker *LTR: Low tracking rate*LCA: Low clinic attendance*DCL: Dwindling case load *RCU: Regular clinic user</p>		

Domain	Microplanning	SHGs
	<p>She will feel like you're suffocating her by keeping on asking her about her clients. ... Someone will say that she is tired and doesn't want to talk, on another day, if I knock and she peers and sees that it's me, she won't open the door. <b>EW, 20 years, HPSHG, Chinhoyi</b></p> <p>The workload is demanding, tracking takes time away from my sex work. I can make more money in sex work... I started with a caseload of 50 women, and I am now pushing 100. I must walk to track the FSWs ... If I get to their house and they are not there it means I must return. <b>EW, 33 years, HPSHG, Rusape</b></p>	<p>they did not have money- lack of clients because of COVID. Then we remained as 7 girls. <b>FSW, 30 years, LPSHG, Ngundu</b></p> <p>So, we started our round [savings] and it went well for some time at first and we later shared the money. It was towards March somewhere there. ... So, we were supposed to share our money and start again but that's when the lockdown came, and I stopped for I could not look for the money in the lockdown. <b>FSW, 35 years, TR, Rusape</b></p>
Coverage	<p>Some clients were registered under two different names because of the pressure on EWs to register FSWs... I discovered this when I quizzed one FSW whose details were not adding up at the clinic...the client then said, "I was told to use a different number and different name and come to the clinic" Nurse, <b>Harare PW</b></p>	<p>When we were starting, there was no one who wanted [to join] because of the issue of trust. Trust was limited. As we started, we just said let's try to trust (our EW) and see how it goes. ... <b>FSW, 23 years, SHG &lt; 5 members, Rusape</b></p> <p>I can say a self-help group is important to those who are part of the group but to those who are not part of the group it's not important. <b>EW, 40 years, SHG Participant, Ngundu</b></p>
Acceptability	<p>What they don't like is to be pressured, that's why they get rude when we are always pushing them to come to the clinic. Going to the clinic is something that is personal. <b>EW, 31 years, HTR, Rusape</b></p> <p>A sex worker can lie and tell you she has not spoken to anyone about the <i>KP</i> Clinic yet she has already been entered in someone else's diary...she can supply false information [phone number and name] which makes it difficult to follow her up... <b>EW, 50 years, LTR, Rusape</b></p>	<p>When I first engaged them, some of them shouted that they would not attend a clinic for prostitutes. those ones do not identify as FSWs although they behave like FSWs and sell sex. <b>EW, 24 years, LTR, Rusape</b></p> <p>I liked the idea of being able to work for myself. Our desire was to buy something which we would then resell to other people. However, due to financial challenges we decided to do an ISAL. Then we won't be relying on sex work alone. Those are some of the things that motivated me to join. ... the proceeds from sex work are not enough and I desired to do something else so that I could have more money. <b>FSW, 29 years, SHG &gt; 5 members, Chinhoyi</b></p>
Quality	<p>Hotspot mapping is done by me and the outreach worker... we would go to</p>	<p>The COVID situation is what is really troubling us. It's because we are not</p>
<p>*HTR: High tracking rate *TR: Tracked routinely *LPSHG: Low performing self-help group *HPSHG: High performing self-help group *HCW: Health care worker *LTR: Low tracking rate*LCA: Low clinic attendance*DCL: Dwindling case load *RCU: Regular clinic user</p>		

