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HIV and sexually transmitted co-infections among sex workers in the Southern African economic region

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ABSTRACT

Background: The Southern African Development Community (SADC) economic block is the most affected region by HIV epidemic in Sub-Saharan Africa (SSA). Despite programmatic interventions, HIV infections remain unprecedentedly high among female sex workers (FSW) in the region. This review assesses the HIV burden and the drivers associated with FSW in the SADC region. **Methods:** We systematically extracted and analyzed HIV burden and other sexually transmitted infections (STIs) research data on FSW indexed in various journal platform and reports from governmental and nongovernmental organizations between 2003 and 2015. Meta-analysis technique was used to estimate the pooled prevalence of the HIV burden among FSW in the region. **Results:** Of the 192 peer-reviewed articles and reports addressing HIV burden, only 21 articles met eligibility criteria totaling 14998 FSW. The combined overall pool HIV prevalence was estimated at 42.0% (95% CI 0.41–0.43). The estimated pooled HIV prevalence ranged from 16% (95% CI 0.13–18) in Democratic Republic of Congo, 59% (95% CI 0.57–0.62) in South Africa and 71% (95% CI 0.65–0.76) in Malawi. The most common STIs reported were syphilis, Chlamydia, and gonorrhoea with little emphasis on viruses. Structural factors such as stigma and discrimination, access to healthcare services and various socioeconomic and political barriers impeded treatment and prevention. **Conclusion:** The HIV prevalence among FSW was 5–30 times higher when compared to the overall female reproductive age population in the SADC region. This signifies and necessitates increase evidence based HIV/STIs research and programs among FSW in the SADC region.

Key words: Barriers, drivers, female sex workers, HIV, intervention, pandemic, prevalence, Southern African Development Community

Introduction

The overall population of the Southern African Development Community (SADC) is estimated at 277 million people^[1] composed of 15-member states. The region accounts for more than 42% of people living with HIV worldwide [Figure 1].^[1–4]

Despite strikes in scaling up interventions such as increased access to HIV testing and antiretroviral

therapy (ART) treatments and prevention, HIV epidemic in most countries in the region remain high.^[2] ART has been scaled by 40% in South Africa, Botswana, Zimbabwe, Zambia, Malawi, Tanzania, Swaziland, Lesotho and Namibia; and by 25%–39% in Angola and Mozambique while in the Democratic Republic of Congo (DRC), Mauritius, and Madagascar it is <25%.^[2,4] [Figure 1].

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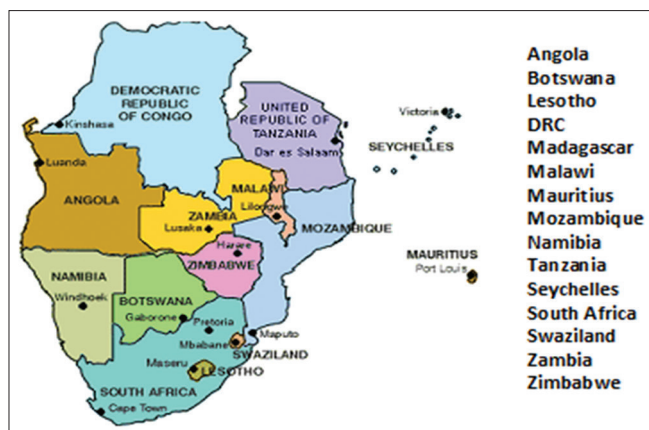


Figure 1: The Southern African Development Community Countries (adapted from Southern African Development Community 2011)

Regardless of HIV interventions, including provision of increased awareness and social mobilization programs, condom distribution, free HIV counseling, testing and treatment, new HIV infections continue to escalate among female sex workers (FSW) and their clients in this region.^[5] With similar trend documented in men who have sex with men (MSM) and people who inject drugs.^[5] The SADC HIV epidemic has always been grouped under the umbrella of sub-Saharan Africa (SSA), despite the fact that HIV transmission structures and other factors are somehow different from SADC region. The region possesses a distinct HIV transmission dynamic when compared with the rest of SSA. Traditionally, HIV in the SADC subregion has been characterized by the use of population-based surveillance to inform HIV policies and interventions, but neglecting to provide specifically for the FSW epidemic extremity in SSA.^[6] Since sex work was considered illegal in the region, this silently escalated the high HIV burden among FSW in the region. Consequently, FSW continue to suffer a high HIV infection/burden across the region.^[2] Despite evidence-based HIV burden among FSW in all settings, FSW still have limited uptake and appropriate safe access to relevant HIV prevention services to address their unmet health needs.

