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Data and methods to characterize the role of sex work and to inform sex work programmes in generalized HIV epidemics: evidence to challenge assumptions

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Summary

In the context of generalized HIV epidemics, there has been limited recent investment in HIV surveillance and prevention programming for key populations including female sex workers (FSWs). Often implicit in the decision to limit investment in these epidemic settings are assumptions including that commercial sex is not significant to the sustained transmission of HIV, and HIV interventions designed to reach 'all segments of society' will reach FSWs and clients. Emerging empiric and model-based evidence is challenging these assumptions. This paper highlights the frameworks and estimates used to characterize the role of sex work in HIV epidemics as well as the relevant empiric data landscape on sex work in generalized HIV epidemics and their strengths and limitations. Traditional approaches to estimate the contribution of sex work to HIV epidemics do not capture the potential for upstream and downstream sexual and vertical HIV transmission. Emerging approaches such as the transmission population attributable fraction from dynamic mathematical models can address this gap. To move forward, the HIV scientific community must begin by replacing assumptions about the epidemiology of generalized HIV epidemics with data and more appropriate methods of estimating the contribution of unprotected sex in the context of sex work.

Characterizing the Role of Sex Work in Generalized HIV Epidemics

Early in the HIV pandemic, HIV surveillance and prevention focused on high risk, and high burden populations including female sex workers (FSWs), men who have sex with men (MSM) and people who inject drugs (PWID) [1-3]. However, for the last 15 years, the total and relative investments in HIV surveillance and programmatic efforts for FSWs declined markedly in many countries with generalized HIV epidemics, especially across Sub-Saharan Africa (SSA)[4]. National expenditure data on HIV suggest that in 17 SSA countries reporting HIV expenditure data after 2007, a median of 0.35% (range, 0.0 to 3.3%) of HIV prevention budgets were allocated to HIV prevention for FSWs and clients [5], and 17 of 22 countries estimated that between 0.01 to 3.1% of HIV funding including HIV care expenditure benefits FSWs and clients [5]. There are also few biological and behavioral data on Key Populations (KPs) in generalized HIV epidemics due to challenges in their representative sampling via traditional surveillance systems [6]. This has limited our understanding of KPs, and of their vulnerabilities to HIV, in most generalized HIV epidemics – and limits comprehensive HIV prevention, treatment, and care responses.[7, 8] While we focus here on female sex work, these issues have relevance for other KP in generalized HIV epidemics.

The role of sex work in HIV epidemics refers to the extent to which unprotected sex in the context of sex work leads to new HIV infections in a given region. Region-specific knowledge on the role of sex work can inform the design of HIV prevention programs to ensure that they meet the needs of those most vulnerable for HIV acquisition and transmission; achieve maximal and sustained HIV prevention benefits at population-levels; optimize resource allocation; and help reduce inequities in the HIV care continuum (Box 1). Appropriately characterizing the role of sex work in Benin [9], for example, resulted in increases in protective behaviors and reductions in HIV incidence and prevalence among FSWs [10], with important impacts on the wider population[11-13].

Optimizing the preventive potential of different combinations of behavioural, biomedical, and structural interventions raises questions about their mix, delivery, and models of implementation to optimize health benefits at affordable costs [14]. Chief among these questions is whether, and to what extent, focused HIV programmes are needed for FSWs and clients. Yet often implicit within generalized epidemic responses are assumptions that (1) sex work is no longer significant to the sustained transmission of HIV, and (2) HIV interventions designed to reach ‘all segments of society’ will reach FSWs and clients [15]. Emerging empiric and model-based evidence is challenging these assumptions. This paper draws on systematic reviews and highlights the current frameworks and estimates of the role of sex work in HIV epidemics; and the relevant empiric data landscape and its strengths and limitations.

Frameworks for Characterizing the Role of Sex Work in HIV Epidemics

Five frameworks have been used to estimate the contribution of sex work to overall HIV transmission (Table 1). Traditional approaches include the numerical proxy [15], the UNAIDS HIV Modes of Transmission (MOT) models [16], and the classic population attributable fraction (PAF). [17-22]. Emerging approaches include the “transmission” PAF (T-PAF) [13, 23-26] and a re-definition of epidemic types on the basis of their behavioral epidemic drivers [20, 27-29]. The term *behavioral epidemic driver* refers to risk factors (such as unprotected sex in the context of sex work) – such that a failure to address the risk factor would undermine all other efforts at HIV epidemic control and thus, the risk factor can sustain HIV epidemics Estimates of the contribution of sex work to overall transmission vary greatly by methods and the time-horizon of measurement. The advantages and disadvantages of each of these frameworks are outlined in Table 1. Estimates are summarized in Table 2.

