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Prevalence and correlates of physical violence and rape among female sex workers in Ethiopia: A respondent-driven sampling study from 11 major towns

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Prevalence and correlates of physical violence and rape among female sex workers in Ethiopia: A respondent-driven sampling study from 11 major towns

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Abstract

Objective: This study examined the prevalence and correlates of physical violence and rape among FSWs in Ethiopia.

Design: A cross-sectional study using respondent-driven sampling was conducted among 4900 FSWs in 11 major towns in Ethiopia in 2014. A structured interview was performed, and blood specimens for HIV, and CD4 testing were collected. Data were examined using descriptive statistics and multiple logistic regression analyses.

Results: Among FSWs, 17.5% reported physical beating within the past year and 15.2% reported rape since they started selling sex. FSWs aged 35+ years (AOR 0.59, 95% CI 0.38, 0.92) were less exposed to physical beating than those aged 15-24 years. FSWs working on the street (AOR 1.92, 95% CI 1.53, 2.39), in red-light houses (AOR 1.63, 95% CI 1.12, 2.38) and in local drinking houses (AOR 1.35, 95% CI 1.02, 1.78) were more exposed to physical beating than FSWs working in bars/hotels. FSWs who consumed alcohol four or more days in a week (AOR 1.92, 95% CI 1.21, 3.04), or who chewed khat frequently were significantly more exposed to physical violence. Rape was associated with having a low monthly income, drinking alcohol four or more days per week (AOR 2.33, 95% CI 1.47, 3.7), experience of heavy episodic drinking in a month (AOR 1.71, 95% CI 1.24, 2.38), and chewing khat 3-4 days per week (AOR 2.15, 95% CI 1.55, 2.98). Condom breakage was more frequent among FSWs who reported both physical beating (AOR 1.51, 95% CI 1.25, 1.84) and rape (AOR 1.26, 95% CI 1.03, 1.55).

Conclusion: FSWs in Ethiopia are vulnerable to physical and sexual violence, and the risk increases when they are younger, street-based, and high consumers of alcohol or khat. Therefore, targeted efforts are needed for prevention and harm reduction.

Key words: female sex workers, physical violence, rape, substance use, Ethiopia

Strengths and limitations of this study

- One of the strengths of this study is that it involves multiple sites (eleven large towns) across the country with a large sample size.
- The second strength is the sampling technique; the study used a respondent-driven sampling technique which is recommended for hard to reach populations.
- However, the study also had limitations. First, sexual and physical violence are sensitive topics that are subject to underreporting because of social desirability bias.
- Second, recall bias could occur because participants were asked about physical violence in the past year and rape since they start selling sex.

Introduction

As per WHO definition, violence is the intentional use of physical force or power against another person or group, which has a high likelihood of resulting in injury, death, or sexual or psychological harm (1). Violence against women is a global phenomenon, as more than one in three women worldwide is beaten, coerced into sex or abused in her lifetime (2). Furthermore, violence is one of the main contributors to poor sexual and reproductive health among women, leading to unintended pregnancy, self-induced abortions, gynecologic problems, sexual dysfunction, and sexually transmitted infections (STIs), including HIV (3, 4).

In most countries, female sex work is either illegal or has an uncertain legal status; for example, prostitution is not illegal but approaching sex workers in public is illegal; this makes authorities reluctant to offer protection or support, which in turn legitimizes violence and discrimination against sex workers (5). In the case of Ethiopia, it is illegal to operate a brothel or procure sex workers as a commercial activity, but the sale of sex by women is neither prohibited nor legally recognized as a profession (6). Female sex workers (FSWs) frequently face harassment and violence, not only because of their illegitimate status, but also as a manifestation of gender inequality and discrimination directed towards women (7, 8).

Violence against FSWs can be perpetrated by anyone, including policemen, intimate partners, and clients. In Adama and Mekelle towns in Ethiopia, nearly 60% and 75% of female sex workers, respectively, reported lifetime violence (9, 10). In the same study in Adama, 8% of

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3 FSW reported forced sex since they started sex work (10). In another study conducted among
4 homeless street females in Bahirdar town, 11.4% of them reported having been raped during the
5 last one year period (11). In Uganda, 40% of FSWs reported physical abuse and 49 % had been
6 raped at least once in their lifetime (12). In another study conducted in Hunan, China and
7 Karnataka, India, 16% and 9% of female sex workers, respectively, reported work-related
8 violence (13, 14).
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15 Several risk factors have been found to have an association with physical and sexual violence
16 against FSWs. Socio-economic characteristics, risky sexual behaviors and substance abuse are
17 the most mentioned factors worldwide (9, 10, 15, 16). A randomized controlled trial study in
18 Kenya and South Africa showed that alcohol consumption reduction by FSWs had a significant
19 contribution to violence reduction (17, 18). Moreover, establishments where alcohol and other
20 drugs are consumed, associates with an increased likelihood of people becoming violent towards
21 sex workers (8, 19). However, other studies suggest that FSWs who work outdoors face more
22 violence than those who work indoors (20, 21).
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30 Violence towards FSWs may also be associated with condom use and condom breakage. Studies
31 conducted among FSWs have found several intentional and unintentional factors associated with
32 condom breakages during sex work. These factors included being drunk or high on drugs,
33 wearing unfitting condoms, incorrect condom use, and having violent or rough sex(22, 23).
34 Moreover, violence towards FSWs may also be linked to disagreement over condom use, which
35 increases the risk of acquiring HIV and other STIs (21, 24-26). In Ethiopia, the weighted HIV
36 prevalence among FSWs is estimated to be 23% (27), while it is 1.2 % in the general population
37 (28), which shows the magnitude of the potential risk exposure among FSWs. In addition,
38 violence also prevents sex workers from seeking appropriate health services (26, 29, 30).
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46 In general, 120,000 to 160,000 FSWs are estimated to live in Ethiopia, working in different
47 venues, mainly in bars and hotels, Key-mebrat (red lighthouses), local drinking houses, and on
48 the street (27). Currently, the number of female sex workers is growing, with increasing numbers
49 of young girls entering the sex trade.
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3 This study explores the prevalence and correlates of physical violence and rape among FSWs in
4 Ethiopia. Successful strategies for handling the trauma may vary by the type of violence
5 experienced. Therefore, identification of risk factors that are specific to various types of violence
6 has the potential to inform the development of evidence-based prevention programs. In addition,
7 generating such types of evidence based on national level data will help to promote more
8 effective prevention for female sex workers.
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14 **Methods**

15 **Study design**

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17 This study was part of a larger study concerning HIV prevalence and related risk factors among
18 female sex workers and long distance drivers that was carried out in Ethiopia in 2014. A cross-
19 sectional study design using Respondent Driven Sampling technique (RDS) was used for data
20 collection. RDS is a complex sampling method based on a chain-referral design and
21 recommended for hard-to-reach populations. In all 11 towns included as study locations, initial
22 FSW “seeds” were selected to start the sampling process. Seeds were selected purposively to
23 represent the type of sex worker, age category, and geographic location. They were identified
24 through formative assessments with key stakeholders working with FSWs and representatives of
25 FSWs. The selected seeds were those who were well-connected with their community and
26 reported large social networks.
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36 A maximum of three recruits per seed was allowed and only one-time participation was ensured
37 by using a fingerprint scanning device. Recruitment pattern (who recruited whom) was tracked
38 and network size was also determined.
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42 **Study area, period and population**

43 The study locations were the seven major regional towns and the four main transport corridor
44 towns. The seven major regional towns were: Addis Ababa, Bahirdar, Mekelle, Hawassa,
45 Adama, Gambela, and Dire-dawa. The four transport corridor towns were Semera-Logia (Addis
46 Ababa-Djibouti route), Kombolcha (Addis Ababa-Mekelle route), Metema (Addis Ababa-
47 Metema route) and Shashemene (Addis Ababa -Moyale route).
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3 The source populations were all female sex workers living in those selected eleven towns. For
4 the purpose of the study, female sex workers were defined as follows: ‘women who practice
5 sexual activity with the pre-conditions of financial or in-kind benefits’. The inclusion criteria
6 were: receiving money or other benefits for sex with four or more people within the last 30 days,
7 being 15 and above years old, properly recruited by a peer (present with the coupon) and giving
8 consent both for the interview and blood drawing.
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14 **Sample size**

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16 The source study protocol calculated sample size of 400 female sex workers in each town using
17 anticipated HIV prevalence of 25%, 6% precision, 95% CI and design effect of two. However,
18 the number of female sex workers who participated in each town was not exactly 400, and the
19 total number of FSWs who participated in the study was 4900.
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24 **Data collection procedure**

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26 Six seed FSWs were selected to initiate coupon-based recruitment. Eligible FSWs who provided
27 informed consent to participate were administered a face to face interview in a private room by a
28 nurse with a structured questionnaire in Amharic language. They then provided blood specimens
29 for HIV, CD4 and viral load testing in a private room. When the process was completed,
30 participants were provided with up to three coupons and instructed to recruit their FSW peers
31 into the study. To compensate the time and costs of transport, a primary incentive of 100 ETB
32 (\$5.0) and additional 50 ETB (\$2.5) for each eligible peer she enrolled into the study was given.
33 An electronic data base for tracking coupons and recruitment was established with participant
34 ID, fingerprint code, and a pre-printed label that was scanned. The data collection tools and
35 questionnaire were pretested in a pilot study; feedbacks from the pilot study was used to finalize
36 the data collection tools and field logistic and operational procedures. The questionnaire
37 included: socio-demographic characteristics, sexual risk exposure, sexual behaviors, condom
38 use, history of STI symptoms, alcohol and drug use consumption, violence related issues,
39 knowledge of HIV transmission, and HIV testing history.
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Variables

Violence was assessed with two dependent variables, which were physical beating during the last one year and rape since sex selling started. The following questions were asked: “When exchanging sex for money during the last one year, have you ever been physically beaten by a sexual partner or client?” and “Have you ever been raped or forced to have sex against your will since you start selling sex?” responses were dichotomized into a Yes and No variable for analysis. For both of the questions, all who had reported beating and rape at least once were considered as exposed to violence (Yes).

The independent measures included current age, monthly income from selling sex, marital status, educational status, sex selling venue, khat chewing, alcohol drinking, HIV status, and condom breakage.

Current age was a continuous variable and for the purpose of analysis was categorized as ten year intervals: younger (15-24), middle age (25-34), and older one (35+), with the younger age group used as the reference category. Monthly income from selling sex was an open-ended question and for the analysis was categorized in to 1000Birr (\$50) intervals considering the cost of living in the country. Educational status was categorized as no formal education, primary first cycle (grade 1-4), primary second cycle (grade 5-8), and secondary and above for analysis, in accordance with the country education system.

In addition, sex workers were categorized based on their sex selling venue, where bar/hotel was used as the reference because it is the most common FSW working venue. In addition, this venue category has better security than the other venues and the numbers of FSWs in this category were higher than the rest.

Alcohol consumption was measured through different approaches including frequency of alcohol consumption, number of drinks per specific day and frequency of heavy episodic drinking (6 or more standard drinks per day). Khat chewing was assessed according to the frequency of days they chewed in a week.

Data analysis

Statistical analysis was performed using SPSS Version 20. Descriptive statistics were used to provide summary measures (means, frequencies). Odds ratios (crude and adjusted) and 95% confidence intervals (CI) were obtained using bivariate and multivariate logistic regression analysis. Those independent variables significantly associated with the outcome variable in the bivariate analysis were included in the multivariate analysis. Cases with missing data were excluded from the analyses. Significance was accepted at p-value <0.05.

Ethical considerations

Permission for data use was obtained from the Ethiopian Public Health Institute (EPHI). The protocol was cleared at the Scientific and Ethical Research Office (SERO) of EPHI, the Ethiopian Science and Technology Ministry Ethical Committee, and CDC-Atlanta IRB. Individual written informed consent was obtained from each participant for the interview and blood sample collection while the study was conducted.

Results

Socio-demographic and other background characteristics

A total of 4900 female sex workers participated in the study. Demographic, socioeconomic and other background characteristics of the participants are shown in Table 1. The majority of the participants were between 15 to 24 years old with a mean age of 24 years (SD= 5.7); 44 % of them were divorced, separated or widowed. A quarter of them reported being uneducated and 40% of them earned on average less than \$50 per month. Regarding sex selling starting age, the majority started selling sex between the ages of 18-24 years, although nearly 25% started before the age of 18. FSWs worked in different eating, drinking and recreation establishments and also other venues; 33% recruited their clients in bars/hotels, followed by 26.5% on the street and 20% in local drinking houses (Table 1).

Table 1. Distribution of socio-demographic and other background characteristics among 4900 female sex workers across eleven towns, Ethiopia

Variable	Frequency	Percentage
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Age		
15-24	2831	57.8
25-34	1700	34.7
35+	369	7.5
Total	4900	100.0
Missing	0	
Mean age of respondents = 24.16 SD= 5.7		
Educational status		
No Education	1224	25.0
Primary 1st cycle (1-4)	764	16.0
Primary 2nd cycle (5-8)	2062	42.0
Secondary & above	831	17.0
Total	4881	100.0
Missing	19	
Sex selling venues		
Bar/Hotel	1613	33.0
Local drinking houses	983	20.1
Spa/Massage/Beauty salon/Own house	261	5.3
Red Light houses	429	8.8
Street	1295	26.5
Others	304	6.2
Total	4885	100.0
Missing	15	
Current marital status		
Never Married	2698	55.2
Married/Cohabited	37	0.8
Separated/Divorced	1976	40.5
Widowed	173	3.5
Total	4884	100.0
Missing	16	
Sex selling starting age		
Less than 15	120	2.5
15 - 17	1088	22.3
18 - 24	2864	58.7
25 - 29	583	12.0
30 & Above	220	4.5
Total	4875	100.0

Missing	25	
Monthly income from selling sex		
Less than 1000 (<\$50)	1932	39.6
1001 – 2000 (\$50-\$100)	1554	31.8
2001 – 3000 (\$100-\$150)	812	16.6
3001 – 4000 (\$150-\$200)	318	6.5
4001 – 5000 (\$200-\$250)	150	3.1
Above 5000 (>\$250)	117	2.4
Total	4883	100.0
Missing	17	

Behavioral and other related factors

Table 2 shows the prevalence of behavioral and other factors. The majority (70%) of the respondents consumed alcohol and of those, 15.8% had drunk so much on a typical day within the past 30 days that they did not remember what happened the next day. About half of the respondents chewed khat and 23.8% of them chewed almost every day (5-7 days a week).

Regarding condom use, 25.5% of them reported condom breakage within the past 30 days prior to the study. HIV/AIDS status of the respondents was also assessed and a quarter of them (23%) were HIV positive. With regard to physical and sexual violence experience, 17.5% of them reported physical beating within the past 12 months and 15.2% reported having been raped since they started selling sex. (Table 2)

Table 2. Behavioral and other related factors among 4900 female sex workers across eleven towns, Ethiopia

Variable	Frequency	Percentage
Frequency alcohol consumption		
Never	1493	30.6
Once a month or less	222	4.5
2 - 4 days a month	492	10.1
2 - 3 days a week	1394	28.5
4 or more days a week	1283	26.3
Total	4884	100.0
Missing	16	
Alcohol containing drinks on a typical day		
1 or 2	806	23.8

3 or 4	1383	40.8
5 or 6	742	21.9
7 to 9	296	8.7
10 or more	164	4.8
Total	3391	100.0
Missing	0	
Frequency of heavy episodic drinking		
Never	1863	54.9
Less than monthly	236	7.0
Monthly	299	8.8
Weekly	630	18.6
Daily or almost daily	363	10.7
Total	3391	100.0
Missing	0	
Drunk so much and can't remember what happened the next day		
Yes, in last 30 days	534	15.8
Yes, not in last 30 days	233	6.9
No	2609	77.2
Don't remember	4	0.1
Total	3380	100.0
Missing	11	
Frequency of khat chewing		
Never	2431	49.8
Less than once a week	577	11.8
1-2 days per week	429	8.8
3-4 days per week	284	5.8
5-7 days per week	1162	23.8
Total	4883	100.0
Missing	17	
Condom breakage in the past 30 days		
Yes	1243	25.5
No	3635	74.5
Total	4878	
Missing	22	
HIV status		
Negative	3708	76.0
Positive	1173	24.0
Total	4881	100.0
Missing	19	
Ever been raped or forced to have sex since start selling sex		
No	4142	84.8
Yes	742	15.2
Total	4884	100.0

Missing	16	
Physically beaten in the last 12 months		
No	4026	82.5
Yes	855	17.5
Total	4881	100.0
Missing	19	

Bivariate regression analysis outcome

Table 3 shows the bivariate logistic regression results; each independent variable was analyzed separately against the two outcome variables. The variables that were significantly associated with physical violence were: age, educational level, monthly income, current marital status, sex selling venues, frequency of alcohol consumption, alcohol containing drinks on a typical day, frequency of heavy episodic drinking, frequency of khat chewing in a week and condom breakage. Variables significantly associated with rape were: educational level, income from selling sex, frequency of alcohol consumption, alcohol containing drinks on a typical day, frequency of heavy episodic drinking, frequency of khat chewing in a week and condom breakage. HIV status was not significantly associated with either physical violence or rape.

Table 3. Bivariate logistic regression analyses results of independent variables associated with physically beaten in the last 12 months and ever been raped since start selling sex, odds ratio (OR) and 95% confidence intervals (CI)

Variables	Physical beating OR (95% CI)	Rape OR (95% CI)
Age		
15-24*		
25-34	1.02 (0.87, 1.19)	1.02 (0.86, 1.21)
35+	0.52 (0.37, 0.74)	0.88 (0.64, 1.20)
Educational level		
No Education*		
Primary 1st cycle (1-4)	1.01 (0.79, 1.31)	1.45 (1.14, 1.85)
Primary 2nd cycle (5-8)	1.35 (1.11, 1.63)	1.08 (0.88, 1.32)
Secondary & above	1.49 (1.18, 1.87)	1.09 (0.85, 1.41)
Monthly income from selling sex		
Less than 1000 birr (<\$50) *		
1001 – 2000 birr (\$50-\$100)	1.44 (1.20, 1.73)	0.69 (0.58, 0.85)

2001 – 3000 birr (\$100-\$150)	1.67 (1.35, 2.07)	0.51 (0.39, 0.66)
3001 – 4000 birr (\$150-\$200)	1.61 (1.19, 2.17)	0.65 (0.46, 0.92)
4001 – 5000 birr (\$200-\$250)	2.12 (1.44, 3.14)	1.01 (0.66, 1.55)
Above 5000 birr (>\$250)	1.62 (1.01, 2.58)	0.75 (0.44, 1.27)

Current marital status

Never Married*		
Married/Cohabited	1.05 (0.46, 2.41)	0.69 (0.24, 1.96)
Separated/Divorced	0.93 (0.80, 1.09)	1.03 (0.88, 1.21)
Widowed	0.59 (0.37, 0.95)	1.39 (0.95, 2.06)

Sex selling venues

Bar/Hotel*		
Local drinking houses	0.87 (0.69, 1.09)	-
Spa/Massage/Beauty salon/Own house	0.45 (0.28, 0.71)	-
Red Light houses	0.95 (0.71, 1.27)	-
Street	1.51 (1.26, 1.82)	-
Others	1.37 (1.01, 1.86)	-

Frequency alcohol consumption

Never*		
2 - 4 days a month	1.82 (1.35, 2.44)	1.74 (1.27, 2.38)
2 - 3 days a week	2.07 (1.66, 2.57)	1.87 (1.48, 2.36)
4 or more days a week	3.54 (2.87, 4.37)	3.43 (2.75, 4.28)

Alcohol containing drinks on a typical day

1 or 2*		
3 or 4	1.39 (1.09, 1.76)	1.16 (0.92, 1.46)
5 or 6	2.03 (1.58, 2.62)	1.09 (0.84, 1.43)
7 to 9	2.19 (1.59, 3.03)	0.98 (0.68, 1.41)
10 or more	2.76 (1.88, 4.03)	1.78 (1.20, 2.65)

Frequency of heavy episodic drinking

Never*		
Less than monthly	1.43 (1.03, 1.98)	1.39 (0.99, 1.95)
Monthly	1.23 (0.90, 1.66)	1.59 (1.18, 2.13)
Weekly	1.73 (1.39, 2.14)	1.03 (0.80, 1.31)
Daily or almost daily	1.97 (1.53, 2.55)	1.69 (1.29, 2.21)

Drunk so much and can't remember what happened the next day

No*		
Yes, in the last 30 days	2.90 (2.37, 3.56)	1.66 (1.33, 2.07)
Yes, before last 30 days	2.22 (1.65, 2.99)	1.27 (0.91, 1.78)

Frequency of khat chewing in a week

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3	Never*		
4	Less than once a week	1.24 (0.96, 1.60)	0.89 (0.67, 1.19)
5	1-2 days per week	1.67 (1.28, 2.18)	2.89 (2.26, 3.69)
6	3-4 days per week	2.49 (1.87, 3.34)	2.92 (2.19, 3.89)
7	5-7 days per week	2.48 (2.08, 2.96)	1.47 (1.21, 1.79)
8			
9			
10	Condom breakage		
11	No*		
12	Yes	1.99 (1.69,2.33)	1.62 (1.37, 1.92)
13			
14	HIV test result		
15	Negative*		
16	Positive	1.04 (0.88, 1.24)	0.88 (0.73, 1.07)
17			

18 **Note: * Reference category**

20 **Multivariate analysis of factors associated with physical violence (physically beaten)**

21 Table 4 shows the results of the multivariate analysis used to identify factors associated with
 22 physical violence after simultaneously adjusting for all measures included in the analyses.
 23 Female sex workers aged 35 years or above (AOR 0.59, 95% CI 0.38, 0.92) were significantly
 24 less exposed to physical violence when compared with the younger age group (15-24 years).
 25 FSWs who attend primary 1st cycle education (AOR 0.71, 95% CI 0.52, 0.97) were also less
 26 exposed to physical beating than those who report no education. On the other hand, FSWs who
 27 worked on the street (AOR 1.92, 95% CI 1.53, 2.39), in red-light houses (AOR 1.63,95% CI
 28 1.12, 2.38) and in local drinking houses (AOR 1.35, 95% CI 1.02, 1.78) were more exposed to
 29 physical violence compared with FSWs who worked in bars/hotels. Moreover, substance use was
 30 significantly related to physical violence exposure. FSWs who consumed alcohol four or more
 31 days in a week (AOR 1.92, 95% CI 1.21, 3.04), those who did not remember what happened the
 32 next day due to heavy alcohol consumption both in the past 30 days (AOR 1.98, 95% CI 1.58,
 33 2.49), and before past 30 days (AOR 1.85, 95% CI 1.35, 2.53), FSWs who chewed khat 3-4 days
 34 per week (AOR 1.58, 95% CI 1.13, 2.21) and 5-7 days per week (AOR 1.43, 95% CI 1.13, 1.80)
 35 were significantly more exposed to physical violence. Condom breakage experience within the
 36 past 30 days prior to the study was also significantly associated with physical violence (AOR
 37 1.51, 95% CI 1.25, 1.84).
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Table 4. Multivariate logistic regression analysis of factors associated with physical violence (physically beaten) in the past twelve month among female sex workers across eleven towns in Ethiopia, odds ratios (OR) and 95% confidence intervals (CI).