At present, the national HIV prevention programs in the region provide very little focus on the reproductive health of FSW,^[7] especially in SSA.^[8] Globally, it is reported that HIV burden among FSW is estimated to be 11.8%,^[5] and they are more (13.5 times higher) likely to be infected with HIV when compared to the general population.^[2,5] The limited attention given to HIV intervention needs among FSW contributed to the paucity of literature and data on HIV epidemic among FSW in the region, thereby hindering public health experts knowledge about the problem among this group and how they can be addressed.

Structural factors (e.g., gender inequality, poverty, violence, stigma, discrimination, social isolation, and exclusion) constitute further barriers to provision of HIV surveillance systems in the region for FSW.^[9] Behavioral and biological factors such as inconsistent use of condoms, unprotected sex, sexually transmitted infections (STIs),^[10-12] and poor adherence to ART^[9,13] constitute added barriers. These risks factors render FSW and their clients highly vulnerable to HIV acquisition and other STIs.^[9] Available studies show that approximately 50% of FSW have access to HIV prevention facilities globally.^[14] This limited access explains why the burden of HIV^[15] and other STIs^[10] continues to escalate among FSW when compared to the general population.^[3] In countries with an elevated HIV epidemic, the FSW, therefore, bear a much higher burden than the general population.^[9] The worst epidemic scenarios occur where relevant information from demographic and health surveys that could have been used to inform prevention and treatment are scanty. This is a common phenomenon among many SADC countries.^[3] SADC HIV surveillance systems, especially tend to focus primarily on antenatal clinics and fail to capture information about FSW transmission dynamics and new infections. Therefore, there is an urgent need for surveillance systems that can be used to adequately estimate the burden of HIV among FSW in the region to generate informed policies specifically for FSW health needs and services.

Furthermore, given the paucity of data on FSW in the SADC region, most HIV programs still use national prevalence statistics to estimate the stages of the epidemic. This fails to adequately account for the HIV burden among FSW in the region. It is therefore necessary to formulate and examine policies that can assess HIV prevention and service delivery needs that are focused on the burden of HIV among FSW across the region. Hence, this review strives to focus specifically on the burden of HIV and other STIs among FSW so as to show the prevalence of these diseases among this group in the region. In addition, it is apparent that the extent of HIV epidemics among FSW is underestimated as there are insufficient data with regard to HIV diagnoses among FSW. The findings of this review will be used to make recommendations for strengthening HIV studies and implementation programs among FSW in the SADC region and beyond. This is urgent as FSW HIV epidemics within SADC remain an important challenge because of limited HIV surveillance and a paucity of targeted prevention programs for FSW as sex work still remains illegal in the region.^[16,17] Thus, this review assesses the drivers of HIV, access to and utilization of preventive and control measures among FSW across the SADC region. This

paper provides baseline information and knowledge to inform implementation of evidence-based innovative social-epidemiological approaches and interventions aimed at reducing the burden of HIV and other STIs among FSW toward sustained HIV-free SADC environment.

