



Received on 23 May, 2014; received in revised form, 01 August, 2014; accepted, 16 September, 2014; published 01 January, 2015

PREVALENCE AND FACTORS ASSOCIATED WITH HIV AND HEPATITIS B VIRUS INFECTIONS AMONG FEMALE COMMERCIAL SEX WORKERS IN MEKELLE, ETHIOPIA: CROSS SECTIONAL STUDY

Gessesew Bugssa^{*1}, Berhe Dessalegn², Balem Dimtsu³ and Yemane Berhane⁴

Institute of Biomedical Sciences¹, Department of Midwifery³, College of Health Sciences, Mekelle University, Mekelle, Ethiopia.

Department of Public Health^{2,4} College of Health Sciences, Adigrat University, Adigrat, Ethiopia.

Keywords:

Sexual transmitted infections, commercial sex workers, HIV, HBV, Associated factors, Mekelle

Correspondence to Author:

Gessesew Bugssa

Lecturer, Institute of Biomedical Sciences, College of Health Sciences, Mekelle University, Mekelle, Ethiopia.


E-mail: bugssag@gmail.com

ABSTRACT: Background: Sexually Transmitted Infections remain major public health problems among the most at risk population groups such as female commercial sex workers. **Objective:** To assess the magnitude of Hepatitis B Virus and HIV/AIDS and identify the associated factors among female commercial sex workers. **Methodology:** A Community Based Cross Sectional Study was conducted in Mekelle city. A total of 319 participants were selected using simple random sampling method. Data was entered and analyzed using SPSS version 16.0. Bivariate logistic regression and multivariate analysis were conducted to identify risk factors and to control confounding factors for acquiring Hepatitis B virus and HIV. **Result:** Overall, the prevalence of HIV and HBV was 11.9% and 6%, respectively. The main factors associated with HIV include: age, educational status, having dependents, birth place, number of years in sex work, income, inconsistent condom use, history of condom breakage, having steady partner, sex during menses, history of genital ulcer, history of STI, alcohol consumption and sexual abuse ($P < 0.05$). The major determinants of HBV were work place of sex workers, inconsistent condom use, sex with male using drugs and use of drug by the sex workers ($P < 0.05$). **Conclusion and recommendation:** The prevalence of HIV and HBV were moderate and the problems were also of particular concern. To reduce the prevalence of these diseases among FCSWs provision of condom, early treatment of genital ulcer, health education on consistent condom utilization and not to have sex during menses, are recommended.

INTRODUCTION: Throughout the globe, sexually transmitted infections (STIs) are among the major causes of serious preventable conditions, such as infertility, pelvic inflammatory disease, ectopic pregnancy, cancer and congenital infection. STIs cause significant morbidity and mortality through their impact on sexual, reproductive and child health.

STIs include at least 30 bacterial, viral and parasitic pathogens that are transmissible sexually^{1, 2}. An estimated 340 million new cases of Syphilis, Gonorrhea, Chlamydia, Trichomoniasis, Hepatitis B virus (HBV), Human Papilloma Virus (HPV), Chancroid and Herpes occur in both men and women of reproductive age groups each year globally, among that, 11-35% of those are in sub-Saharan Africa^{3, 4, 5, 6}.

HBV infection occurs all over the world and is estimated that there are more than 2 billion HBV infected people and about 378 million chronic carriers worldwide. There are approximately 620 000 HBV related deaths each year⁷. On the other

QUICK RESPONSE CODE 	DOI: 10.13040/IJPSR.0975-8232.6(1).135-46
	Article can be accessed online on: www.ijpsr.com
DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.6(1).135-46	

hand there were an estimated 34 million people living with HIV worldwide in 2011 with 1.7 million deaths from AIDS and related causes⁸.

Sex work remains an important contributor to HBV and HIV transmission within early, advanced and regressing epidemics in sub-Saharan Africa, and its social and behavioral factors play an important role in the transmission of these diseases⁹. Female sex workers (FSW) are more prone to HIV and other STIs as well as transmitting them to the public through their clients as they are often in a poor position to negotiate safe sex because of social, economic, cultural and legal factors^{4, 10, 11, 12}.

Unprotected sex or inconsistent condom use and STIs are more associated with alcohol use, lower educational status, awareness on HIV/STI, regular sex partners and other sexual risk behavior among FSW^{12, 13}.

