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An action agenda for HIV and sex workers

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The women, men, and transgender people who sell sex globally have disproportionate risks and burdens of HIV in countries of low, middle, and high income, and in concentrated and generalised epidemic contexts. The greatest HIV burdens continue to be in African female sex workers. Worldwide, sex workers still face reduced access to needed HIV prevention, treatment, and care services. Legal environments, policies, police practices, absence of funding for research and HIV programmes, human rights violations, and stigma and discrimination continue to challenge sex workers' abilities to protect themselves, their families, and their sexual partners from HIV. These realities must change to realise the benefits of advances in HIV prevention and treatment and to achieve global control of the HIV pandemic. Effective combination prevention and treatment approaches are feasible, can be tailored for cultural competence, can be cost-saving, and can help to address the unmet needs of sex workers and their communities in ways that uphold their human rights. To address HIV in sex workers will need sustained community engagement and empowerment, continued research, political will, structural and policy reform, and innovative programmes. But such actions can and must be achieved for sex worker communities everywhere.

Introduction

Women, men, and transgender people who engage in sex work face disproportionate burdens of HIV, HIV risks, and a scarcity of access to essential services. This is true in countries of low, middle, and high income, in concentrated HIV epidemics, and in generalised ones.^{1,2} We must do better and we can. Improved efforts by and for people who sell sex can no longer be seen as peripheral to the achievement of universal access to HIV services and to eventual control of the pandemic.

Sex workers are an enormously diverse group working in a wide array of contexts—some in safety—and some in difficult and dangerous settings. In this Series, Shannon and colleagues show how structural measures can heighten risk of HIV, or markedly decrease it.^{1,2} Although governments and security entities, most notably the police, have crucial roles in helping to establish environments that support public health goals of safety and HIV risk reduction, they are often impediments to protection.³ Widespread use of condom carriage as evidence of sex work by police is a vivid reminder of how life-threatening bad public policy can be.

There is great optimism regarding HIV prevention. Breakthroughs in HIV treatment, prevention science, programme implementation, and human rights realisation have led to assertions that an AIDS free generation is possible.⁴ Advances in HIV prevention science relevant to sex workers were reviewed by Bekker and colleagues⁵ for women, by Baral and colleagues⁶ for men, and by Poteat and colleagues⁷ for transgender women, and show substantial promise. Uptake, adaptation, and successful use of these innovations by sex workers are crucial steps for the future. Yet, however far the global response to HIV can move towards the goal of universal access to these new interventions, Decker³

Search strategy and selection criteria

We updated the 2012 estimates by Baral and colleagues² to identify new publications since the last search and to do a global analysis that included high-income countries. We searched PubMed and Embase for studies published in English between Jan 1, 2007, and June 20, 2013. Articles and citations were reviewed with QUOSA information management software (version 8.05) and EndNote (version X4). The search included MeSH terms for HIV or AIDS, and terms associated with sex work (“prostitute”, “sex work”, “sex worker”, “HIV”, or “AIDS”). Other data sources were UNAIDS and national surveillance system reports, which included demographic health surveys, and integrated biobehavioural surveillance studies undertaken by large international non-governmental organisations.

We included studies and reports from countries of low, middle, and high income, with samples sizes greater than 50 female sex workers and of any design that measured the prevalence or incidence of HIV in female sex workers. Studies were accepted if clear descriptions of sampling, HIV testing methods (ie, laboratory-derived HIV status with biological samples from blood, urine, or oral specimens), and analytical methods were included. Excluded were studies with: self-reported HIV status, estimates derived from respondent-driven sampling that did not provide sample sizes, and non-weighted estimates. Studies in which female sex workers were not the main focus of the study were included only if results were disaggregated to provide results specific to female sex workers. Studies that required additional criteria, such as injection drug use or present incarceration, were excluded.

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Key messages

- HIV epidemics in female sex workers are generally similar to the HIV burden in heterosexual adults in their surrounding communities, but with substantially higher HIV incidence and prevalence. The most burdened sex workers are African women and all countries with more than 50% HIV prevalence in sex workers are in sub-Saharan Africa.
- Male sex workers have very high HIV risks and burdens, as a result of the high HIV incidence in gay, bisexual, and other men who have sex with men at risk worldwide.
- The burden of HIV among transgender women sex workers is very high and HIV prevention and care is challenged by significant structural and social barriers.
- Structural measures, including laws, policies, rights contexts, community organisation, and the physical and economic features of sex work have crucial roles in generation or mitigation of risks for HIV infection in sex workers. Models suggest that decriminalisation of sex work could avert 33–46% of new HIV infections in sex workers and clients during a decade, through its iterative effects on violence, policing, safer work environment, and HIV transmission.
- Human rights violations against sex workers increase HIV susceptibility and undermine effective prevention. Many rights violations, including physical and sexual violence by police and other state groups, are the result of climates of impunity which must change.
- Decriminalisation, expanded access to antiviral treatment for sex workers living with HIV, and community empowerment and engagement could have synergistic effects on reduction of HIV infections in sex workers.
- Community-empowerment-based HIV prevention substantially reduces HIV risks, gonorrhoea, and chlamydia infections in female sex workers, and increases condom use with clients. Social and political changes that are related to the recognition of sex work as work, and scale-ups of empowerment-based approaches to HIV prevention for sex workers, are needed.
- Peer or community counselling and condom distribution among female sex workers are cost effective in south-east Asia and sub-Saharan Africa, more so than school-based education, voluntary counselling and testing, prevention of mother-to-child transmission, and treatment of sexually transmitted infections.
- Combined HIV-prevention programmes that address biological drivers of HIV infection, including tailored use of antiretroviral drugs in pre-exposure prophylaxis, post-exposure prophylaxis, and rectal microbicides, will probably be needed to prevent HIV in male and transgender sex workers.
- High coverage of HIV testing and ART treatment access will be key to health outcomes and reduction of HIV transmission. These approaches should be carefully added to tailored prevention packages that recognise and respect communities' human rights in programme design and implementation. Equitable funding for HIV programmes can support these efforts.
- Research is urgently needed about the epidemiology of HIV in sex workers, and novel effective interventions and combination interventions. The global scarcity of data for HIV in transgender women and male sex workers calls for more and better research in these populations to identify needs and inform prevention efforts and treatment access.

and Kerrigan⁸ state that without a rights-based framework for HIV interventions, and participation, engagement, and empowerment of sex workers, HIV control will remain elusive.