Southern African Development Community: A brief background

The SADC region is highly diverse in terms of language, history, and culture.^[1] The official languages (international lingua-franca) include English spoken by 9 (60%) of the countries, French by 2 (13.3%), Portuguese by another 2 (13.3%), and 2 that have both English and French (13.3%) as official languages.^[1] According to the SADC reports from the year 2000–2009, the average life expectancy in the region was estimated to be 52.8 years, except for Mauritius and the Seychelles both with a significantly higher life expectancy of 73 years. Among all, Lesotho has the lowest life expectancy of 46.7 years in the region.^[1] In addition, a 2011 report indicates that the SADC gross domestic product was estimated to be approximately 5.2%.^[1] The region has the highest HIV prevalence globally, with an HIV prevalence in population aged 15–49 estimated at 12.6% when compared to the SSA adult prevalence of 5%, with women accounting for 60% of those infected.^[1,2] The region also has differences in sexual and reproductive behaviour practice.^[1,2]

Methods

Search strategy

The epidemiology of HIV among FSW in the SADC region was extracted from PubMed, Global Health, Embase, Scopus, Cochrane Central, SIS-Web of Science, PsycINFO, nonpeer reviewed articles, reports, online abstracts databases presented at International AIDS Conferences, and other HIV-related conferences. Relevant country-related keywords pertaining to HIV prevalence among FSW were used to search for HIV and STI infection data in indexing systems. We used the PRISMA guidelines in carrying out this research^[55] with specific key words depending on the language background. The keywords included phrases such as commercial sex work, female sex work, HIV-sex works, HIV- FSW, HIV-commercial sex works, HIV and prostitute, HIV-most at risk population and HIV-key population, “VIH et les prostituees du sexe” etc., These keywords and phrases are all associated with the following SADC countries [Figure 1]. Other data sources searched included international organizations websites such as UNAIDS and other national surveillance system data reports, including global networks for sex work research websites (e.g., <http://www.nswp.org/>).

Articles published in both English and French were searched and relevant ones were included in this review.

Selection criteria and extraction processes

All extant studies that focus on HIV prevalence as the main outcome among FSW in the SADC region were searched and explored. The information was then synthesized and filtered based on the study’s inclusion criteria. CSY conceptualized and lead the study design. CSY and ET independently reviewed the extracted articles in an excel format, consolidated, and categorized per country and reviewed for discrepancies. CSY performed the statistical analysis and wrote the draft article with ET while AO and AM gave addition input. All authors have read and approved the final manuscript.

Data processing and analysis

In general, there were 192 studies identified from 2003 to 2015. Of the 192 studies, only 21 met the study inclusion criteria as shown in Figure 2. The meta-analysis statistical techniques were applied to estimate the pooled prevalence of the HIV burden among FSW.^[61] The random-effects model was used to aggregate the individual effect sizes and produce a more conservative estimate than a fixed-effects model of variance according to Mohan *et al*^[61] the method accounted and generated an estimated pooled HIV proportion estimates from the selected studies. The data were analyzed using STATA 13, 4905 Lakeway Drive College Station, Texas 77845 USA, and constructive input from a senior biostatistician. Only

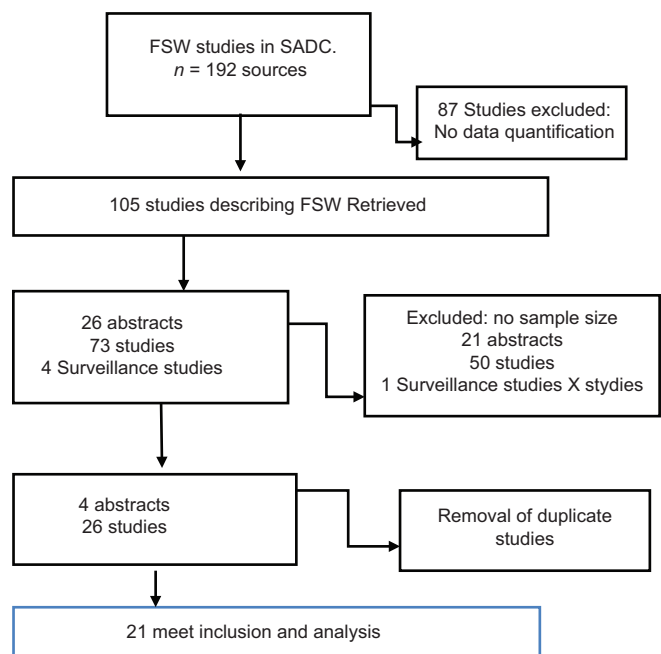


Figure 2: Flow Chart extraction of HIV burden studies among female sex workers (12%) in Southern African Development Community Countries

studies with sample size and HIV prevalence were included in the study as per the aim and objective of the review [Figure 2].