In Africa, sex workers have been heavily affected by HIV and other STIs, with levels of infection much higher than those among other groups. HIV prevalence among sex workers and their clients today is commonly 10–20 fold higher than among the general population. As HIV epidemics appear to be decreasing in some countries in sub-Saharan Africa in the general population, like in parts of eastern Africa, the relative importance of key populations such as sex workers increase prevention among sex workers on an adequate scale¹⁴.

In sub-Saharan Africa, FSW constitute one of the high risk groups for STIs and HIV/AIDS acquisition and transmission. This is perhaps because sex workers have numerous sex partners and they engage in unprotected sex and other forms of sex that cause contact with body fluids of a partner who may be infected with STDs¹⁵.

Ethiopia represents a stable, low-level, generalized epidemic with marked regional variations driven by most-at-risk populations (MARPs). However, urban areas and females are more affected than rural areas and males. In 2009, urban HIV prevalence was 7.7% and that of rural was 0.9% which accounted 62% and 38% of the total people living with HIV/AIDS (PLWA) population in the

country, respectively. Small towns are also becoming hot-spots and can potentially bridge further spread of HIV epidemic to rural settings. Across the country, FSW carry a disproportionate burden of HIV and HBV. According to the Ethiopian Demographic Health Survey (EDHS) report of 2005, females were twice more affected than males. In 2009, female HIV prevalence was 2.8% while male HIV prevalence was 1.8%. Females accounted for 59% of the total PLWA in the country^{16, 17}.

A study conducted in Gondar showed that the prevalence of HBV and HIV was 28.9% and 11.8%, respectively¹⁸. Another study conducted in Addis Ababa in 2006 revealed that HIV/AIDS prevalence was 73% among FSW attending health centers of the city for this reason it can be concluded STIs are more prevalent among sex workers than the general population group¹³.

While there is ongoing STI intervention program and follow up in the study area, still the degree of Hepatitis B virus and HIV/AIDS and their determinant factors are not clearly identified and documented particularly on the most at risk groups especially female commercial sex workers. Therefore, this study was proposed to explore the degree of Hepatitis B virus and HIV/AIDS, and their predisposing factors /determinant factors in the hot spot kebelles of Mekelle City.

METHODS AND MATERIALS

Study design, area and study population

A cross sectional study with analytical component was employed. The study was conducted in Mekelle City, Tigray Region, North Ethiopia from January 2013 to June 2013. Mekelle is the capital city of Tigray National Regional State and is located in the North part of Ethiopia, at approximately 783 km from the capital city, Addis Ababa. Mekelle has a total population of 260,250 currently residing in the town.

The rate of unemployment in Mekelle is 21.6% (28,864) and of these, 59.6% (17191) are females and 40.4% (11673) are males. According to the Social and Work Office of Mekelle city the exact number of Female Commercial Sex workers (FCSWs) in the city is exactly unknown due to the

dramatic incremental opening of new bars, hotels, restaurants, coffee houses, and etc. As a result, the enrollment of females for sex work is alarmingly increasing by considering as better job opportunity and a good source of income¹⁹. However, current data from health extension workers in the hot spot area of the city kebelles 14, 15 and 16 shows that the number of commercial sex workers is about 1650.

Sample size and Sampling method

Sample size determination

The sample size was determined based on two assumptions. The first assumption was by considering the 50% prevalence of Hepatitis B virus (HBV) using a single population proportion formula ($n = z^2 * (p \times q) / d^2$) where n is sample size, $z = 1.96$ at 95% confidence level and 5% marginal error $p =$ expected HBV prevalence as a fraction of 1, $q =$ expected number of Female Commercial Sex Workers free of HBV as a fraction of 1, $d =$ absolute precision factor.

The second assumption was based on the prevalence of HIV/AIDS of 73% among female commercial sex workers from previous study¹³, using the same formula, where $p =$ expected HIV/AIDS prevalence as a fraction of 1; $q =$ expected number of HIV/AIDS negative Female Commercial Sex Workers as a fraction of 1; $d =$ absolute precision factor.

Using the above information with a 95% confidence level and a precision of 5%, the 73% prevalence rate yields 303 and the 50% prevalence yields 384. Since “384” included the “303”, 384” was taken. However, the total number of Female Commercial Sex Workers was less than 10,000 and it required finite population correction as the number of female sex workers in the selected kebelles were about 1650. Hence, using the correction formula and assuming non response rate of 10%, the final sample size was 348.