The numerical proxy approach to defining HIV epidemics and inferring role of sex work

By the late 1990's, tailored HIV surveillance and prevention policies were grounded in the user friendly numerical proxy approach -defining HIV epidemics as concentrated or generalized based on HIV prevalence thresholds across risk-groups[15]. This framework drew on the theory of epidemic phase for the role of unprotected sex work in sustaining HIV epidemics [30-36]. It suggested that in the early phase of an HIV epidemic, infections entered a population through KP, like FSW, and spread via 'bridge populations,' such as clients, to wider populations. The size of these epidemics depended on a maintenance (or general population) network, and the extent to which the two networks overlapped [31]. Epidemics were 'concentrated' in the early phase, became 'generalized' and were sustained by maintenance networks[31]. The numerical proxy emerged when the epidemic phase constructs of 'concentrated' and 'generalized' HIV epidemics were assigned HIV prevalence thresholds [15]. Epidemics were classified based on whether HIV prevalence exceeded 1% in the general population.) [15, 37, 38]. If overall HIV prevalence remained below 1% while HIV burden exceeded 5% in a KP the epidemic was deemed concentrated and focused HIV strategies recommended [15, 37, 38]. If HIV prevalence surpassed 1% in the general population, the epidemic was generalized and HIV efforts were to reach all segments of society [15, 37, 38]. The numerical proxy approach was originally developed to guide HIV surveillance, [15] however, in practice often guided resource allocation and programmatic design [37, 38].

Overall HIV prevalence in 39 SSA countries exceeds 1%, with considerable variability as defined by the numerical proxy within countries [39]. A limitation of the approach is that prevalence thresholds have not been validated for inferring the contribution of specific behaviors among KPs (like unprotected sex work) to overall HIV transmission. [20]. Dynamic mathematical modelling studies of SSA regions with >1% HIV prevalence such as in Cotonou, Benin and across Kenya, suggest that unprotected sex work can be an important risk for onward HIV transmission [9, 13, 24, 29], and challenge the assumption that sex work is not important in these epidemics.

Short-term estimates of the distribution of new HIV infections and classic PAF of sex work on prevalent/incident HIV infections

Allocation of resources is also informed by estimates of the relative burden of new annual HIV infections acquired in different risk such as those obtained from the UNAIDS HIV MOT model [16, 40]), or the classic PAF on HIV prevalence or incidence [17-19, 41]. The current MOT model uses data on HIV prevalence across risk-groups, population size estimates of different risk groups including KPs and clients, and sexual behaviors such as number of sexual partners [42]. The classic PAF is estimated using point prevalence or within-population incidence data, as well as estimates of the size of different risk groups.

Half of the 39 SSA countries with generalized epidemics have estimated the fraction of annual new HIV infections acquired by FSWs/clients using the MOT [40, 43], while the classical PAF of sex work on prevalent HIV infections in males and females has been estimated in 25 and 27 countries respectively [22, 44]. These measures often suggest a small role for sex work in current generalized HIV epidemics (Table 2), but have been shown to underestimate the medium- to long-term contribution of sex work [29, 44]. Both approaches ignore a central feature of HIV spread: the propagation of HIV infections via onward HIV transmission (Table 1). Onward transmission refers to the chain of transmission from a single (direct) transmission during unprotected sex work that leads to another infection between the infected individual and their subsequent partners, which in turn, leads to another infection between the newly infected partner to their other partners. The MOT and classic PAF capture the single, direct transmission, but not the chain of transmission.

Emerging approaches: the "transmission" PAF and re-defining HIV epidemic typology by behavioral epidemic drivers

The implications of underestimating the contribution of sex work to HIV spread are important because they can lead to misallocation of resources. From a program perspective, we may erroneously assume that because few infections arise among FSWs/clients, there is little to gain from targeted efforts. Two emerging frameworks may address the limitations of the traditional approaches by accounting for behaviors which potentiate HIV epidemics.

