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Adolescent girls who sell sex in Zimbabwe: HIV risk, behaviours and service engagement

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investigator and designed the study, oversaw implementation and interpreted the data and contributed to the writing of the manuscript.

Abstract

Background: To reduce HIV incidence among adolescent girls who sell sex (AGSS) in Zimbabwe we need to better understand how vulnerabilities intersect with HIV infection, and how those living with HIV engage in care.

Methods: In 2017, we conducted social mapping in four locations in Zimbabwe, and recruited girls aged 16 to 19 years who sell sex, using respondent driven sampling or census sampling methods. Participants completed a questionnaire and provided finger-prick blood samples for HIV antibody testing.

Results: Of 605 AGSS recruited, 74.4% considered themselves sex workers, 24.4% reported experiencing violence in the past year, 91.7% were not in school, and 83.8% had less than a complete secondary education. Prevalence of HIV increasing steeply from 2.1% among those aged 16 years to 26.9% among those aged 19 years; overall 20.2% of AGSS were HIV positive. In multivariate analysis, age, education, marital status, and violence from a client were associated with HIV. Among the 605 AGSS, 86.3% had ever tested for HIV, with 64.1% having tested in the past six months. Among AGSS living with HIV, half (50.8%) were aware of their status, among whom 83.9% reported taking antiretroviral therapy.

Conclusion: The steep rise in HIV prevalence between 16 and 19 years, suggests the window to engage with AGSS prior to HIV acquisition is short. To accelerate reductions in incidence among AGSS, intensified combination prevention strategies that address structural factors and tailor services to the needs of AGSS are required, particularly ensuring girls enrol and remain in school.

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Key words: Zimbabwe; prevalence; sex workers; risk; vulnerabilities; engagement

Introduction

In Zimbabwe, in 2020, HIV prevalence among adolescent girls (3.8%) was almost twice that among adolescent boys (2.1%).[1] This difference is driven by a stark disparity in incidence. In 2020, among persons aged 15-24 years, estimated incidence of HIV among females was 0.76% compared to 0.08% among males.[2] This difference is likely driven by a combination of biological, behavioural and structural factors.[3-5] Adolescent girls who sell sex (AGSS) are at particularly high risk as a result of high partner numbers, often with older men who are more likely to be HIV positive, poorly developed condom negotiation skills, and extreme economic vulnerability.[6] In addition to being highly stigmatised, selling sex as an adolescent is criminalised (both for selling sex and selling sex under the legal age of consent), making AGSS wary of accessing health services, and fearing referral to police and child protection services.[7] We explore how vulnerabilities among younger AGSS intersect with HIV infection, and how these adolescent girls, when diagnosed with HIV, engage in HIV care.

Methods

Sampling and recruitment

Four sites, including Zimbabwe's two largest cities, a rural farming /mining community and a border town, were chosen to represent different types of communities where sex is sold. Adolescent girls were eligible if they exchanged sex for money in the past thirty days, were aged 16-19 years, and were living or working in one of the four study areas. In August 2017, we deployed rapid social mapping to identify sex work locations and typologies in each site. We listed

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all sex work venues and assessed AGSS social networks as to whether they were willing to invite their peers.

In the two cities we used Respondent Driven Sampling (RDS) by purposively selecting seeds based on sex work typologies emerging from the mapping. Each seed completed a questionnaire, had a finger prick blood sample collected for HIV antibody testing, and was given two uniquely identified coupons. The seeds each recruited two AGSS meeting the study's inclusion criteria; those who consented to participate were in turn given two coupons to recruit two peers until we reached six recruitment waves. Each recruiter was provided with US$5 to cover costs of participation, and an additional $2 for each eligible AGSS recruited. In the border town and rural community, the census sampling method was used to recruit all AGSS identified in venues listed during mapping. The study team visited each site several times, particularly during "peak" hours such as evenings and weekends, to maximize recruitment.

Data collection

An interviewer-administered questionnaire was delivered anonymously to all participants collecting socio-demographic data, information on selling sex risk of common mental disorders (CMD), HIV status and risk perceptions, HIV-related service use, and structural factors known to heighten risk. The questionnaire was administered in participants' language (Shona or Ndebele). Data were collected directly in a computer-assisted survey instrument (CAPI) (Questionnaire Development System [QDS], Nova Research Company, Silver Spring, MD, USA). Information on CMD was collected using a fourteen item Shona Symptom Questionnaire; a combined score of ≥9 indicated risk of CMD, with a score of ≥11 indicating risk of severe CMD.[8]

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Laboratory Procedures

Each participant had a finger-prick blood sample taken for rapid HIV testing. Pre- and post-HIV counselling were offered. Samples were tested according to the Zimbabwe National HIV testing algorithm.