Results

The FSW HIV burden data were found to vary significantly across the region and within countries. Only 13 (87%) of the 15 SADC member states had FSW data on the HIV burden available with the exception of Lesotho and the Seychelles where no data were available on HIV infection rates among FSW at the time of this review. Of the 192 relevant articles, reports and abstracts addressing HIV among FSW that were extracted and explored, only 21 studies met the inclusion criteria of both sample size and HIV prevalence in 11 countries. This culminated to a total of 14 998 FSW in SADC region. The pooled HIV estimate varied across the countries with a total pooled HIV prevalence of 42.0% (95% CI 0.41–0.43) in SADC economic hub among FSW. The pooled estimate was 16% (95% CI 0.13–18) in DRC, 24% (95% CI 0.22–0.25) in Tanzania, 25% (95% CI 0.22–0.28) in Mauritius, 28% (95% CI 0.25–0.3) in Mozambique, 38% (95% CI 0.32–0.44) in Namibia, 39% (95% CI 0.36–0.43) in Zambia, 57% (95% CI 0.54–0.6) in Zimbabwe, 59% (95% CI 0.57–0.62) in South Africa, 64% (95% CI 0.61–0.67) in Swaziland, 62% (0.6–0.63) in Botswana and as high as 71% (95% CI 0.65–0.76) in Malawi as shown in Table 1. The HIV burden was comparatively high in 5 countries that are above 50% and 7 between 16% and 49%. Although there were variations in sampling techniques, the respondent-driven sampling was found to be the most common method used in accruing participants in most settings. The median sample size was 370 (interquartile range 103–537) and the minimum sample was $n = 103$ while the maximum was $n = 4152$. In general, the HIV burden among FSW was found to be 5–30 times higher than that of the general population in different social settings. The trends and characteristics of the HIV epidemic among FSW in the SADC region were quite different from other regions, with an exceptionally high burden when compared to other regions [Table 1].

Principal drivers of HIV among female sex workers in the Southern African Development Community region

The findings showed that a range of factors are responsible for HIV transmission dynamics and continuous spread among FSW^[6] and their clients and to the general community^[62] For example. (1) Risky behaviors, including unprotected sexual intercourse, and alcohol and drug abuse.^[49,53] (2) Other factors including inconsistent use of condoms, poverty, unemployment, low levels of education,

infections through SADC truck drivers, and poor access to prevention measures were some of the common potential causes of infections as documented in the previous studies, as shown in Figure 3.^[3,6,22,49,53,62] The presence of barriers to FSW HIV programs and interventions aimed at curbing the spread of HIV in the region were also highlighted.^[6,22] Some of the barriers reported include poor access to HIV diagnostics and interventions; poor attitudes to care-seeking interventions; poor adherence and retention to preventive interventions (e.g., use of condoms and antiretroviral [ARVs]).⁽⁴⁾ Also included are declining individual and family responsibility; increasing poverty and unemployment; alcohol/drug use and abuse; stigmatization, isolation and fatigue in condom use, discrimination and ARTs uptake^[53,62] as shown in Figure 3.

Table 1: The pooled HIV Prevalence among female sex worker in Southern African Development Community economic hub