Variables	OR (95% CI)
Age	
15-24*	
25-34	1.04 (0.82, 1.22)
35+	0.59 (0.38, 0.92)
Educational level	
No Education*	
Primary 1st cycle (1-4)	0.71 (0.52, 0.97)
Primary 2nd cycle (5-8)	0.98 (0.77, 1.26)
Secondary & above	1.14 (0.85, 1.53)
Monthly income from selling sex	
Less than 1000 birr (<\$50) *	
1001 – 2000 birr (\$50-\$100)	1.13 (0.90, 1.41)
2001 – 3000 birr (\$100-\$150)	1.14 (0.87, 1.48)
3001 – 4000 birr (\$150-\$200)	1.12 (0.77, 1.61)
4001 – 5000 birr (\$200-\$250)	1.44 (0.93, 2.24)
Above 5000 birr (>\$250)	1.12 (0.63, 1.99)
Current marital status	
Never Married*	
Married/Cohabited	0.68 (0.24, 1.89)
Separated/Divorced	1.08 (0.88, 1.29)
Widowed	0.87 (0.48, 1.59)
Sex selling venues	
Bar/Hotel*	
Local drinking houses	1.35 (1.02, 1.78)
Spa/massage/beauty salon/own house	1.04 (0.58, 1.84)
Red Light houses	1.63 (1.12, 2.38)
Street	1.92 (1.53, 2.39)
Others	1.39 (0.98, 1.99)
Frequency alcohol consumption	
Never*	
2 - 4 days a month	1.25 (0.77, 2.04)
2 - 3 days a week	1.32 (0.84, 2.06)
4 or more days a week	1.92 (1.21, 3.04)
Alcohol containing drinks on a typical day	
1 or 2*	

3 or 4	1.08 (0.84, 1.39)
5 or 6	1.15 (0.85, 1.57)
7 to 9	1.09 (0.74, 1.64)
10 or more	1.14 (0.72, 1.81)
Frequency of heavy episodic drinking	
Never*	
Less than monthly	1.07 (0.75, 1.52)
Monthly	0.84 (0.59, 1.18)
Weekly	1.07 (0.82, 1.39)
Daily or almost daily	0.99 (0.71, 1.38)
Drunk so much and can't remember what happened the next day	
No*	
Yes, in the last 30 days	1.98 (1.58, 2.49)
Yes, before last 30 days	1.85 (1.35, 2.53)
Frequency of khat chewing in a week	
Never*	
Less than once a week	1.04 (0.77, 1.42)
1-2 days per week	1.30 (0.96, 1.77)
3-4 days per week	1.58 (1.13, 2.21)
5-7 days per week	1.43 (1.13, 1.80)
Condom breakage	
No*	
Yes	1.51 (1.25, 1.84)

Note: * Reference category

Multivariate analysis of factors associated with sexual violence (rape)

Table 5 shows the results of the multivariate logistic regression analyses to identify factors that were significantly associated with rape after simultaneously adjusting for all measures included in the analyses. Female sex workers with a monthly income of \$50 to \$200 were significantly less exposed to rape compared to those with a monthly income of below \$50. Drinking alcohol four or more days per week (AOR 2.33, 95% CI 1.47, 3.7), those with experience of heavy drinking in the last 30 days and did not remember what happened the next day (AOR 1.34, 95% CI 1.05, 1.72), experience of HED in a month (AOR 1.71, 95% CI 1.24, 2.38), experience of HED almost daily (AOR 1.49, 95% CI 1.06, 2.11) and chewing khat 1-2 days (AOR 2.13, 95% CI 1.61, 2.83) and 3-4 days (AOR 2.15, 95% CI 1.55, 2.98) per week were positively associated

with rape. Moreover, condom breakage (AOR 1.26, 95% CI 1.03, 1.55) was significantly more frequent among FSWs who reported rape.

Table 5. Multivariate logistic regression analysis of factors associated with sexual violence (rape) since sex selling start among female sex workers across eleven towns in Ethiopia, odds ratios (OR) and 95% confidence intervals (CI).

Variables	OR (95% CI)
Monthly income from selling sex	
Less than 1000 birr (<\$50) *	
1001 – 2000 birr (\$50-\$100)	0.62 (0.49, 0.77)
2001 – 3000 birr (\$100-\$150)	0.42 (0.32, 0.57)
3001 – 4000 birr (\$150-\$200)	0.45 (0.29, 0.69)
4001 – 5000 birr (\$200-\$250)	0.84 (0.53, 1.33)
Above 5000 birr (>\$250)	0.62 (0.34, 1.15)
Current marital status	
Never Married*	
Married/Cohabited	0.57 (0.17, 1.97)
Separated/Divorced	1.01 (0.83, 1.22)
Widowed	1.61 (0.98, 2.63)
Educational level	
No Education*	
Primary 1st cycle (1-4)	1.06 (0.79, 1.43)
Primary 2nd cycle (5-8)	0.83 (0.65, 1.07)
Secondary & above	0.92 (0.68, 1.25)
Frequency of alcohol consumption	
Never*	
2 - 4 days a month	1.15(0.69, 1.89)
2 - 3 days a week	1.24(0.78, 1.96)
4 or more days a week	2.33(1.47,3.73)
Drunk so much and can't remember what happened the next day	
No*	
Yes, in the last 30 days	1.34 (1.05, 1.72)
Yes, before last 30 days	1.07 (0.75, 1.52)
Frequency of heavy episodic drinking	
Never*	
Less than monthly	1.61 (1.12, 2.32)
Monthly	1.71 (1.24, 2.38)
Weekly	1.04 (0.78, 1.38)

Daily or almost daily	1.49 (1.06, 2.11)
Frequency of khat chewing in a week	
Never*	
less than once a week	0.83 (0.59, 1.16)
1-2 days per week	2.13 (1.61, 2.83)
3-4 days per week	2.15 (1.55, 2.98)
5-7 days per week	1.06 (0.83, 1.36)
Condom breakage	
No*	
Yes	1.26 (1.03, 1.55)

Note: * Reference category

Discussion

According to this study, 17.5% of FSWs in Ethiopia had been physically beaten within the past 12 months and 15.2% had been raped since they start selling sex. Age, sex selling venues, and high consumption of alcohol and khat were significant predictors of physical violence (beating). On the other hand, the significant predictors of sexual violence (rape) were low income and also high consumption of alcohol and khat.

The prevalence of both physical violence and sexual violence (rape) was lower than prevalence found in studies conducted in Uganda, Ivory Coast, and Kenya (9, 12, 30, 31). However, when compared to the studies conducted in Adama (Ethiopia), China, India, and Mexico the current study reported a higher prevalence of both physical and sexual violence (10, 11, 13, 14, 32). The difference in the definition of violence used might be one of the possible explanations for the difference between the current results and those found in other studies in Africa. Most of the studies assessed all forms of physical and sexual violence while the current study assessed solely physical beating and forced penetrative sex (rape). On the other hand, differences in results across settings might also be due to differences in background and contextual factors such as socio-economic status and cultural aspects.

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3 Several studies showed that younger FSWs are more exposed to physical and sexual violence
4 (13, 33) in line with the current findings that younger FSWs (15-24 years) were at higher risk for
5 physical violence when compared to their older counter parts (35+ years). The lack of experience
6 in identifying perpetrators and the perpetrator approach towards young FSWs may play a role in
7 increased exposure to violence.
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13 Even though sex work is not a legally recognized profession in Ethiopia, most of the
14 establishments where the sex workers are based (hotels, bars/restaurants, night clubs etc.) operate
15 legally with working licenses. Nevertheless, some FSWs work on the street and in red-light
16 houses where they manage their own working area. Consequently, the levels of exposure to
17 physical violence vary according to their working area. The present study revealed that FSWs
18 who mainly work in bar and hotels face less physical beating when compared with FSWs who
19 work on the street, in red-light houses and local drinking houses. This finding is in line with the
20 studies conducted in New York City and England (20, 21). This might be due to the level of
21 protection in their working areas and/or due to the type of clients who frequents those localities.
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30 Furthermore, an association between alcohol use and higher frequency of physical violence and
31 rape was reported. In particular, FSWs who consume alcohol more than four days a week and
32 those with experience of HED were significantly exposed to violence. Several studies conducted
33 in Ethiopia, Uganda, and Kenya also reported similar findings (9, 10, 12, 19). High level of
34 alcohol consumption places FSWs in disadvantaged situations by intensifying their vulnerability
35 (8). Research reviews also report that alcohol use impairs FSWs' ability to detect the risk of
36 violence and increases their vulnerability to risk-prone situations (34, 35)
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43 Correspondingly, chewing khat more days in a week was significantly associated with exposure
44 to physical violence and rape. Khat is a stimulant, and after chewing an individual may become
45 talkative, alert, feel excitement, increased self-esteem, and increased imagination (36). After
46 chewing khat, some of the users consume alcohol-containing drinks to decrease the level of
47 stimulation. Although there is no study on the relationship between khat chewing and exposure
48 to violence among FSWs, most FSWs chew khat before departing to work and drink alcohol
49 during working hours to minimize the effect, which in turn exposes them to HED and violence.
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3 In addition, the resistance to condom use from clients and the violence experience may create a
4 difficult situation for FSWs with regard to proper use of condoms, which further exposes FSWs
5 to HIV and other STIs. In this study there were a significant relationship between condom
6 breakage and history of physical beating and rape. Even though there was no significant
7 association between HIV and violence, the proportion of HIV positive FSWs in the sample was
8 high (23%). A study conducted in Benin reported a similar finding concerning the association
9 between condom breakage and violence, but unlike our study there was a significant association
10 between HIV and violence experience (23).
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18 In general, there were some similarities but also differences concerning the predictors of rape
19 and physical violence. For example, being in the younger age group was a significant predictor
20 of physical beating but not for rape, and having lower income was associated with exposure to
21 rape but not to physical beating. Nevertheless, based on the current data, it is difficult to draw
22 any conclusions about why one variable would matter for physical beating but not for rape. The
23 reasons underlying the differences are currently unknown, and further research might be required
24 to gain an understanding of the patterns observed.
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31 **Methodological considerations**

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34 There are a limited number of studies on violence among FSWs in Ethiopia and the existing
35 studies are restricted to one city (9, 10). One of the strengths of this study is that it involves
36 multiple sites (eleven large towns) across the country. The second strength is the sampling
37 technique; the study used a respondent-driven sampling technique which is recommended for
38 hard to reach populations and is believed to give a representative sample of the target population.
39 The third strength is the assessment of their HIV status on site using the national testing
40 algorithm. In addition, the pilot study conducted prior to the actual implementation added
41 strength for the main study protocol.
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49 This study also had limitations. First, sexual and physical violence are sensitive topics that are
50 subject to underreporting because of social desirability bias. Second, recall bias could occur
51 because participants were asked about physical violence in the past year and rape since they start
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3 selling sex. We tried to minimize underreporting through intense interviewer training. In
4 addition, since it is a cross-sectional study, participants are assessed only once; thus, it would be
5 difficult to infer the temporal association between a risk factor and an outcome. In addition, the
6 results regarding correlates of physical and sexual violence among FSWs in Ethiopia might have
7 limited generalizability across settings. However, these results are likely to be relevant for other
8 FSWs in other African countries that have a similar setting as Ethiopia, and may inform targeted
9 prevention strategies for this key population.
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16 **Conclusion**

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18 In general, FSWs are vulnerable to physical and sexual violence, and the risk increases when
19 they are younger, street-based, and are high consumers of alcohol or khat. Therefore, to reduce
20 physical and sexual violence, strategies to secure and improve their work environment should be
21 a critical component of targeted interventions. Increasing awareness regarding the role of khat
22 chewing and alcohol drinking towards vulnerability to violence should be an integral component
23 of HIV prevention and violence reduction programs. In addition, targeted efforts should be made
24 for the younger FSWs to reduce their vulnerability.
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33 **Conflict of Interest:** None to declare.

34 **Authors contributions**

35 MA and AA developed the study design. MA analyzed and interpreted the data and drafted the
36 manuscript. AA was involved in the data analysis and interpretation, and in the writing of the
37 manuscript. TT was involved in the interpretation of the data and contributed to the writing of
38 the manuscript. All authors approved the final manuscript.
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47 **Data sharing statement:** No additional data available.
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51 **Reference**

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Based on the STROBE cross sectional guidelines.

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			Page
		Reporting Item	Number
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	1

1	Background /	#2	Explain the scientific background and rationale for the	2
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6	Objectives	#3	State specific objectives, including any prespecified	3
7			hypotheses	
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11	Study design	#4	Present key elements of study design early in the paper	4
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15	Setting	#5	Describe the setting, locations, and relevant dates, including	4, 5, 6
16			periods of recruitment, exposure, follow-up, and data collection	
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20	Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of	5
21			selection of participants.	
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26		#7	Clearly define all outcomes, exposures, predictors, potential	6
27			confounders, and effect modifiers. Give diagnostic criteria, if	
28			applicable	
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33	Data sources /	#8	For each variable of interest give sources of data and details of	6
34	measurement		methods of assessment (measurement). Describe	
35			comparability of assessment methods if there is more than one	
36			group. Give information separately for for exposed and	
37			unexposed groups if applicable.	
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45	Bias	#9	Describe any efforts to address potential sources of bias	2, 18
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48	Study size	#10	Explain how the study size was arrived at	5
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51	Quantitative	#11	Explain how quantitative variables were handled in the	6
52	variables		analyses. If applicable, describe which groupings were chosen,	
53			and why	
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1	Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	7	
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7		#12b	Describe any methods used to examine subgroups and interactions	NA	
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12		#12c	Explain how missing data were addressed	8	
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15		#12d	If applicable, describe analytical methods taking account of sampling strategy	NA	
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21		#12e	Describe any sensitivity analyses	7	
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23	Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	5	
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36		#13b	Give reasons for non-participation at each stage	5	
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39		#13c	Consider use of a flow diagram		
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41	Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.		
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52		#14b	Indicate number of participants with missing data for each variable of interest	8, 9 in tables	
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56	Outcome data	#15	Report numbers of outcome events or summary measures.	na	
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1		Give information separately for exposed and unexposed	
2		groups if applicable.	
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6	Main results	#16a Give unadjusted estimates and, if applicable, confounder-	7 - 10
7		adjusted estimates and their precision (eg, 95% confidence	
8		interval). Make clear which confounders were adjusted for and	
9		why they were included	
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16		#16b Report category boundaries when continuous variables were	
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21		#16c If relevant, consider translating estimates of relative risk into	
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26	Other analyses	#17 Report other analyses done—e.g., analyses of subgroups and	10 -16
27		interactions, and sensitivity analyses	
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32	Key results	#18 Summarise key results with reference to study objectives	
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35	Limitations	#19 Discuss limitations of the study, taking into account sources of	18
36		potential bias or imprecision. Discuss both direction and	
37		magnitude of any potential bias.	
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43	Interpretation	#20 Give a cautious overall interpretation considering objectives,	16 -18
44		limitations, multiplicity of analyses, results from similar studies,	
45		and other relevant evidence.	
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50	Generalisability	#21 Discuss the generalisability (external validity) of the study	19
51		results	
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55	Funding	#22 Give the source of funding and the role of the funders for the	20
56		present study and, if applicable, for the original study on which	
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1 the present article is based

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Prevalence and correlates of physical violence and rape among female sex workers in Ethiopia: A cross-sectional study with respondent-driven sampling from 11 major towns

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Prevalence and correlates of physical violence and rape among female sex workers in Ethiopia: A cross-sectional study with respondent-driven sampling from 11 major towns

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Abstract

Objective: This study examined the prevalence and correlates of physical violence and rape among FSWs in Ethiopia.

Design: A cross-sectional study using a respondent-driven sampling technique

Setting: Eleven major towns in Ethiopia

Participants: 4900 female sex workers (FSWs)

Main outcome measures: The prevalence of physical beating and rape and factors contributing

Results: Among FSWs, 17.5% reported physical beating within the past year and 15.2% reported rape since they started selling sex. FSWs aged 35+ years (AOR 0.59, 95% CI 0.38, 0.92) were less exposed to physical beating than those aged 15-24 years. FSWs working on the street (AOR 1.92, 95% CI 1.53, 2.39), in red-light houses (AOR 1.63, 95% CI 1.12, 2.38) and in local drinking houses (AOR 1.35, 95% CI 1.02, 1.78) experienced more physical beating than FSWs working in bars/hotels. FSWs who consumed alcohol four or more days in a week (AOR 1.92, 95% CI 1.21, 3.04), and who chewed khat frequently experienced more physical violence. Rape was associated with having a low monthly income, drinking alcohol four or more days per week (AOR 2.33, 95% CI 1.47, 3.7), experience of heavy episodic drinking in a month (AOR 1.71, 95% CI 1.24, 2.38), and chewing khat 3-4 days per week (AOR 2.15, 95% CI 1.55, 2.98). Condom breakage was more frequent among FSWs who reported both physical beating (AOR 1.51, 95% CI 1.25, 1.84) and rape (AOR 1.26, 95% CI 1.03, 1.55).

Conclusion: FSWs in Ethiopia are vulnerable to physical and sexual violence, and the risk increases when they are younger, street-based, and high consumers of alcohol or khat. Therefore, targeted efforts are needed for prevention and harm reduction.

Keywords: female sex workers, physical violence, rape, substance use, Ethiopia

Strengths and limitations of this study

- The study involves multiple sites (eleven large towns) across the country with a large sample size.
- The study used a respondent-driven sampling technique which is recommended for hard to reach populations.
- Sexual and physical violence are sensitive topics that are subject to underreporting because of social desirability bias.
- Recall bias could occur because participants were asked about physical violence in the past year and rape since they start selling sex.
- Due to a cross-sectional study design, it would be difficult to infer the temporal association between a risk factor and an outcome

Introduction

As per WHO definition, violence is the intentional use of physical force or power against another person or group, which has a high likelihood of resulting in injury, death, or sexual or psychological harm (1). Violence against women is a global phenomenon, as more than one in three women worldwide is beaten, coerced into sex or abused in her lifetime (2). Furthermore, violence is one of the main contributors to poor sexual and reproductive health among women, leading to unintended pregnancy, self-induced abortions, gynecologic problems, sexual dysfunction, and sexually transmitted infections (STIs), including HIV (3, 4).