Sampling method

Representative sample was selected from the source population. For this study, three kebelles namely: kebele 13, kebele 14 and Kebele 15 were purposely selected as these areas are peak hot spot and dominated by these risky groups among the

other kebelles of the city administration (kebele is Amharic word which represents the smallest administrative unit of Ethiopia similar to ward, a neighbourhood or a localized and delimited group of people). Since the number of commercial sex workers (FCSWs) in the three kebelles were registered by the city health extension workers including their mobile numbers and we used simple random sampling method from the existing data from each kebele according to their population proportion. In the study, all FCSWs who were living in these kebelles and who had been working as commercial sex worker for at least 3 months preceding the study were included.

Data collection and Analysis

Before the actual data collection, Pre-test was conducted on 5% of the study subjects who were living outside the selected kebelles. Finally, Study participants were interviewed using a standardized questionnaire with information regarding socio-demographic characteristics (Family size, income, educational level, ethnicity, religion) and behavioral and related variables (condom use, number of sexual partners, drug addiction, alcohol consumption). Besides, venous blood sample was taken from each study participant. The amount of blood taken was about 3ml. The blood sample was used to determine HBV and HIV status through rapid Chromatographic Immunoassay for the qualitative detection of HIV antibodies and HBV surface antigen. The test kits used for the qualitative detection of HIV were KHB, Stat-PAK, Uni-Gold and for HBV, HBV-surface antigen was used.

Data was entered in to SPSS version 16.0 for analysis and then data cleaning was made. The data was analyzed using descriptive summary using frequencies, appropriate summary tables, and cross tabs, and relevant summarized information were made to present study results. Bivariate logistic regression analysis was performed to identify the factors associated with HBV and HIV; multivariate logistic regression analysis was used to control potential confounding factors.

Ethical consideration

This research was reviewed by ethical review committee of Mekelle University. Permission to

conduct the research was granted by the Tigray regional health bureau. Participation was voluntary, confidentiality ensured, and informed consent was secured before the start of each interview and blood draw.

RESULTS:

Demographic and Socio-Economic Conditions:

of the 348 enrolled subjects, 319 had completed information for the questionnaire and also recruited for laboratory blood tests making a response rate of 91.7%. The Majority (81.5%) of the study subjects were Tigray in ethnicity. As shown in **Table 1**, One hundred forty four (45.1%) of the respondents were from indoor, the rest 76 (23.8%), 44 (13.8%), 37 (11.6%) and 18 (5.6%) were from bars, hotels, streets and coffee houses, respectively.

The majority (57.1%) of the respondents were from urban. Two Hundred thirty one (72.6%) of our study subjects attended basic education where as the rest (25.7%) of them didn't attend basic education and 1.6% of them were able to read and write. About 167 (52.4%) of the respondents were found to have dependents.

Of these, 26 (15.6%) of them have more than two dependents. The majority (87.1%) of the respondents had no additional work. Of our study participants, majority (53.6%) of them had monthly income ranged from 65- 135USD (1201- 2500 Ethiopian Birr). Their monthly income ranged from 900 to 5500 ETB and most frequently charged amount money was 2000ETB with mean and median of 2421 and 2000, respectively (**Table 1**).

TABLE 1: DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS OF FEMALE COMMERCIAL SEX WORKERS IN MEKELLE, TIGRAY, ETHIOPIA, 2013.

Variables		Frequency (N)	Percent (%)
Ethnicity	Tigray	260	81.5
	Amhara	41	12.9
	Oromo	16	5.0
	Afar	2	0.6
Religion	Orthodox	297	93.1
	Muslim	14	4.4
	Protestant	2	0.6
	Catholic	6	1.9
Birth place	Urban	182	57.1
	Rural	137	42.9
Educational status	Yes	230	72.1
	No	89	27.9
Educational level	1-4	45	19.6
	5-8	112	48.7
	Secondary and above	73	31.7
Dependents	Yes	167	52.4
	No	152	47.6
Number of dependents	1-2	141	84.4
	>2	26	15.6
	Work place for sex work	Open door	144
Income monthly	Bar	76	23.8
	Hotel	44	13.8
	Street	37	11.6
	Coffee house	18	5.6
	<65 USD	27	8.5
	65-135 USD	171	53.6
Additional work	>135 USD	121	37.9
	Yes	41	12.9
Type of additional work	No	278	87.1
	Merchant	13	31.7
	Daily labor	13	31.7
	House servant	12	29.3
	Other	3	7.3

Characteristics of Female Commercial Sex Workers

As it is shown in **Table 2**, all the study subjects assessed were engaged in commercial sex work for an average of 3.2 ± 2.8 SD years. The average age of the respondents was 24.0 ± 5.7 SD years while

35.7% of the commercial sex workers were aged from 20-24 years.