Statistical Analysis

For the two RDS sites, we examined recruitment trees and assessed convergence of the HIV prevalence estimate and homophily pattens in recruitment. Survey design was accounted for by weighting observations using the RDS-II approach.[9,10] Purposely selected seed participants were dropped, and remaining participants' responses were weighted using the inverse of participant-reported network size with confidence intervals calculated using Taylor linearization.[11] The variable used for network size was the final response to three questions: (1) how many young women you know personally have sex with men in exchange for material support; (2) how many of these young women whom you know personally would you consider recruiting to this study; (3) how many of them are aged 16-19 years. For young women with missing responses to the network size question, the value was replaced with the mean inverse network size by site. The two census sampling method sites were assigned a weight equal to one, representing the probability of being selected in each census site.

Analyses were conducted in Stata version 15 (Stata Corp, College Station, TX), using the survey commands with seeds dropped and inverse degree probability weights to obtain the weighted estimates. In our risk factor analysis, variables found to be associated with HIV prevalence in univariate analysis ($p \leq 0.05$) were included in a multivariate logistic regression model, where a fixed term for site was applied. The mapping protocol and data collection was approved by the Medical Research Council of Zimbabwe (MRCZ/A/2222).

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Results

Between September and November 2017, 615 AGSS were recruited; 294 in city1, 201 in city2, 79 in town1, and 41 in town2. In city-1, each of the four seeds led to recruitment chains of five or six waves. In city-2 half of the six seeds led to recruitment chains of between two and five waves, with the remaining half recruiting six waves each. The cumulative RDS-II weighted estimate of the proportion of AGSS who were HIV positive converged well by end of recruitment in city-1, and reasonably well in city-2. There was little evidence that AGSS recruited each other preferentially according to HIV status. The ten seeds were removed from further analyses.

Characteristics of AGSS and of sex work

The majority of AGSS (n=605) were aged 18 or 19 years (61.3%), were not in school (91.7%), had less than a complete secondary education (83.8%), and had never been married (66%) (table 1). Compared to the other three sites, participants in city-2, where four of six seeds were in school, were younger, had a greater level of current school attendance, and were more likely to have never married or had children (table 1). In the past twelve months, one in four AGSS (24.4%) experienced sexual violence, with lower prevalence in the cities than the towns (table 1). Among AGSS, 29.7% reported potential signs, symptoms, and complications of sexually transmitted infections, and 48% reported symptoms suggestive of being at risk of a CMD, with 25.5% reporting symptoms suggestive of severe CMD.

Overall, 72% of AGSS considered themselves to be a sex worker (table 1). Among AGSS aged 16-17 years, 70% considered themselves sex workers, 83% stated that having sex with men for material support was their main way to obtain money, and 63% reported that they were younger than 16 years when they started selling sex. Among AGSS aged 18-19 years a greater proportion considered themselves sex workers (76%) and reported sex work was their main source of income

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(88%), whereas the proportion who reported starting sex work at an age younger than 16 years was lower (23%).

Risk factors for HIV among AGSS

One fifth of AGSS (n= 122; 20.2%) were HIV positive, with prevalence increasing steeply from 2.1% among those aged 16 years to 26.9% among those aged 19 years (table 2). In multivariable analysis, older age, lower level of educational attainment, being divorced or separated, and having experienced physical violence / abuse from a client, were associated with prevalent HIV (table 2).

AGSS engagement with HIV-related services

Among the 605 AGSS, 86.3% had ever tested for HIV, 64.1% in the past six months. Among the 483 AGSS testing HIV negative, these figures were 84.9% and 66.0%, respectively. A public clinic (53.7%) or a national Sisters with a Voice programme clinic for FSW (17.6%) were the two most common venues where HIV negative AGSS received their last test. Of the 122 AGSS living with HIV, 62 (50.8%) were aware of their status, among whom 52 (83.9%) were taking antiretroviral therapy (ART).

Risk perception among AGSS

When asked "*What do you think are the chances that you will become infected with HIV in the near future?*", over half (58.2%) of the 483 HIV negative AGSS reported no or small chance. When asked "*do you think you are able to protect yourself from getting HIV?"*, the majority (90.9%) replied affirmatively. We found no association between perceived chance of becoming infected soon (p=0.44), or ability to protect oneself from HIV in day-to-day life (p=0.86) and having tested in the past six months.