In most countries, female sex work is either illegal or has an uncertain legal status; for example, prostitution is not illegal but approaching sex workers in public is illegal; this makes authorities reluctant to offer protection or support, which in turn legitimizes violence and discrimination against sex workers (5). In the case of Ethiopia, it is illegal to operate a brothel or procure sex workers as a commercial activity, but the sale of sex by women is neither prohibited nor legally recognized as a profession (6). Female sex workers (FSWs) frequently face harassment and violence, not only because of their illegitimate status, but also as a manifestation of gender inequality and discrimination directed towards women (7, 8).

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3 Violence against FSWs can be perpetrated by anyone, including policemen, intimate partners,
4 and clients. In Adama and Mekelle towns in Ethiopia, nearly 60% and 75% of female sex
5 workers, respectively, reported lifetime violence (9, 10). In the same study in Adama, 8% of
6 FSW reported forced sex since they started sex work (10). In another study conducted among
7 homeless street females in Bahirdar town, 11.4% of them reported having been raped during the
8 last one year period (11). In Uganda, 40% of FSWs reported physical abuse and 49 % had been
9 raped at least once in their lifetime (12). In another study conducted in Hunan, China and
10 Karnataka, India, 16% and 9% of female sex workers, respectively, reported work-related
11 violence (13, 14).
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20 Several risk factors have been found to have an association with physical and sexual violence
21 against FSWs. Socio-economic characteristics, risky sexual behaviors and substance abuse are
22 the most mentioned factors worldwide (9, 10, 15, 16). A randomized controlled trial study in
23 Kenya and South Africa showed that alcohol consumption reduction by FSWs had a significant
24 contribution to violence reduction (17, 18). Moreover, establishments where alcohol and other
25 drugs are consumed, associates with an increased likelihood of people becoming violent towards
26 sex workers (8, 19). However, other studies suggest that FSWs who work outdoors face more
27 violence than those who work indoors (20, 21).
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35 Violence towards FSWs may also be associated with condom use and condom breakage. Studies
36 conducted among FSWs have found several intentional and unintentional factors associated with
37 condom breakages during sex work. These factors included being drunk or high on drugs,
38 wearing unfitting condoms, incorrect condom use, and having violent or rough sex(22, 23).
39 Moreover, violence towards FSWs may also be linked to disagreement over condom use, which
40 increases the risk of acquiring HIV and other STIs (21, 24-26). In Ethiopia, the weighted HIV
41 prevalence among FSWs is estimated to be 23% (27), while it is 1.2 % in the general population
42 (28), which shows the magnitude of the potential risk exposure among FSWs. In addition,
43 violence also prevents sex workers from seeking appropriate health services (26, 29, 30).
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51 In general, 120,000 to 160,000 FSWs are estimated to live in Ethiopia, working in different
52 venues, mainly in bars and hotels, Key-mebrat (red lighthouses), local drinking houses, and on
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3 the street (27). Currently, the number of female sex workers is growing, with increasing numbers
4 of young girls entering the sex trade.
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7 This study explores the prevalence and correlates of physical violence and rape among FSWs in
8 Ethiopia. Successful strategies for handling the trauma may vary by the type of violence
9 experienced. Therefore, identification of risk factors that are specific to various types of violence
10 has the potential to inform the development of evidence-based prevention programs. In addition,
11 generating such types of evidence based on national level data will help to promote more
12 effective prevention for female sex workers.
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18 **Methods**

19 **Study design**

20 This study was part of a larger study concerning HIV prevalence and related risk factors among
21 female sex workers and long distance drivers that was carried out in Ethiopia in 2014. A cross-
22 sectional study design using Respondent Driven Sampling technique (RDS) was used for data
23 collection. RDS is a complex sampling method based on a chain-referral design and
24 recommended for hard-to-reach populations. In all 11 towns included as study locations, initial
25 FSW “seeds” were selected to start the sampling process. Seeds were selected purposively to
26 represent the type of sex worker, age category, and geographic location. They were identified
27 through formative assessments with key stakeholders working with FSWs and representatives of
28 FSWs. The selected seeds were those who were well-connected with their community and
29 reported large social networks.
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40 A maximum of three recruits per seed was allowed and only one-time participation was ensured
41 by using a fingerprint scanning device. Recruitment pattern (who recruited whom) was tracked
42 and network size was also determined.
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46 **Study area, period and population**

47 The study locations were the seven major regional towns and the four main transport corridor
48 towns. The seven major regional towns were: Addis Ababa, Bahirdar, Mekelle, Hawassa,
49 Adama, Gambela, and Dire-dawa. The four transport corridor towns were Semera-Logia (Addis
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3 Ababa-Djibouti route), Kombolcha (Addis Ababa-Mekelle route), Metema (Addis Ababa-
4 Metema route) and Shashemene (Addis Ababa -Moyale route).
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8 The source populations were all female sex workers living in those selected eleven towns. For
9 the purpose of the study, female sex workers were defined as follows: ‘women who practice
10 sexual activity with the pre-conditions of financial or in-kind benefits’. The inclusion criteria
11 were: receiving money or other benefits for sex with four or more people within the last 30 days,
12 being 15 and above years old, properly recruited by a peer (present with the coupon) and giving
13 consent both for the interview and blood drawing.
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19 **Sample size**

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21 The source study protocol calculated sample size of 400 female sex workers in each town using
22 anticipated HIV prevalence of 25%, 6% precision, 95% CI and design effect of two. However,
23 the number of female sex workers who participated in each town was not exactly 400, and the
24 total number of FSWs who participated in the study was 4900.
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29 **Data collection procedure**

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31 Six seed FSWs were selected to initiate coupon-based recruitment. Eligible FSWs who provided
32 informed consent to participate were administered a face to face interview in a private room by a
33 nurse with a structured questionnaire in Amharic language. They then provided blood specimens
34 for HIV, CD4 and viral load testing in a private room. When the process was completed,
35 participants were provided with up to three coupons and instructed to recruit their FSW peers
36 into the study. To compensate the time and costs of transport, a primary incentive of 100 ETB
37 (\$5.0) and additional 50 ETB (\$2.5) for each eligible peer she enrolled into the study was given.
38 An electronic data base for tracking coupons and recruitment was established with participant
39 ID, fingerprint code, and a pre-printed label that was scanned. The data collection tools and
40 questionnaire were pretested in a pilot study; feedbacks from the pilot study was used to finalize
41 the data collection tools and field logistic and operational procedures. The questionnaire
42 included: socio-demographic characteristics, sexual risk exposure, sexual behaviors, condom
43 use, history of STI symptoms, alcohol and drug use consumption, violence related issues,
44 knowledge of HIV transmission, and HIV testing history.
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Variables

Violence was assessed with two dependent variables, which were physical beating during the last one year and rape since sex selling started. The following questions were asked: “When exchanging sex for money during the last one year, have you ever been physically beaten by a sexual partner or client?” and “Have you ever been raped or forced to have sex against your will since you start selling sex?” responses were dichotomized into a Yes and No variable for analysis. For both of the questions, all who had reported beating and rape at least once were considered as exposed to violence (Yes).

The independent measures included current age, monthly income from selling sex, marital status, educational status, sex selling venue, khat chewing, alcohol drinking, HIV status, and condom breakage.

Current age was a continuous variable and for the purpose of analysis was categorized as ten year intervals: younger (15-24), middle age (25-34), and older one (35+), with the younger age group used as the reference category. Monthly income from selling sex was an open-ended question and for the analysis was categorized in to 1000Birr (\$50) intervals considering the cost of living in the country. Educational status was categorized as no formal education, primary first cycle (grade 1-4), primary second cycle (grade 5-8), and secondary and above for analysis, in accordance with the country education system.

In addition, sex workers were categorized based on their sex selling venue, where bar/hotel was used as the reference because it is the most common FSW working venue. In addition, this venue category has better security than the other venues and the numbers of FSWs in this category were higher than the rest.

Alcohol consumption was measured through different approaches including frequency of alcohol consumption, number of drinks per specific day and frequency of heavy episodic drinking (6 or more standard drinks per day).

Khat chewing was assessed with the frequency of days they chewed in a week. Khat (*Catha edulis*) is a stimulant leave, and after chewing an individual may become talkative, alert, feel excitement, increased self-esteem, and increased imagination (31). Khat chewing is also popular

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3 among FSWs, as it is a means to spend the day time, to be active during the night for sex work
4 and to socialize with each other.
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6 7 **Data analysis**

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9 Statistical analysis was performed using SPSS Version 20. Descriptive statistics were used to
10 provide summary measures (means, frequencies). Odds ratios (crude and adjusted) and 95%
11 confidence intervals (CI) were obtained using bivariate and multivariate logistic regression
12 analysis. Those independent variables significantly associated with the outcome variable in the
13 bivariate analysis were included in the multivariate analysis. Cases with missing data were
14 excluded from the analyses. Significance was accepted at p-value <0.05.
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20 21 **Ethical considerations**

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23 Permission for data use was obtained from the Ethiopian Public Health Institute (EPHI). The
24 protocol was cleared at the Scientific and Ethical Research Office (SERO) of EPHI, the
25 Ethiopian Science and Technology Ministry Ethical Committee, and CDC-Atlanta IRB.
26 Individual written informed consent was obtained from each participant for the interview and
27 blood sample collection while the study was conducted.
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31 32 **Patient and Public Involvement**

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34 No patients were involved in the development of research question, the outcome measures, the
35 design or implementation of the study. Nevertheless, Due to the nature of respondent driven
36 sampling technique, an assessment was conducted to identify seeds and hotspot areas for the
37 actual data collection. These assessment was conducted in collaboration with organizations
38 working with FSWs and with active member of FSWs in the towns. The primary result is
39 planned to disseminate by publication in a peer-reviewed journals and to present the study at
40 national level for stakeholders working with FSWs.
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46 47 **Results**

48 49 **Socio-demographic and other background characteristics**

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51 A total of 4900 female sex workers participated in the study. Demographic, socioeconomic and
52 other background characteristics of the participants are shown in Table 1. The majority of the
53 participants were between 15 to 24 years old with a mean age of 24 years (SD= 5.7); 44 % of
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3 them were divorced, separated or widowed. A quarter of them reported being uneducated and
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5 40% of them earned on average less than \$50 per month. Regarding sex selling starting age, the
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7 majority started selling sex between the ages of 18-24 years, although nearly 25% started before
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9 the age of 18. FSWs worked in different eating, drinking and recreation establishments and also
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11 other venues; 33% recruited their clients in bars/hotels, followed by 26.5% on the street and 20%
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13 in local drinking houses (Table 1).
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15 **Table 1. Distribution of socio-demographic and other background characteristics among**
16 **4900 female sex workers across eleven towns, Ethiopia**
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18 Variable	19 Frequency	20 Percentage
21 Age		
22 15-24	2831	57.8
23 25-34	1700	34.7
24 35+	369	7.5
25 Total	4900	100.0
26 Missing	0	
27 Mean age of respondents = 24.16		
28 SD= 5.7		
29 Educational status		
30 No Education	1224	25.0
31 Primary 1st cycle (1-4)	764	16.0
32 Primary 2nd cycle (5-8)	2062	42.0
33 Secondary & above	831	17.0
34 Total	4881	100.0
35 Missing	19	
36 Sex selling venues		
37 Bar/Hotel	1613	33.0
38 Local drinking houses	983	20.1
39 Spa/Massage/Beauty salon/Own house	261	5.3
40 Red Light houses	429	8.8
41 Street	1295	26.5
42 Others	304	6.2
43 Total	4885	100.0
44 Missing	15	
45 Current marital status		
46 Never Married	2698	55.2
47 Married/Cohabited	37	0.8

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Separated/Divorced	1976	40.5
Widowed	173	3.5
Total	4884	100.0
Missing	16	
Sex selling starting age		
Less than 15	120	2.5
15 - 17	1088	22.3
18 - 24	2864	58.7
25 - 29	583	12.0
30 & Above	220	4.5
Total	4875	100.0
Missing	25	
Monthly income from selling sex		
Less than 1000 (<\$50)	1932	39.6
1001 – 2000 (\$50-\$100)	1554	31.8
2001 – 3000 (\$100-\$150)	812	16.6
3001 – 4000 (\$150-\$200)	318	6.5
4001 – 5000 (\$200-\$250)	150	3.1
Above 5000 (>\$250)	117	2.4
Total	4883	100.0
Missing	17	

Behavioral and other related factors

Table 2 shows the prevalence of behavioral and other factors. The majority (70%) of the respondents consumed alcohol and of those, 15.8% had drunk so much on a typical day within the past 30 days that they did not remember what happened the next day. About half of the respondents chewed khat and 23.8% of them chewed almost every day (5-7 days a week).

Regarding condom use, 25.5% of them reported condom breakage within the past 30 days prior to the study. HIV/AIDS status of the respondents was also assessed and a quarter of them (23%) were HIV positive. With regard to physical and sexual violence experience, 17.5% of them reported physical beating within the past 12 months and 15.2% reported having been raped since they started selling sex. (Table 2)

Table 2. Behavioral and other related factors among 4900 female sex workers across eleven towns, Ethiopia

Variable	Frequency	Percentage
Frequency alcohol consumption		
Never	1493	30.6
Once a month or less	222	4.5
2 - 4 days a month	492	10.1
2 - 3 days a week	1394	28.5
4 or more days a week	1283	26.3
Total	4884	100.0
Missing	16	
Alcohol containing drinks on a typical day		
1 or 2	806	23.8
3 or 4	1383	40.8
5 or 6	742	21.9
7 to 9	296	8.7
10 or more	164	4.8
Total	3391	100.0
Missing	0	
Frequency of heavy episodic drinking		
Never	1863	54.9
Less than monthly	236	7.0
Monthly	299	8.8
Weekly	630	18.6
Daily or almost daily	363	10.7
Total	3391	100.0
Missing	0	
Drunk so much and can't remember what happened the next day		
Yes, in last 30 days	534	15.8
Yes, not in last 30 days	233	6.9
No	2609	77.2
Don't remember	4	0.1
Total	3380	100.0
Missing	11	
Frequency of khat chewing		
Never	2431	49.8
Less than once a week	577	11.8
1-2 days per week	429	8.8
3-4 days per week	284	5.8
5-7 days per week	1162	23.8
Total	4883	100.0
Missing	17	
Condom breakage in the past 30 days		
Yes	1243	25.5
No	3635	74.5

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Total	4878	
Missing	22	
HIV status		
Negative	3708	76.0
Positive	1173	24.0
Total	4881	100.0
Missing	19	
Ever been raped or forced to have sex since start selling sex		
No	4142	84.8
Yes	742	15.2
Total	4884	100.0
Missing	16	
Physically beaten in the last 12 months		
No	4026	82.5
Yes	855	17.5
Total	4881	100.0
Missing	19	

Bivariate regression analysis outcome

Table 3 shows the bivariate logistic regression results; each independent variable was analyzed separately against the two outcome variables. The variables that were significantly associated with physical violence were: age, educational level, monthly income, current marital status, sex selling venues, frequency of alcohol consumption, alcohol containing drinks on a typical day, frequency of heavy episodic drinking, frequency of khat chewing in a week and condom breakage. Variables significantly associated with rape were: educational level, income from selling sex, frequency of alcohol consumption, alcohol containing drinks on a typical day, frequency of heavy episodic drinking, frequency of khat chewing in a week and condom breakage. HIV status was not significantly associated with either physical violence or rape.

Table 3. Bivariate logistic regression analyses results of independent variables associated with physically beaten in the last 12 months and ever been raped since start selling sex, odds ratio (OR) and 95% confidence intervals (CI)

Variables	Physical beating OR (95% CI)	Rape OR (95% CI)
Age		
15-24*		
25-34	1.02 (0.87, 1.19)	1.02 (0.86, 1.21)
35+	0.52 (0.37, 0.74)	0.88 (0.64, 1.20)

Educational level

No Education*

Primary 1st cycle (1-4) 1.01 (0.79, 1.31) 1.45 (1.14,1.85)

Primary 2nd cycle (5-8) 1.35 (1.11, 1.63) 1.08 (0.88,1.32)

Secondary & above 1.49 (1.18, 1.87) 1.09 (0.85,1.41)

Monthly income from selling sex

Less than 1000 birr (<\$50) *

1001 – 2000 birr (\$50-\$100) 1.44 (1.20, 1.73) 0.69 (0.58, 0.85)

2001 – 3000 birr (\$100-\$150) 1.67 (1.35, 2.07) 0.51 (0.39, 0.66)

3001 – 4000 birr (\$150-\$200) 1.61 (1.19, 2.17) 0.65 (0.46, 0.92)

4001 – 5000 birr (\$200-\$250) 2.12 (1.44, 3.14) 1.01 (0.66, 1.55)

Above 5000 birr (>\$250) 1.62 (1.01, 2.58) 0.75 (0.44, 1.27)

Current marital status

Never Married*

Married/Cohabited 1.05 (0.46, 2.41) 0.69 (0.24, 1.96)

Separated/Divorced 0.93 (0.80, 1.09) 1.03 (0.88, 1.21)

Widowed 0.59 (0.37, 0.95) 1.39 (0.95, 2.06)

Sex selling venues

Bar/Hotel*

Local drinking houses 0.87 (0.69, 1.09) -

Spa/Massage/Beauty salon/Own house 0.45 (0.28, 0.71) -

Red Light houses 0.95 (0.71, 1.27) -

Street 1.51 (1.26, 1.82) -

Others 1.37 (1.01, 1.86) -

Frequency alcohol consumption

Never*

2 - 4 days a month 1.82 (1.35, 2.44) 1.74 (1.27, 2.38)

2 - 3 days a week 2.07 (1.66, 2.57) 1.87 (1.48, 2.36)

4 or more days a week 3.54 (2.87, 4.37) 3.43 (2.75, 4.28)

Alcohol containing drinks on a typical day

1 or 2*

3 or 4 1.39 (1.09, 1.76) 1.16 (0.92, 1.46)

5 or 6 2.03 (1.58, 2.62) 1.09 (0.84, 1.43)

7 to 9 2.19 (1.59, 3.03) 0.98 (0.68, 1.41)

10 or more 2.76 (1.88, 4.03) 1.78 (1.20, 2.65)

Frequency of heavy episodic drinking

Never*

Less than monthly 1.43 (1.03, 1.98) 1.39 (0.99, 1.95)

Monthly 1.23 (0.90, 1.66) 1.59 (1.18, 2.13)

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Weekly	1.73 (1.39, 2.14)	1.03 (0.80, 1.31)
Daily or almost daily	1.97 (1.53, 2.55)	1.69 (1.29, 2.21)
Drunk so much and can't remember what happened the next day		
No*		
Yes, in the last 30 days	2.90 (2.37, 3.56)	1.66 (1.33, 2.07)
Yes, before last 30 days	2.22 (1.65, 2.99)	1.27 (0.91, 1.78)
Frequency of khat chewing in a week		
Never*		
Less than once a week	1.24 (0.96, 1.60)	0.89 (0.67, 1.19)
1-2 days per week	1.67 (1.28, 2.18)	2.89 (2.26, 3.69)
3-4 days per week	2.49 (1.87, 3.34)	2.92 (2.19, 3.89)
5-7 days per week	2.48 (2.08, 2.96)	1.47 (1.21, 1.79)
Condom breakage		
No*		
Yes	1.99 (1.69, 2.33)	1.62 (1.37, 1.92)
HIV test result		
Negative*		
Positive	1.04 (0.88, 1.24)	0.88 (0.73, 1.07)

Note: * Reference category

Multivariate analysis of factors associated with physical violence (physically beaten)

Table 4 shows the results of the multivariate analysis used to identify factors associated with physical violence after simultaneously adjusting for all measures included in the analyses. Female sex workers aged 35 years or above (AOR 0.59, 95% CI 0.38, 0.92) were significantly less experienced to physical violence when compared with the younger age group (15-24 years). FSWs who attend primary 1st cycle education (AOR 0.71, 95% CI 0.52, 0.97) were also less likely to experience physical beating than those who report no education. On the other hand, FSWs who worked on the street (AOR 1.92, 95% CI 1.53, 2.39), in red-light houses (AOR 1.63, 95% CI 1.12, 2.38) and in local drinking houses (AOR 1.35, 95% CI 1.02, 1.78) have an increased odd of experience to physical violence compared with FSWs who worked in bars/hotels. Moreover, substance use was significantly related to physical violence. FSWs who consumed alcohol four or more days in a week (AOR 1.92, 95% CI 1.21, 3.04), those who did not remember what happened the next day due to heavy alcohol consumption both in the past 30 days (AOR 1.98, 95% CI 1.58, 2.49), and before past 30 days (AOR 1.85, 95% CI 1.35, 2.53),

FSWs who chewed khat 3-4 days per week (AOR 1.58, 95% CI 1.13, 2.21) and 5-7 days per week (AOR 1.43, 95% CI 1.13, 1.80) have more likelihood of experiencing physical violence. Condom breakage experience within the past 30 days prior to the study was also significantly associated with physical violence (AOR 1.51, 95% CI 1.25, 1.84).