When we reviewed the evidence about HIV in sex workers, we identified striking trends and problematic gaps. For the first two decades of HIV, female sex workers were central to many HIV research and programme efforts. Studies of HIV in women were either routinely undertaken within populations of female sex workers or included a substantial number of them.⁹ Community-based and led-intervention efforts, including the Sonagachi Programme and other efforts in Bangladesh, Thailand, Cambodia, Kenya, the Gambia, and Brazil, showed impressive reductions in HIV risk, and in other sexually transmitted infections (STI), before the antiretroviral therapy (ART) era.^{8,10,11}

Several events and trends markedly changed this situation and slowed further progress. Controversy regarding the ethics of the first oral pre-exposure prophylaxis (PrEP) trials in women, which had been designed for female sex workers in Cambodia in 2004 and

Cameroon in 2005, halted both studies. Many researchers moved toward less-contested populations.¹² The 2003 so-called Prostitution Pledge policy requirement for US Federal (PEPFAR) funding reduced programmatic engagement with sex workers in some settings.^{3,13,14} This reduction has been associated with reduced financing of HIV programmes for sex workers, particularly programmes which funded organisations led by sex workers.¹⁵ Finally, the very high HIV incidence in women in southern sub-Saharan Africa from 2001 to 2005, meant that HIV studies which required HIV seroconversion endpoints (eg, microbicides, HIV vaccines, and PrEP) could be undertaken in the general population of reproductive-aged women, and would markedly reduce the necessity of recruiting sex workers. These trends led to a challenging new situation: there has been a substantial increase in effective HIV-prevention techniques and approaches—yet none of these advances have specifically been investigated in sex workers. Adaptation of these methods, and assessment of sex workers' interest and effectiveness of their use in this group, is still to be done. Table 1 sets forth a research agenda to address these gaps.

	Study needed	Comments
Epidemiology		
How prevalent is HIV in SW? How common is undiagnosed HIV infection?	HIV seroprevalence and testing surveys	Must be voluntary, use newer methods (RDS, VTS)
What is HIV incidence in SW?	Cross-sectional or prospective studies	Next-generation assays
Basic sciences		
What formulations of vaginal and rectal microbicides will be acceptable, safe, and effective for SW?	Phase 1 and 2 trials should include SW in sufficient sample size for stratified analyses	..
What new oral or injectable PrEP agents will be acceptable, safe, and effective for SW?	Phase 1 and 2 trials should include SW of all genders	..
Promotion of optimum care		
How do we optimise access to care for SW?	Continuum of care and implementation science studies for SW; stigma reduction interventions in health-care settings; novel adherence studies	Stand alone vs integrated services; community-led vs community-engaged; community mobilisation interventions could be adapted to adherence support
Human rights: effect on successful prevention and treatment	Integration of violence, discrimination, and other human rights measures into SW studies; trauma-informed care	Violence and broader dimensions of trauma shown to compromise adherence and treatment responses
HIV prevention		
What combinations of HIV-preventive interventions will reduce HIV incidence for SW?	Testing feasibility and acceptability of prevention packages and trials of efficacy	Resources for SW-specific RCTs might be reduced
What are the best methods to assess combination prevention?	Modelling studies, community-participatory research	..
What new interventions could hold promise for SW?	Next-generation HIV vaccines	Planned WRAIR trial will study MSM in Thailand, and might include MSW and TGSW
Structural change		
Could structural interventions reduce HIV risks and increase HIV access for SW?	Structural measures (risks and protective) studies	Many studies might not have HIV outcomes, but could measure changes in violence, safety, and access to care
Ending impunity for crimes and abuses	Effect of decriminalisation on health outcomes; police, violence prevention, and community empowerment interventions	Little is known about changing contexts of impunity to accountability
SW=sex workers. RDS=respondent driven sampling. VTS=venue time sampling. PrEP=pre-exposure prophylaxis. RCTs=randomised clinical trials. MSM=men who have sex with men. MSW=male sex workers. TGSW=transgender sex workers.		

Table 1: Research agenda for sex workers and HIV

The global burden of HIV in sex workers

Estimates of the global numbers of sex workers and their global HIV burden have been challenged by limitations in surveillance, research methods, and available data. Baral and colleagues²⁹ did a systematic review and meta-analysis of HIV prevalence data in female sex workers in countries of low and middle income from January, 2007 to June, 2011. Data were available from 50 countries, and included HIV data for 99878 adult women. Overall HIV prevalence was estimated at 11·8% (95% CI 11·6–12·0), with the highest burdens in sub-Saharan Africa (36·9% [36·2–37·5]) and eastern Europe (10·9% [9·8–12·0]). A comparison of these burdens with women of reproductive age in the same populations yielded a pooled global odds ratio (OR) of 13·5 (10·0–18·1).

We expanded these data to include high-income countries and updated prevalence estimates for countries of low and middle income countries from June, 2011 to June 20, 2013. The figure shows the global burden of HIV in female sex workers by 2013 from 79 countries (n=437025 women). The appendix pp 1–12 shows the

meta-analysis by region and country economy level. Sub-Saharan Africa remains the highest burden region with a combined HIV prevalence of 29·3% (25·0–33·8). Countries with more than 50% of sex workers with HIV are all in southern Africa. Differences in HIV prevalence across economic strata are marked but might be biased by an absence of data in high-income countries; neither the USA nor Canada collect HIV-surveillance data for sex workers.

The high HIV burdens in sex workers globally (figure), particularly in southern Africa, underscore the need for tailored interventions for sex workers with HIV. Although all sex workers need access to condoms, education, STI care, and other basic services, ART access for those with HIV is a treatment and prevention priority.

Prüss-Ustün and colleagues¹⁶ reported a population attributable fraction (PAF) analysis of the estimated proportion of HIV in women and of the number of HIV deaths in women attributable to sexual transmission in sex work. They estimated that globally, 15% (range 11·5–18·6%) of HIV infections in women in 2011 were attributable to sexual transmission in sex work, with the

See Online for appendix

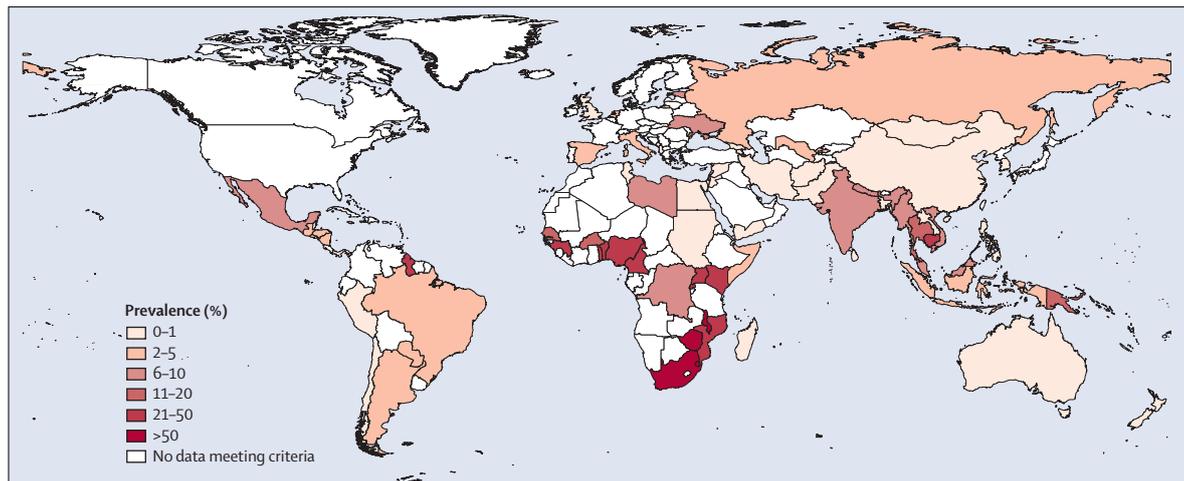


Figure: Global burden of HIV infection in adult female sex workers in 2013
References in appendix pp 1–12.