Domain	Microplanning	SHGs
	<p>my hotspot together and we would talk to sex workers asking them how things are...however, hotspot mapping during the lockdown was a challenge because bars would now open between 8 am and 8 pm and when we went there, there would be only a few sex workers and men, so the last hot spot mapping that we did didn't go well <b>EW, 32 years, HTR, Rusape</b></p> <p>They [clinics] open at 8 and finish as soon as they finish attending to 20 or 25 people. The people who have an opportunity to go in to see the nurse and get attended to take too much time, they take forever to explain what's wrong with them ... The problem is that they can only attend to a few people each day but there will be so many of us waiting so we don't get treated. <b>FSW, 36 years, LCA, Chinhoyi</b></p> <p>As I said that I give them according to their levels of risk for example, medium risk level I do risk assessment twice, and also the high-risk level I do them four times a week, so I ask them how many condoms they use per week. That's how I give out my condoms. <b>EW, 30 years, DCL, Rusape</b></p>	<p>standing together and understanding each other. We are not nicely getting together because everything is just being done online. You know that some of the things are better understood in person, discussing, and advising each other in a face-to-face meeting as a group. So that is what is troubling us as a group. <b>EW, 35 years, LPSHG, Ngundu</b></p>
<p><b>Perceived Effectiveness</b></p>	<p>Micro planning is more powerful than what we did as peer education and the way the girls came to the clinic - it has an impact. I liked the friendship ... you can see that there is a big change</p> <p><b>EW, 36 years, HPSHG, Ngundu</b></p> <p>[The EW is] a reminder that someone cares about me ...Having someone follow up on me makes me feel better” <b>FSW, 38 years, SHG participant, Rusape.</b></p>	<p>We look for topics to educate each other about. For example, how to correctly wear a female condom or a male condom. We also educate each other on self-care and hygiene and also COVID-19. ... We also help each other on adherence to ART. Some of us are HIV positive and they don't want to take their ARVs, so we encourage each other to take our medications correctly. ... When one of us is very sick we do accompany her to the clinic. One of us once fell sick and we carried her in a wheelbarrow to the clinic. <b>FSW, 35 years, HPSHG, Chinhoyi</b></p> <p>We also encourage those who are HIV positive to take and adhere to our medication without fear and drinking our medication on time and also those who</p>
<p>*HTR: High tracking rate *TR: Tracked routinely *LPSHG: Low performing self-help group *HPSHG: High performing self-help group *HCW: Health care worker *LTR: Low tracking rate*LCA: Low clinic attendance*DCL: Dwindling case load *RCU: Regular clinic user</p>		

Domain	Microplanning	SHGs
		<p>are on PrEP to do the same with their medication. <b>FSW, 26 years, LPSHG, Ngundu</b></p> <p>With this group I got to see that my peers are taking their ART medication and I am the only one who is not. The problem I had was that I was getting sick, all because I was ashamed thinking that I was the only one. <b>FSW, 32 years, RCU, Rusape</b></p>
<p>*HTR: High tracking rate *TR: Tracked routinely *LPSHG: Low performing self-help group *HPSHG: High performing self-help group *HCW: Health care worker *LTR: Low tracking rate*LCA: Low clinic attendance*DCL: Dwindling case load *RCU: Regular clinic user</p>		

## Effects on risk behaviour

Although AMETHIST did not significantly reduce risk of a combined measure of HIV acquisition or transmission among the FSW population, this was due to a lack of effect on prevention of acquisition. Engagement across the care cascade did improve among FSW living with HIV. For HIV-negative FSW, we hypothesised that risk-differentiated provision of condoms and increased engagement with KP services would lead to more condom use, HIV testing and PrEP use. While risk-differentiated support by EW occurred, this did not translate into preventive behaviour. Only 20% FSW reported no condomless sex in the preceding month. This corroborates data from risk assessments conducted by EW, where inconsistent condom use was reported by close to half of all FSW and was considerably higher among those with problematic drug or alcohol use (72%), or who had more than 10 clients per week (67%) or reported problems with violence (66%). FSW struggle to use condoms despite good access to them, including community-based delivery, even during SARS-COV2 lockdowns.

Similarly, our PrEP use data show that while there was an impressive number of PrEP initiations in AMETHIST intervention sites (3377 vs 1610), the adherence necessary for achieving protection did not occur. Among 491 self-reported current PrEP users who underwent blood testing, just 2 had protective plasma Tenofovir-diphosphate levels (> 700fmol/punch) with 38 having levels 350–700 fmol/punch. Qualitative data show that scepticism, misconceptions, and reluctance to maintain PrEP use negatively affected use. FSW did not want to be mistakenly identified as taking ART and face HIV stigma and discrimination, there was widespread belief that it was better to “wait” until HIV seroconversion before taking routine medication, and rumours circulated that once on PrEP, any interruption of adherence would increase susceptibility to HIV infection.