Study	ES	[95% Conf. Interval]	% Weight	Ref
Mauritius				
1	0.29	0.24	0.34	2.01
2	0.22	0.18	0.27	3.18
Sub-total				
Fixed pooled ES	0.25	0.22	0.28	5.18 ³³⁻³⁴
Swaziland				
3	0.61	0.55	0.66	1.88
4	0.61	0.55	0.66	1.83
5	0.70	0.65	0.75	2.13
Sub-total				
Fixed pooled ES	0.64	0.61	0.67	5.84 ^{9,15,35-36}
South Africa				
6	0.60	0.56	0.63	4.42
7	0.46	0.41	0.52	1.63
8	0.67	0.62	0.72	2.49
Sub-total				
Fixed pooled ES	0.59	0.57	0.62	8.54 ³⁹⁻⁴¹
Zimbabwe				
9	0.51	0.45	0.56	2.03
10	0.51	0.44	0.57	1.30
11	0.70	0.63	0.76	1.47
12	0.61	0.54	0.68	1.24
Sub-total				
Fixed pooled ES	0.57	0.54	0.60	6.05 ⁴³⁻⁴⁴
Botswana				
13	0.62	0.60	0.63	24.19 ^{10,45}
DRC				
14	0.29	0.23	0.35	1.66
15	0.12	0.10	0.16	6.96
Sub-total				
Fixed pooled ES	0.16	0.13	0.18	8.61 ⁴⁶⁻⁴⁷
Malawi				
16	0.71	0.65	0.76	1.82 ⁴⁹
Mozambique				
17	0.31	0.27	0.36	2.56
18	0.24	0.20	0.28	3.13
19	0.29	0.25	0.34	2.85
Sub-total				
Fixed pooled ES	0.28	0.25	0.30	8.54 ⁵⁰
Namibia				
20	0.36	0.27	0.46	0.61
21	0.39	0.31	0.48	0.75
Sub-total				
Fixed pooled ES	0.38	0.32	0.44	1.36 ⁵¹
Tanzania				
22	0.26	0.24	0.28	13.66
23	0.17	0.14	0.20	7.79
24	0.31	0.28	0.36	3.42
Sub-total				
Fixed pooled ES	0.24	0.22	0.25	24.87 ^{11,52-53}
Zambia				
25	0.39	0.36	0.43	4.98 ¹²
Overall				
Fixed pooled ES	0.42	0.41	0.43	100.00

Heterogeneity 687.0, df = 10, overall Z = 113.22, P < 0.01. ES = Effect size

Understanding sexually transmitted infections Prevalence among female sex workers in Southern African Development Community Region

Table 2 reveals only countries with data on STIs among FSW. The nature and presence of STIs were found to be highly diverse in the region. The most common STIs associated with FSW were syphilis, Hepatitis C virus (HCV), Chlamydia, and gonorrhoea. Syphilis was the most prevalent bacteria-STI presented in most of the studies. Syphilis was found to range from 23% in Zambia, 11% in Madagascar, 7% in the republic of Tanzania, 6.6% in Swaziland, 5.1% in Mauritius, and 3.7%–14.5% in Botswana. The second most common bacterial isolate was gonorrhoea, ranging from 8.3% to

11.7% in Botswana, 7.8% in DRC, 10.5% in the republic of Tanzania, and 12% in Madagascar [Table 2]. Other associated bacteria-STIs included Chlamydia, ranging from 4.8% to 16.3% in Botswana, and 7% in Madagascar to 8.4% in DRC. Furthermore, bacterial vaginosis was 15.7% in Tanzania. In addition to bacteria pathogens, sexually transmitted parasitic pathogens were also common among FSW in the region: *Trichomonas vaginalis* was 4.2% in the republic of Tanzania and 10% in Zambia. Also indicated was candidiasis (8.0%) in the republic of Tanzania, the most common fungal yeast infection of *Candida albicans* species [Table 2]. Similarly, the data triangulation shows that apart from HIV other viruses were also associated with FSW and these include HCV, herpes simplex-2 (HSV-2), and hepatitis B virus (HBV). HSV-2 was the most prevalent, ranging from 58.5% in the DRC, 56% in the republic of Tanzania to 85.4% in Zimbabwe. HCV was 3.4% in the Republic of Tanzania and 43.8% in Mauritius while HBV was 6.3% in the Republic of Tanzania [Table 2]. In Malawi, the total STI prevalence was estimated at 2.5% among the FSW tested [Table 2].