The majority (94.0 %) of the respondents used condom consistently during sexual practice with paying partner. Two Hundred thirty four (74.6%) of the respondents had 2-4 number of clients per

day while the rest 73 (22.9%) and 8 (2.5%) had ≥ 5 persons and one person per day, respectively. Most (90.0%) of the study subjects used vagina for sexual intercourse while 7.8% of them used anal and vaginal, 0.6% oral and vaginal, and 1.6% of them used oral, anal and vaginal.

About 54 (16.9%) and 60 (18.8%) of the study participants had history of genital ulcer and STI, respectively. To this end, the participants used to charge their customers starting from less than 8 USD (150 EBR) and up to or more than 24 USD (450 ETB) per sex per person (**Table 2**).

TABLE 2: CHARACTERISTICS OF FEMALE COMMERCIAL SEX WORKERS IN MEKELLE CITY, TIGRAY, ETHIOPIA, 2013.

Variables		Frequency (N)	Percent (%)
Age category	15-19	81	25.4
	20-24	114	35.7
	25-29	64	20.1
	30-34	40	12.5
	≥ 35	20	6.3
Years in sex work (in months)	< 12 months	40	12.5
	12-24 months	137	42.9
	25-59 months	68	21.3
	60-96 months	53	16.6
	> 96 months	21	6.6
	Consistent condom use	Yes	300
No		19	6.0
Reason for inconsistent condom use	Client satisfaction	11	57.9
	To get more money	7	36.8
	Other	1	5.3
History of condom breakage	Yes	208	65.2
	No	111	34.8
Measures taken for condom breakage	Went to Health facility	37	11.6
	Washing using water	112	35.1
	Others	13	4.1
	Nothing	46	14.4
Steady partner	Yes	141	44.1
	No	178	55.8
Condom use with steady partner	Yes	80	56.7
	No	61	43.3
Frequency of using condom with steady partner	Always	5	6.2
	Sometimes	75	93.8
	Number of Clients per day	1	8
	2-4	238	74.6
	≥ 5	73	22.9
	Type of sexual practice	Vaginal	287
Anal and vaginal		25	7.8
Oral and vaginal		2	0.6
Oral, anal and vaginal		5	1.6
Charge per sex per person	< 8 USD	121	37.9
	8-16 USD	120	37.6
	16.1 -24 USD	54	16.9
	>24 USD	24	7.5
Sex during menses	Yes	52	16.3
	No	267	83.7
Sex with male who uses injectable drug	Yes	86	27.0
	No	233	73.0
Have you heard about STI	Yes	306	95.9
	No	13	4.1
History of genital ulcer	Yes	54	16.9
	No	265	83.1
History of STI	Yes	60	18.8
	No	259	81.2
Preventive measures for STI	Condom	310	97.2
	Holy water	3	0.9
	Nothing	3	0.9
	Other	3	0.9
Alcohol consumption	Yes	256	80.3
	No	63	19.7
Sexual abuse	Yes	44	13.8
	No	275	86.2
Use of injectable/oral drugs	Yes	53	16.6
	No	266	83.4
History of blood transfusion	Yes	3	0.9
	No	316	99.1
HIV Status	Positive	38	11.9
	Negative	281	88.1
HBV Status	Positive	19	6.0
	Negative	300	94.0

Prevalence and Determinants of HIV and HBV

Of the 348 enrolled subjects, 319 had undergone laboratory examination for HIV and HBV. The prevalence of HIV and HBV was 11.9% and 6% respectively. The prevalence of HIV and HBV among studied groups is shown in **Figure 1** below.

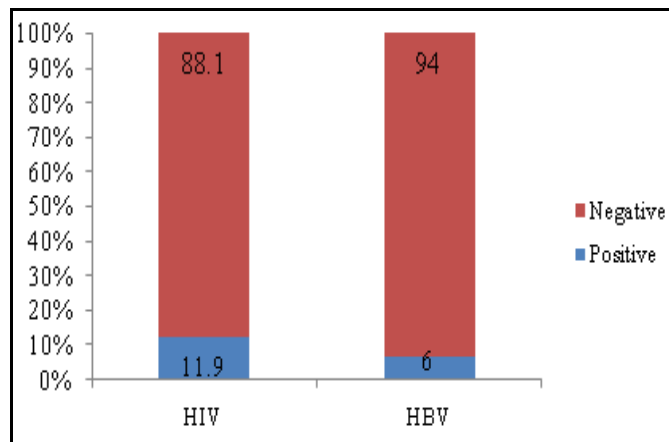


FIGURE 1: THE DISTRIBUTION OF HIV AND HBV AMONG FEMALE COMMERCIAL SEX WORKERS IN MEKELLE, TIGRAY, ETHIOPIA, 2013.