highest proportions in sub-Saharan Africa (17·8%, 13·6–22·1%). The proportion of new HIV infections within the past year that were due to sexual transmission in sex work is estimated to include nearly a third of new infections in Ghana, 14% in Kenya, and 10% in Uganda.^{17–19} A microsimulation study showed a reduction in incident HIV infection in the total population of Kisumu, Kenya by 66% (range 54–75%) during 20 years with the removal of transmission in sex work.²⁰

For male sex workers, data for HIV burden are sparse. As of 2011, 51 countries provided data for this issue to UNAIDS.⁶ Four countries reported HIV prevalence of more than 25%, 12 between 12·5% and 25, and 35 less than 12·5%.

Global data for the burden of HIV in transgender sex workers are also scarce. A meta-analysis of data from 14 countries reported that transgender female sex worker had a higher burden of HIV (27%) than other transgender women (15%), male (15%), and female sex workers (5%). A report from Argentina showed that transgender sex workers were the most HIV-burdened group (33·9% HIV prevalence and an incidence of 11·3 per 100 person-years.²¹ However, transgender women and transgender female sex workers are often incorrectly included in research as men who have sex with men (MSM) or female sex workers. Results stratified by transgender status are rarely available, which reduces the understanding of HIV epidemiology or intervention effects. The very high HIV burdens in transgender women argue for urgent action in research and interventions.

Calls to action

The role of structural measures

In the epidemiology paper of this Series,¹ we reviewed the global epidemiology of HIV in female sex worker and the extent to which epidemiology considers structural measures (eg, laws, migration, and stigma; community

organisation; social, policy, economic, and physical features of the work environment), with partner or dyad, behavioural, and biological factors in HIV transmission. We then modelled the potential course of HIV epidemics and potential reduction of infections through structural change in three epidemiological settings: high and medium prevalence, concentrated epidemics (India and Canada), and heavy HIV burden settings (Kenya).

Coverage and equitable access to condoms, ART, and HIV prevention for sex workers continues to lag. In countries with a heavy HIV burden such as Kenya, where access remains low and ability of sex workers to organise has been limited by criminalisation, stigma, and funding gaps, enhanced ART for sex workers and client populations to meet new WHO guidelines (CD4 count <500 cells per μ L) could avert 34% of HIV infections in sex workers and clients if met with structural support (eg, reduction of stigma and discrimination). Even slight peer or sex worker-led outreach and support could avert a further 20% of infections in sex workers and clients over the next decade. These results support calls for multipronged structural and community-led interventions that substantially reduce HIV burden and promote human rights.

Our review and modeling emphasise that macro-structural changes (eg, decriminalisation of sex work; and addressing of migration and stigma), and work environment features (eg, reductions or elimination of violence, police harassment, and implementation of supportive venue-based policies and practices) that they engender, are crucial to stem HIV epidemics in sex workers and clients. In settings such as Kenya and Canada where sex work is criminalised and sexual violence against sex workers (by clients, police, partners, or strangers) remains endemic, elimination of sexual violence alone could avert 17–20% of HIV infections in sex workers and clients over the next decade. Access to

safer work environments (eg, venues with supportive policies and practices on violence, HIV, and access to condoms) could substantially shift the course of epidemics. Decriminalisation of sex work could avert the largest percentage of HIV infections in sex workers and clients (33–46%) during the next decade, through iterative effects on violence, police harassment, safer work environments, and HIV transmission pathways.

Prevention

Reduction of the HIV transmissions associated with sex work and making sex work safer for workers and clients are key components to achieve universal HIV prevention.²² Bekker and colleagues⁵ describe an impressive array of prevention modalities that can be combined and applied to reduce the risk of HIV acquisition in female sex worker populations globally. In this era of biomedical advances, including topical and oral ARV-based PrEP and earlier antiretroviral treatment as prevention, it is crucial that these are additive, voluntary, and not at the cost of established prevention methods.²³ Community-empowerment programmes such as Sonagachi²⁴ and others²⁵ have shown the effectiveness of sex worker-led, rights-based programmes for a range of HIV-related prevention outcomes—although not HIV incidence—and these approaches can serve as the essential platforms for adaptation and uptake of the next generation of prevention approaches.^{5,26,27} These are occupational health approaches, which recognise sex work as work, that many people will continue to sell sex, and that a reduction in HIV risks and exposures is a key goal.¹⁰ Model simulations suggest that condom promotion and distribution in South Africa have already reduced HIV incidence in sex workers and their clients by more than 70%. Voluntary access to PrEP for sex workers with a test and treat approach could further reduce HIV incidence in South African female sex workers and their clients by 40% or more between 2015 and 2025.⁵ Biomedical ART-based interventions provide roughly more than 90% protection against transmission if used consistently.²⁸ The great value of treatment with ART to individual health is clear, in terms of cost-effectiveness, and reductions in individual morbidity and mortality. Earlier effective treatment at community levels will also prevent further transmission of HIV to sex workers by reducing the pool of potentially infectious clients.²⁹ Scale-up of coverage will be a challenge, therefore other promising approaches should be available and accessible. Male circumcision might also reduce the risks of female sex workers getting HIV by reducing the number of men with HIV infection at community levels, although this hypothesis has not been formally investigated. These approaches should be carefully added to tailored prevention packages that recognise and support safe workplaces and respect communities, which will go far to reduce HIV infection in sex workers.

Community-empowerment responses

Kerrigan and colleagues⁸ report that community-empowerment-based responses to HIV are significantly associated with reductions in HIV (OR: 0·68, 95% CI 0·52–0·89), gonorrhoea (OR: 0·61, 95% CI 0·46–0·82), chlamydia (OR: 0·74, 95% CI 0·57–0·98), and high-titre syphilis (OR: 0·53, 95% CI 0·41–0·69), and were associated with increased consistent condom use with clients (OR: 3·27; 95% CI: 2·32–4·62). Their review, which examined both peer-reviewed and practice-based evidence from sex worker-led initiatives, documented formidable barriers to implementation and scale-up of community empowerment approaches despite the growing evidence of its effectiveness. Challenges include regressive international discourses and funding constraints, national laws criminalising sex work, and intersecting social stigmas, discrimination, and violence that includes those related to occupation, sex, and HIV status. These findings underscore the need for social and political change related to the recognition of sex work as work.