Table 4. Multivariate logistic regression analysis of factors associated with physical violence (physically beaten) in the past twelve month among female sex workers across eleven towns in Ethiopia, odds ratios (OR) and 95% confidence intervals (CI).

Variables	OR (95% CI)
Age	
15-24*	
25-34	1.04 (0.82, 1.22)
35+	0.59 (0.38, 0.92)
Educational level	
No Education*	
Primary 1st cycle (1-4)	0.71 (0.52, 0.97)
Primary 2nd cycle (5-8)	0.98 (0.77, 1.26)
Secondary & above	1.14 (0.85, 1.53)
Monthly income from selling sex	
Less than 1000 birr (<\$50) *	
1001 – 2000 birr (\$50-\$100)	1.13 (0.90, 1.41)
2001 – 3000 birr (\$100-\$150)	1.14 (0.87, 1.48)
3001 – 4000 birr (\$150-\$200)	1.12 (0.77, 1.61)
4001 – 5000 birr (\$200-\$250)	1.44 (0.93, 2.24)
Above 5000 birr (>\$250)	1.12 (0.63, 1.99)
Current marital status	
Never Married*	
Married/Cohabited	0.68 (0.24, 1.89)
Separated/Divorced	1.08 (0.88, 1.29)
Widowed	0.87 (0.48, 1.59)
Sex selling venues	
Bar/Hotel*	
Local drinking houses	1.35 (1.02, 1.78)
Spa/massage/beauty salon/own house	1.04 (0.58, 1.84)
Red Light houses	1.63 (1.12, 2.38)
Street	1.92 (1.53, 2.39)
Others	1.39 (0.98, 1.99)
Frequency alcohol consumption	

Never*	
2 - 4 days a month	1.25 (0.77, 2.04)
2 - 3 days a week	1.32 (0.84, 2.06)
4 or more days a week	1.92 (1.21, 3.04)

Alcohol containing drinks on a typical day

1 or 2*	
3 or 4	1.08 (0.84, 1.39)
5 or 6	1.15 (0.85, 1.57)
7 to 9	1.09 (0.74, 1.64)
10 or more	1.14 (0.72, 1.81)

Frequency of heavy episodic drinking

Never*	
Less than monthly	1.07 (0.75, 1.52)
Monthly	0.84 (0.59, 1.18)
Weekly	1.07 (0.82, 1.39)
Daily or almost daily	0.99 (0.71, 1.38)

Drunk so much and can't remember what happened the next day

No*	
Yes, in the last 30 days	1.98 (1.58, 2.49)
Yes, before last 30 days	1.85 (1.35, 2.53)

Frequency of khat chewing in a week

Never*	
Less than once a week	1.04 (0.77, 1.42)
1-2 days per week	1.30 (0.96, 1.77)
3-4 days per week	1.58 (1.13, 2.21)
5-7 days per week	1.43 (1.13, 1.80)

Condom breakage

No*	
Yes	1.51 (1.25, 1.84)

Note: * Reference category

Multivariate analysis of factors associated with sexual violence (rape)

Table 5 shows the results of the multivariate logistic regression analyses to identify factors that were significantly associated with rape after simultaneously adjusting for all measures included in the analyses. Female sex workers with a monthly income of \$50 to \$200 have significantly less experience of rape compared to those with a monthly income of below \$50. Drinking alcohol four or more days per week (AOR 2.33, 95% CI 1.47, 3.7), those with experience of heavy drinking in the last 30 days and did not remember what happened the next day (AOR 1.34,

95% CI 1.05, 1.72), experience of heavy episodic drinking (HED) in a month (AOR 1.71, 95% CI 1.24, 2.38), experience of HED almost daily (AOR 1.49, 95% CI 1.06, 2.11) and chewing khat 1-2 days (AOR 2.13, 95% CI 1.61, 2.83) and 3-4 days (AOR 2.15, 95% CI 1.55, 2.98) per week were positively associated with rape. Moreover, condom breakage (AOR 1.26, 95% CI 1.03, 1.55) was significantly more frequent among FSWs who reported rape.

Table 5. Multivariate logistic regression analysis of factors associated with sexual violence (rape) since sex selling start among female sex workers across eleven towns in Ethiopia, odds ratios (OR) and 95% confidence intervals (CI).

Variables	OR (95% CI)
Monthly income from selling sex	
Less than 1000 birr (<\$50) *	
1001 – 2000 birr (\$50-\$100)	0.62 (0.49, 0.77)
2001 – 3000 birr (\$100-\$150)	0.42 (0.32, 0.57)
3001 – 4000 birr (\$150-\$200)	0.45 (0.29, 0.69)
4001 – 5000 birr (\$200-\$250)	0.84 (0.53, 1.33)
Above 5000 birr (>\$250)	0.62 (0.34, 1.15)
Current marital status	
Never Married*	
Married/Cohabited	0.57 (0.17, 1.97)
Separated/Divorced	1.01 (0.83, 1.22)
Widowed	1.61 (0.98, 2.63)
Educational level	
No Education*	
Primary 1st cycle (1-4)	1.06 (0.79, 1.43)
Primary 2nd cycle (5-8)	0.83 (0.65, 1.07)
Secondary & above	0.92 (0.68, 1.25)
Frequency of alcohol consumption	
Never*	
2 - 4 days a month	1.15(0.69, 1.89)
2 - 3 days a week	1.24(0.78, 1.96)
4 or more days a week	2.33(1.47,3.73)
Drunk so much and can't remember what happened the next day	
No*	
Yes, in the last 30 days	1.34 (1.05, 1.72)
Yes, before last 30 days	1.07 (0.75, 1.52)
Frequency of heavy episodic drinking	
Never*	

Less than monthly	1.61 (1.12, 2.32)
Monthly	1.71 (1.24, 2.38)
Weekly	1.04 (0.78, 1.38)
Daily or almost daily	1.49 (1.06, 2.11)

Frequency of khat chewing in a week

Never*	
less than once a week	0.83 (0.59, 1.16)
1-2 days per week	2.13 (1.61, 2.83)
3-4 days per week	2.15 (1.55, 2.98)
5-7 days per week	1.06 (0.83, 1.36)

Condom breakage

No*	
Yes	1.26 (1.03, 1.55)

Note: * Reference category

Discussion

According to this study, 17.5% of FSWs in Ethiopia had been physically beaten within the past 12 months and 15.2% had been raped since they start selling sex. Age, sex selling venues, and high consumption of alcohol and khat were significant predictors of physical violence (beating). On the other hand, the significant predictors of sexual violence (rape) were low income and also high consumption of alcohol and khat.

The prevalence of both physical violence and sexual violence (rape) was lower than prevalence found in studies conducted in Uganda, Ivory Coast, and Kenya (9, 12, 30, 32). However, when compared to the studies conducted in Adama (Ethiopia), China, India, and Mexico the current study reported a higher prevalence of both physical and sexual violence (10, 11, 13, 14, 33). The difference in the definition of violence used might be one of the possible explanations for the difference between the current results and those found in other studies in Africa. Most of the studies assessed all forms of physical and sexual violence while the current study assessed solely physical beating and forced penetrative sex (rape). On the other hand, differences in results across settings might also be due to differences in background and contextual factors such as socio-economic status and cultural aspects.

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3 Several studies showed that younger FSWs are more exposed to physical and sexual violence
4 (13, 34) in line with the current findings that younger FSWs (15-24 years) were at higher risk for
5 physical violence when compared to their older counter parts (35+ years). The lack of experience
6 in identifying perpetrators and the perpetrator approach towards young FSWs may play a role in
7 increased exposure to violence. This finding is significant because younger FSWs entering the
8 sex trade is increasing. Therefore to reduce the vulnerability of younger FSWs; targeted harm
9 reduction program including awareness creation on how they could be exposed to violence and
10 factors which increases the likelihood of violence should be introduced to the interventions
11 program.
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20 Even though sex work is not a legally recognized profession in Ethiopia, most of the
21 establishments where the sex workers are based (hotels, bars/restaurants, night clubs etc.) operate
22 legally with working licenses. Nevertheless, some FSWs work on the street and in red-light
23 houses where they manage their own working area. Consequently, the levels of experience to
24 physical violence vary according to their working area. The present study revealed that FSWs
25 who mainly work in bar and hotels face less physical beating when compared with FSWs who
26 work on the street, in red-light houses and local drinking houses. This finding is in line with the
27 studies conducted in New York City and England (20, 21). This might be due to the level of
28 protection in their working areas and/or due to the type of clients who frequents those localities.
29 This signifies that engaging bar/hotel managers in the prevention activity could be additional
30 strategy to increase the effectiveness of harm reduction programs.
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40 Furthermore, an association between alcohol use and higher frequency of physical violence and
41 rape was reported. In particular, FSWs who consume alcohol more than four days a week and
42 those with experience of HED significantly experienced violence. Several studies conducted in
43 Ethiopia, Uganda, and Kenya also reported similar findings (9, 10, 12, 19). A large proportion of
44 female sex workers (FSWs) and their clients use alcohol prior to or during sex to helps them to
45 solicit clients and overcome their shyness (35, 36). In particular high level of alcohol
46 consumption places FSWs in disadvantaged situations by intensifying their vulnerability (8).
47 Research reviews also report that alcohol use impairs FSWs' ability to detect the risk of violence
48 and increases their vulnerability to risk-prone situations (37, 38). The consequences HED is not
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3 just limited to physical effects of intoxication but further exposes them to violence and risky
4 sexual behaviors.
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8 Correspondingly, chewing khat more days in a week was significantly associated
9 with experience of physical violence and rape. After chewing khat, some of the users consume
10 alcohol-containing drinks to decrease the level of stimulation. Although there is no study on the
11 relationship between khat chewing and experience to violence among FSWs, most FSWs chew
12 khat before departing to work and drink alcohol during working hours to minimize the effect,
13 which in turn exposes them to HED and violence. Even though the correlation of alcohol and
14 khat on the current study is low; Some says drinking alcohol after chewing khat will reduce the
15 stimulant effect. Further studies should assess the contribution of Khat chewing to increasing
16 violence experience independently.
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25 In addition, the resistance to condom use from clients and the violence experience may create a
26 difficult situation for FSWs with regard to proper use of condoms, which further exposes FSWs
27 to HIV and other STIs. In this study there were a significant relationship between condom
28 breakage and history of physical beating and rape. Even though there was no significant
29 association between HIV and violence, the proportion of HIV positive FSWs in the sample was
30 high (23%). A study conducted in Benin reported a similar finding concerning the association
31 between condom breakage and violence, but unlike our study there was a significant association
32 between HIV and violence experience (23). This finding signifies that providing condom only
33 will not be effective to prevent HIV and other STIs transmission; rather working on factors
34 contributing for not utilizing condom properly (like violence) could play an important role on
35 HIV prevention programs.
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45 In general, there were some similarities but also differences concerning the predictors of rape
46 and physical violence. For example, being in the younger age group was a significant predictor
47 of physical beating but not for rape, and having lower income was associated with experience to
48 rape but not to physical beating. Nevertheless, based on the current data, it is difficult to draw
49 any conclusions about why one variable would matter for physical beating but not for rape. The
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3 reasons underlying the differences are currently unknown, and further research might be required
4 to gain an understanding of the patterns observed.
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7 **Methodological considerations**

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10 There are a limited number of studies on violence among FSWs in Ethiopia and the existing
11 studies are restricted to one city (9, 10). One of the strengths of this study is that it involves
12 multiple sites (eleven large towns) across the country. The second strength is the sampling
13 technique; the study used a respondent-driven sampling technique which is recommended for
14 hard to reach populations and is believed to give a representative sample of the target population.
15 The third strength is the assessment of their HIV status on site using the national testing
16 algorithm. In addition, the pilot study conducted prior to the actual implementation added
17 strength for the main study protocol.
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25 This study also had limitations. First, sexual and physical violence are sensitive topics that are
26 subject to underreporting because of social desirability bias. Second, recall bias could occur
27 because participants were asked about physical violence in the past year and rape since they start
28 selling sex. We tried to minimize underreporting through intense interviewer training. In
29 addition, since it is a cross-sectional study, participants are assessed only once; thus, it would be
30 difficult to infer the temporal association between a risk factor and an outcome. In addition, the
31 results regarding correlates of physical and sexual violence among FSWs in Ethiopia might have
32 limited generalizability across settings. However, these results are likely to be relevant for other
33 FSWs in other African countries that have a similar setting as Ethiopia, and may inform targeted
34 prevention strategies for this key population.
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44 **Conclusion**

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46 In general, FSWs are vulnerable to physical and sexual violence, and the risk increases when
47 they are younger, street-based, and are high consumers of alcohol or khat. Therefore, to reduce
48 physical and sexual violence, strategies to secure and improve their work environment should be
49 a critical component of targeted interventions. Increasing awareness regarding the role of khat
50 chewing and alcohol drinking towards vulnerability to violence should be an integral component
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of HIV prevention and violence reduction programs. In addition, targeted efforts should be made for the younger FSWs to reduce their vulnerability.

Acknowledgments

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Conflict of Interest: None to declare.

Authors contributions

MA and AA developed the study design. MA analyzed and interpreted the data and drafted the manuscript. AA was involved in the data analysis and interpretation, and in the writing of the manuscript. TT was involved in the interpretation of the data and contributed to the writing of the manuscript. All authors approved the final manuscript.

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Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

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In your methods section, say that you used the STROBE cross sectional reporting guidelines, and cite them as:

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			Page
		Reporting Item	Number
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	1

1	Background /	#2	Explain the scientific background and rationale for the	2
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3	rationale		investigation being reported	
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6	Objectives	#3	State specific objectives, including any prespecified	3
7			hypotheses	
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11	Study design	#4	Present key elements of study design early in the paper	4
12				
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15	Setting	#5	Describe the setting, locations, and relevant dates, including	4, 5, 6
16			periods of recruitment, exposure, follow-up, and data collection	
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20	Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of	5
21			selection of participants.	
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26		#7	Clearly define all outcomes, exposures, predictors, potential	6
27			confounders, and effect modifiers. Give diagnostic criteria, if	
28			applicable	
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33	Data sources /	#8	For each variable of interest give sources of data and details of	6
34	measurement		methods of assessment (measurement). Describe	
35			comparability of assessment methods if there is more than one	
36			group. Give information separately for for exposed and	
37			unexposed groups if applicable.	
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45	Bias	#9	Describe any efforts to address potential sources of bias	2, 18
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48	Study size	#10	Explain how the study size was arrived at	5
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51	Quantitative	#11	Explain how quantitative variables were handled in the	6
52	variables		analyses. If applicable, describe which groupings were chosen,	
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1	Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	7	
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7		#12b	Describe any methods used to examine subgroups and interactions	NA	
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12		#12c	Explain how missing data were addressed	8	
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15		#12d	If applicable, describe analytical methods taking account of sampling strategy	NA	
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21		#12e	Describe any sensitivity analyses	7	
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23	Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	5	
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36		#13b	Give reasons for non-participation at each stage	5	
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39		#13c	Consider use of a flow diagram		
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41	Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.		
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52		#14b	Indicate number of participants with missing data for each variable of interest	8, 9 in tables	
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57	Outcome data	#15	Report numbers of outcome events or summary measures.	na	
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1		Give information separately for exposed and unexposed	
2		groups if applicable.	
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6	Main results	#16a Give unadjusted estimates and, if applicable, confounder-	7 - 10
7		adjusted estimates and their precision (eg, 95% confidence	
8		interval). Make clear which confounders were adjusted for and	
9		why they were included	
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16		#16b Report category boundaries when continuous variables were	
17		categorized	
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21		#16c If relevant, consider translating estimates of relative risk into	
22		absolute risk for a meaningful time period	
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26	Other analyses	#17 Report other analyses done—e.g., analyses of subgroups and	10 -16
27		interactions, and sensitivity analyses	
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32	Key results	#18 Summarise key results with reference to study objectives	
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35	Limitations	#19 Discuss limitations of the study, taking into account sources of	18
36		potential bias or imprecision. Discuss both direction and	
37		magnitude of any potential bias.	
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42	Interpretation	#20 Give a cautious overall interpretation considering objectives,	16 -18
43		limitations, multiplicity of analyses, results from similar studies,	
44		and other relevant evidence.	
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50	Generalisability	#21 Discuss the generalisability (external validity) of the study	19
51		results	
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55	Funding	#22 Give the source of funding and the role of the funders for the	20
56		present study and, if applicable, for the original study on which	
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1 the present article is based

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Prevalence and correlates of physical violence and rape among female sex workers in Ethiopia: A cross-sectional study with respondent-driven sampling from 11 major towns

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3 **Prevalence and correlates of physical violence and rape among female sex workers in**
4 **Ethiopia: A cross-sectional study with respondent-driven sampling from 11 major towns**

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27 **Abstract**

28 **Objective:** This study examined the prevalence and correlates of physical violence and rape
29 among FSWs in Ethiopia.
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31 **Design:** A cross-sectional study using respondent-driven sampling technique
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33 **Setting:** Eleven major towns in Ethiopia
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35 **Participants:** 4900 female sex workers (FSWs)
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37 **Main outcome measures:** The prevalence of experiences of physical beating and rape
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39 **Results:** Among FSWs, 17.5% reported physical beating within the past year and 15.2% reported
40 rape since they started selling sex. FSWs aged 35+ years (AOR 0.59, 95% CI 0.38, 0.92) were less
41 exposed to physical beating than those aged 15-24 years. FSWs working on the street (AOR 1.92,
42 95% CI 1.53, 2.39), in red-light houses (AOR 1.63, 95% CI 1.12, 2.38) and in local drinking houses
43 (AOR 1.35, 95% CI 1.02, 1.78) experienced more physical beating than FSWs working in
44 bars/hotels. FSWs who consumed alcohol four or more days in a week (AOR 1.92, 95% CI 1.21,
45 3.04), and who chewed khat frequently experienced more physical violence. Rape was associated
46 with having a low monthly income, drinking alcohol four or more days per week (AOR 2.33, 95%
47 CI 1.47, 3.7), experience of heavy episodic drinking in a month (AOR 1.71, 95% CI 1.24, 2.38),
48 and chewing khat 3-4 days per week (AOR 2.15, 95% CI 1.55, 2.98). Condom breakage was more
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3 frequent among FSWs who reported both physical beating (AOR 1.51, 95% CI 1.25, 1.84) and rape
4 (AOR 1.26, 95% CI 1.03, 1.55).

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6 **Conclusion:** FSWs in Ethiopia are vulnerable to physical and sexual violence, and the risk
7 increases when they are younger, street-based, and high consumers of alcohol or khat. Therefore,
8 targeted efforts are needed for prevention and harm reduction.
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12 **Key words:** female sex workers, physical violence, rape, substance use, Ethiopia
13

14 15 **Strengths and limitations of this study**

- 16 • The study involves multiple sites (eleven large towns) across the country with a large
17 sample size.
- 18 • The study used a respondent-driven sampling, a technique which is recommended for hard
19 to reach populations.
- 20 • Sexual and physical violence are sensitive topics that are subject to underreporting because
21 of social desirability bias.
- 22 • Recall bias could have occurred because participants were asked about physical violence
23 in the past year and rape since they started selling sex.
- 24 • Due to a cross-sectional study design, the influence of alcohol use/Khat chewing must be
25 interpreted with caution, since the participants' current consumption status might not be an
26 accurate indicator of the consumption status at the time of the violence.
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Introduction

As per WHO definition, violence is the intentional use of physical force or power against another person or group, which has a high likelihood of resulting in injury, death, or sexual or psychological harm (1). Violence against women is a global phenomenon, as more than one in three women worldwide is beaten, coerced into sex, or abused in her lifetime (2). Furthermore, violence is one of the main contributors to poor sexual and reproductive health among women, leading to unintended pregnancy, self-induced abortions, gynecologic problems, sexual dysfunction, and sexually transmitted infections (STIs), including HIV (3, 4).

In most countries, female sex work is either illegal or has an uncertain legal status. For example, prostitution is not illegal but approaching sex workers in public is illegal; this makes authorities reluctant to offer protection or support, which in turn legitimizes violence and discrimination against sex workers (5). In the case of Ethiopia, it is illegal to operate a brothel or procure sex workers as a commercial activity, but the sale of sex by women is neither prohibited nor legally recognized as a profession (6). Female sex workers (FSWs) frequently face harassment and violence, not only because of their illegitimate status, but also as a manifestation of gender inequality and discrimination directed towards women (7, 8).