The 'transmission PAF' (T-PAF) of sex work accounts for transmission chains over time – the extent to which the cumulative number of new HIV infections are due – directly or indirectly - to unprotected sex work [9, 23, 25, 26, 29, 44]. The T-PAF is particularly useful because it tells us about the potential fraction of infections that may be prevented if we can add to existing interventions and protect all FSWs and clients from HIV during sex work. It provides information on the potential impact on the total or wider population of a 'perfect' intervention for FSWs and clients, without changes in the sexual network or displacement of sex acts As a result, the T-PAF provides a clearer picture of the role of unprotected sex work as a driver of HIV epidemics with implications for the design, delivery, and scale of HIV prevention. The T-PAF is estimated from dynamic mathematical models over different periods of time. Dynamic models are used to predict cumulative infections with and without transmission within commercial sex)[9, 25, 26, 29]. Like the numerical proxy, MOT, and classic PAF, the T-PAF depends on inputs from the best available empiric data.. Other counterfactuals to describe the influence of sex work itself may include displacement of sex acts or changes in the sexual network but are distinguished from the T-PAF.

To date, the T-PAF over different time-periods has been estimated for three SSA countries; Benin, Burkina Faso, and Kenya [13, 24, 29, 45]. Estimates of the long term transmission PAF in each suggest that even in the presence of sustained existing FSW interventions and medium to high-levels of condom use, 13.5-37.6% of all new HIV infections over the next 20 years could be due directly and indirectly to sex work [13, 44, 45]. Without FSW interventions, this figure of new infections attributable to sex work is estimated to be 58.3-88.9% over the same time-period [13, 44, 45]. Direct comparisons of the MOT estimates and classic PAF with the transmission PAF where all are derived from simulated HIV epidemics via dynamic mathematical models have shown that the MOT and classic PAF are similar to the transmission PAF of sex work in the short-term (1 year) but the former are much smaller in the medium- to long-term [29, 44]. This discrepancy occurs because the transmission-PAF captures onward transmission. Onward transmission is particularly important with behavioral epidemic drivers such as unprotected sex work associated with high frequency of sexual partnerships and mixing between risk groups. A systematic review of dynamic mathematical modelling studies summarized the potential impact of sex work interventions on onward transmission within the wider community in SSA (Table 3)[13, 24, 46, 47] – i.e. HIV in the overall population and beyond FSWs and their clients. Most models were calibrated to observed HIV prevalence in FSWs [13, 24, 47-50]. They suggest that across a range of interventions, focused FSW programming could avert up to 85% of new HIV infections in the total population over 15 years[9], and reduce HIV incidence by up to 35% over 10 years in the general population [51]. Reaching clients could also provide large incremental benefits [52].

Finally, there has been growing momentum to re-define HIV epidemics on the basis of their underlying transmission dynamics – and the role of FSW/clients in the emergence and persistence of HIV spread [19, 20, 27-29]. In this new classification system, HIV epidemics are classified as ‘generalized’ if they are entirely driven by non-KP sexual networks and ‘mixed’ if epidemic control requires preventing transmission within KP and non-KP networks (preventing infections among KP are insufficient to control the epidemic, and likewise if only preventing infections among non-KP networks). A growing number of countries are adopting this new nomenclature – particularly the use of the term ‘mixed’ epidemic [19, 53]. In practice, this re-definition of epidemic types remains dependent on testing via dynamic mathematical models [29].

Existing Data Available for the Transmission PAF, Re-Defining HIV Epidemics, and Informing the Design of Sex Work Programs across SSA

Dynamic mathematical models can be used to estimate the T-PAF and to help classify epidemics based on behavioral drivers, but require the best available data on sex work, clear definitions of who is a sex worker, HIV burdens across risk-groups including clients of FSWs, population size of FSWs and clients, mediators of individual-level HIV acquisition and HIV transmission risks, sexual partnerships and networks, and HIV prevention and treatment coverage. The data needs overlap with the programmatic needs to inform the content and scale of sex work programs (Table 4). Recent reviews shed light on the current FSW/client data landscape, how data are being collected, where, and limitations of the data (Table 5). Stigma and criminalization can pose barriers to data collection; working with FSW communities in the design and implementation of surveillance and research tools can help ensure data collection is rights-based, appropriate, and reflects the diversity of the population.