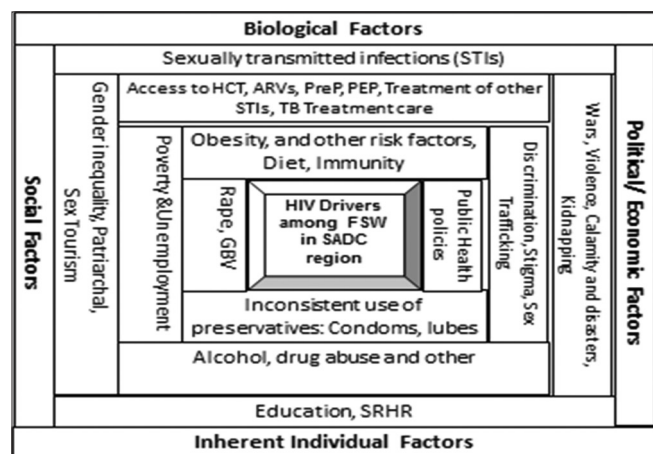


Figure 3: Determinants/drivers of female sex workers vicious cycle of transmission dynamics and spread in Southern African Development Community-economic hub

Discussions

Despite the different intervention programs aimed at reducing the widespread of HIV globally, HIV and other STIs-among FSW still continue to constitute a huge burden, especially in the SADC region. STIs and HIV challenges among FSW are arguably still intensifying and are often highly stigmatizing.^[6] The SADC HIV

Table 2: A snapshot of sexually transmitted Infections among female sex worker in Southern African Development Community economic region

Country	Number of FSW recruited	Recruitment methods	FSW age in years	STIs	HIV prevalence in general population	HIV prevalence among FSW	HIV infected female reproductive 15-49 years [‡]	Authors
Mauritius	299	IBBSS RDS	Median 31	Syphilis 5.1%, HCV 43.8%	1%	28.9%	3000	[2,33-34]
Swaziland	327	RDS	N/A	Syphilis 6.6%	26.6	60.5%	120,000	[2,9,35]
Zimbabwe	214		N/A	HSV-2 85.4%	14.4	61.2% (54.7-67.7)	750,000	[2,44]
Botswana	4152	CRS: Time location sampling	Median 29.7	Syphilis (3.7%-14.5%), Chlamydia (4.8%-16.3%), gonorrhoea (8.3%-11.7%)	20.8	61.9% (56.7-69.2)	190,000	[2,10,45]
DRC	553	CRS	N/A	Herpes-2.58.5%, 7.8% gonorrhoea, 8.4% chlamydia	0.9	12.4% (9.62-15.58)	260,000	[2,47]
Madagascar	100	N/A	N/A	27%, trichomonas vaginalis, 12% gonorrhoea, 7% chlamydia, 11% syphilis	<1%	0%	2600	[2,24]
Malawi	273	CRS: IBBS	N/A	287 (2.5%) tested for STI	9.6	71%	520,000	[2,49]
Tanzania	1914	IBBSS: RDS	Median 26	Syphilis 7% HSV-2.56%	11.9	26%	750,000	[2,11]
Tanzania	537	IBBSS: RDS	N/A	STI 27.3%; HBV 6.3%, HCV 3.4%, syphilis 2.0%, gonorrhoea 10.5%, chlamydia 6.3%, TV 4.2%, bacterial vaginosis 15.7%, candidiasis 8.0%	11.9	31.4	750,000	[2,53]
Zambia	863		N/A	10% +ve TV, 23% +ve syphilis	11.9	45%	530,000	[2,12]

IBBSS=Integrated Biological and Behavioral Surveillance Survey, RDS=Respondent-driven sampling, CRS=Cross-sectional survey, N/A=Not applicable, FSW=Female sex worker, STIs=Sexually transmitted infections, DRC=Democratic Republic of Congo, HCV=Hepatitis C virus, HSV-2=Herpes simplex 2, HBV=Hepatitis B virus, TV=*Trichomonas vaginalis*

burden remains higher than those reported in other SSA economic regions, such as West, East, and Central African countries.^[20,21] Consequently, this high burden may affect the general health and socioeconomic well-being of the whole SADC region.^[25] The extent of the economic burden has been outlined by Baral *et al.*^[5] and Richter,^[22] who assert that SSA has an overall HIV estimate of 7.4% and 36.9% among FSW. When compared to the overall pooled HIV burden, this necessitates special interventions that will significantly reduce the burden in the SADC region. The potential interventions include in-depth longitudinal studies, improved access to HCT, diagnosis, treatment and care, retention adherence, as well as health policies that are acceptable and sustainable.