Violence against FSWs can be perpetrated by anyone, including policemen, intimate partners, and clients. In Adama and Mekelle towns in Ethiopia, nearly 60% and 75% of female sex workers, respectively, reported lifetime violence (9, 10). In the same study in Adama, 8% of FSW reported forced sex since they started sex work (10). In another study conducted among homeless street females in Bahirdar town, 11.4% of them reported having been raped during the last one year period (11). In Uganda, 40% of FSWs reported physical abuse and 49 % had been raped at least once in their lifetime (12). In another study conducted in Hunan, China and Karnataka, India, 16% and 9% of female sex workers, respectively, reported work-related violence (13, 14).

Several risk factors have been found to have an association with physical and sexual violence against FSWs. Socio-economic characteristics, risky sexual behaviors and substance abuse are the most mentioned factors worldwide (9, 10, 15, 16). A randomized controlled trial study in Kenya and South Africa showed that alcohol consumption reduction by FSWs had a significant

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3 contribution to violence reduction (17, 18). Moreover, establishments where alcohol and other
4 drugs are consumed are associated with an increased likelihood of people becoming violent
5 towards sex workers (8, 19). However, other studies suggest that FSWs who work outdoors face
6 more violence than those who work indoors (20, 21).
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11 Violence towards FSWs may also be associated with condom use and condom breakage. Studies
12 conducted among FSWs have found several intentional and unintentional factors associated with
13 condom breakages during sex work. These factors included being drunk or high on drugs, wearing
14 unfitting condoms, incorrect condom use, and having violent or rough sex (22, 23). Moreover,
15 violence towards FSWs may also be linked to disagreement over condom use, which increases the
16 risk of acquiring HIV and other STIs (21, 24-26). In Ethiopia, the weighted HIV prevalence among
17 FSWs is estimated to be 23% (27), while it is 1.2 % in the general population (28), which shows
18 the magnitude of the potential risk exposure among FSWs. In addition, violence also prevents sex
19 workers from seeking appropriate health services (26, 29, 30).
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27 In general, 120,000 to 160,000 FSWs are estimated to live in Ethiopia, working in different venues,
28 mainly in bars and hotels, Key-mebrat (red lighthouses), local drinking houses, and on the street
29 (27). Currently, the number of female sex workers is growing, with increasing numbers of young
30 girls entering the sex trade.
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35 This study explores the prevalence and correlates of physical violence and rape among FSWs in
36 Ethiopia. Successful strategies for handling the trauma may vary by the type of violence
37 experienced. Therefore, identification of risk factors that are specific to various types of violence
38 has the potential to inform the development of evidence-based prevention programs. In addition,
39 generating such types of evidence based on national level data will help to promote more effective
40 prevention for female sex workers.
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Methods

Study design

This study was part of a larger study concerning HIV prevalence and related risk factors among female sex workers and long-distance drivers that was carried out in Ethiopia in 2014. A cross-sectional study design using Respondent Driven Sampling technique (RDS) was used for data collection. RDS is a complex sampling method based on a chain-referral design and recommended for hard-to-reach populations. At all data collection sites, initial FSW “seeds” were selected to start the sampling process. Seeds were selected purposively to represent the type of sex worker, age category, and geographic location. They were identified through formative assessments with key stakeholders working with FSWs and representatives of FSWs. The selected seeds were those who were well-connected with their community and reported large social networks.

A maximum of three recruits per seed was allowed and only one-time participation was ensured by using a fingerprint scanning device. Recruitment pattern (who recruited whom) was tracked and network size was also determined.

Study area, period and population

The study locations were the seven major regional towns and the four main transport corridor towns. The seven major regional towns were: Addis Ababa, Bahirdar, Mekelle, Hawassa, Adama, Gambela, and Dire-dawa. The four transport corridor towns were Semera-Logia (Addis Ababa-Djibouti route), Kombolcha (Addis Ababa-Mekelle route), Metema (Addis Ababa-Metema route) and Shashemene (Addis Ababa - Moyale route).

The source populations were all female sex workers living in those selected eleven towns. For the purpose of the study, female sex workers were defined as follows: ‘women who practice sexual activity with the pre-conditions of financial or in-kind benefits’. The inclusion criteria were: receiving money or other benefits for sex with four or more people within the last 30 days, being 15 and above years old, properly recruited by a peer (present with the coupon) and giving consent both for the interview and blood drawing.

Sample size

The source study protocol calculated sample size of 400 female sex workers in each town using anticipated HIV prevalence of 25%, 6% precision, 95% CI, and design effect of two. However, the number of female sex workers who participated in each town was not exactly 400, and the total number of FSWs who participated in the study was 4900.

Data collection procedure

Six seed FSWs were selected to initiate coupon-based recruitment. Eligible FSWs who provided informed consent to participate were administered a face to face interview in a private room by a nurse with a structured questionnaire in Amharic language. They then provided blood specimens for HIV, CD4 and viral load testing in a private room. When the process was completed, participants were provided with up to three coupons and instructed to recruit their FSW peers into the study. To compensate the time and costs of transport, a primary incentive of 100 ETB (\$5.0) and additional 50 ETB (\$2.5) for each eligible peer she enrolled into the study was given. An electronic data base for tracking coupons and recruitment was established with participant ID, fingerprint code, and a pre-printed label that was scanned. The data collection tools and questionnaire were pretested in a pilot study; feedback from the pilot study was used to finalize the data collection tools and field logistic and operational procedures. The questionnaire included: socio-demographic characteristics, sexual risk exposure, sexual behaviors, condom use, history of STI symptoms, alcohol and drug use consumption, violence related issues, knowledge of HIV transmission, and HIV testing history.

Variables

Violence was assessed with two dependent variables, which were physical beating during the last one year and rape since sex selling started. The following questions were asked: “When exchanging sex for money during the last one year, have you ever been physically beaten by a sexual partner or client?” and “Have you ever been raped or forced to have sex against your will since you start selling sex?”. Responses were dichotomized into a Yes and No variable for analysis. For both of the questions, all who had reported beating and rape at least once were considered as having experienced violence (Yes).

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3 The different time periods used to assess experiences of physical beating and rape were based on
4 the presumed frequency of the two different types of violence. Physical beating might occur more
5 frequently, while rape presumably occurs less frequently. Therefore, to measure the general burden
6 of the two experiences, We specifically selected the time period that might be appropriate for the
7 recall of the particular experience.
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12 The independent measures included current age, monthly income from selling sex, marital status,
13 educational status, sex selling venue, khat chewing, alcohol drinking, HIV status, and condom
14 breakage.
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18 Current age was a continuous variable and for the purpose of analysis was categorized as ten-year
19 intervals: younger (15-24), middle age (25-34), and older one (35+), with the younger age group
20 used as the reference category. Monthly income from selling sex was an open-ended question and
21 for the analysis was categorized into 1000Birr (\$50) intervals considering the cost of living in the
22 country. Educational status was categorized as no formal education, primary first cycle (grade 1-
23 4), primary second cycle (grade 5-8), and secondary and above for analysis, in accordance with
24 the country education system.
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30 In addition, sex workers were categorized based on their sex selling venue, where bar/hotel was
31 used as the reference because it is the most common FSW working venue. In addition, this venue
32 category has better security than the other venues, and there were greater numbers of FSWs in
33 this category.
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38 Alcohol consumption was measured through different approaches including frequency of alcohol
39 consumption, number of drinks per specific day and frequency of heavy episodic drinking (6 or
40 more standard drinks per day).
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44 Frequency of Khat chewing was assessed according to the number of days that they chewed in a
45 week. Khat (*Catha edulis*) is a stimulant leaf, and after chewing Khat, an individual may become
46 talkative, alert, feel excitement, increased self-esteem, and increased imagination (31). Khat
47 chewing is also popular among FSWs, as it is a means to spend the day time, to be active during
48 the night for sex work and to socialize with each other.
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Data analysis

Statistical analysis was performed using SPSS Version 20. Descriptive statistics were used to provide summary measures (means, frequencies). Odds ratios (crude and adjusted) and 95% confidence intervals (CI) were obtained using bivariate and multivariate logistic regression analysis. Those independent variables significantly associated with the outcome variable in the bivariate analysis were included in the multivariate analysis. In addition, correlation analysis was performed to examine potential multicollinearity; no correlation was found between the variables. Cases with missing data were excluded from the analyses. Significance was accepted at p-value <0.05.

During data collection, we did not specifically assess where FSWs experienced the violence (in the current town or in another town). Because FSWs are highly mobile from one town to another, it would be biased to assume that their experiences of violence occurred in any one town. Therefore, during analysis, we did not conduct any cluster effect analysis.

Ethical considerations

Permission for data use was obtained from the Ethiopian Public Health Institute (EPHI). The protocol was cleared at the Scientific and Ethical Research Office (SERO) of EPHI, the Ethiopian Science and Technology Ministry Ethical Committee, and CDC-Atlanta IRB. Individual written informed consent was obtained from each participant for the interview and blood sample collection while the study was conducted.

Patient and Public Involvement

During the design or implementation of the study, no patients were involved in the development of the research question and outcome measures. Nevertheless, due to the nature of the respondent driven sampling methodology, an assessment was conducted to identify seeds and hotspot areas for the actual data collection. This assessment was conducted in collaboration with organizations working with FSWs and an active member of FSWs in those organizations. The primary results will be disseminated by publication in peer-reviewed journals and presented at the national level for stakeholders working with FSWs.

Results

Socio-demographic and other background characteristics

A total of 4900 female sex workers participated in the study. Demographic, socioeconomic and other background characteristics of the participants are shown in Table 1. The majority of the participants were between 15 to 24 years old with a mean age of 24 years (SD= 5.7); 44 % of them were divorced, separated or widowed. A quarter of them reported being uneducated and 40% of them earned on average less than \$50 per month. Regarding sex selling starting age, the majority started selling sex between the ages of 18-24 years, although nearly 25% started before the age of 18. FSWs worked in different eating, drinking and recreation establishments and also other venues; 33% recruited their clients in bars/hotels, followed by 26.5% on the street and 20% in local drinking houses (Table 1).

Table 1. Distribution of socio-demographic and other background characteristics among 4900 female sex workers across eleven towns, Ethiopia

Variable	Frequency	Percentage
Age		
15-24	2831	57.8
25-34	1700	34.7
35+	369	7.5
Total	4900	100.0
Missing	0	
Mean age of respondents = 24.16		
SD= 5.7		
Educational status		
No Education	1224	25.0
Primary 1st cycle (1-4)	764	16.0
Primary 2nd cycle (5-8)	2062	42.0
Secondary & above	831	17.0
Total	4881	100.0

Missing	19	
Sex selling venues		
Bar/Hotel	1613	33.0
Local drinking houses	983	20.1
Spa/Massage/Beauty salon/Own house	261	5.3
Red-light houses	429	8.8
Street	1295	26.5
Others	304	6.2
Total	4885	100.0
Missing	15	
Current marital status		
Never Married	2698	55.2
Married/Cohabited	37	0.8
Separated/Divorced	1976	40.5
Widowed	173	3.5
Total	4884	100.0
Missing	16	
Sex selling starting age		
Less than 15	120	2.5
15 - 17	1088	22.3
18 - 24	2864	58.7
25 - 29	583	12.0
30 & Above	220	4.5
Total	4875	100.0
Missing	25	
Monthly income from selling sex		
Less than 1000 (<\$50)	1932	39.6
1001 – 2000 (\$50-\$100)	1554	31.8
2001 – 3000 (\$100-\$150)	812	16.6
3001 – 4000 (\$150-\$200)	318	6.5

4001 – 5000 (\$200-\$250)	150	3.1
Above 5000 (>\$250)	117	2.4
Total	4883	100.0
Missing	17	

Behavioral and other related factors

Table 2 shows the prevalence of behavioral and other factors. The majority (70%) of the respondents consumed alcohol and of those, 15.8% had drunk so much on a typical day within the past 30 days that they did not remember what happened the next day. About half of the respondents chewed khat and 23.8% of them chewed almost every day (5-7 days a week).

Regarding condom use, 25.5% of them reported condom breakage within the past 30 days prior to the study. HIV/AIDS status of the respondents was also assessed and a quarter of them (23%) were HIV positive. With regard to physical and sexual violence experience, 17.5% of them reported physical beating within the past 12 months and 15.2% reported having been raped since they started selling sex. (Table 2)

Table 2. Behavioral and other related factors among 4900 female sex workers across eleven towns, Ethiopia

Variable	Frequency	Percentage
Frequency alcohol consumption		
Never	1493	30.6
Once a month or less	222	4.5
2 - 4 days a month	492	10.1
2 - 3 days a week	1394	28.5
4 or more days a week	1283	26.3
Total	4884	100.0
Missing	16	

Alcohol containing drinks on a typical day

1 or 2	806	23.8
3 or 4	1383	40.8
5 or 6	742	21.9
7 to 9	296	8.7
10 or more	164	4.8
Total	3391	100.0
Missing	0	

Frequency of heavy episodic drinking

Never	1863	54.9
Less than monthly	236	7.0
Monthly	299	8.8
Weekly	630	18.6
Daily or almost daily	363	10.7
Total	3391	100.0
Missing	0	

Drunk so much and can't remember

what happened the next day

Yes, in last 30 days	534	15.8
Yes, not in last 30 days	233	6.9
No	2609	77.2
Don't remember	4	0.1
Total	3380	100.0
Missing	11	

Frequency of khat chewing

Never	2431	49.8
Less than once a week	577	11.8
1-2 days per week	429	8.8
3-4 days per week	284	5.8
5-7 days per week	1162	23.8
Total	4883	100.0

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2			
3	Missing	17	
4			
5	Condom breakage in the past 30 days		
6	Yes	1243	25.5
7	No	3635	74.5
8			
9	Total	4878	
10	Missing	22	
11			
12	HIV status		
13	Negative	3708	76.0
14	Positive	1173	24.0
15	Total	4881	100.0
16	Missing	19	
17			
18	Ever been raped or forced to have sex		
19	since start selling sex		
20	No	4142	84.8
21	Yes	742	15.2
22	Total	4884	100.0
23	Missing	16	
24			
25	Physically beaten in the last 12 months		
26	No	4026	82.5
27	Yes	855	17.5
28	Total	4881	100.0
29	Missing	19	
30			
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Bivariate regression analysis outcome

Table 3 shows the bivariate logistic regression results; each independent variable was analyzed separately against the two outcome variables. The variables that were significantly associated with physical violence were: age, educational level, monthly income, current marital status, sex selling venues, frequency of alcohol consumption, alcohol containing drinks on a typical day, frequency of heavy episodic drinking, frequency of khat chewing in a week and condom breakage. Variables

significantly associated with rape were: educational level, income from selling sex, frequency of alcohol consumption, alcohol containing drinks on a typical day, frequency of heavy episodic drinking, frequency of khat chewing in a week and condom breakage. HIV status was not significantly associated with either physical violence or rape.

Table 3. Bivariate logistic regression analyses of independent variables associated with physically beaten in the last 12 months and ever been raped since start selling sex, odds ratios (OR) and 95% confidence intervals (CI)

Variables	Physical beating OR (95% CI)	Rape OR (95% CI)
Age		
15-24*		
25-34	1.02 (0.87, 1.19)	1.02 (0.86, 1.21)
35+	0.52 (0.37, 0.74)	0.88 (0.64, 1.20)
Educational level		
No Education*		
Primary 1st cycle (1-4)	1.01 (0.79, 1.31)	1.45 (1.14,1.85)
Primary 2nd cycle (5-8)	1.35 (1.11, 1.63)	1.08 (0.88,1.32)
Secondary & above	1.49 (1.18, 1.87)	1.09 (0.85,1.41)
Monthly income from selling sex		
Less than 1000 birr (<\$50) *		
1001 – 2000 birr (\$50-\$100)	1.44 (1.20, 1.73)	0.69 (0.58, 0.85)
2001 – 3000 birr (\$100-\$150)	1.67 (1.35, 2.07)	0.51 (0.39, 0.66)
3001 – 4000 birr (\$150-\$200)	1.61 (1.19, 2.17)	0.65 (0.46, 0.92)
4001 – 5000 birr (\$200-\$250)	2.12 (1.44, 3.14)	1.01 (0.66, 1.55)
Above 5000 birr (>\$250)	1.62 (1.01, 2.58)	0.75 (0.44, 1.27)
Current marital status		
Never Married*		
Married/Cohabited	1.05 (0.46, 2.41)	0.69 (0.24, 1.96)
Separated/Divorced	0.93 (0.80, 1.09)	1.03 (0.88, 1.21)

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3	Widowed	0.59 (0.37, 0.95)	1.39 (0.95, 2.06)
4			
5	Sex selling venues		
6	Bar/Hotel*		
7			
8	Local drinking houses	0.87 (0.69, 1.09)	-
9			
10	Spa/Massage/Beauty salon/Own house	0.45 (0.28, 0.71)	-
11			
12	Red-light houses	0.95 (0.71, 1.27)	-
13			
14	Street	1.51 (1.26, 1.82)	-
15			
16	Others	1.37 (1.01, 1.86)	-
17	Frequency alcohol consumption		
18	Never*		
19			
20	2 - 4 days a month	1.82 (1.35, 2.44)	1.74 (1.27, 2.38)
21			
22	2 - 3 days a week	2.07 (1.66, 2.57)	1.87 (1.48, 2.36)
23			
24	4 or more days a week	3.54 (2.87, 4.37)	3.43 (2.75, 4.28)
25			
26	Alcohol containing drinks on a typical day		
27	1 or 2*		
28			
29	3 or 4	1.39 (1.09, 1.76)	1.16 (0.92, 1.46)
30			
31	5 or 6	2.03 (1.58, 2.62)	1.09 (0.84, 1.43)
32			
33	7 to 9	2.19 (1.59, 3.03)	0.98 (0.68, 1.41)
34			
35	10 or more	2.76 (1.88, 4.03)	1.78 (1.20, 2.65)
36	Frequency of heavy episodic drinking		
37	Never*		
38			
39	Less than monthly	1.43 (1.03, 1.98)	1.39 (0.99, 1.95)
40			
41	Monthly	1.23 (0.90, 1.66)	1.59 (1.18, 2.13)
42			
43	Weekly	1.73 (1.39, 2.14)	1.03 (0.80, 1.31)
44			
45	Daily or almost daily	1.97 (1.53, 2.55)	1.69 (1.29, 2.21)
46	Drunk so much and can't remember what		
47	happened the next day		
48	No*		
49			
50	Yes, in the last 30 days	2.90 (2.37, 3.56)	1.66 (1.33, 2.07)
51			
52	Yes, before last 30 days	2.22 (1.65, 2.99)	1.27 (0.91, 1.78)
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Frequency of khat chewing in a week

Never*		
Less than once a week	1.24 (0.96, 1.60)	0.89 (0.67, 1.19)
1-2 days per week	1.67 (1.28, 2.18)	2.89 (2.26, 3.69)
3-4 days per week	2.49 (1.87, 3.34)	2.92 (2.19, 3.89)
5-7 days per week	2.48 (2.08, 2.96)	1.47 (1.21, 1.79)

Condom breakage

No*		
Yes	1.99 (1.69, 2.33)	1.62 (1.37, 1.92)

HIV test result

Negative*		
Positive	1.04 (0.88, 1.24)	0.88 (0.73, 1.07)

Note: * Reference category

Multivariate analysis of factors associated with physical violence (physically beaten)

Table 4 shows the results of the multivariate analysis used to identify factors associated with physical violence after simultaneously adjusting for all measures included in the analyses. Female sex workers aged 35 years or above (AOR 0.59, 95% CI 0.38, 0.92) were significantly less likely to experience physical violence when compared with the younger age group (15-24 years). FSWs who had attended primary 1st cycle education (AOR 0.71, 95% CI 0.52, 0.97) were also less likely to experience physical beating than those who reported no education. On the other hand, FSWs who worked on the street (AOR 1.92, 95% CI 1.53, 2.39), in red-light houses (AOR 1.63, 95% CI 1.12, 2.38) and in local drinking houses (AOR 1.35, 95% CI 1.02, 1.78) have an increased odds of experiencing physical violence compared with FSWs who worked in bars/hotels. Moreover, substance use was significantly related to physical violence. FSWs who consumed alcohol four or more days in a week (AOR 1.92, 95% CI 1.21, 3.04), those who did not remember what happened the next day due to heavy alcohol consumption both in the past 30 days (AOR 1.98, 95% CI 1.58, 2.49), and before the past 30 days (AOR 1.85, 95% CI 1.35, 2.53), and FSWs who chewed khat 3-4 days per week (AOR 1.58, 95% CI 1.13, 2.21) and 5-7 days per week (AOR 1.43, 95% CI 1.13, 1.80) had more likelihood of experiencing physical violence. Condom breakage experience

within the past 30 days prior to the study was also significantly associated with physical violence (AOR 1.51, 95% CI 1.25, 1.84).