Human rights and the law

A rapidly growing evidence base confirms that human rights violations raise HIV vulnerability and undermine effective prevention.³ Punitive laws create substantial barriers to the access of justice, which creates a climate of impunity that fuels abuses by police and non-state groups alike. Many rights violations against sex workers represent gross misinterpretations of policy. Physical and sexual abuses by police, which include rape in detention, are completely outside of international law. Even when lawfully implemented, punitive laws preclude health and safety measures and often result in sex workers being incarcerated or detained, including in so-called rehabilitation centres, without access to HIV treatment or prevention. HIV prevention and treatment for sex workers requires laws, policies, and a social climate that enable their human rights. Furthermore, HIV-interventions themselves must abide by human rights guidelines and policy programmes; and practices that are coercive or discriminatory, such as mandatory or forced testing, or denial of care, must be ended.

Policy shifts and innovative programmes suggest promise for the future for a rights-based HIV response. Shifts toward full decriminalisation, such as that in New Zealand, have improved human rights for sex workers, which include the right to health³ (panel 1).

Male sex workers

Risks of HIV acquisition have been reported at many levels for male sex workers including the efficient transmission of HIV in anal intercourse, high numbers of sexual partners, large and non-dense sexual networks, and compounded intersectional stigmas.⁶ Risk reduction for these men is impeded by laws criminalising sex work, homosexual acts or people, and HIV

Panel 1: The Global Commission on HIV and the law

In 2011, the Global Commission on HIV and the law examined the relation between law and public health in the context of HIV. The 14 member independent commission, chaired by Fernando Henrique Cardoso (former President of Brazil), assessed research and submissions from more than 1000 investigators in 140 countries, and engaged parliamentarians, ministries of justice and health, judiciary, lawyers, police, and civil society in frank and constructive policy dialogue.

The Commission concluded that laws criminalising consensual adult sex and a range of other laws and legal practices, are undermining effective HIV programming with and for sex workers. The Commission noted that:

- Laws against consensual adult sex work impede HIV prevention, allow for police harassment and violence, and weaken sex workers' ability to negotiate safe sex. These laws deter sex workers from accessing services for HIV and other health issues and raise HIV vulnerability.
- Criminal laws conflate trafficking with consensual adult sex work, and the broad deployment of antitrafficking laws against sex work results in denial of human rights of people in sex work. The harms from this conflation have increased over the past decade because much HIV funding has been predicated on the acceptance of the conflation of trafficking with consensual adult sex work.
- Criminalisation of the clients of sex workers negatively affects sex workers and hinders effective HIV responses. This approach shifts sex work into underground settings with less security, more violence, and raised susceptibility to HIV, and worsens the lives of sex workers.
- Rights-based approaches that empower sex workers and engage law-enforcement officials are crucial for effective

HIV responses. When the rights of sex workers are recognised, they are collectivised to protect their health, bodily integrity, and control HIV.

Progress is being made: sex workers are becoming increasingly organised and are demanding recognition that they do not lose their rights when involved in sex work. Some communities have had long experience with rights-based approaches to sex work, and data show that HIV and other health outcomes have improved. Some countries have moved away from the so-called rehabilitation centre model and other punitive approaches, and court decisions have begun to disentangle the conflation of sex work with human trafficking; —eg, the decision to strike down punitive conditions in development assistance.

The Commission concluded that countries should reform their approach towards sex work so that consenting adults involved in sex work are not punished but are ensured safe working conditions, and that sex workers and clients have access to services for HIV and health. Countries must take all measures to stop police harassment and violence against sex workers, which should include stopping mandatory testing for HIV and sexually transmitted infections. They should also ensure that enforcement of human antitrafficking laws is carefully targeted to punish those who use force, dishonesty, or coercion to procure people into sex work. Antitrafficking laws should be used to prohibit sexual exploitation of adults and children, but they must not be used against adults involved in consensual sex work.

Reformation of the legal environments related to sex work is not without political challenges, but it is the right thing to do. Such reformation is essential to curb the HIV epidemic and to ensure the realisation of human rights.

non-disclosure, and reduced access to HIV prevention and treatment. To address the complex needs of these men necessitates: synergisation of laws with public health policy so that available HIV prevention and treatment can be accessed by male sex workers; improvement in HIV surveillance; characterisation of context-specific HIV risks; and provision of comprehensive HIV prevention, treatment, and care programmes. An increase in access to basic prevention technologies, including condoms and condom-compatible lubricants, is necessary, but will probably be insufficient. Combination HIV-prevention programmes for male sex workers that address the biological drivers of HIV infection, including the strategic and tailored use of antiretroviral drugs such as post-exposure prophylaxis, PrEP, and rectal microbicide formulations, will probably be necessary for HIV-prevention success. High coverage of HIV-testing services with active linkage to CD4 testing, ART initiation, and retention services are core components to ensure optimum health outcomes and to reduce HIV transmission.

Transgender sex workers

Transgender sex workers face unique susceptibilities to HIV.⁷ Globally, social acceptance of transgender women is heterogeneous, and ranges from cultural acceptance to social stigma and criminalisation. Stigmatisation and criminalisation of cross-dressing, perceived homosexuality, and sex worker status, can create intensely hostile environments for transgender sex workers. Challenges related to legal identities often reduce their access to HIV services and other care. Few evidence-based HIV prevention interventions have been assessed in transgender sex workers and none address structural drivers. Better-quality research and surveillance are needed that clearly differentiate transgender women sex workers from MSM, female sex workers, and other transgender women. In sub-Saharan Africa and eastern Europe or central Asia where there are no data for this issue, researchers should engage and collaborate with local transgender communities to fill this gap. Mathematical modelling of data from distinct settings in San Francisco and Peru

Panel 2: The Melbourne 2014 declaration

Nobody left behind

All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood.

Article 1, Universal Declaration of Human Rights, 1948.

We gather in Melbourne, the traditional meeting place of the Wurundjeri, Boonerwung, Taungurong, Djajawurrung, and the Wathaurung people, the original and enduring custodians of the lands that make up the Kulin nation, to assess progress on the global HIV response and its future direction, at the 20th International AIDS Conference, AIDS 2014.

We, the signatories and endorsers of this Declaration, affirm that non-discrimination is fundamental to an evidence-based, rights-based, and gender-transformative response to HIV and effective public health programmes.