The high HIV epidemic in the region, however, can be closely linked to labor migration^[56] which has encourage sex workers to seek sex tourism in more advance cities, towns, and countries.^[56] The high mobility has placed individual migrant as high-risk agents in the spread of HIV.^[57] This has played a significant impact in the spread of HIV in the Southern African region. According to Statistics South Africa,^[58] SADC region conversely has the highest proportion of female tourists (43.1%) when compared to other African region (32.0%). Furthermore, this has been documented in other studies where migrant sex workers had shown creative social networks and how to deal with sex work.^[59] In addition, this has shifted and influence the epidemic burden within the region since FSW also has laissez-faire attitude in accessing health care as migrants due to structural factors.

Furthermore, the extent of the HIV FSW epidemic was found to vary significantly across the region. Reiterated, the HIV prevalence was reportedly 5–30 times higher than the general population, especially in Namibia, Mozambique, Botswana, Zimbabwe, Malawi, Swaziland, and South Africa. Madagascar, on the other hand, had almost 0% HIV prevalence among FSW.^[48] It should be mentioned that STIs' prevalence was significantly higher among FSWs in Madagascar when compared to other settings. This high STIs prevalence was described by Gallo *et al.*^[23] in an 18-month control trial as part of a community-based condom promotion. The results showed that, of the 331 FSWs who participated in the trial, 29.0% reported unprotected sex within the last 48 h while 38.1% had prostate-specific antigens in their clients' semen, a sign of unprotected sex. In addition, in the same trial, FSWs were 4.5 times (aOR 4.5: 95% CI 2.0–10.1) more likely to acquire *Chlamydia* infection as one of the sole predictor of STIs during the trial period.^[23] However, to reduce the incidences of STIs, the government of Madagascar has promulgated

a by-law requiring all FSW's who are 21 years or older to enroll at STI Health Centres to benefit from regular monthly diagnoses, and treatment of STIs.^[24] This has helped to curb the rate of HIV and other STIs transmission in Madagascar when compared to other settings without such interventions. In other settings without such interventions, the incidences of HIV and other STIs among FSW are unknown and the rate of STIs' acquisition and transmission may be even higher than those reported in Madagascar. This indicates that mitigation interventions are highly needed to curb the HIV epidemic among FSW in the region. Integrating the 90-90-90 approach in the region may bring an end to HIV epidemic since 90% of FSW will test and know their status; 90% of those that are HIV positive will be engaged on treatment; 90% of those on treatment are virally suppressed.

This study provides an account of HIV epidemiology among FSW in the SADC region, including a survey of associated driving factors such as STIs and other structural barriers which revealed that FSWs are likely to indulge in risky sexual habits in their quest to make a livelihood. These alleged "habits" have culminated in escalating acquisition and transmission of infections among FSW and their clients, as well as high prevalence of HIV and other STIs infections in the general population.^[1] Despite the scale-up successes achieved in treatment and prevention in some settings,^[1,50-52] the FSW community in the SADC region still constitutes a treatment-naive population based on their reluctance to seek health care.^[18] Moreover, FSW in the region is still faced with the barrier of an aggressively hostile environment with regard to both social and political structures which continue to limit their dignity and human rights' privileges.^[6] Most STI programs, including HIV interventions among FSW in the region, are propagated by international donors who receive limited support from regional and national governments.^[18,19] Direct involvement of some national governments with FSW HIV programs is still in its infancy in some settings in the region.^[18] This accounts for the paucity of literature and insufficient data for programmatic and scaled-up interventions among FSW and their clients.^[36-40]

Earlier pooled HIV data pertaining to FSW worldwide showed that FSW have a 14-fold higher risk of HIV infection when compared to women of a similar age group.^[5] The SADC are subject to similar high HIV trends,^[40-43,46] with some countries experiencing FSW HIV epidemics as high as 71%. This extremely high prevalence is driven by repression and criminalization of sex work in the region, and these barriers make it impossible to find safe workplaces for FSWs.^[22] Only