Epidemiologically and Programmatically Meaningful Definitions of Sex Work

Clear definitions of sex work are needed to (a) ensure FSW/client interventions are reaching them and to (b) design intervention packages that meet their needs. [54-58] There is no current consensus on the surveillance definition of sex work. Some define sex work as any exchange of sex for money, favors, or goods [59]. Others limit definitions to only the exchange of money, large client volumes, self-identification, or reference to sexual partners as FSW/client, when money was negotiated [54, 60-62]. Terms such as informal, part-time, clandestine, or transactional sex permeate the discourse yet their distinction from formal, high-volume sex work, remains unclear. [57, 60, 61, 63]. It is important to distinguish sex work within this spectrum even if individuals engage in more than one type or transition between types [64].

Formal sex work with large client volumes in highly-connected and high-risk sexual networks has different implications for HIV spread than casual, or long-term, concurrent partnerships that may be financially motivated [65]. Without clear definitions of sex work, T-PAF analyses to estimate the contribution of sex work to HIV epidemics may use conflated FSW/client size estimations, risk-behaviors, and HIV burdens, thereby under or over-estimating the role of sex work – and limit all approaches, including dynamic modeling. Client volume and percent income from sex work has been associated with HIV in a number of generalized HIV epidemics ranging from Nigeria to Swaziland[66, 67]. Thus, we suggest a strategy that defines sex work based on client numbers and on a pragmatic basis for focused HIV prevention efforts.

Population Size Estimation of FSWs and Their Clients

Size estimates and the duration of sex work are central to understanding the contribution of sex work to HIV epidemics. Every framework (Table 1) needs this information - as direct inputs into mathematical models or as the bases for representative sampling for bio-behavioral surveys. Size estimates also are critical for programs to provide services at scale and to monitor coverage, and are increasingly being used by funders to support allocation of HIV expenditures[68, 69].

FSW/client population size estimation are not routinely collected as part of traditional HIV surveillance. However, guidelines on different approaches exist, and several countries have started to enumerate FSWs [69, 70]. Size estimation methods include network-size analyses of respondent driven sampling surveys, and multi-staged key informant and geographic mapping and enumeration of KP hotspots [69, 71, 72]. Geographic mapping with enumeration has the added benefit of providing program "catchment areas" for better intervention delivery [73, 74]. Size estimations conducted in 29 SSA countries to date suggest that about one to three percent of adult women are engaged in active formal sex work [44],whereas estimates of client population size range widely from a median of 3% using direct surveys methods to 7-30% using indirect methods [44]. The indirect method of client population size estimation was first described by Cote *et al.* to calculate a plausible match from the adult male population to the number and frequency of clients reported by FSWs, and the frequency of repeat FSW visits reported by clients [17]. These indirect SSA size estimates are similar to those reported in concentrated HIV epidemics characteristic of India [20]. The indirect method requires FSW-specific and client-specific behavioral surveys and FSW size estimations; absence of client surveys has been the limiting factor for estimating client population size. While the value of size estimation cannot be overstated, it is important to note that a number of biases limit each size estimation method for KPs [68, 70], and the indirect method for client size estimation depends on several data from FSW and client-specific surveys. Where possible, triangulating estimates from different methods may be helpful[72].

Size estimations are often conducted once, and rarely repeated using the same approach. Thus, the stability or temporal dynamics of FSW/client size (relative to the general population) remains unknown. Rates of entry and exit from engaging in sex work ("turn over") and thus, duration in sex work, may be important when estimating downstream HIV transmission from unprotected sex work [75] during the career-span of FSW or after retiring from sex work [76]. Sex work population dynamics and how it may influence the T-PAF remain unexplored.

Representative Estimates of Relative HIV Burden

Representative estimates of HIV prevalence, incidence, and , potentially, superinfection data among FSW and clients can be used to estimate the role of sex work in HIV epidemics (Table 1)[77]. Obtaining unbiased empirical estimates of HIV incidence is challenging so most dynamic mathematical models will use HIV prevalence data to support model calibration. Optimal estimates can help allocate for HIV care, further risk-stratify FSW and clients, and monitor program impacts..