To defeat HIV and achieve universal access to HIV prevention, treatment, care, and support, nobody should be criminalised or discriminated against because of their gender, age, race, ethnicity, disability, religious or spiritual beliefs, country of origin, national status, sexual orientation, gender identity, status as a sex worker, prisoner or detainee, because they use or have used illicit drugs, or because they are living with HIV.

We affirm that all women, men, transgender and intersex adults, and children are entitled to equal rights and to equal access to HIV prevention, care, and treatment information and services. The promotion of gender equality is essential to HIV responses that truly meet the needs of those most affected. Additionally, people who sell or who have sold sex, and people who use, or who have used, illicit drugs, are entitled to the same rights as everyone else, including non-discrimination and confidentiality in access to HIV care and treatment services.

We express our shared and profound concern at the continued enforcement of discriminatory, stigmatising, criminalising, and harmful laws which lead to policies and practices that increase vulnerability to HIV. These laws, policies, and practices incite extreme violence towards marginalised populations, reinforce stigma, and undermine HIV programmes, and as such are significant steps backward for social justice, equality, human rights, and access to health care for people living with HIV and people most at risk of acquiring the virus.

In over 80 countries, there are unacceptable laws that criminalise people on the basis of sexual orientation. All people,

including lesbian, gay, bisexual, transgender, and intersex people are entitled to the same rights as everyone else. All people are born free and equal, and are equal members of the human family.

Health providers who discriminate against people living with HIV or groups at risk of HIV infection or other health threats, violate their ethical obligations to care for and treat people impartially.

We therefore call for the immediate and unified opposition to these discriminatory and stigmatising practices and urge all parties to take a more equitable and effective approach through the following actions:

- Governments must repeal repressive laws and end policies that reinforce discriminatory and stigmatising practices that increase the susceptibility to HIV, and pass laws that actively promote equality.
- Decision makers must not use international health meetings or conferences as a platform to promote discriminatory laws and policies that undermine health and wellbeing.
- The exclusion of organisations that promote intolerance and discrimination including sexism, homophobia, and transphobia against individuals or groups, from donor funding for HIV programmes.
- All health-care providers must show the implementation of non-discriminatory policies as a prerequisite for future HIV programme funding.
- Restrictions on funding, such as the antiprostitution pledge and the ban on the purchase of needles and syringes, should be removed as they actively impede the struggle to combat HIV, sexually transmitted infections, and hepatitis C in sex workers and people who inject drugs.
- Advocacy by all signatories to this Declaration for the principles of inclusion, non-criminalisation, non-discrimination, and tolerance.

In conclusion we reaffirm our unwavering commitment to fairness, to universal access to health care and treatment services, and to support the inherent dignity and rights of all human beings. All people are entitled to the rights and protections afforded by international human rights frameworks.

An end to AIDS is only possible if we overcome the barriers of criminalisation, stigma, and discrimination that remain key drivers of the epidemic.

For the Melbourne 2014 Declaration see <http://www.aids2014.org/declaration.aspx>

shows that even slight improvements in coverage of biomedical interventions might effect a 50% reduction in HIV incidence within 10 years. Rapid implementation of sustainable, community-led, combination-prevention strategies that address social, interpersonal, and individual risks of HIV, and integrate gender care into HIV services are urgently needed (panel 2).

Diversity and communality

The great diversity of sex workers and of sex-work settings, contexts, and work environments is a challenge for the optimisation of HIV services. Although burdens of HIV infection in sex workers are generally similar, albeit at higher prevalence levels, to the HIV burdens in the populations of which they are a part,² sex workers do

Panel 3: Christine's story, Burma

"I started selling sex when I was 18. When I was 15 or 16, I started taking [a form of] cough syrup as a drug. My friends were doing drugs, and then I got a boyfriend who also used drugs so we started doing it together. Then we broke up and I started trading sex for drugs.

In 2008, Cyclone Nargis hit my country. During the cyclone, my father passed away. After his death, I had to look after my family. Before the cyclone, I was not forced to sell sex; I could choose when and with whom, and I could say no. But after the cyclone, I had to go with any client that came. Some clients were good and some were bad. But I wanted to give my little sister and brothers an education, and my grandmother needed an eye operation.

To deal with the stress, I started taking more cough syrup. At first I didn't take a lot, but then I started using it to get high and ease the pain. The drugs made me feel inner peace and also allowed me to do more work since I didn't need to sleep. It was a circle of doing drugs, and needing money for drugs and my siblings' education.

I had some health problems in the beginning, like excessive discharge, pain, and bruising. My fellow sex workers and I helped each other to heal our health issues. You need to have a group where you can discuss issues and solve problems together; you can discuss your feelings like if you are happy or sad. I had an implant for birth control in case a condom broke, but I also used condoms and every 3 months went for an HIV test.

I never wanted problems with the police, so whenever they wanted to have sex, I gave it to them for free. They didn't care if I was tired or didn't want to—they just told me they want it. Also, the police made us pay for their food in tea houses. If I went to do sex work in a different area of my city, I had to make a deal with the police chief of that area. Sometimes I had to give them money for alcohol.

Through having saved money, I finally managed to support education for my two younger brothers and my sister, and I was able to pay for my grandmother's eye operation. I also got a job in an international non-governmental organisation, and they helped me to stop my [drug] addiction through keeping me busy with work but also providing me information about drug use. Having the job with the NGO made my grandmother so proud of me—she cried when I told her the news.

I still do sex work sometimes when I travel because my job doesn't pay me enough to support my family. My salary is only 100 dollars a month. But I feel proud at what I've achieved.

I want to keep working on human rights issues, and also support other young people like me."

share some communalities that transcend context and might need novel approaches to HIV prevention and treatment (panel 3).

Multiple partnerships, antiretroviral coverage, and viral load in sex workers

In high HIV prevalence networks, even slight risks can yield high probabilities of infection.³⁰ The proportion of HIV-infected people treated or untreated with ART has a crucial role in individual risks of HIV acquisition.³¹ Sexually-active people in networks with high viral load and low ART coverage are at higher risk of HIV infection.³¹ For individuals in serodiscordant relationships, earlier initiation of ART is effective for HIV prevention.³² But for those with many partners, who could encounter people at different stages of HIV

infection (acute, recent, established, diagnosed, undiagnosed, treated, and untreated), the population levels of these parameters could be crucial. This might explain why women who sell sex in settings with high rates of HIV infection and low treatment coverage, as in southern and east Africa, have the highest global rates of HIV infection in sex workers. Theoretical models suggest that because of the preventive effects of ART, scale-up of ART access in Kenya for both female sex workers and their male clients to meet new WHO treatment guidelines of treatment initiation (at CD4 <500) could avert a third of new HIV infections in sex workers and clients during the next decade.¹