8 out of the 15 SADC countries have criminalized female sex work.^[61] FSW, therefore, remain ignored, unsupported, and under-researched for the initiation of pragmatic interventions.^[5]

Moreover, findings from a recent global epidemiology of HIV among FSW and clients by Shannon and Montaner.^[21] reveals that sexual violence constitutes another root-cause of HIV epidemic among FSW. Shannon and Montaner^[21] further revealed that HIV infections can be reduced by 17% within 10 years if violence is curbed. Also, the findings indicated that if FSW and their clients can test regularly and engage in early treatment this can avert the infection prevalence by 34%. Thus, HIV can be significantly decreased among FSW and their clients when these conditions are coupled to the “90-90-90” targets which are being applied (in cases where 90% of FSW test and know their HIV status, 90% receiving ART and 90% virally suppression) and where there are linkages and program planning interventions, especially tailored for the unmet needs of FSW. Such interventions are needed since 9.2% to 19.8% of new HIV infections are attributed to FSW and MSM behaviors.^[26]

In addition, STIs of syphilis, chlamydia, gonorrhea, and including viruses such as HBV, HCV, and HSV-2 were also some of the host-specific biological risks associated with FSW in the SADC economic hub. The screening and enrollment of FSW in treatment and care heightened another dimension of programmatic intervention. Since FSW and their clients are linkage-bridges of HIV spread and other STIs to the wider population.^[15] According to Leclerc *et al.*,^[27] HIV simulation model revealed that over 36.4% of HIV spread to the general population is attributable to infections from male clients of FSW. It is therefore safe to argue that HIV acquisition and transmission occur mainly because of limited use of prophylactics or because of totally unprotected sexual intercourse/behavior.

This review shows that HIV epidemics among FSW are poorly understood and more intense research efforts are needed to meet some of the challenges involved in providing interventions and services to FSWs. Restated, a majority of the studies identified syphilis as the most frequent STI among FSW in the SADC economic region. This finding is similar to other studies reported in other economic regions.^[28] Other STIs mentioned included Chlamydia and gonorrhea, HCV, HBV, *T. vaginalis*, and bacterial vaginosis.^[10-12,24] Reports indicate that the high STIs' frequency among FSW is due to one or more of the following: slippage and breakage of condoms;^[29,30] FSW being raped or paid

more not to demand the use of condoms by clients,^[5,10] inconsistent use of condoms^[5,29] and being forced to have sex without condoms.^[10] Combating STIs among FSW and their clients is thus a cost-effective way of reducing HIV and other dangerous health consequences. Studies show that FSW who use condoms infrequently and have poor education are subjected to higher STIs'/HIV acquisition.^[31] Therefore, strengthening sex education and countering adverse health consequences are important economic components for reducing the HIV burden.^[31,50-52,54,60] The economic health consequences associated with STIs in developing countries are estimated at 17%,^[31] with infection acquisitions among FSW in SSA estimated at 17.8%.^[32]

Limitation of the study review

Only findings published in English and French were included in the study. The number of extant empirical investigations was from 2003 to 2015. Difficulties in making valid comparisons were exacerbated due to variations in research findings and differences in the national HIV epidemics. The following are some of the study limitations.

- Subpopulation of FSW such as transgender women, not included
- Other subpopulation of sex workers such as male sex workers, not included.
- Paucity of studies describing HIV and STIs among FSW in SADC economic hub
- Madagascar and Seychelles had zero HIV prevalence among FSW and were excluded.

Conclusion

The review revealed exceptional high disproportions of HIV infections among FSW, when compared to other sub-Saharan economic regions. The HIV prevalence among FSW was 5–30 times higher when compared to the overall female reproductive age population in the SADC region. This signifies and necessitates increase evidence base HIV/STIs researches and programs among FSW in the SADC region. The findings indicate an urgent expanded intervention programs that align behavioral, biological, and community prevention of HIV among FSW within the region. Escalation of policies that enhance the routine screening of STIs and HIV treatment and prevention among FSW.

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Conflicts of interest

There are no conflicts of interest.

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