*People say they look like ARVs. ... My boyfriend came over and went straight for the place I keep my pills and asked if I take HIV medication. I told him to go and ask [nurse] what the pills are for because she works at the clinic. The issue ended when we went to [nurse] and when I also went to the clinic to get self-test kits to test myself so he could see that I am not positive. **FSW, 22 years, LCA, Chinhoyi***



*... Some will tell you that PrEP is similar to ART. They can tell you that ART is taken daily, and we now want them to take a tablet daily. So, what's the difference... they might as well wait until they are HIV positive since they are sex workers? EW, 23 years, LPSHG, Chinhoyi.*

*Some had said if you are given PrEP and you forget to take it for a day or two and the condom bursts you will be at high risk of contracting HIV. So, the best way is to stay as you are without taking PrEP and wait until you get HIV. FSW, 42 years, TR, Rusape*

On the other hand, uptake and sustained use of ART was high, and while HIV stigma posed a barrier to PrEP use, it was less likely to deter HIV-positive FSW from treatment. Interviews with FSW on ART provide evidence of the normalisation of treatment and acceptance of HIV as a manageable chronic condition (potentially less threatening than other common illnesses).

*You can actually hear people say that these days, HIV is actually better than sugar diabetes. If you are still able to take your tablets, you should just take them. I don't see a problem of stigma and discrimination. AIDS is no longer scary because there are pills now and it's all good. FSW, 30 years, LCA, Rusape*

Thus, the improved contact and service use that microplanning and SHG facilitated sustained longer-term engagement among women living with HIV compared to those in need of prevention.

## Discussion

The AMETHIST intervention combined microplanning and SHG as key ingredients to reach FSW with risk-differentiated and enhanced social support. It proved feasible to deliver as intended, although there were gaps in fidelity related to incomplete “hotspot” mapping, particularly at the beginning as EW became familiar with the process and conducting regular risk assessments and following these up with appropriate tracking frequency. As with many programmes for key populations (33–35), SARS-COV2 disrupted delivery, most seriously the implementation of SHG, which relied on regular group meetings and social interactions. The programme was able to realign most activities, for example by providing more community based and remote service options, including ART and PrEP provision. Indeed, introduction of these new measures appeared to increase PrEP uptake, although this proved an ephemeral effect (32). While some SHG tried to remain functioning through phone-based communication, they were considerably weakened by restrictions and by SARS-COV2's negative effects on sex work more generally, making it less likely that FSW would earn enough money to put toward savings or financial ventures. Sex workers' already precarious economic position worsened during the pandemic in many settings, and they did not benefit from measures provided to alleviate loss of earnings for workers in less marginalised occupations (36–38).

As specified in the programme logic model, microplanning's systematic approach to identifying, enumerating, and engaging FSW based on levels of risk did improve numbers of FSW attending regular appointments at the clinic, testing for HIV, and initiating ART and PrEP. Microplanning has already been

successfully introduced elsewhere, including in Kenya (20). Over time, it is hoped microplanning will further increase FSW ownership of the *KP Programme* through enhanced capability to analyse data and tailor activities accordingly. EW should eventually move into supervisory roles as in India (4). There is some evidence that SHG increased members' identification of shared identity and priorities, strengthening their capacity to work collectively (i.e. in shared business schemes) and to support and aid individuals (i.e. offering financial assistance in a crisis; taking a sick FSW to the clinic). The higher clinic attendance among SHG members might indicate that groups fostered proactive health-seeking norms and reduced anxieties about potential stigmatisation, offering both emotional and instrumental help (e.g. accompanying others), as other models of group-based support have shown (30, 39).

Despite increased engagement with services, preventive behaviours did not significantly differ between trial arms. There appears to be a specific form of stigma around PrEP, such that FSW feel it is better to avoid it and wait until treatment becomes necessary. Many FSW expressed the fatalistic belief that all sex workers eventually contract HIV and displayed lack of optimism or a sense of agency about successful prevention. They also feared prevailing conflation of PrEP with ART (both in terms of appearance, but also the view that the drug is basically the same) and did not want others to assume they were already living with HIV. Other studies have found similar slow uptake, including where reported adherence proved inaccurate once drug levels were measured (40). It could be that it is still "early days" for PrEP use; previous work showed that while there was a core of "early adopters", PrEP was not gaining acceptance as quickly as anticipated (16). This is an area that requires significant more exploration particularly as it has implications for future CAB-LA, which would overcome some but not all identified barriers (41).