Differentials and determinants of HIV and HBV were identified by some selected variables related to socio-demographic and Female Commercial Sex Workers Characteristics. **Table 3** illustrates the various factors associated with HIV. As shown age of respondents, lack of education, educational level, birth place, having dependents, number of years in sex work, income, inconsistent condom utilization, condom breakage, having steady partner, sex during menses, history of genital ulcer, history of STI, use of preventive measures for STI, alcohol consumption and sexual abuse were

TABLE 3: FACTORS ASSOCIATED WITH HIV AMONG FEMALE COMMERCIAL SEX WORKERS IN MEKELLE, TIGRAY, ETHIOPIA, 2013.

Variables	HIV No (%)	Crude OR (95% CI)	Adjusted OR (95% CI)
Age category (in years)			
15-19	6 (7.4)	1.0	1.0
20-24	3 (2.6)	0.3 (0.1, 1.4)	0.2 (0.1, 1.1)
25-29	13 (20.3)	3.2 (1.1, 8.9)*	1.4 (0.4, 5.3)
30-34	8 (20.0)	3.1 (1.0, 9.7)	0.9 (0.2, 4.3)
≥ 35	8 (40.0)	8.3 (2.4, 28.3)*	2.2 (0.4, 11.4)
Educational status			
Yes	15 (6.5)	1.0	1.0
No	23 (25.8)	5.0 (2.5, 10.1)*	2.7 (1.0, 7.1)
Educational level			
1-4	6 (13.3)	(1.3, 95.3)*	2.2 (0.2, 27.4)
5-8	8 (7.1)	5.5 (0.7, 45.2)	0.5 (0.0, 8.4)
Secondary and above	1 (1.4)	1.0	1.0
Birth place			
Urban	13 (7.1)	1.0	1.0
Rural	25 (18.2)	2.9 (1.4, 5.9)*	0.7 (0.3, 2.0)
Dependents			
Yes	31 (18.6)	4.7 (2.0, 11.1)*	2.5 (0.8, 8.0)
No	7 (4.6)	1.0	1.0

important determinants of HIV. Prevalence of HIV was significantly increased in FCSWs aged 25- 29 and ≥ 35 years. FCSWs aged 15-19, 20-24 and 30-34 years were relatively protected from being HIV positive. The magnitude of HIV among FCSWs aged 25-29 and ≥ 35 years were 3.2 times (OR = 3.2, 95% CI: 1.1- 8.9) and 8.3 times more likely positive (OR= 8.3, 95% CI: 2.4-28.3) than FCSWs aged 15-19 years.

The prevalence of HIV among illiterate FCSWs was 5 times higher (OR= 5.0, 95% CI: 2.5-10.1); 3 times higher in those born in rural (OR= 2.9, 95% CI: 1.4-5.9); 4.7 times more in those who had dependents (OR= 4.7, 95% CI: 2.0- 11.1); 45.2 times higher in those who didn't use condom consistently (OR= 45.2, 95% CI: 13.8, 147.3); 3 times higher in those who had faced condom breakage (OR= 3.2, 95% CI: 1.3, 7.9); 4.2 times more in those who had steady partner (OR= 4.2, 95% CI: 1.9-8.9); and 6.5 times more among FCSWs who had sex during menses (OR= 6.5, 95% CI: 3.1-13.6) than their counterparts.

It was also noted that HIV was prevalent 23 times more (OR= 23.1, 95% CI: 10.3-51.7) and 22 times higher (OR=21.8, 95% CI: 9.7-49.0) in FCSWs who had history of genital ulcer and STI, respectively. Those commercial sex workers who consumed alcohol and who were abused sexually were 10.5 times (OR=10.5, 95% CI: 1.4-77.9) and 3 times more positive (OR=3.1, 95% CI: 1.4, 6.7) than those who didn't consume alcohol and not sexually abused respectively (**Table 3**).