FSWs/client HIV prevalence data in generalized HIV epidemics comes from household surveys such as the Demographic Health Surveys, and from FSW/client- bio-behavioral surveys. General population surveys are limited by willingness to report sex work.[78]. Household surveys also tend to under-sample mobile or migrant populations, including truckers, miners, fisher-folk and refugees, who may be more likely to be clients or SWs.[79, 80]. While some of these biases are addressed with direct surveys of FSWs and clients, participants in these studies may not be representative of the underlying FSW/client population. For example, two-thirds of FSW HIV data in generalized epidemics of SSA come from convenience sampling of sexually transmitted infection (STI) clinics or FSW venues [44]. Despite these limitations, the available data suggest a disproportionate burden of HIV among FSW in generalized epidemics (Table 5) – and variability in the magnitude of inequity is not fully explained by differences in study design. Three recent systematic reviews of HIV among FSW in the generalized epidemics of SSA suggest a 9 to 14-fold greater HIV burden compared to all women of reproductive age [22, 44, 81]. Meanwhile, client-specific studies across six SSA countries suggest a 4-fold greater odds of HIV prevalence among self-reported male clients compared to non-client males [44] [18, 19, 82, 83].

Thus, the next phase in HIV surveillance in generalized HIV epidemics should include FSW and client HIV prevalence estimates. Where possible, HIV prevalence estimates should be obtained via representative sampling [84] using pre-sampling size estimations or venue assessments to inform sampling frames [70]. Where size estimations are not possible, using respondent-driven sampling as a chain-referral strategy may support the calculation of less biased estimates of HIV burdens [85].

HIV Acquisition and Transmission Risks and Protective Behaviors Among FSW/clients

Dynamic models of HIV epidemics that include sex work need to parameterize the heterogeneity in HIV acquisition and transmission risk associated with sex work in order to capture the 'mechanistic' processes that underpin transmission events. There is an extensive body of literature that outlines the proximal and distal determinants of HIV acquisition among FSWs and clients [55, 86, 87]. Proximal determinants include differential patterns of condom use by partner type (regular, new, and non-paying), numbers of partners, frequency of sexual acts by partners and type of sex (vaginal vs. anal), concomitant STIs, , anal and vaginal douching and use of drying agents and spermicides[88-90]. Proximal determinants are important for estimating the transmission PAF and re-defining HIV epidemics on the basis of behavioral drivers; whilst proximal and distal factors such as laws, policies, or health-system factors are each critical to the design of HIV programs.

Currently, the only FSW risk-factor data routinely requested and reported in the UNAIDS country reports is condom use at last sex [91]. The majority of studies on HIV factors among

FSWs have focused on assessing individual, proximal risks. Yet distal factors are increasingly recognized as predictors of HIV acquisition and for the coverage of services for FSWs [86, 92, 93]. In Swaziland, there were significant relationships between increased measures of social capital and condom use and uptake of HIV testing in FSWs [94]. Recent modelling of a potential causal pathway from history of sexual violence and current condom-use among FSWs suggests important population-level effects of sexual violence mediated through individual-level sexual practices [95].

Taken together, these findings suggest the utility of comprehensive risk assessments – and causal pathways of HIV risk and/or protective behaviors - when characterizing HIV- risks among FSW/clients. An understanding of proximal determinants is needed to reproduce HIV epidemics with dynamic models, and thus, estimate the T-PAF. Estimating the T-PAF of distal determinants requires a strong empirical basis for the full causal pathway. However, developing indicators to measure the full scope of structural and social factors and relating each to individual-level proximal determinants is a challenging and emerging area of research in dynamic modeling. Nonetheless, HIV programs are implemented within structural determinants such as human rights violations, criminalization, sexual and physical violence, condom accessibility and perceived and experienced stigma and discrimination [86]. Programs need to address determinants along the full casual pathway to HIV acquisition and transmission during sex work.

Characterizing HIV Transmission Networks of FSWs, Clients, and the Wider Community

Key to the transmission PAF is data on how partnerships are formed within sex work and between FSW/clients and individuals not directly engaged in sex work, including those involved in other financially-motivated partnerships, concurrent or serial multiple partnerships, and the ‘lower-risk’ general population. To date, these have only included sexual partnerships – but can (and should) be extended to include other risks.

For the transmission PAF, we usually infer ‘who has sex with whom’ from available data by fitting these data to observed data on HIV prevalence/incidence across risk groups. Such data are not routinely collected as part of HIV surveillance, but can come from individual surveys of FSWs and clients with questions about the number, type, age, etc. of sexual partners by the type of partnership or sexual network surveys [96]. Phylogenetic analyses using HIV sequence data have been used to infer networks among people who inject drugs and MSM [97-100], and are being explored to infer HIV transmission networks of FSW/clients and the wider community[98, 101]. Deterministic models assume instantaneous partnerships and – with the exception of pair models - do not explicitly account for duration of partnerships, which may be important for casual or long-term partnerships. The type of dynamic mathematical model may influence the T-PAF. Early work on model comparison suggests that deterministic models with assumptions of instantaneous partnerships may overestimate the role of long-term partnerships in transmission compared with network models with explicit partnership duration .