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Discussions

Although there is a body of literature focusing on adult sex workers in sub-Saharan Africa,[12] or adolescents involved in transactional sex,[13] there is little data on adolescent girls aged 16-19 years who rely on selling sex for their livelihoods. In our study, the majority of AGSS considered themselves to be sex workers and reported selling sex as their main way to obtain money, the majority were not in school, almost half reported symptoms suggesting they were at risk of CMD, and one in four reported experiencing sexual violence in the past year. In Zimbabwe's Multiple Indicator Survey in 2019, one third of adolescent girls reported physical violence by their current or last husband or partner. [14] Young South African women experiencing violence are at greater risk of acquiring HIV.[15]

We report a steep rise in HIV prevalence between 16 and 19 years of age, suggesting high HIV incidence. consistent with a recent study that reported incidence to be up to 7.1/100 person-years among 18-24 year olds who sell sex in Zimbabwe.[16] In addition to age, we found education (lower level of attainment), marital status (being divorced or separated), and having experienced physical violence / abuse from a client to be associated with being HIV positive. Young women who sell sex in Zimbabwe have previously been reported as being less able to negotiate safe sex and more likely to have higher risk partners compared to older sex workers.[17]

Perhaps reflecting awareness of high HIV incidence, the majority of AGSS reported having tested in the past six months. The high proportion of AGSS reporting having tested is difficult to interpret considering our finding that almost half of AGSS living with HIV reported being unaware of their status. However, among those reported being HIV positive, the majority reported being on treatment. This may reflect that AGSS are either not testing or misreporting their HIV-negative status due to a misunderstanding of terminology,[18] and/or due to social desirability bias.[19]

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Alternatively, if both self-reported testing uptake and HIV-negative results are accurate, they suggests high incidence of HIV in the preceding six months.

Despite reporting HIV risk, the majority of HIV negative AGSS believed they could protect themselves and that they were at little risk of infection in the near future, possibly because some AGSS interpret recent negative test results as confirming they are at little risk or that they don't want to admit their level of risk. Of note, our study was conducted before the widescale roll out of pre-exposure prophylaxis (PrEP) in Zimbabwe.

Our study has some limitations. Our sample in city-2 was different to the other sites in that four of our six seeds were in school, and we observed recruitment homophily by school status, with girls more likely recruiting others with a similar school status. Although it is likely this homophily reflects differences in sampling rather than different pathways into sex work, it may explain some of our findings. To inform the future sampling of AGSS, we need to learn more about how school attendance acts as a network determinant.

The steep rise in HIV prevalence between 16 and 19 years, suggests the window to engage with AGSS prior to HIV acquisition is short. There is an urgent need to reach young entrants into sex work to reduce their myriad vulnerabilities.

Easy access to sexual health services to speed their engagement with prevention and care needs to be prioritised. We also need to scale up evidence-based safety-net interventions to tackle the structural factors that place vulnerable young girls at risk of selling sex, including social protection schemes to keep girls in school, and gender transformative interventions to shift harmful gender norms and mitigate the risk of violence.

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Figure and table captions

Table 1: Characteristics of adolescent girls who sell sex

Table 2: HIV prevalence and risk factors associated with HIV

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Table 1: Characteristics of adolescent girls who sell sex

		Town 1		Town 2		City 1*		City 2*		Total*	
		n	%	n	%	n	$\%_{RDS}$	n	$\%_{RDS}$	n	$\%_{RDS}$
Total		**79**	-	**41**	-	**290**	-	**195**	-	**605**	-
Age (years)	16	5	6.3	10	24.4	48	17.6	32	21.8	95	16.3
	17	17	21.5	6	14.6	58	20.4	61	31.7	142	22.4
	18	28	35.4	14	34.2	76	27.4	57	26.1	175	30.5
	19	29	36.7	11	26.8	108	34.5	45	20.3	193	30.8
In school	No	79	100.0	41	100.0	289	99.8	130	63.7	539	91.7
	Yes	0	0.0	0	0.0	1	0.2	65	36.3	66	8.3
Education**	None/primary incomplete	27	34.2	16	39.0	35	35.5	27	17.3	105	31.5
	Secondary incomplete	42	53.2	21	51.2	51	50.9	111	54.1	225	52.3
	Complete secondary/higher	10	12.7	4	9.8	14	13.7	57	28.6	85	16.2
Marital Status***	Single/never married	37	46.8	22	53.7	193	69.3	183	94.6	435	66.0
	Married/living together	0	0.0	2	4.9	2	0.4	1	0.6	5	1.0
	Divorced/separated	42	53.2	17	41.5	93	29.6	11	4.8	163	32.8
	Widowed	0	0.0	0	0.0	2	0.7	0	0.0	2	0.2
How many children do you have**	0	22	27.9	19	46.3	111	38.5	108	58.4	260	41.1
	1 to 2	28	35.4	15	36.6	103	39.9	33	15.4	179	32.5
	>=3	29	36.7	7	17.1	76	21.6	54	26.2	166	26.4
Where live****	Relatives home	12	15.2	6	14.6	80	28.7	161	85.9	259	35.5
	Own home	44	55.7	25	61.0	139	45.9	12	4.9	220	41.8
	Friends home	5	6.3	8	19.5	48	16.3	16	6.8	77	11.7
	Other	18	22.8	2	4.9	22	8.8	6	2.3	48	10.9
	Don't wish to answer	0	0.0	0	0.0	1	0.4	0	0.0	1	0.1
Is having sex with men in exchange for material support the main way you obtain money, or support yourself?	Yes	62	78.5	36	87.8	251	89.1	165	82.9	514	84.4
	No	17	21.5	5	12.2	39	10.9	30	17.1	91	15.6
Do you consider yourself to be a sex worker?	Yes	51	64.6	28	68.3	244	87.3	127	62.4	450	72.0