Number of dependents/children			
1-2			
>2	22 (15.6)	1.0	1.0
	9 (34.6)	2.9 (1.1, 7.2)*	3.8 (0.6, 26.6)
Years in sex work (in months)			
< 12 months			
12-24months	1(2.5)	1.0	1.0
25-59 months	10(7.3)	3.1 (0.4, 24.7)	3.3 (0.4, 29.1)
60-96 months	7(10.3)	4.5 (0.5, 37.8)	5.1 (0.5, 48.0)
> 96 months	15(28.3)	15.4 (1.9, 122.4)*	20.6(2.2,190.9)*
	5(23.8)	12.2 (1.3, 112.7)*	13.2(1.2, 148.1)*
Additional work			
Yes	2 (4.9)	1.0	1.0
No	36 (12.9)	2.9 (0.7, 12.5)	1.3 (0.2, 7.9)
Income			
<65 USD	6 (22.2)	17.0 (3.2, 90.0)*	1.2(0.0, 30.0)
65-135 USD	30 (17.5)	12.7 (3.0, 54.1)*	3.0(0.3, 34.2)
>135 USD	2(1.7)	1.0	1.0
Consistent condom use			
Yes	23 (7.7)	1.0	1.0
No	15 (78.9)	45.2 (13.8, 147.3)*	8.3(1.0, 71.7)
History of condom breakage			
Yes	32 (15.4)	3.2 (1.3, 7.9)*	1.0 (0.3, 2.8)
No	6 (5.4)	1.0	1.0
Measures taken for condom breakage			
Went to Health facility			
Washing using water	2 (5.4)	1.0	1.0
Others	18 (16.1)	3.4 (0.7, 15.2)	3.8 (0.4, 33.5)
Nothing	2 (14.3)	2.9 (0.4, 23.0)	3.0 (0.2, 61.4)
	10 (21.7)	4.9 (1.0, 23.8)	10.3(1.0,94.1)
Steady partner			
Yes	28 (19.9)	4.2 (1.9, 8.9)*	4.6(1.9,10.9)*
No	10 (5.6)	1.0	1.0
Condom use with steady partner			
Yes			
No	13 (16.2)	1.0	1.0
	15 (24.6)	1.7 (0.7, 3.9)	2.1 (0.8, 5.8)
Type of sexual practice			
Vaginal	32 (11.1)	1.0	1.0
Anal and vaginal	4 (16.0)	1.5 (0.5, 4.7)	0.9 (0.2, 5.2)
Oral and vaginal	1 (50.0)	8.0 (0.5, 130.5)	2.5 (0.1, 45.4)
Oral, anal and vaginal	1 (20.0)	2.0 (0.2, 18.4)	0.0 (0.0, -----)
Sex during menses			
Yes	18 (34.6)	6.5 (3.1, 13.6)*	7.3(3.1, 17.2)*
No	20 (7.5)	1.0	1.0
Sex with male who uses injectable drug			
Yes	9 (10.5)	0.8 (0.4, 1.8)	0.9 (0.3, 2.2)
No	29 (12.4)	1.0	1.0
Have you heard about STI			
Yes	37 (12.1)	1.0	1.0
No	1 (7.7)	0.6 (0.1, 4.8)	0.4 (0.0, 4.0)
History of genital ulcer			
Yes	27 (50.0)	23.1 (10.3, 51.7)*	6.1(1.5, 24.0)*
No	11 (4.2)	1.0	1.0
History of STI			
Yes	28 (46.7)	21.8 (9.7, 49.0)*	5.5 (1.4, 21.8)*
No	10 (3.9)	1.0	1.0
Preventive measures for STI			
Condom	34 (11.0)	1.0	1.0
Holy water	1 (33.3)	4.1 (0.4, 46.0)	2.7 (0.2, 38.4)
Nothing	2 (66.7)	16.2 (1.4, 183.8)*	15.7 (1.0, 17.4)
Other	1 (33.3)	4.1 (0.4, 46.0)	2.5 (0.2, 34.8)
Alcohol consumption			
Yes	37 (14.5)	10.5 (1.4, 77.9)*	11.5(1.4,94.8)*
No	1 (1.6)	1.0	1.0
Sexual abuse			
Yes	11 (25.0)	3.1 (1.4, 6.7)*	2.2 (1.4,6.3) *
No	27 (9.8)	1.0	1.0
Have you used injectable/oral drugs			
Yes			
No	5 (9.4)	0.7 (0.3, 2.0)	0.8 (0.2, 2.5)
	33 (12.4)	1.0	1.0
HBV Status			
Yes	4 (21.1)	2.1 (0.7, 6.7)	2.0 (0.5, 7.9)
No	34 (11.3)	1.0	1.0

*Significant at P < 0.05

However, in the multiple logistic regressions analysis, only number of years in sex work, having steady partner, sex during menses, history of genital ulcer, history of STI, alcohol consumption

and sexual abuse remained significantly associated with HIV. In FCSWs who had sex during menses, HIV was 7.3 times higher (AOR=7.5, 95% CI: 3.1-17.2) and 4.6 times higher in those who had steady partner (AOR= 4.6, 95% CI: 1.9- 10.9). It was also 6 times (AOR= 6.1, 95% CI: 1.5-24.0) and 5.5 times higher (AOR= 5.5, 95% CI: 1.4-21.8) among FCSWs who had history of genital ulcer and STI respectively.