Because ART has been shown to substantially reduce onward transmission with the suppression of viral load, treatment for sex workers with HIV is an important prevention priority and an individual right and is essential to improved morbidity and mortality outcomes. Many sex worker community groups and advocates are rightfully cautious about HIV testing programmes targeting sex workers—in view of the rights violations inherent in ongoing mandatory testing programmes. Testing innovations, including self-testing, might help sex workers who wish to know their status free of coercion.³³ Reduction in discrimination in health-care settings will also be a necessary part of successful treatment programmes. Too many sex workers are treated as unwelcome, unworthy, and undeserving of the treatment that they need.^{34,35} Violence and trauma have been shown to undermine treatment adherence, which underscores the need for trauma-informed approaches for sex workers, when relevant.^{36–38}

Molecular epidemiology

Molecular epidemiology informs the understanding of HIV transmission dynamics, spread of resistance, network and community level dynamics, and the role of acute and super-infection. Because sex workers share the potential risks of multiple partners, and for many, patterns of mobility and social mixing both for themselves and their clients, they might face some distinct biological challenges to HIV prevention and treatment. Sex workers have participated in many molecular epidemiological investigations, which include some early studies that showed the usefulness of molecular approaches to understanding of HIV outbreaks.³⁹ Table 2 summarises some of the work regarding molecular epidemiology in sex workers.

Encouragingly, studies have investigated, but not identified, increases in ART resistance mutations in sex workers.^{43,46} Several groups have reported substantial clustering of HIV subtypes by sex-work status, clade differences from other high-risk groups, linkage with general population samples, and high proportions of dual, multiple, and recombinant HIV infections (table 2). These findings are consistent with multiple and repeated exposures. The molecular epidemiology of

	Population	Findings
Ssemwanga, et al ⁴⁰	324 HIV-positive FSW in Kampala, Uganda	Virology and partnership history. Women working in the same venues shared HIV variants; high rates of multiple HIV infections (dual and triple)
Carobene, et al ⁴¹	273 HIV-positive TG SW in Argentina	Subtypes BF, B, C, and A were similar to other risk groups. Many drug-resistant variants, and 6·5% co-infection with hepatitis C virus
Merati, et al ⁴²	175 IDU, SW, and MSM in Bali, and Jakarta, Indonesia	IDU had 100% CRF-01 A or E sexual transmission; SW and MSM had more mixed, non-A or E
Tran, et al ⁴³	284 FSW in Vietnam	No NRTI or PI resistance mutations detected, although the rate of ART coverage had increased
Mehta, et al ⁴⁴	Many sources such as San Diego, USA, and Tijuana, Mexico	Molecular analysis showed distinct HIV outbreaks in these border cities
Pando, et al ⁴¹	12 192 people: MSM, IDU, FSW, MSW, TGSW, and FDU, in Argentina	TG SW were the most HIV-burdened group, but ARV-resistant mutations were most common in women drug users
Land, et al ⁴⁵	240 people: mixed risk and FSW, in Nairobi, Kenya	HIV subtypes clustered by sex work status: less clade C, but more recombinant subtypes in SW

FSW=female sex workers. TG SW=transgender sex workers. IDU=injecting drug users. MSM=men who have sex with men. CRF=circulating recombinant forms. NRTI=non-nucleoside reverse transcriptase inhibitor. PI=protease inhibitor. ARV=antiretroviral. FDU=female drug user.

Table 2: Studies on the molecular epidemiology of HIV-1 in sex workers

HIV in female sex workers is generally linked to heterosexual variants in the populations from which they come (table 2). Male and transgender sex workers, by contrast, typically cluster with MSM populations, and less so with either female sex workers or other heterosexual networks.^{21,47,48}

Female sex workers, and their distinctive risk exposures, have also been part of intensive research on HIV-exposed seronegative individuals. Cohorts of female sex workers, who have remained HIV uninfected despite very high levels of exposure to HIV, have been studied in Kenya, Thailand, and Cote d'Ivoire since the 1990s.^{49–51} Although a wide range of immunological factors have been investigated to understand this occurrence and its implications for HIV prevention, no mucosal immunological finding yet fully explains why subsets of women who sell sex might not acquire HIV.^{49,52,53}

Costing of a new response

Optimisation of HIV prevention for sex workers and clients needs estimates of the costs and benefits of interventions within national and local contexts, which are shaped by HIV epidemiology, patterns and characteristics of sex work, and economic, social, and policy environments. Unfortunately few cost-effectiveness studies focus on female sex workers (and none on transgender sex workers), and scarce data are available for intervention costs, infections averted, treatment costs saved, and disability-adjusted life-years (DALYs) averted. Mathematical models have begun to address some of these limitations by extrapolation of the benefits and costs of interventions for female sex workers. We reviewed the cost-effectiveness literature for individual-based and structural interventions for female sex workers and clients. Models of this series of biomedical⁵ and structural¹ interventions for female sex workers allow estimates of the thresholds for these interventions to be cost-saving or

cost-effective; these have also been reported (appendix pp 13–26).

A main HIV prevention strategy—to increase condom use in sex work—has long been identified as an economical strategy.⁵⁴ Mathematical models of the epidemic in South Africa suggest that increases in condom use during sex work since 1990 prevented 66% of new infections in clients and 85% in sex workers in 2010.⁵ In sub-Saharan Africa and southeast Asia, peer or community counselling and condom distribution among female sex workers was estimated to be cost effective, at US\$86 per infection averted and \$5 per DALY averted (all costs from here expressed in 2012 US\$), and was more cost-effective than school-based education, voluntary counselling and testing, prevention of mother-to-child transmission, and STI treatment.⁵⁵ For the female condom, simulations suggest that distribution to rural Kenyan female sex workers would be cost saving,⁵⁶ but substitution of female condoms for less-expensive male condoms that would otherwise have been used might reduce financial benefits.⁵⁷ Female condoms might be most appropriate when the use of male condoms is not a viable prevention strategy.⁵⁸

Microbicides and oral PrEP are promising prevention strategies, but more data are needed for efficacy, acceptability, adherence, and risk compensation. Models by Bekker and colleagues⁵ show that even with slight uptake and efficacy and reduced condom use, microbicide use by female sex workers in South Africa could prevent 1385 new infections in female sex workers and clients during 10 years, and save more than US\$10 million in HIV-treatment costs (appendix pp 13–26). On the basis of estimated intervention costs in South Africa,^{59,60} microbicides are unlikely to cost less than the cost-saving threshold of \$0·17 per sex act, but they could meet the highly cost-effective threshold of \$2·17 based on international standards.⁶¹

Use of PrEP by female sex workers in South Africa would reduce incident infections in this population by

Panel 4: Calls for action for stakeholders in the HIV response for sex workers**For communities**

- Engage in SW community empowerment, and commit to activism.
- Advocate for community engagement as it is cost effective and reduces HIV risks.³
- Advocate for universal access to services, including HIV services provided with dignity, safety, and confidentiality.
- Monitor the work of governments, donors, and multilaterals, and hold them accountable for adequate programming and policy to address HIV among SW.