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	No	28	35.4	13	31.7	46	12.7	66	36.8	153	27.9
	I don't know	0	0.0	0	0.0	0	0.0	2	0.8	2	0.1
Sex work debut***	Late sex work debut	60	76.0	28	68.3	185	61.9	98	49.6	371	64.3
	Early sex work debut	19	24.0	13	31.7	105	38.1	97	50.4	234	35.8
Have you experienced sexual violence in the past 12 months?	Yes	24	30.4	12	29.3	58	21.9	30	17.1	124	24.4
	No	55	69.6	29	70.7	232	78.1	165	82.9	481	75.6
During the last 12 months, have you had pelvic pain, genital sores or itching, genital warts or unusual vaginal discharge ?	Yes	25	31.7	13	31.7	98	35.3	34	17.9	170	29.7
	No	54	68.3	28	68.3	192	64.7	161	82.1	435	70.3
Common mental disorders (CMD)	Not at risk of CMD	31	39.2	20	48.8	167	57.5	124	63.0	342	52.0
	At risk of CMD	19	24.1	8	19.5	66	22.0	45	23.1	138	22.5
	At risk of severe CMD	29	36.7	13	31.7	57	20.5	26	13.9	125	25.5
In the past 12 months how often did you drink alcohol?	Never	27	34.2	8	19.5	97	37.2	35	17.2	167	29.0
	Once a month	7	8.9	2	4.9	9	3.2	16	12.2	34	7.2
	2 to 4 times a month	6	7.6	5	12.2	38	15.6	37	19.3	86	13.5
	2 to 3 times a week	20	25.3	10	24.4	73	23.5	74	39.4	177	27.8
	4 or more times a week	19	24.1	15	36.6	73	20.6	33	12.0	140	22.1
	I don't wish to answer	0	0	1	2.4	0	n	0	0	1	0.4

** Percentages are RDS-II weighted*
*** Percentages are as among those who responded to the question*
**** In Zimbabwe marriage may only indicate living with a partner*
***** Other includes dormitory room, no fixed abode or other*
****** AGSS who had their first sex with a man in exchange for material support at the age of 15 years or younger assigned as early sex work debut*

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Table 2: HIV prevalence and risk factors associated with HIV