Similarly, the prevalence of HIV among study subjects who consumed alcohol and who were abused sexually was 11.5 times and 2 times more than the referent groups respectively (Table 3).

Type of sexual practice, number of clients per day, sex with male who used injectable drug, presence HBV, use of injectable or oral drug by FCSWs, use of condom with steady partner, charge per sex per person and measures taken for condom breakage were not associated with the presence of HIV.

On the other hand, work place for sex work, inconsistent condom utilization, is having sex with male who used injectable drug and use of injectable

or oral drug by FCSWs were significantly associated with Hepatitis B Virus (HBV). HBV was 5.1 times more in FCSWs who didn't utilize condom consistently (OR= 5.1, 95% CI: 1.5-17.1). Those FCSWs who had sex with male who used injectable drug were 5.2 times more (OR = 5.2, 95% CI: 2.0-13.8) positive than the referent groups. Likewise, commercial sex workers who used injectable or oral drugs were 5.2 times more positive (OR= 5.2, 95% CI: 2.0, 13.6) than those who did not use injectable or oral drugs. However, in multiple logistic regression analysis, only work place for sex workers retained significantly associated (Table 4).

Unexpectedly, age of respondents, both educational status and educational level, place of birth, having dependents, number of years in sex work, income, history of condom breakage, having steady partner, type of sexual practice, sex during menses, history of genital ulcer, history of STI, alcohol consumption, sexual abuse, number of clients per day and presence of HIV were not associated with HBV and requires careful interpretation.

TABLE 4: FACTORS ASSOCIATED WITH HBV AMONG FEMALE COMMERCIAL SEX WORKERS IN MEKELLE CITY, TIGRAY, ETHIOPIA, 2013.

Variables	HBV No (%)	Crude OR (95% CI)	Adjusted OR (95% CI)
Age category			
15-19	7 (8.6)	1.0	1.0
20-24	5(4.4)	0.5 (0.1, 1.6)	0.5 (0.2, 1.8)
25-29	3(4.7)	0.5 (0.1, 2.1)	0.6 (0.1, 3.4)
30-34	1 (2.5)	0.3 (0.0, 2.3)	0.2 (0.0, 2.8)
≥ 35	3 (15.0)	1.9 (0.4, 8.0)	1.4 (0.2, 10.7)
Educational status			
Yes	11 (4.8)	1.0	1.0
No	8 (9.0)	2.0 (0.8, 5.1)	3.8 (0.9, 15.4)
Educational level			
1-4	2 (4.4)	1.7 (0.2, 12.2)	1.8 (0.2, 14.3)
5-8	7 (6.2)	2.4 (0.5, 11.7)	2.7 (0.5, 14.3)
Secondary and above	2 (2.7)	1.0	1.0
Birth place			
Urban	11(6.0)	1.0	1.0
Rural	8(5.8)	1.0 (0.4, 2.5)	0.6 (0.2, 2.2)
Dependents			
Yes	8 (4.8)	0.6 (0.3, 1.6)	0.6 (0.1, 2.2)
No	11 (7.2)	1.0	1.0
Number of dependents/children			
1-2			
>2	7 (5.0)	1.0	1.0
	1 (3.8)	0.8 (0.1, 6.5)	1.0 (0.1, 9.9)
Work place for sex work			
Open door	7 (4.9)	1.0	1.0
Bar	3 (3.9)	0.8 (0.2, 3.2)	0.9 (0.2, 3.6)
Hotel	2 (4.5)	0.9 (0.2, 4.7)	1.1 (0.2, 5.8)
Street	6 (16.2)	3.8 (1.2, 12.1)*	4.4 (1.4, 14.5)*
Coffee house	1 (5.6)	1.2 (0.1, 9.9)	2.1 (0.2, 20.6)
Years in sex work (in months)			
< 12 months			
12-24months	3(7.5)	1.0	1.0
25-59 months	9(6.6)	0.9 (0.2, 3.4)	0.7 (0.2, 3.0)
60-96 months	3(4.4)	0.6 (0.1, 3.0)	0.5 (0.1, 2.5)