Characterizing sexual networks includes the different contexts within which sex work takes place, such as short-term migration [26], and how networks (or sexual mixing between risk groups) change over time. Intersections and overlaps with networks of people who use drugs, and casual sex networks, are also an emerging area of study [102, 103]. If we do not account for overlaps in transmission networks, we may underestimate the T-PAF of sex work to HIV epidemics. Similarly, vertical HIV transmission among FSWs may be high but remains unknown in SSA. FSWs are less likely to use condoms with non-paying partners – with whom FSWs may choose to have children [104].

Program and Biological Data to Characterize Interventions and Engagement in HIV Prevention and Treatment Programs

Data on program-related protective factors for HIV acquisition and transmission – such as condom-use, voluntary male circumcision among clients, and HIV viral suppression among FSW/clients on ART are important to include when estimating the T-PAF, and when designing and monitoring HIV programs.

The only routinely collected indicators of FSW-program reach include awareness of where to access HIV testing, and receipt of condoms in the last 12 months [91]. These indicators were reported for 20 countries in the 2012 UNAIDS Country Progress Reports. A country-median of 54.4% (range, 1.5-89.9%) of FSWs surveyed reported knowledge of where to access HIV testing and receipt of condoms in the last 12 months. The indicators were based on convenience samples (18 from surveys), and only one had pre-sampling enumeration; 28 countries did not report or have data on FSW coverage with denominators. The extent to which existing HIV prevention programs are reaching FSWs and clients and addressing their HIV risk remains highly questionable.

The remainder of the HIV continuum of care for FSWs (or clients) has not been monitored as part of the UNAIDS country reports. Although there are a few studies of the HIV care cascade among FSWs [105, 106], the data are limited to FSWs who meet study-specific eligibility criteria and agree to participate.. Thus existing HIV care data are likely not representative of the underlying FSW populations [105, 106]. Continuum of care data could help estimate the additional ART needs of FSW[107, 108]. Monitoring of primary and secondary emergence of HIV drug-resistance could be important in populations at highest risk, such as FSWs in generalized HIV epidemics – as has been done with `sentinel` surveillance of drug-resistant gonorrhea in industrialized settings [109]

Conclusions

There is growing empiric and model-based evidence for helping decide whether, how much, and how to focus on sex work in generalized HIV epidemics. A small, but growing, body of model-based evidence of the transmission PAF and sex work interventions demonstrate the large potential for HIV prevention and health benefits to the wider community from sex work programs in generalized HIV epidemics. However, gaps remain and limit a comprehensive understanding of the role of sex work. Understanding could be improved by investing in the collection of specific data, by making the best use of these data, and with appropriate methods of estimating the role of sex work in HIV epidemics. To move forward, the HIV scientific community must begin by characterizing the epidemiology of generalized HIV epidemics with data and more appropriate methods of estimating the contribution of the unmet needs of sex workers and their clients.

Box 1: Why quantify the role of sex work in HIV epidemics?

Quantifying the role of sex work in generalized HIV epidemics involves:
• Estimating the cumulative fraction of new HIV infections that directly or indirectly originate from unprotected sex in the context of commercial sex work in presence and absence of existing interventions.
• Distinguishing the cumulative fraction of new HIV infections that directly or indirectly originate from unprotected sex in the context of commercial sex work versus other financially-motivated transactional partnerships.
Importance of quantifying the role of sex work in generalized HIV epidemics:
• To better understand local HIV epidemics and identify the main behavioural sources of HIV transmission fuelling the HIV epidemic (i.e. unprotected behaviours that without additional interventions, could undermine HIV epidemic control).
• To help HIV programmes decide when, where, and how to focus on sex work interventions for individual-level prevention and health benefit to those most-vulnerable to HIV acquisition and transmission.
• To help HIV programmes decide when, where, and how to focus on sex work interventions for population-level prevention and health benefits in the wider community.
• To help policy-makers allocate HIV resources effectively and efficiently.
• To reduce inequities in HIV service delivery across risk-groups.