Table 4. Multivariate logistic regression analysis of factors associated with physical violence (physically beaten) in the past twelve months among female sex workers across eleven towns in Ethiopia, odds ratios (OR) and 95% confidence intervals (CI).

Variables	OR (95%CI)
Age	
15-24*	
25-34	1.04 (0.82, 1.22)
35+	0.59 (0.38, 0.92)
Educational level	
No Education*	
Primary 1st cycle (1-4)	0.71 (0.52, 0.97)
Primary 2nd cycle (5-8)	0.98 (0.77, 1.26)
Secondary & above	1.14 (0.85, 1.53)
Monthly income from selling sex	
Less than 1000 birr (<\$50) *	
1001 – 2000 birr (\$50-\$100)	1.13 (0.90, 1.41)
2001 – 3000 birr (\$100-\$150)	1.14 (0.87, 1.48)
3001 – 4000 birr (\$150-\$200)	1.12 (0.77, 1.61)
4001 – 5000 birr (\$200-\$250)	1.44 (0.93, 2.24)
Above 5000 birr (>\$250)	1.12 (0.63, 1.99)
Current marital status	
Never Married*	
Married/Cohabited	0.68 (0.24, 1.89)
Separated/Divorced	1.08 (0.88, 1.29)
Widowed	0.87 (0.48, 1.59)
Sex selling venues	
Bar/Hotel*	

Local drinking houses	1.35 (1.02, 1.78)
Spa/massage/beauty salon/own house	1.04 (0.58, 1.84)
Red-light houses	1.63 (1.12, 2.38)
Street	1.92 (1.53, 2.39)
Others	1.39 (0.98, 1.99)

Frequency alcohol consumption

Never*	
2 - 4 days a month	1.25 (0.77, 2.04)
2 - 3 days a week	1.32 (0.84, 2.06)
4 or more days a week	1.92 (1.21, 3.04)

Alcohol containing drinks on a typical day

1 or 2*	
3 or 4	1.08 (0.84, 1.39)
5 or 6	1.15 (0.85, 1.57)
7 to 9	1.09 (0.74, 1.64)
10 or more	1.14 (0.72, 1.81)

Frequency of heavy episodic drinking

Never*	
Less than monthly	1.07 (0.75, 1.52)
Monthly	0.84 (0.59, 1.18)
Weekly	1.07 (0.82, 1.39)
Daily or almost daily	0.99 (0.71, 1.38)

Drunk so much and can't remember what happened the next day

No*	
Yes, in the last 30 days	1.98 (1.58, 2.49)
Yes, before last 30 days	1.85 (1.35, 2.53)

Frequency of khat chewing in a week

Never*	
Less than once a week	1.04 (0.77, 1.42)

1-2 days per week	1.30 (0.96, 1.77)
3-4 days per week	1.58 (1.13, 2.21)
5-7 days per week	1.43 (1.13, 1.80)
Condom breakage	
No*	
Yes	1.51 (1.25, 1.84)

Note: * Reference category

Multivariate analysis of factors associated with sexual violence (rape)

Table 5 shows the results of the multivariate logistic regression analyses to identify factors that were significantly associated with rape after simultaneously adjusting for all measures included in the analyses. Female sex workers with a monthly income of \$50 to \$200 were significantly less likely to experience rape compared to those with a monthly income of below \$50. Drinking alcohol four or more days per week (AOR 2.33, 95% CI 1.47, 3.7), experience of heavy drinking in the last 30 days and not remembering what happened the next day (AOR 1.34, 95% CI 1.05, 1.72), experience of heavy episodic drinking (HED) in a month (AOR 1.71, 95% CI 1.24, 2.38), experience of HED almost daily (AOR 1.49, 95% CI 1.06, 2.11) and chewing khat 1-2 days (AOR 2.13, 95% CI 1.61, 2.83) and 3-4 days (AOR 2.15, 95% CI 1.55, 2.98) per week were positively associated with rape. Moreover, condom breakage (AOR 1.26, 95% CI 1.03, 1.55) was significantly more frequent among FSWs who reported rape.

Table 5. Multivariate logistic regression analysis of factors associated with sexual violence (rape) since sex selling start among female sex workers across eleven towns in Ethiopia, odds ratios (OR) and 95% confidence intervals (CI).

Variables	OR (95%CI)
Monthly income from selling sex	
Less than 1000 birr (<\$50) *	
1001 – 2000 birr (\$50-\$100)	0.62 (0.49, 0.77)
2001 – 3000 birr (\$100-\$150)	0.42 (0.32, 0.57)

3001 – 4000 birr (\$150-\$200)	0.45 (0.29, 0.69)
4001 – 5000 birr (\$200-\$250)	0.84 (0.53, 1.33)
Above 5000 birr (>\$250)	0.62 (0.34, 1.15)

Current marital status

Never Married*	
Married/Cohabited	0.57 (0.17, 1.97)
Separated/Divorced	1.01 (0.83, 1.22)
Widowed	1.61 (0.98, 2.63)

Educational level

No Education*	
Primary 1st cycle (1-4)	1.06 (0.79, 1.43)
Primary 2nd cycle (5-8)	0.83 (0.65, 1.07)
Secondary & above	0.92 (0.68, 1.25)

Frequency of alcohol consumption

Never*	
2 - 4 days a month	1.15 (0.69, 1.89)
2 - 3 days a week	1.24 (0.78, 1.96)
4 or more days a week	2.33 (1.47, 3.73)

Drunk so much and can't remember what happened the next day

No*	
Yes, in the last 30 days	1.34 (1.05, 1.72)
Yes, before last 30 days	1.07 (0.75, 1.52)

Frequency of heavy episodic drinking

Never*	
Less than monthly	1.61 (1.12, 2.32)
Monthly	1.71 (1.24, 2.38)
Weekly	1.04 (0.78, 1.38)
Daily or almost daily	1.49 (1.06, 2.11)

Frequency of khat chewing in a week

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3	Never*	
4		
5	less than once a week	0.83 (0.59, 1.16)
6		
7	1-2 days per week	2.13 (1.61, 2.83)
8		
9	3-4 days per week	2.15 (1.55, 2.98)
10		
11	5-7 days per week	1.06 (0.83, 1.36)
12	Condom breakage	
13		
14	No*	
15		
16	Yes	1.26 (1.03, 1.55)

Note: * Reference category

Discussion

According to this study, 17.5% of FSWs in Ethiopia had been physically beaten within the past 12 months and 15.2% had been raped since they started selling sex. Age, sex selling venues, and high consumption of alcohol and khat were significant predictors of physical violence (beating). On the other hand, the significant predictors of sexual violence (rape) were low income and also high consumption of alcohol and khat.

The prevalence of both physical violence and sexual violence (rape) was lower than the prevalence found in studies conducted in Uganda, Ivory Coast, and Kenya(9, 12, 30, 32). However, when compared to the studies conducted in Adama (Ethiopia), China, India, and Mexico, the current study reported a higher prevalence of both physical and sexual violence (10, 11, 13, 14, 33). The difference in the definition of violence used might be one of the possible explanations for the difference between the current results and those found in other studies in Africa. Most of the studies assessed all forms of physical and sexual violence while the current study assessed solely physical beating and forced penetrative sex (rape). On the other hand, differences in results across settings might also be due to differences in background and contextual factors such as socio-economic status and cultural aspects.

Several studies showed that younger FSWs are more exposed to physical and sexual violence (13, 34) in line with the current findings that younger FSWs (15-24years) were at higher risk for

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3 physical violence when compared to their older counterparts (35+years). Perpetrators' find it easier
4 to manipulate younger FSWs and this might play a role in their increased exposure to violence.
5 That younger FSWs are especially vulnerable to violence has important implications due to the
6 increasing number of younger FSWs who are entering the sex trade. Therefore, to minimize the
7 vulnerability of younger FSWs, intervention programs need to create awareness about the factors
8 that increase the likelihood of violence and to ensure that younger FSWs are particularly addressed
9 in such programs.
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16 Even though sex work is not a legally recognized profession in Ethiopia, most of the establishments
17 where the sex workers are based (hotels, bars/restaurants, nightclubs, etc.) operate legally with
18 working licenses. Nevertheless, some FSWs work on the street and in red-light houses where they
19 manage their own working area. Consequently, the extent to which physical violence occurs may
20 vary according to their working area. The present study revealed that FSWs who mainly work in
21 bars and hotels face less physical beating when compared with FSWs who work on the street, in
22 red-light houses and local drinking houses. This finding is in-line with studies conducted in New
23 York City and England (20, 21). This might be due to the level of protection in their working areas
24 and/or due to the type of clients who frequents those localities. This means that engaging bar/hotel
25 managers in the prevention activities could be an additional strategy to increase the effectiveness
26 of harm reduction programs.
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36 On the other hand, FSWs who work on the street, in red-light houses and local drinking houses
37 experience more violence. Most of these venues are located in the slum areas of the cities, and
38 such areas are often the focus of police efforts to control various unwanted activities. In this regard,
39 FSWs are one of the targets of the police and face harassment, beating, and arrest. Due to that, the
40 reporting rate of violence is very poor, and the actions of the police also make the use of violence
41 seem legitimate among FSWs. Therefore, to minimize the harm in these localities, involving the
42 police force in violence prevention activities is crucial and should be one of the first steps. In
43 addition, a peer education program led by the sex workers could be an additional strategy. It could
44 help FSWs to create information sharing platform to discuss the incidences of violence, types of
45 perpetrators, etc., which could raise awareness and help them to become more alert.
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3 Furthermore, an association between alcohol use and higher frequency of physical violence and
4 rape was reported. In particular, FSWs who consume alcohol more than four days a week and those
5 with experience of HED were significantly more likely to experience violence. Several studies
6 conducted in Ethiopia, Uganda, and Kenya also reported similar findings (9, 10, 12, 19). A large
7 proportion of female sex workers (FSWs) use alcohol prior to or during sex to help them to solicit
8 clients and overcome their shyness (35, 36). In particular high level of alcohol consumption places
9 FSWs in disadvantaged situations by intensifying their vulnerability (8). Research reviews also
10 report that alcohol use impairs FSWs' ability to detect the risk of violence and increases their
11 vulnerability to risk-prone situations (37, 38). The consequences of HED are not just limited to the
12 physical effects of intoxication but further exposes them to violence and risky sexual behaviors.
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21 Correspondingly, chewing khat more days in a week was significantly associated with experience
22 of physical violence and rape. After chewing khat, some of the users consume alcohol-containing
23 drinks to decrease the level of stimulation. Although there is no previous study on the relationship
24 between khat chewing and experience of violence among FSWs, most FSWs chew khat before
25 departing for work. In the bar, they drink alcohol to minimize the effect, which in turn exposes
26 them to HED and violence. Further studies should assess the contribution of Khat chewing to
27 increasing violence experience independently.
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35 The extent to which alcohol use/Khat chewing are risk factors for the occurrence of experiences
36 of violence must be interpreted with caution. Since physical beating was measured within the past
37 12 months and rape was measured since they started selling sex, the participants' current Khat
38 chewing or alcohol consumption status might not be an accurate indicator of the consumption
39 status at the time of the violence. In addition, the current use of substances might be a means to
40 cope with the trauma related to the experience of violence.
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46 In addition, the resistance to condom use from clients and the violence experience may create a
47 difficult situation for FSWs with regard to proper use of condoms, which further exposes FSWs to
48 HIV and other STIs. In this study there was a significant relationship between condom breakage
49 and history of physical beating and rape. Even though there was no significant association between
50 HIV and violence, the proportion of HIV positive FSWs in the sample was high (23%). A study
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3 conducted in Benin reported a similar finding concerning the association between condom
4 breakage and violence, but unlike our study there was a significant association between HIV and
5 violence experience (23). This finding indicates that solely providing condoms will not be
6 effective to prevent HIV and other STIs transmission. Rather working on factors which contribute
7 to not utilizing condoms properly (such as violence) could be an additional strategy for HIV
8 prevention programs.
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15 In general, our study demonstrates that sex workers are particularly vulnerable to physical beating
16 and rape. Nevertheless, the harm reduction program among FSWs in Ethiopia is poor. Given the
17 associations between violence and unprotected sex, the HIV control program may not accomplish
18 epidemic control without also addressing violence. Therefore, combining both programs could
19 yield better results with regard to attaining epidemic control as well as reducing the harm
20 associated with violence. In addition, this study shows that different factors (such as sex selling
21 venues, the age of FSWs, and level of alcohol use etc.) were associated with violence among
22 FSWs, signifying the need of different approaches to minimize the incidence of violence (39). At
23 the individual level, efforts to reduce violence could focus on developing educational materials
24 and creating awareness for sex workers about their legal rights and about how to prevent, reduce
25 and respond to violence (40). In addition, involving the community in the prevention program
26 could play a vital role especially towards reducing stigma and discrimination towards FSWs,
27 which in turn would create a suitable environment for FSWs to stand up for their rights.
28 Furthermore, involving police and law enforcement authorities to reduce harassment could play a
29 greater role in violence reduction.
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41 Finally, there were some similarities but also differences concerning the predictors of rape and
42 physical violence. For example, being in the younger age group was a significant predictor of
43 physical beating but not rape, and having lower income was associated with rape but not with
44 physical beating. Nevertheless, based on the current data, it is difficult to draw any conclusions
45 about why one variable would matter for physical beating but not for rape. The reasons underlying
46 the differences are currently unknown, and further research might be required to gain an
47 understanding of the patterns observed.
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Methodological considerations

There are a limited number of studies on violence among FSWs in Ethiopia and the existing studies are restricted to one city (9, 10). One of the strengths of this study is that it involves multiple sites (eleven large towns) across the country. The second strength is the sampling technique; the study used a respondent-driven sampling, which is a strategy recommended for hard-to-reach populations and which is believed to give a representative sample of the target population. The third strength is the assessment of their HIV status on site using the national testing algorithm. In addition, the pilot study conducted prior to the actual implementation added strength for the main study protocol.

This study also had limitations. First, sexual and physical violence are sensitive topics that are subject to underreporting because of social desirability bias. Second, recall bias could have occurred because participants were asked about physical violence in the past year and rape since they started selling sex. We tried to minimize underreporting through intense interviewer training. In addition, since it was a cross-sectional study, participants were assessed only once; thus, it would be difficult to infer the temporal association between a risk factor and the outcome measures, i.e. physical violence and rape.

Furthermore, the results regarding correlates of physical and sexual violence among FSWs in Ethiopia might have limited generalizability across settings. However, these results are likely to be relevant for other FSWs in other African countries that have a similar setting as Ethiopia, and may inform targeted prevention strategies for this key population.

Conclusion

In general, FSWs are vulnerable to physical and sexual violence, and the risk increases when they are younger, street-based, and are high consumers of alcohol or khat. Therefore, to reduce physical and sexual violence, strategies to secure and improve their work environment should be a critical component of targeted interventions. Increasing awareness regarding the role of khat chewing and alcohol drinking towards vulnerability to violence should be an integral component of HIV

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3 prevention and violence reduction programs. In addition, targeted efforts should be made for the
4 younger FSWs to reduce their vulnerability.
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7 8 **Acknowledgments**

9 We would like to express gratitude to the study participants and the data collectors.
10

11 **Conflict of Interest:** None to declare.
12

13 **Authors contributions**

14 MA and AA developed the study design. MA analyzed and interpreted the data and drafted the
15 manuscript. AA was involved in the data analysis and interpretation, and in the writing of the
16 manuscript. TT was involved in the interpretation of the data and contributed to the writing of the
17 manuscript. All authors approved the final manuscript.
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23 **Data sharing statement:** No additional data available.
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26 **Reference**

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Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

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			Page
		Reporting Item	Number
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	1

1	Background /	#2	Explain the scientific background and rationale for the	2
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3	rationale		investigation being reported	
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6	Objectives	#3	State specific objectives, including any prespecified	3
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11	Study design	#4	Present key elements of study design early in the paper	4
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15	Setting	#5	Describe the setting, locations, and relevant dates, including	4, 5, 6
16			periods of recruitment, exposure, follow-up, and data collection	
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20	Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of	5
21			selection of participants.	
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26		#7	Clearly define all outcomes, exposures, predictors, potential	6
27			confounders, and effect modifiers. Give diagnostic criteria, if	
28			applicable	
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33	Data sources /	#8	For each variable of interest give sources of data and details of	6
34	measurement		methods of assessment (measurement). Describe	
35			comparability of assessment methods if there is more than one	
36			group. Give information separately for for exposed and	
37			unexposed groups if applicable.	
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45	Bias	#9	Describe any efforts to address potential sources of bias	2, 18
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48	Study size	#10	Explain how the study size was arrived at	5
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51	Quantitative	#11	Explain how quantitative variables were handled in the	6
52	variables		analyses. If applicable, describe which groupings were chosen,	
53			and why	
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1	Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	7	
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12		#12c	Explain how missing data were addressed	8	
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15		#12d	If applicable, describe analytical methods taking account of sampling strategy	NA	
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21		#12e	Describe any sensitivity analyses	7	
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23	Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	5	
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36		#13b	Give reasons for non-participation at each stage	5	
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39		#13c	Consider use of a flow diagram		
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41	Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.		
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52		#14b	Indicate number of participants with missing data for each variable of interest	8, 9 in tables	
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57	Outcome data	#15	Report numbers of outcome events or summary measures.	na	
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1		Give information separately for exposed and unexposed	
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6	Main results	#16a Give unadjusted estimates and, if applicable, confounder-	7 - 10
7		adjusted estimates and their precision (eg, 95% confidence	
8		interval). Make clear which confounders were adjusted for and	
9		why they were included	
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26	Other analyses	#17 Report other analyses done—e.g., analyses of subgroups and	10 -16
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32	Key results	#18 Summarise key results with reference to study objectives	
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35	Limitations	#19 Discuss limitations of the study, taking into account sources of	18
36		potential bias or imprecision. Discuss both direction and	
37		magnitude of any potential bias.	
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42	Interpretation	#20 Give a cautious overall interpretation considering objectives,	16 -18
43		limitations, multiplicity of analyses, results from similar studies,	
44		and other relevant evidence.	
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50	Generalisability	#21 Discuss the generalisability (external validity) of the study	19
51		results	
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55	Funding	#22 Give the source of funding and the role of the funders for the	20
56		present study and, if applicable, for the original study on which	
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1 the present article is based

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BMJ Open

Prevalence and correlates of physical violence and rape among female sex workers in Ethiopia: A cross-sectional study with respondent-driven sampling from 11 major towns

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3 **Prevalence and correlates of physical violence and rape among female sex workers in**
4 **Ethiopia: A cross-sectional study with respondent-driven sampling from 11 major towns**

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27 **Abstract**

28 **Objective:** This study examined the prevalence and correlates of physical violence and rape
29 among FSWs in Ethiopia.
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31 **Design:** A cross-sectional study using respondent-driven sampling technique
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33 **Setting:** Eleven major towns in Ethiopia
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35 **Participants:** 4900 female sex workers (FSWs)
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37 **Main outcome measures:** The prevalence of experiences of physical beating and rape
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39 **Results:** Among FSWs, 17.5% reported physical beating within the past year and 15.2% reported
40 rape since they started selling sex. FSWs aged 35+ years (AOR 0.59, 95% CI 0.38, 0.92) were less
41 exposed to physical beating than those aged 15-24 years. FSWs working on the street (AOR 1.92,
42 95% CI 1.53, 2.39), in red-light houses (AOR 1.63, 95% CI 1.12, 2.38), and in local drinking
43 houses (AOR 1.35, 95% CI 1.02, 1.78) experienced more physical beating than FSWs working in
44 bars/hotels. FSWs who consumed alcohol four or more days in a week (AOR 1.92, 95% CI 1.21,
45 3.04), and who chewed khat frequently experienced more physical violence. Rape was associated
46 with having a low monthly income, drinking alcohol four or more days per week (AOR 2.33, 95%
47 CI 1.47, 3.7), experience of heavy episodic drinking in a month (AOR 1.71, 95% CI 1.24, 2.38),
48 and chewing khat 3-4 days per week (AOR 2.15, 95% CI 1.55, 2.98). Condom breakage was more
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3 frequent among FSWs who reported both physical beating (AOR 1.51, 95% CI 1.25, 1.84) and rape
4 (AOR 1.26, 95% CI 1.03, 1.55).