FSW's positive perceptions of the quality of *KP* services in Zimbabwe has been consistently documented (9, 14, 42), and reflected in qualitative data in this study, alongside complaints and frustrations when there have been delays and gaps in coverage due to SARS-COV2, funding constraints, logistical challenges. The improved engagement with the care cascade among FSW living with HIV is further evidence of trust in the programme and services to which it refers FSW. HIV treatment has increased in acceptability and our previous work showed that for many FSW, perceived stigma of selling sex can be higher than that of living with HIV (43). The seemingly intractable challenges of prevention among this vulnerable group may reflect pervasive sex work stigma, and also increasing desperation to prioritise current financial need over longer-term health benefits at a time of globally rising costs. It is also possible that the dynamics of sex work are changing, as they have in the past, particularly during times of economic instability (44). If sex work is becoming more diffuse and less formalised it may be that women selling sex are less likely to identify as FSW and attend a service associated with sex work. Prior research has identified this as an issue, particularly among younger FSW and those who are newly selling sex, both attributes that would put women at high risk of seroconversion and are associated with lower preventive behaviours (45–48).

## Conclusions

The AMETHIST intervention successfully combined microplanning and SHG to engage FSW with risk-differentiated social support, enhancing access to HIV prevention and treatment services. Status-neutral peer-led community-based interventions for FSWs play a vital role in addressing the unique challenges they face in accessing HIV prevention and treatment services. Delivery was feasible, but SARS-COV2 disruptions had an impact. Microplanning increased clinic attendance and HIV testing, and engagement in care among FSW living with HIV but preventive behaviours didn't significantly differ between trial arms. Ongoing, formalised and risk-differentiated peer support helped identify and track the most vulnerable FSW, encouraging them to work together to overcome problems and increase confidence in using targeted services.

This approach clearly improved clinic registration, attendance and HIV testing, and FSW living with HIV further responded positively to encouragement to initiate and adhere to treatment. Yet effective prevention remains difficult to achieve, even when it appears that behaviour is changing i.e., PrEP initiation but not use. Fatalism and low agency compound the well-known barriers that FSW face in negotiating condom use. The study underscores the need to better understand barriers to prevention and continue to seek ways to overcome these. While reliance on social support and collective capacity is beneficial and needed, it remains a challenge due to competition and economic difficulties among FSWs. Strengthening HIV prevention should consider how to improve FSW's hope and agency alongside reducing stigma and supporting collective rights and action.

## Abbreviations

AMETHIST

Adapted Microplanning to Eliminate Transmission of HIV in Sex Transactions

ART

Antiretroviral therapy

CeSHHAR

Centre for Sexual Health, HIV and AIDS Research Zimbabwe

EW

Empowerment worker

FSW

Female sex worker

KP

Key population

HIV

Human immunodeficiency virus

ORW

Outreach worker

PPI

Programme Performance Indicators

PrEP

Pre-exposure prophylaxis  
SARS-COV2  
Severe acute respiratory syndrome coronavirus 2  
SHG  
Self-help group

## **Declarations**

### **Ethics approval and Consent**

Ethical approval was granted by the Medical Research Council of Zimbabwe (MRCZ/A/2559) and the Liverpool School of Tropical Medicine (Ref 19-115RS), the UK. Written informed consent from participants was obtained before enrolment.

### **Consent for Publication**

Not applicable

### **Availability of Data**

The datasets generated and/or analysed during the current study are not publicly available due to the sensitive, stigmatised and criminalised nature of participating respondents but are available from the corresponding author on reasonable request.

### **Competing Interests**

The authors declare that they have no competing interests

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### **Author Contributions**

FMC led the trial design, with involvement from SC, JB, RS, AP and JRH. FMC led protocol development, with involvement from FM, SA. FMC and FM led the trial implementation with

involvement from JB, RS, PM, MM, AT. JB and FM led the process evaluation. MM and TK undertook qualitative data collection and analysis. FM was trial director and MM was the trial coordinator. PM led the intervention implementation. AT oversaw program data analysis. FM, GM and JB wrote the paper and all authors were involved in the review of drafts.

All authors had full access to all the data in the study and had final responsibility for the decision to submit for publication.

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## Figures



Image not available with this version

**Figure 3**

**Instrument for guiding differentiated support**