For governments

- Decriminalise sex work. Decriminalisation can improve the risk environment.^{3,3}
- End impunity for crimes and abuses committed against sex workers.³
- Advance evidence-based policies and practices in partnership with SW-led organisations.⁶
- End discriminatory laws, policies, and practices against female, male, and transgender sex workers.⁷
- Include sex workers in epidemiological surveillance and make results publicly available.
- Include civil society, including SW-led-organisations, in national policy planning.
- Recognise sex work as work, and develop occupational health and safety standards, mechanisms to redress violence against sex workers and other violations of labour and human rights.

For donors

- Address the present underfunding of the responses to HIV among sex workers.
- Raise support for the research agenda for combination HIV-prevention and care services for SW.
- Novel and combined enhanced prevention and treatment programmes have not been investigated in SW. This needs to change.
- Support SW-led-organisations at global, regional, and country levels.
- Empowerment models require funding of community-led organisations rather than organisations working with communities.^{74,75}
- Invest in strategic information about HIV and sex work.
- Reliable data for HIV and sex work is needed and should include access to ART and ART coverage; condoms and lubricants; comprehensive SRH services; migration and mobility; trafficking in people meeting the Palermo Protocol; gender-based violence; and affirmative action to address human rights violations towards sex workers.

Harmonise donor responses

- Interventions that compete with each other, including those driven by ideology and not science, reduce the scale and effectiveness of the HIV response in sex workers.^{8,9}

For implementers and providers

- Tailor care and support programmes for sex workers living with HIV.
- SW mainly live and work away from home communities. National and local support for the wider population living with HIV is unavailable to SW, and this needs to change.
- Scale up comprehensive HIV, STI, and SRH programmes for SW that are non-stigmatising and meet quality standards.
- SW face inadequate access to: ART, condoms and lubricants; safe abortions and post-abortion care; STI management; contraception services; vertical transmission programmes; and maternal health services and drug treatment services.
- Act to reduce stigma and discrimination in health-care settings for SW
- Refrain from participation in health programmes that are not evidence-based.
- Ensure training in culturally competent care for all personnel in clinical settings, including non-clinical staff (security, intake) who might interact with sex workers.

For researchers

- Partner with sex-worker communities and organisations to focus research efforts on questions of relevance to sex workers.
- Partnerships between researchers and sex-worker communities have led to some of the most robust research findings for HIV prevention.
- Investigate novel options for HIV prevention, treatment, and care for SW of all genders, including those in challenging policy environments.
- Take advantage of natural experiments to assess the effect of various sex work regulations on HIV incidence, prevention, care, and treatment.
- Dispel myths about sex workers that undermine access to HIV prevention, care, and treatment.
- Research can be a powerful method to dispel myths about SW.¹
- Expand implementation science and operations research to develop and refine HIV services for SW.
- Expand research of SW-relevant issues in understudied regions, including Africa, the Middle East, eastern Europe and central Asia.
- Very little prevention or treatment research has been undertaken in some crucial areas where HIV epidemics continue to expand.
- Expand research on HIV prevention and treatment for male and TG sex workers, particularly in regions where there are little or no data.
- No research has been done for, or with, male or TG SW in most countries worldwide. HIV data for TG women in general were available for only 15 countries in 2013.⁷⁶

SW=sex worker. TG=transgender. ART=antiretroviral therapy. SRH=sexual reproductive health. STI=sexually transmitted infection.

7·4% during 10 years and prevent nearly 3000 infections.⁵ General population person-year costs are estimated at \$200 in South Africa,⁶² therefore PrEP for female sex workers would be cost-saving. However, for both microbicides and PrEP, additional expenditures might be needed to reach and engage female sex workers and to help with adequate coverage and adherence. Drug costs will be a major determinant—Truvada costs as much as \$10 000 per year in some countries.⁶³ Additionally, local variation in HIV, condom use, and patterns of sex work can substantially affect the effectiveness of microbicides⁶⁴ and oral PrEP.⁶⁵

Periodical testing of HIV status and the offer of immediate treatment for female sex workers is an especially promising intervention. Mathematical models show that during a 40-year period in Vietnam, an additional 19% investment in HIV testing,

counselling, and ART could prevent 31% of new infections at an estimated cost of \$116 per DALY.⁶⁶ For female sex workers in South Africa, a test-and-treat strategy during a 10-year period could reduce infections in clients by 23%, prevent nearly 34 000 infections,⁵ and save \$265 million in treatment costs. However, investments of more than \$80 million would probably be needed to achieve these savings.

Individual-based interventions could need additional activities and resources when stigmatisation affects prevention programmes, condoms as evidence of sex work affects condom carriage and use, or social exclusion affects access to care. Community-based, structural interventions, by contrast, change these contexts through the creation of safer work environments, and a reduction in violence and police harassment.

Panel 5: Dutch pragmatism in policing sex work (from a police inspector in Amsterdam)

“Brothels were illegal, but tolerated until 2000 in the Netherlands, when the ban was lifted. Sex work itself has never been illegal, provided it was voluntary. Important reasons to lift the ban were to better control and regulate the sex industry, to protect sex workers, and to decrease the links between sex work and crime, such as the sexual exploitation of children and human trafficking.

Local authorities formulate and implement policies and are responsible for issuing licences and regulating brothels. Amsterdam chose to regulate sex establishments through local licensing. To receive licences owners cannot have criminal records, can only employ sex workers older than eighteen, must offer STI and HIV testing, must provide health education, empower sex workers to make their own decisions, and grant access to government health workers and police. Mandatory testing is forbidden.

Health workers and the police work together. The role of law enforcement is to control if minors or illegal residents are doing sex work, to check licences, and to investigate illegal sex work. The number of underaged girls in the visible sex industry has dropped substantially—brothels do not want to lose their licences.

One of the most striking features in the Netherlands is how sex workers perceive the police. Sex workers are not afraid and come to us for assistance. We notice the difference with sex workers that come from eastern European countries. They do not trust us at first because of harsh experiences with police in home countries.

Our main target is to ensure that human trafficking and sexual exploitation are eradicated and proper facilities are in place for adult sex workers. One of the main ways to reach this goal is to make a distinction between sex work and sexual exploitation in policy and response. Connections between different professionals are another aspect of pragmatism. Quick responses can be provided in cases of human rights violations.

Health staff and NGOs know where to reach us when they detect young girls or illegal sex workers. And we, as the police, call them to check on sex workers we are concerned about.