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6 **Conclusion:** FSWs in Ethiopia are vulnerable to physical and sexual violence, and the risk
7 increases when they are younger, street-based, and high consumers of alcohol or khat. Therefore,
8 targeted efforts are needed for prevention and harm reduction.
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12 **Keywords:** female sex workers, physical violence, rape, substance use, Ethiopia
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14 15 **Strengths and limitations of this study**

- 16 • The study involves multiple sites (eleven large towns) across the country with a large
17 sample size.
- 18 • The study used a respondent-driven sampling, a technique that is recommended for hard to
19 reach populations.
- 20 • Sexual and physical violence are sensitive topics that are subject to underreporting because
21 of social desirability bias.
- 22 • Recall bias could have occurred because participants were asked about physical violence
23 in the past year and rape since they started selling sex.
- 24 • Due to a cross-sectional study design, the influence of alcohol use/khat chewing must be
25 interpreted with caution, since the participants' current consumption status might not be an
26 accurate indicator of the consumption status at the time of the violence.
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Introduction

As per WHO definition, violence is the intentional use of physical force or power against another person or group, which has a high likelihood of resulting in injury, death, or sexual or psychological harm (1). Violence against women is a global phenomenon, as more than one in three women worldwide is beaten, coerced into sex, or abused in her lifetime (2). Furthermore, violence is one of the main contributors to poor sexual and reproductive health among women, leading to unintended pregnancy, self-induced abortions, gynecologic problems, sexual dysfunction, and sexually transmitted infections (STIs), including HIV (3, 4).

In most countries, female sex work is either illegal or has an uncertain legal status. For example, prostitution is not illegal but approaching sex workers in public is illegal; this makes authorities reluctant to offer protection or support, which in turn legitimizes violence and discrimination against sex workers (5). In the case of Ethiopia, it is illegal to operate a brothel or procure sex workers as a commercial activity, but the sale of sex by women is neither prohibited nor legally recognized as a profession (6). Female sex workers (FSWs) frequently face harassment and violence, not only because of their illegitimate status, but also as a manifestation of gender inequality and discrimination directed towards women (7, 8).

Violence against FSWs can be perpetrated by anyone, including police officers, intimate partners, and clients. In Adama and Mekelle towns in Ethiopia, nearly 60% and 75% of female sex workers, respectively, reported lifetime violence (9, 10). In the same study in Adama, 8% of FSW reported forced sex since they started sex work (10). In another study conducted among homeless street females in Bahirdar town, 11.4% of them reported having been raped during the last one year period (11). In Uganda, 40% of FSWs reported physical abuse, and 49 % had been raped at least once in their lifetime (12). In another study conducted in Hunan, China and Karnataka, India, 16% and 9% of female sex workers, respectively, reported work-related violence (13, 14).

Several risk factors have been found to have an association with physical and sexual violence against FSWs. Socio-economic characteristics, risky sexual behaviors and substance abuse are the most mentioned factors worldwide (9, 10, 15, 16). A randomized controlled trial study in Kenya and South Africa showed that alcohol consumption reduction by FSWs had a significant

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3 contribution to violence reduction (17, 18). Moreover, establishments where alcohol and other
4 drugs are consumed are associated with an increased likelihood of people becoming violent
5 towards sex workers (8, 19). However, other studies suggest that FSWs who work outdoors face
6 more violence than those who work indoors (20, 21).
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11 Violence towards FSWs may also be associated with condom use and condom breakage. Studies
12 conducted among FSWs have found several intentional and unintentional factors associated with
13 condom breakage during sex work. These factors included being drunk or high on drugs, wearing
14 unfitting condoms, incorrect condom use, and having violent or rough sex (22, 23). Moreover,
15 violence towards FSWs may also be linked to disagreement over condom use, which increases the
16 risk of acquiring HIV and other STIs (21, 24-26). In Ethiopia, the weighted HIV prevalence among
17 FSWs is estimated to be 23% (27), while it is 1.2 % in the general population (28), which shows
18 the magnitude of the potential risk exposure among FSWs. In addition, violence also prevents sex
19 workers from seeking appropriate health services (26, 29, 30).
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27 In general, 120,000 to 160,000 FSWs are estimated to live in Ethiopia, working in different venues,
28 mainly in bars and hotels, Key-mebrat (red lighthouses), local drinking houses, and on the street
29 (27). Currently, the number of female sex workers is growing, with increasing numbers of young
30 girls entering the sex trade.
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35 This study explores the prevalence and correlates of physical violence and rape among FSWs in
36 Ethiopia. Successful strategies for handling the trauma may vary by the type of violence
37 experienced. Therefore, identification of risk factors that are specific to various types of violence
38 has the potential to inform the development of evidence-based prevention programs. In addition,
39 generating such types of evidence based on national level data will help to promote effective
40 prevention for female sex workers.
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Methods

Study design

This study was part of a larger study concerning HIV prevalence and related risk factors among female sex workers and long-distance drivers that was carried out in Ethiopia in 2014. A cross-sectional study design using Respondent Driven Sampling technique (RDS) was used for data collection. RDS is a complex sampling method based on a chain-referral design and recommended for hard-to-reach populations. At all data collection sites, initial FSW “seeds” were selected to start the sampling process. Seeds were selected purposively to represent the type of sex worker, age category, and geographic location. They were identified through formative assessments with key stakeholders working with FSWs and representatives of FSWs. The selected seeds were those who were well-connected with their community and reported large social networks.

A maximum of three recruits per seed was allowed and only one-time participation was ensured by using a fingerprint-scanning device. Recruitment pattern (who recruited whom) was tracked and network size was determined.

Study area, period and population

The study locations were the seven major regional towns and the four main transport corridor towns. The seven major regional towns were: Addis Ababa, Bahirdar, Mekelle, Hawassa, Adama, Gambela, and Dire-dawa. The four transport corridor towns were Semera-Logia (Addis Ababa-Djibouti route), Kombolcha (Addis Ababa-Mekelle route), Metema (Addis Ababa-Metema route), and Shashemene (Addis Ababa - Moyale route).

The source populations were all female sex workers living in those selected eleven towns. For the purpose of the study, female sex workers were defined as follows: ‘women who practice sexual activity with the pre-conditions of financial or in-kind benefits’. The inclusion criteria were: receiving money or other benefits for sex with four or more people within the last 30 days, being 15 and above years old, properly recruited by a peer (presenting with the coupon), and giving consent both for the interview and blood drawing.

Sample size

The source study protocol calculated that a sample size of 400 female sex workers was needed in each town using anticipated HIV prevalence of 25%, 6% precision, 95% CI, and design effect of two. However, the number of female sex workers who participated in each town was not exactly 400, and the total number of FSWs who participated in the study was 4900.

Data collection procedure

Six seed FSWs were selected to initiate coupon-based recruitment. Eligible FSWs who provided informed consent to participate were administered a face to face interview in a private room by a nurse with a structured questionnaire in Amharic language. They then provided blood specimens for HIV, CD4, and viral load testing in a private room. When the process was completed, participants were provided with up to three coupons and instructed to recruit their FSW peers into the study. To compensate the time and costs of transport, a primary incentive of 100 ETB (\$5.0) and additional 50 ETB (\$2.5) for each eligible peer she enrolled into the study was given. An electronic data base for tracking coupons and recruitment was established with participant ID, fingerprint code, and a pre-printed label that was scanned. The data collection tools and questionnaire were pretested in a pilot study; feedback from the pilot study was used to finalize the data collection tools and field logistic and operational procedures. The questionnaire included: socio-demographic characteristics, sexual risk exposure, sexual behaviors, condom use, history of STI symptoms, alcohol and drug use consumption, violence related issues, knowledge of HIV transmission, and HIV testing history.

Variables

Violence was assessed with two dependent variables, which were physical beating during the last one year and rape since sex selling started. The following questions were asked: “When exchanging sex for money during the last one year, have you ever been physically beaten by a sexual partner or client?” and “Have you ever been raped or forced to have sex against your will since you start selling sex?”. Responses were dichotomized into a Yes and No variable for analysis. For both of the questions, all who had reported beating and rape at least once were considered as having experienced violence (Yes).

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3 The different time periods used to assess experiences of physical beating and rape were based on
4 the presumed frequency of the two different types of violence. Physical beating might occur more
5 frequently, while rape presumably occurs less frequently. Therefore, to measure the general burden
6 of the two experiences, we specifically selected the time period that might be appropriate for the
7 recall of the particular experience.
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12 The independent measures included current age, monthly income from selling sex, marital status,
13 educational status, sex selling venue, khat chewing, alcohol drinking, HIV status, and condom
14 breakage.
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18 Current age was a continuous variable and for the purpose of analysis categorized as ten-year
19 intervals: younger (15-24), middle age (25-34), and older one (35+), with the younger age group
20 used as the reference category. Monthly income from selling sex was an open-ended question and
21 for the analysis was categorized into 1000 birr (\$50) intervals considering the cost of living in the
22 country. Educational status was categorized as no formal education, primary first cycle (grade 1-
23 4), primary second cycle (grade 5-8), and secondary and above for analysis, in accordance with
24 the country education system.
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31 In addition, sex workers were categorized based on their sex-selling venue, where bar/hotel was
32 used as the reference because it is the most common FSW working venue. In addition, this venue
33 category has better security than the other venues, and there were greater numbers of FSWs in this
34 category.
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38 Alcohol consumption was measured by different indicators, including frequency of alcohol
39 consumption, number of drinks per specific day and frequency of heavy episodic drinking (6 or
40 more standard drinks per day).
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44 Frequency of khat chewing was assessed according to the number of days that they chewed in a
45 week. Khat (*Catha edulis*) is a stimulant leaf, and after chewing khat, an individual may become
46 talkative, alert, feel excitement, increased self-esteem, and increased imagination (31). Khat
47 chewing is also popular among FSWs, as it is a means to spend the daytime, to be active during
48 the night for sex work, and to socialize with each other.
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Data analysis

Statistical analysis was performed using SPSS Version 20. Descriptive statistics were used to provide summary measures (means, frequencies). Odds ratios (crude and adjusted) and 95% confidence intervals (CI) were obtained using bivariate and multivariate logistic regression analysis. Those independent variables significantly associated with the outcome variable in the bivariate analysis were included in the multivariate analysis. In addition, correlation analysis was performed to examine potential multicollinearity; no correlation was found between the variables. Cases with missing data were excluded from the analyses. Significance was accepted at p-value <0.05.

During data collection, we did not specifically assess where FSWs experienced the violence (in the current town or in another town). Because FSWs are highly mobile from one town to another, it would be inaccurate to assume that their experiences of violence occurred in the town from which they were sampled. Therefore, during analysis, we did not conduct any statistical analysis that assessed the contribution of the sampling site (participant's town) to the experience of violence.

Ethical considerations

Permission for data use was obtained from the Ethiopian Public Health Institute (EPHI). The protocol was cleared at the Scientific and Ethical Research Office (SERO) of EPHI, the Ethiopian Science and Technology Ministry Ethical Committee, and CDC-Atlanta IRB. Individual written informed consent was obtained from each participant for the interview and blood sample collection while the study was conducted.

Patient and Public Involvement

During the design or implementation of the study, no patients were involved in the development of the research question and outcome measures. Nevertheless, due to the nature of the respondent driven sampling methodology, an assessment was conducted to identify seeds and hotspot areas for the actual data collection. This assessment was conducted in collaboration with organizations working with FSWs and an active member of FSWs in those organizations. The primary results will be disseminate by publication in peer-reviewed journals and presented at the national level for stakeholders working with FSWs.

Results

Socio-demographic and other background characteristics

A total of 4900 female sex workers participated in the study. Demographic, socioeconomic, and other background characteristics of the participants are shown in Table 1. The majority of the participants were between 15 to 24 years old with a mean age of 24 years (SD= 5.7); 44 % of them were divorced, separated or widowed. A quarter of them reported being uneducated and 40% of them earned on average less than \$50 per month. Regarding sex selling starting age, the majority started selling sex between the ages of 18-24 years, although nearly 25% started before the age of 18. FSWs work in different eating, drinking and recreation establishments, as well as other venues; 33% recruited their clients in bars/hotels, followed by 26.5% on the street, and 20% in local drinking houses (Table 1).

Table 1. Distribution of socio-demographic and other background characteristics among 4900 female sex workers across eleven towns, Ethiopia

Variable	Frequency	Percentage
Age		
15 - 24	2831	57.8
25 - 34	1700	34.7
35+	369	7.5
Total	4900	100.0
Missing	0	
Mean age of respondents = 24.16		
SD= 5.7		
Educational status		
No Education	1224	25.0
Primary 1st cycle (1 - 4)	764	16.0
Primary 2nd cycle (5 - 8)	2062	42.0
Secondary & above	831	17.0
Total	4881	100.0

Missing	19	
Sex selling venues		
Bar/Hotel	1613	33.0
Local drinking houses	983	20.1
Spa/Massage/Beauty salon/Own house	261	5.3
Red-light houses	429	8.8
Street	1295	26.5
Other	304	6.2
Total	4885	100.0
Missing	15	
Current marital status		
Never Married	2698	55.2
Married/Cohabited	37	0.8
Separated/Divorced	1976	40.5
Widowed	173	3.5
Total	4884	100.0
Missing	16	
Sex selling starting age		
Less than 15	120	2.5
15 - 17	1088	22.3
18 - 24	2864	58.7
25 - 29	583	12.0
30 & above	220	4.5
Total	4875	100.0
Missing	25	
Monthly income from selling sex		
Less than 1000 (<\$50)	1932	39.6
1001 - 2000 (\$50 - \$100)	1554	31.8
2001 - 3000 (\$100 - \$150)	812	16.6
3001 - 4000 (\$150 - \$200)	318	6.5

4001 - 5000 (\$200 - \$250)	150	3.1
Above 5000 (>\$250)	117	2.4
Total	4883	100.0
Missing	17	

Behavioral and other related factors

Table 2 shows the prevalence of behavioral and other factors. The majority (70%) of the respondents consumed alcohol, and of those, 15.8% had drunk so much on a typical day within the past 30 days that they did not remember what happened the next day. About half of the respondents chewed khat, and 23.8% of them chewed almost every day (5-7 days a week).

Regarding condom use, 25.5% of them reported condom breakage within the past 30 days prior to the study. HIV/AIDS status of the respondents was also assessed and a quarter of them (23%) were HIV positive. With regard to physical and sexual violence experience, 17.5% of them reported physical beating within the past 12 months and 15.2% reported having been raped since they started selling sex. (Table 2)

Table 2. Behavioral and other related factors among 4900 female sex workers across eleven towns, Ethiopia

Variable	Frequency	Percentage
Frequency alcohol consumption		
Never	1493	30.6
Once a month or less	222	4.5
2 - 4 days a month	492	10.1
2 - 3 days a week	1394	28.5
4 or more days a week	1283	26.3
Total	4884	100.0
Missing	16	

Alcohol containing drinks on a typical day

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1 or 2	806	23.8
3 or 4	1383	40.8
5 or 6	742	21.9
7 to 9	296	8.7
10 or more	164	4.8
Total	3391	100.0
Missing	0	

Frequency of heavy episodic drinking

Never	1863	54.9
Less than monthly	236	7.0
Monthly	299	8.8
Weekly	630	18.6
Daily or almost daily	363	10.7
Total	3391	100.0
Missing	0	

Drunk so much and can't remember

what happened the next day

Yes, in last 30 days	534	15.8
Yes, not in last 30 days	233	6.9
No	2609	77.2
Don't remember	4	0.1
Total	3380	100.0
Missing	11	

Frequency of khat chewing

Never	2431	49.8
Less than once a week	577	11.8
1 - 2 days per week	429	8.8
3 - 4 days per week	284	5.8
5 - 7 days per week	1162	23.8
Total	4883	100.0

Missing	17	
Condom breakage in the past 30 days		
Yes	1243	25.5
No	3635	74.5
Total	4878	
Missing	22	
HIV status		
Negative	3708	76.0
Positive	1173	24.0
Total	4881	100.0
Missing	19	
Ever been raped or forced to have sex since start selling sex		
No	4142	84.8
Yes	742	15.2
Total	4884	100.0
Missing	16	
Physically beaten in the last 12 months		
No	4026	82.5
Yes	855	17.5
Total	4881	100.0
Missing	19	

Bivariate regression analysis outcome

Table 3 shows the bivariate logistic regression results; each independent variable was analyzed separately against the two outcome variables. The variables that were significantly associated with physical violence were: age, educational level, average monthly income from selling sex, current marital status, sex selling venues, frequency of alcohol consumption, alcohol containing drinks on a typical day, frequency of heavy episodic drinking, frequency of khat chewing in a week, and

condom breakage. Variables significantly associated with rape were educational level, average monthly income from selling sex, frequency of alcohol consumption, alcohol containing drinks on a typical day, frequency of heavy episodic drinking, frequency of khat chewing in a week, and condom breakage. HIV status was not significantly associated with either physical violence or rape.

Table 3. Bivariate logistic regression analyses of independent variables associated with physically beaten in the last 12 months and ever been raped since start selling sex, odds ratios (OR) and 95% confidence intervals (CI)

Variables	Physical beating OR (95% CI)	Rape OR (95% CI)
Age		
15 - 24*		
25 - 34	1.02 (0.87, 1.19)	1.02 (0.86, 1.21)
35+	0.52 (0.37, 0.74)	0.88 (0.64, 1.20)
Educational level		
No Education*		
Primary 1st cycle (1 - 4)	1.01 (0.79, 1.31)	1.45 (1.14,1.85)
Primary 2nd cycle (5 - 8)	1.35 (1.11, 1.63)	1.08 (0.88,1.32)
Secondary & above	1.49 (1.18, 1.87)	1.09 (0.85,1.41)
Monthly income from selling sex		
Less than 1000 birr (<\$50) *		
1001 - 2000 birr (\$50-\$100)	1.44 (1.20, 1.73)	0.69 (0.58, 0.85)
2001 - 3000 birr (\$100-\$150)	1.67 (1.35, 2.07)	0.51 (0.39, 0.66)
3001 - 4000 birr (\$150-\$200)	1.61 (1.19, 2.17)	0.65 (0.46, 0.92)
4001 - 5000 birr (\$200-\$250)	2.12 (1.44, 3.14)	1.01 (0.66, 1.55)
Above 5000 birr (>\$250)	1.62 (1.01, 2.58)	0.75 (0.44, 1.27)
Current marital status		
Never Married*		
Married/Cohabited	1.05 (0.46, 2.41)	0.69 (0.24, 1.96)

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3	Separated/Divorced	0.93 (0.80, 1.09)	1.03 (0.88, 1.21)
4			
5	Widowed	0.59 (0.37, 0.95)	1.39 (0.95, 2.06)
6			
7	Sex selling venues		
8	Bar/Hotel*		
9			
10	Local drinking houses	0.87 (0.69, 1.09)	-
11			
12	Spa/Massage/Beauty salon/Own house	0.45 (0.28, 0.71)	-
13			
14	Red-light houses	0.95 (0.71, 1.27)	-
15			
16	Street	1.51 (1.26, 1.82)	-
17			
18	Other	1.37 (1.01, 1.86)	-
19	Frequency alcohol consumption		
20	Never*		
21			
22	2 - 4 days a month	1.82 (1.35, 2.44)	1.74 (1.27, 2.38)
23			
24	2 - 3 days a week	2.07 (1.66, 2.57)	1.87 (1.48, 2.36)
25			
26	4 or more days a week	3.54 (2.87, 4.37)	3.43 (2.75, 4.28)
27	Alcohol containing drinks on a typical day		
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29	1 or 2*		
30			
31	3 or 4	1.39 (1.09, 1.76)	1.16 (0.92, 1.46)
32			
33	5 or 6	2.03 (1.58, 2.62)	1.09 (0.84, 1.43)
34			
35	7 to 9	2.19 (1.59, 3.03)	0.98 (0.68, 1.41)
36			
37	10 or more	2.76 (1.88, 4.03)	1.78 (1.20, 2.65)
38	Frequency of heavy episodic drinking		
39	Never*		
40			
41	Less than monthly	1.43 (1.03, 1.98)	1.39 (0.99, 1.95)
42			
43	Monthly	1.23 (0.90, 1.66)	1.59 (1.18, 2.13)
44			
45	Weekly	1.73 (1.39, 2.14)	1.03 (0.80, 1.31)
46			
47	Daily or almost daily	1.97 (1.53, 2.55)	1.69 (1.29, 2.21)
48	Drunk so much and can't remember what		
49	happened the next day		
50			
51	No*		
52			
53	Yes, in the last 30 days	2.90 (2.37, 3.56)	1.66 (1.33, 2.07)
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Yes, before last 30 days	2.22 (1.65, 2.99)	1.27 (0.91, 1.78)
Frequency of khat chewing in a week		
Never*		
Less than once a week	1.24 (0.96, 1.60)	0.89 (0.67, 1.19)
1 - 2 days per week	1.67 (1.28, 2.18)	2.89 (2.26, 3.69)
3 - 4 days per week	2.49 (1.87, 3.34)	2.92 (2.19, 3.89)
5 - 7 days per week	2.48 (2.08, 2.96)	1.47 (1.21, 1.79)
Condom breakage		
No*		
Yes	1.99 (1.69, 2.33)	1.62 (1.37, 1.92)
HIV test result		
Negative*		
Positive	1.04 (0.88, 1.24)	0.88 (0.73, 1.07)

Note: * Reference category

Multivariate analysis of factors associated with physical violence (physically beaten)

Table 4 shows the results of the multivariate analysis used to identify factors associated with physical violence after simultaneously adjusting for all measures included in the analyses. Female sex workers aged 35 years or above (AOR 0.59, 95% CI 0.38, 0.92) were significantly less likely to experience physical violence when compared with the younger age group (15-24years). FSWs who had attended primary first cycle education (AOR 0.71, 95% CI 0.52, 0.97) were also less likely to experience physical beating than those who reported no education. On the other hand, FSWs who worked on the street (AOR 1.92, 95% CI 1.53, 2.39), in red-light houses (AOR 1.63, 95% CI 1.12, 2.38) and in local drinking houses (AOR 1.35, 95% CI 1.02, 1.78) had an increased odds of experiencing physical violence compared with FSWs who worked in bars/hotels. Moreover, substance use was significantly related to physical violence. FSWs who consumed alcohol four or more days in a week (AOR 1.92, 95% CI 1.21, 3.04), those who did not remember what happened the next day due to heavy alcohol consumption both in the past 30 days (AOR 1.98, 95% CI 1.58, 2.49) and before the past 30 days (AOR 1.85, 95% CI 1.35, 2.53), and FSWs who chewed khat 3-4 days per week (AOR 1.58, 95% CI 1.13, 2.21) and 5-7 days per week (AOR

1.43, 95% CI 1.13, 1.80) had more likelihood of experiencing physical violence. Condom breakage experience within the past 30 days prior to the study was also significantly associated with physical violence (AOR 1.51, 95% CI 1.25, 1.84).