		Total	HIV positive		Univariate				Multivariate			Overall p-value
			n	%	OR	(95% CI)	p	p-value	OR	(95% CI)	p	
Total		605	122		-	-	-	-	-	-	-	-
Age (years)	16	95	2	2.1	0.07	(0.01-0.36)	0.001	*<0,001*	0.10	(0.02-0.51)	0.006	*0.003*
	17	142	24	16.9	0.56	(0.30-1.15)	0.121	-	0.80	(0.37-1.76)	0.584	-
	18	175	44	25.1	1.06	(0.60-1.87)	0.846	-	1.36	0.73-2.53)	0.339	-
	19*	193	52	26.9	1	-	-	-	1	-	-	-
Site	City 1*	290	67	23.1	1	-	-	*<0,001*	1	-	-	0.260
	Town 1	79	30	38.0	1.98	(1.13-3.45)	0.018	-	1.34	(0.72-2.53)	0.358	-
	Town 2	41	11	26.8	1.18	(0.55-2.54)	0.671	-	1.16	(0.49-2.76)	0.734	-
	City 2	195	14	7.2	0.23	(0.12-0.46)	<0.001	-	0.60	(0.26-1.42)	0.248	-
In school	No*	539	119	22.1	1	-	-	-	1	-	-	0.095
	Yes	66	3	4.5	0.12	(0.03-0.45)	*0.002*	-	0.60	(0.14-2.69)	0.507	-
Education	None/primary (incomplete & complete)	164	51	31.1	1.56	(0.92-2.64)	0.101	0.063	1.62	(0.86-3.05)	0.136	*0.013*
	Secondary incomplete*	329	58	17.6	1	-	-	-	1			-
	Secondary complete (O and A level)	112	13	11.6	0.64	(0.29-1.38)	0.253	-	0.59	(0.26-1.34)	0.205	-
How many children do you have	Zero*	260	42	16.2	1	-	-	0.203	-	-	-	-
	One to two children	179	48	26.8	1.66	(0.94-2.94)	0.082	-	-	-	-	-
	Three or more	166	32	19.3	1.45	(0.78-2.68)	0.240	-	-	-	-	-
Marital Status	Single/never married*	435	65	14.9	1	-	-	*<0,001*	1	-	-	*0.012*
	Married/living together as married	5	0	0.0	1	-	-	-	1	-	-	-
	Divorced/separated	163	56	34.4	2.99	(1.80-4.97)	<0.001	-	1.76	(0.98-3.15)	0.058	-
	Widowed	2	1	50.0	3.5	(0.21-57.47)	0.38	-	3.87	(0.31-48.79)	0.295	-
Where live**	Relatives home*	259	27	10.4	1	-	-	*<0,001*	1	-	-	0.208
	Own home	220	70	31.8	3.85	(2.10-7.04)	<0.001	-	1.77	(0.83-3.78)	0.137	-
	Friends home	77	12	15.6	1.61	(0.64-4.08)	0.312	-	1.11	(0.41-3.03)	0.840	-
	Other	48	13	27.1	5.21	(2.21-12.29)	0.001	-	1.90	(0.67-5.40)	0.225	-
	Don't wish to answer	1	0	0.0	-	-	-	-	-	-	-	-
Sex work debut	Late sex work debut*	371	84	22.6	1	-	-	-	1	-	-	0.633

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	Early sex work debut	234	38	16.2	0.55	(0.33-0.93)	*0.027*	-	1.03	(0.53-1.99)	0.933	-
Experience of physical violence/abuse from steady partner	No*	454	86	18.9	1	-	-	-	-	-	-	-
	Yes	151	36	23.8	1.51	(0.89-2.58)	0.128	-	-	-	-	-
Experience of physical violence/abuse from client	No*	472	84	17.8	1	-	-	-	1	-	-	*0.015*
	Yes	133	38	28.6	2.53	(1.48-4.32)	*<0.001*	-	1.97	(1.05-3.67)	0.034	-
Experience of sexual violence/abuse	No*	481	95	19.8	1	-	-	-	-	-	-	-
	Yes	124	27	21.8	1.4	(0.80-2.45)	0.236	-	-	-	-	-
Experience of violence from police in the last 12 months	No*	555	112	20.2	1	-	-	-	-	-	-	-
	Yes	50	10	20.0	1.23	(0.52-2.92)	0.637	-	-	-	-	-
Food insecure	No*	230	44	19.1	1	-	-	-	-	-	-	-
	Yes	375	78	20.8	1.12	(0.68-1.85)	0.654	-	-	-	-	-
Common Mental Disorders (CMD)	Not at risk of CMD*	342	66	19.3	1	-	-	0.318	-	-	-	-
	At risk of CMD	138	25	18.1	1.13	(0.61-2.10)	0.685	-	-	-	-	-
	At risk of severe CMD	125	31	24.8	1.57	(0.88-2.81)	0.130	-	-	-	-	-
In the past 12 months how often did you drink alcohol?	Never	167	33	19.8	0.65	(0.35-1.22)	0.178	0.232	-	-	-	-
	Once a month	34	7	20.6	0.66	(0.23-1.90)	0.44	-	-	-	-	-
	2 to 4 times a month	86	12	14.0	0.41	(0.17-1.01)	0.054	-	-	-	-	-
	2 to 3 times a week*	177	38	21.5	1	-	-	-	-	-	-	-
	4 or more times a week	140	32	22.9	1.02	(0.53-1.95)	0.958	-	-	-	-	-
	I don't wish to answer	1	0	0.0	1	-	-	-	-	-	-	-

Variables identified in univariate analysis as being associated with HIV prevalence included in multivariate model; statistical significant results (at 95% level) in italics

** Baseline groups are those with the highest number of responses*

*** Other includes dormitory room, no fixed abode and other*

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