In the Netherlands the prevalence rate of HIV in sex workers is not much higher than that in the general public. The pragmatic approach of the previous years might have contributed to this low rate. Additional positive effects have been the support of the government with empowerment programmes for sex workers, low incidence of violence, informed sex workers about labour and health rights, and additional income revenues for the government.

During exchange visits in Sweden, where clients of sex workers are criminalised, we noticed that police officers were literally eavesdropping at the doors of sex establishments, in order to seek proof that clients were paying for sex. Yet in previous years, no cases against clients had made it to court. Another field exchange in Vietnam showed that police and sex workers did not discuss mutual problems. When you don't know each other and don't understand problems that the other party is facing, how can you work together? Enforcement is not the only solution. Despite an uncomfortable start, we arranged a meeting between police and sex workers to start a dialogue.

Although the Dutch system of legalisation of sex work has been found to have many benefits, we also face challenges. We suspect that many sex workers without valid papers have gone into hiding, and forced prostitution remains difficult to police. In our political system, discussion of legislation of sex work is in many politicians' minds. People see sex workers as victims, even when they consciously and voluntarily choose their work. We must fight human trafficking and at the same time be protectors for the sex workers. We have to combine our efforts with partners in the field because this global problem cannot be tackled by law enforcement alone.”

STI=sexually transmitted infection. NGO=non-governmental organisation.

Beattie and colleagues⁶⁷ provide estimates of the effectiveness (but not the costs) of violence-reduction interventions for female sex workers, and modelling studies show that elimination of violence-attributable risk of HIV in various countries would substantially reduce HIV transmission.^{1,68} However, the investments required to achieve such benefits have not been established, and cost estimates are similarly needed for reduction of police harassment and creation of safer work environments.

To inform policy makers about the merits of sex-work decriminalisation needs better identification and quantification of the potential benefits and costs. In addition to HIV prevention,¹ other societal benefits could include raised access to police protection, improved occupational health and safety in sex work, and the redirection of law enforcement and criminal justice expenditures towards health and social services.⁶⁹ Even with rights-based law reform, advocacy and interventions led by female sex workers with police departments⁷⁰ might be required to maximise the benefits in regard to reduced harassment and increased access to justice for female sex workers.

On the basis of their modelling, Shannon and colleagues¹ estimated that decriminalisation of sex work would, during 10 years, avert 72 infections in female sex workers and clients in Vancouver, Canada; 233 in Bellary, India; and 1155 in Mombasa, Kenya. The cost-saving and highly cost-effective thresholds for the decriminalisation of sex work varies across these settings because of differences in the estimated number of infections averted, gross domestic product, HIV-treatment costs, and DALYs averted. The cost-saving thresholds are estimated to be around \$24 million for Vancouver, \$1.5 million for Bellary, and \$12 million for Mombasa (appendix pp 13–26).

Several cost-effectiveness studies show the value of community empowerment. In Ahmedabad, India, empowerment, outreach, peer education, condom distribution, and free STI clinics were cost saving and eliminated more than 50% of incident infections in female sex workers and their clients.⁷¹ Two community-mobilisation interventions in the Dominican Republic were cost effective and reduced HIV by \$523 and \$1356 per DALY averted.⁷² Modelled scale-up of empowerment-based approaches in Ukraine, Kenya, Brazil, and Thailand during a 5-year period has shown reductions in around 8–12% of new infections in sex workers, with benefits further enhanced by scale-up of ART.⁷³ Kerrigan and colleagues⁹ estimated that the cost per DALY averted with these community empowerment-based interventions would vary between countries: \$87 in Ukraine and Kenya, \$1448 in Brazil, and \$3167 in Thailand.

These studies are investigating how the prevention response could be improved, but much more research is needed. How is the cost-effectiveness of individual or

combined interventions for female sex workers shaped by local and national contexts? How will the costs and benefits of tailored interventions overcome the unique barriers to HIV-risk reduction in female sex workers? And can resilience be strengthened and leveraged? (panel 4).

Conclusions

The component of global HIV and AIDS related to sex workers has been understudied and underaddressed for too long. Sex workers are in need of HIV services globally, and empowered and engaged individuals, collectives, and communities want and will use these services if they are available in safety, and with dignity and freedom from harassment. To recognise the diversity of sex workers and their environments and to appropriately tailor promising HIV interventions to the specific contexts are public health priorities. Many HIV interventions which meet criteria for efficacy or effectiveness, or both, would also be cost saving. In the present policy and funding climate in which some donors seek to transition to country ownership of HIV efforts, HIV programmes for sex workers might be challenged. All engaged in the HIV response must work to ensure that effective programmes for sex workers are supported and sustained in these transitions.

Punitive approaches to sex work have hindered responses, and helped and abetted the HIV virus. Such occurrences are barriers to pragmatic and public health oriented approaches which can reduce transmission, save lives, and reduce violence and rights abuses against the women, men, and transgender people who sell sex. The rich evidence base for community-based interventions shows that when sex workers lead in interventions, real and measureable improvements in health and rights can be achieved. Together, community engagement and new biomedical methods for HIV prevention and treatment offer the promise of substantial reductions in HIV risks and burdens for sex workers in the future, and could reduce treatment costs and save lives. If these advances can be made available in policy contexts where carrying condoms is seen as a positive occurrence, where police protect sex workers from violence rather than perpetrate it, and where outcomes of policies are measured in reduced HIV infections, not increases in arrests, this component of the global HIV response could be markedly more effective (panel 5).

Contributors

CB did the original conceptualisation of the manuscript, drafted the outline, led the paper writing team, drafted the introduction diversity, molecular epidemiology sections, and contributed to tables 1 and 2, the figure, and panels. A-LC contributed to the human rights call to action, and to table 1 and panel 4. L-GB contributed to the prevention call to action section, and to table 1 and panel 4. JB contributed to the community empowerment call to action, and to table 1 and panel 4. KS contributed to the structural determinants call, and to table 1 and panel 4. DK contributed to the community empowerment call and to

tables 1 and 2. MRD contributed to the human rights and the law section. SDB contributed to the male sex worker call to action and to table 1 and panel 4. TP contributed to the transgender sex worker call to action. ALW led the systematic review and analysis for the global burden of HIV among sex workers section and contributed to the figure, and to the appendix (global burden of disease). BWW led the costing analysis section and drafted that section, and the appendix (costing). FB-S contributed to the policy and human rights analysis. MK contributed to the policy and programme components and to panel 4. MS contributed to the prevention and implementation components of the manuscript and to panel 4. K-LD contributed to the prevention call to action and to panel 4. M-CB led the modelling work for the structural determinants call to action and contributed to the introduction and conclusions. SAS contributed to the conceptualisation of the manuscript and to the overall writing and editing of the manuscript.

Declaration of interests

We declare no competing interests.

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