Table 4. Multivariate logistic regression analysis of factors associated with physical violence (physically beaten) in the past twelve months among female sex workers across eleven towns in Ethiopia, odds ratios (OR) and 95% confidence intervals (CI).

Variables	OR (95%CI)
Age	
15 - 24*	
25 - 34	1.04 (0.82, 1.22)
35+	0.59 (0.38, 0.92)
Educational level	
No Education*	
Primary 1st cycle (1 - 4)	0.71 (0.52, 0.97)
Primary 2nd cycle (5 - 8)	0.98 (0.77, 1.26)
Secondary & above	1.14 (0.85, 1.53)
Monthly income from selling sex	
Less than 1000 birr (<\$50) *	
1001 - 2000 birr (\$50 - \$100)	1.13 (0.90, 1.41)
2001 - 3000 birr (\$100 - \$150)	1.14 (0.87, 1.48)
3001 - 4000 birr (\$150 - \$200)	1.12 (0.77, 1.61)
4001 - 5000 birr (\$200 - \$250)	1.44 (0.93, 2.24)
Above 5000 birr (>\$250)	1.12 (0.63, 1.99)
Current marital status	
Never Married*	
Married/Cohabited	0.68 (0.24, 1.89)
Separated/Divorced	1.08 (0.88, 1.29)
Widowed	0.87 (0.48, 1.59)
Sex selling venues	

Bar/Hotel*	
Local drinking houses	1.35 (1.02, 1.78)
Spa/massage/beauty salon/own house	1.04 (0.58, 1.84)
Red-light houses	1.63 (1.12, 2.38)
Street	1.92 (1.53, 2.39)
Other	1.39 (0.98, 1.99)

Frequency alcohol consumption

Never*	
2 - 4 days a month	1.25 (0.77, 2.04)
2 - 3 days a week	1.32 (0.84, 2.06)
4 or more days a week	1.92 (1.21, 3.04)

Alcohol containing drinks on a typical day

1 or 2*	
3 or 4	1.08 (0.84, 1.39)
5 or 6	1.15 (0.85, 1.57)
7 to 9	1.09 (0.74, 1.64)
10 or more	1.14 (0.72, 1.81)

Frequency of heavy episodic drinking

Never*	
Less than monthly	1.07 (0.75, 1.52)
Monthly	0.84 (0.59, 1.18)
Weekly	1.07 (0.82, 1.39)
Daily or almost daily	0.99 (0.71, 1.38)

Drunk so much and can't remember what happened the next day

No*	
Yes, in the last 30 days	1.98 (1.58, 2.49)
Yes, before last 30 days	1.85 (1.35, 2.53)

Frequency of khat chewing in a week

Never*

Less than once a week	1.04 (0.77, 1.42)
1 - 2 days per week	1.30 (0.96, 1.77)
3 - 4 days per week	1.58 (1.13, 2.21)
5 - 7 days per week	1.43 (1.13, 1.80)

Condom breakage

No*	
Yes	1.51 (1.25, 1.84)

Note: * Reference category

Multivariate analysis of factors associated with sexual violence (rape)

Table 5 shows the results of the multivariate logistic regression analyses used to identify factors that were significantly associated with rape after simultaneously adjusting for all measures included in the analyses. Female sex workers with a monthly income of \$50 to \$200 were significantly less likely to experience rape compared to those with a monthly income of below \$50. Drinking alcohol four or more days per week (AOR 2.33, 95% CI 1.47, 3.7), experience of heavy drinking in the last 30 days and not remembering what happened the next day (AOR 1.34, 95% CI 1.05, 1.72), experience of heavy episodic drinking (HED) in a month (AOR 1.71, 95% CI 1.24, 2.38), experience of HED almost daily (AOR 1.49, 95% CI 1.06, 2.11), and chewing khat 1-2 days (AOR 2.13, 95% CI 1.61, 2.83) and 3-4 days (AOR 2.15, 95% CI 1.55, 2.98) per week were positively associated with rape. Moreover, condom breakage (AOR 1.26, 95% CI 1.03, 1.55) was significantly more frequent among FSWs who reported rape.

Table 5. Multivariate logistic regression analysis of factors associated with sexual violence (rape) since sex selling start among female sex workers across eleven towns in Ethiopia, odds ratios (OR) and 95% confidence intervals (CI).

Variables	OR (95%CI)
Monthly income from selling sex	
Less than 1000 birr (<\$50) *	
1001 - 2000 birr (\$50-\$100)	0.62 (0.49, 0.77)

2001 - 3000 birr (\$100-\$150)	0.42 (0.32, 0.57)
3001 - 4000 birr (\$150-\$200)	0.45 (0.29, 0.69)
4001 - 5000 birr (\$200-\$250)	0.84 (0.53, 1.33)
Above 5000 birr (>\$250)	0.62 (0.34, 1.15)

Current marital status

Never Married*	
Married/Cohabited	0.57 (0.17, 1.97)
Separated/Divorced	1.01 (0.83, 1.22)
Widowed	1.61 (0.98, 2.63)

Educational level

No Education*	
Primary 1st cycle (1 - 4)	1.06 (0.79, 1.43)
Primary 2nd cycle (5 - 8)	0.83 (0.65, 1.07)
Secondary & above	0.92 (0.68, 1.25)

Frequency of alcohol consumption

Never*	
2 - 4 days a month	1.15 (0.69, 1.89)
2 - 3 days a week	1.24 (0.78, 1.96)
4 or more days a week	2.33 (1.47, 3.73)

Drunk so much and can't remember what happened the next day

No*	
Yes, in the last 30 days	1.34 (1.05, 1.72)
Yes, before last 30 days	1.07 (0.75, 1.52)

Frequency of heavy episodic drinking

Never*	
Less than monthly	1.61 (1.12, 2.32)
Monthly	1.71 (1.24, 2.38)
Weekly	1.04 (0.78, 1.38)
Daily or almost daily	1.49 (1.06, 2.11)

Frequency of khat chewing in a week

Never*

less than once a week 0.83 (0.59, 1.16)

1 - 2 days per week 2.13 (1.61, 2.83)

3 - 4 days per week 2.15 (1.55, 2.98)

5 - 7 days per week 1.06 (0.83, 1.36)

Condom breakage

No*

Yes 1.26 (1.03, 1.55)

Note: * Reference category

Discussion

According to this study, 17.5% of FSWs in Ethiopia had been physically beaten within the past 12 months and 15.2% had been raped since they started selling sex. Age, sex selling venues, and high consumption of alcohol and khat were significant predictors of physical violence (beating). On the other hand, the significant predictors of sexual violence (rape) were low income and high consumption of alcohol and khat.

The prevalence of both physical violence and sexual violence (rape) was lower than the prevalence found in studies conducted in Uganda, Ivory Coast, and Kenya (9, 12, 30, 32). However, when compared to the studies conducted in Adama (Ethiopia), China, India, and Mexico, the current study reported a higher prevalence of both physical and sexual violence (10, 11, 13, 14, 33). The difference in the definition of violence used might be one of the possible explanations for the difference between the current result and those found in other studies in Africa. Most of the studies assessed all forms of physical and sexual violence while the current study assessed solely physical beating and forced penetrative sex (rape). On the other hand, differences in results across settings might also be due to differences in background and contextual factors such as socio-economic status and cultural aspects.

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3 Several studies showed that younger FSWs are more exposed to physical and sexual violence (13,
4 34) in line with the current findings that younger FSWs (15-24 years) were at higher risk for
5 physical violence when compared to their older counterparts (35+years). Perpetrators find it easier
6 to manipulate younger FSWs and this might play a role in their increased exposure to violence.
7 That younger FSWs are especially vulnerable to violence has important implications due to the
8 increasing number of younger FSWs who are entering the sex trade. Therefore, to minimize the
9 vulnerability of younger FSWs, intervention programs need to create awareness about the factors
10 that increase the likelihood of violence and to ensure that younger FSWs are particularly addressed
11 in such programs.
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20 Even though sex work is not a legally recognized profession in Ethiopia, most of the establishments
21 where the sex workers are based (hotels, bars/restaurants, nightclubs, etc.) operate legally with
22 working licenses. Nevertheless, some FSWs work on the street and in red-light houses where they
23 manage their own working area. Consequently, the extent to which physical violence occurs may
24 vary according to their working area. The present study revealed that FSWs who mainly work in
25 bars and hotels face less physical beating when compared with FSWs who work on the street, in
26 red-light houses and local drinking houses. This finding is in line with studies conducted in New
27 York City and England (20, 21). This might be due to the level of protection in their working areas
28 and/or due to the type of clients who frequents those localities. This means that engaging bar/hotel
29 managers in the prevention activities could be an additional strategy to decrease violence against
30 FSWs.
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40 On the other hand, FSWs who work on the street, in red-light houses and local drinking houses
41 experienced more violence. Most of these venues are located in the slum areas of the cities, and
42 such areas are often the focus of police efforts to control various unwanted activities. In this regard,
43 FSWs are targets of harassment, physical violence and arrest by police. The actions of the police
44 towards FSWs might also serve to legitimize violence against FSWs in the community (especially
45 among FSWs residing in slum areas), thus increasing such acts of violence. Therefore, to minimize
46 the harm in these localities, involving the police force in violence prevention activities is crucial
47 and should be one of the first step. In addition, a peer education program led by the sex workers
48 could be an additional strategy. Such a program could help FSWs to create an information sharing
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3 platform to discuss the incidences of violence, types of perpetrators, etc., which could raise
4 awareness and help them to become more alert.
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8 Furthermore, an association between alcohol use and higher frequency of physical violence and
9 rape was reported. In particular, FSWs who consume alcohol more than four days per week and
10 those with experience of HED were significantly more likely to experience violence. Several
11 studies conducted in Ethiopia, Uganda, and Kenya also reported similar findings (9, 10, 12, 19).
12 A large proportion of female sex workers (FSWs) use alcohol prior to or during sex to help them
13 to solicit clients and overcome their shyness (35, 36). In particular high level of alcohol
14 consumption places FSWs at a disadvantage by intensifying their vulnerability (8). Research
15 reviews also report that alcohol use impairs FSWs' ability to detect the risk of violence and
16 increases their vulnerability to risk-prone situations (37, 38). The consequences of HED are not
17 just limited to the physical effects of intoxication but further expose them to violence and risky
18 sexual behaviors.
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28 Correspondingly, chewing khat more days in a week was significantly associated with experience
29 of physical violence and rape. After chewing khat, some of the users consume alcohol-containing
30 beverages to decrease the level of stimulation. Although there is no previous study on the
31 relationship between khat chewing and experience of violence among FSWs, most FSWs chew
32 khat before departing for work. In the bar, they drink alcohol to minimize the effect, which in turn
33 exposes them to HED and violence. Further studies should assess the independent contribution of
34 khat chewing to increasing violence occurrence.
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41 The extent to which alcohol use and khat chewing are risk factors for the occurrence of experiences
42 of violence must be interpreted with caution. Since physical beating was measured within the past
43 12 months and rape was measured since they started selling sex, the participants' current khat
44 chewing or alcohol consumption status might not be an accurate indicator of their consumption
45 patterns at the time of the violence. In addition, the current use of substances might be a means to
46 cope with the trauma related to the experience of violence.
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3 In addition, the resistance to condom use from clients and the violence experience may create a
4 difficult situation for FSWs with regard to the proper use of condoms, which further exposes FSWs
5 to HIV and other STIs. In this study, there was a significant relationship between condom breakage
6 and history of physical beating and rape. Even though there was no significant association between
7 HIV and violence, the proportion of HIV positive FSWs in the sample was high (23%). A study
8 conducted in Benin reported a similar finding concerning the association between condom
9 breakage and violence, but unlike our study there was a significant association between HIV and
10 violence experience (23). This finding indicates that solely providing condoms will not be effective
11 to prevent HIV and other STIs transmission. Instead, working on factors that contribute to
12 improper use of condoms (such as violence) could be an additional strategy for HIV prevention
13 programs.
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23 In general, our study demonstrates that sex workers are particularly vulnerable to physical beating
24 and rape. Nevertheless, the harm reduction program among FSWs in Ethiopia is poor. Given the
25 associations between violence and unprotected sex, the HIV control program may not accomplish
26 its goal of reducing the number of new infections without also addressing violence. Therefore,
27 combining both programs could yield better results with regard to attaining epidemic control as
28 well as reducing the harm associated with violence. In addition, this study shows that different
29 factors (such as sex selling venues, the age of FSWs, and level of alcohol use etc.) were associated
30 with violence among FSWs, signifying the need for different approaches to minimize the incidence
31 of violence (39). At the individual level, efforts to reduce violence could focus on developing
32 educational materials and creating awareness for sex workers about their legal rights and about
33 how to prevent, reduce and respond to violence (40). In addition, involving the community in the
34 prevention program could play a vital role especially towards reducing stigma and discrimination
35 towards FSWs, which in turn would create a suitable environment for FSWs to stand up for their
36 rights. Furthermore, involving police and law enforcement authorities to reduce harassment could
37 play a greater role in violence reduction.
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50 Finally, there were some similarities but also differences concerning the predictors of rape and
51 physical violence. For example, being in the younger age group was a significant predictor of
52 physical beating but not rape, and having lower income was associated with rape but not with
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3 physical beating. Nevertheless, based on the current data, it is difficult to draw any conclusions
4 about why one variable would matter for physical beating but not for rape. The reasons underlying
5 the differences are currently unknown, and further research might be required to gain an
6 understanding of the patterns observed.
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10 11 **Methodological considerations** 12

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14 There are a limited number of studies on violence among FSWs in Ethiopia and the existing studies
15 are restricted to one city (9, 10). One of the strengths of this study is that it involves multiple sites
16 (eleven large towns) across the country. The second strength is the sampling technique; the study
17 used a respondent-driven sampling, which is a strategy recommended for hard-to-reach
18 populations and which is believed to give a representative sample of the target population. The
19 third strength is the assessment of FSWs' HIV status on site using the national testing algorithm.
20 In addition, the pilot study conducted prior to the actual implementation added strength to the main
21 study protocol.
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29 This study also had limitations. First, sexual and physical violence are sensitive topics that are
30 subject to underreporting because of social desirability bias. Second, recall bias could have
31 occurred because participants were asked about physical violence in the past year and rape since
32 they started selling sex. We tried to minimize underreporting through intense interviewer training.
33 In addition, since it was a cross-sectional study, participants were assessed only once; thus, it
34 would be difficult to infer the temporal association between a risk factor and the outcome
35 measures, i.e. physical violence and rape.
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42 Furthermore, the results regarding correlates of physical and sexual violence among FSWs in
43 Ethiopia might have limited generalizability across settings. However, these results are likely to
44 be relevant for other FSWs in other African countries that have a similar setting as Ethiopia, and
45 may inform targeted prevention strategies for this key population.
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50 **Conclusion** 51

52 In general, FSWs are vulnerable to physical and sexual violence, and the risk increases when they
53 are younger, street-based, and are high consumers of alcohol or khat. Therefore, to reduce physical
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3 and sexual violence, strategies to secure and improve their work environment should be a critical
4 component of targeted interventions. Increasing awareness regarding the role of khat chewing and
5 alcohol drinking towards vulnerability to violence should be an integral component of HIV
6 prevention and violence reduction programs. In addition, targeted efforts should be made for the
7 younger FSWs in order to reduce their vulnerability.
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15 **Conflict of Interest:** None to declare.

16 **Authors contributions**

17 MA and AA developed the study design. MA analyzed and interpreted the data and drafted the
18 manuscript. AA was involved in the data analysis and interpretation, and in the writing of the
19 manuscript. TT was involved in the interpretation of the data and contributed to the writing of the
20 manuscript. All authors approved the final manuscript.
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28 **Data sharing statement:** No additional data available.
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32 **Reference**

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Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

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In your methods section, say that you used the STROBE cross sectional reporting guidelines, and cite them as:

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		Reporting Item	Page Number
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	1

1	Background /	#2	Explain the scientific background and rationale for the	2
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3	rationale		investigation being reported	
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6	Objectives	#3	State specific objectives, including any prespecified	3
7			hypotheses	
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11	Study design	#4	Present key elements of study design early in the paper	4
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15	Setting	#5	Describe the setting, locations, and relevant dates, including	4, 5, 6
16			periods of recruitment, exposure, follow-up, and data collection	
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20	Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of	5
21			selection of participants.	
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26		#7	Clearly define all outcomes, exposures, predictors, potential	6
27			confounders, and effect modifiers. Give diagnostic criteria, if	
28			applicable	
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33	Data sources /	#8	For each variable of interest give sources of data and details of	6
34	measurement		methods of assessment (measurement). Describe	
35			comparability of assessment methods if there is more than one	
36			group. Give information separately for for exposed and	
37			unexposed groups if applicable.	
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45	Bias	#9	Describe any efforts to address potential sources of bias	2, 18
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48	Study size	#10	Explain how the study size was arrived at	5
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51	Quantitative	#11	Explain how quantitative variables were handled in the	6
52	variables		analyses. If applicable, describe which groupings were chosen,	
53			and why	
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1	Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	7	
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7		#12b	Describe any methods used to examine subgroups and interactions	NA	
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12		#12c	Explain how missing data were addressed	8	
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15		#12d	If applicable, describe analytical methods taking account of sampling strategy	NA	
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21		#12e	Describe any sensitivity analyses	7	
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23	Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	5	
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36		#13b	Give reasons for non-participation at each stage	5	
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39		#13c	Consider use of a flow diagram		
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41	Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.		
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52		#14b	Indicate number of participants with missing data for each variable of interest	8, 9 in tables	
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57	Outcome data	#15	Report numbers of outcome events or summary measures.	na	
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1		Give information separately for exposed and unexposed	
2		groups if applicable.	
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6	Main results	#16a Give unadjusted estimates and, if applicable, confounder-	7 - 10
7		adjusted estimates and their precision (eg, 95% confidence	
8		interval). Make clear which confounders were adjusted for and	
9		why they were included	
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16		#16b Report category boundaries when continuous variables were	
17		categorized	
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21		#16c If relevant, consider translating estimates of relative risk into	
22		absolute risk for a meaningful time period	
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26	Other analyses	#17 Report other analyses done—e.g., analyses of subgroups and	10 -16
27		interactions, and sensitivity analyses	
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32	Key results	#18 Summarise key results with reference to study objectives	
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35	Limitations	#19 Discuss limitations of the study, taking into account sources of	18
36		potential bias or imprecision. Discuss both direction and	
37		magnitude of any potential bias.	
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42	Interpretation	#20 Give a cautious overall interpretation considering objectives,	16 -18
43		limitations, multiplicity of analyses, results from similar studies,	
44		and other relevant evidence.	
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50	Generalisability	#21 Discuss the generalisability (external validity) of the study	19
51		results	
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55	Funding	#22 Give the source of funding and the role of the funders for the	20
56		present study and, if applicable, for the original study on which	
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1 the present article is based

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