> 96 months	3(5.7) 1(4.8)	0.7 (0.1, 3.9) 0.6 (0.1, 6.3)	0.5 (0.1, 2.9) 0.4 (0.0, 4.8)
Additional work			
Yes	1 (2.4)	1.0	1.0
No	18 (6.5)	2.8 (0.4, 21.3)	4.1 (0.5, 34.1)
Income			
<65 USD	1 (3.7)	0.9 (0.1, 8.0)	1.3 (0.1, 12.9)
65-135 USD	13 (7.6)	2.0 (0.7, 5.5)	2.4 (0.7, 7.7)
>135 USD	5 (4.1)	1.0	1.0
Consistent condom use			
Yes	15 (5.0)	1.0	1.0
No	4 (21.1)	5.1 (1.5, 17.1)*	4.8 (0.3, 72.8)
History of condom breakage			
Yes	14 (6.7)	1.5 (0.5, 4.4)	1.4 (0.4, 4.3)
No	5 (4.5)	1.0	1.0
Measures taken for condom breakage			
Went to Health facility			
Washing using water	2 (5.4)	1.0	1.0
Others	2 (1.8)	0.3 (0.0, 2.3)	0.3 (0.0, 4.2)
Nothing	2 (14.3)	3.0 (0.4, 23.0)	2.0 (0.1, 37.4)
Steady partner	8 (17.4)	3.7 (0.7, 18.5)	4.5 (0.5, 44.5)
Yes	8 (5.7)	1.0	1.0
No	11 (6.2)	1.1 (0.4, 2.8)	1.3 (0.3, 6.3)
Condom use with steady partner			
Yes	4 (5.0)	1.0	1.0
No	4 (6.6)	1.3 (0.3, 5.6)	1.7 (0.4, 8.1)
Number of Clients per day			
1	1 (12.5)	1.0	1.0
2-4	14 (5.9)	0.4 (0.1, 3.8)	0.3 (0.0, 2.9)
≥5	4 (5.5)	0.4 (0.1, 4.2)	0.2 (0.0, 2.7)
Charge per sex per person			
< 8 USD	4 (3.3)	1.0	1.0
8-16 USD	12 (10.0)	3.3 (1.0, 10.4)	2.5 (0.4, 15.2)
16.1 -24 USD	2 (3.7)	1.1 (0.2, 6.3)	3.7 (0.4, 31.9)
>24 USD	1 (4.2)	1.3 (0.1, 11.9)	0.0 (0.0, -----)
Sex during menses			
Yes	5 (9.6)	1.9 (0.7, 5.6)	1.5 (0.5, 4.5)
No	14 (5.2)	1.0	1.0
Sex with male who uses injectable drug			
Yes			
No	12 (14.0)	5.2 (2.0, 13.8)*	5.7 (0.9, 35.9)
No	7 (3.00)	1.0	1.0
Have you heard about STI			
Yes	18 (5.9)	1.0	1.0
No	1 (7.7)	1.3 (0.2, 10.8)	1.9 (0.2, 19.3)
History of genital ulcer			
Yes	4 (7.4)	1.3 (0.4, 4.2)	1.6 (0.2, 13.2)
No	15 (5.7)	1.0	1.0
History of STI			
Yes	4 (6.7)	1.2 (0.4, 3.6)	0.8 (0.7, 5.9)
No	15 (5.8)	1.0	1.0
Alcohol consumption			
Yes	17 (6.6)	2.2 (0.5, 9.6)	2.1 (0.5, 9.4)
No	2 (3.2)	1.0	1.0
Sexual abuse			
Yes	4 (9.1)	1.7 (0.5, 5.5)	1.6 (0.5, 5.1)
No	15 (5.5)	1.0	1.0
Have you used injectable/oral drugs			
Yes	9 (17.0)	5.2 (2.0, 13.6)*	4.8 (0.9, 24.7)
No	10 (3.8)	1.0	1.0
HIV Status			
Yes	4 (10.5)	2.1 (0.7, 6.7)	2.2 (0.6, 7.9)
No	15 (5.3)	1.0	1.0

*Significant at $p < 0.05$

DISCUSSIONS: Across Ethiopia, HIV epidemic is generalized. However, urban areas and females are more affected than rural areas and males. Urban HIV prevalence was 7.7% in 2009 and this accounted for 62% of the total PLWHA in the country, while rural HIV prevalence was 0.9% in

2009, which accounted for 38% of total PLWHA population in the country. In 2011, adult HIV/AIDS prevalence in Ethiopia was estimated at 1.5 percent. Approximately 1.2 million Ethiopians were living with HIV/AIDS in 2010^{15, 16}. Globally, the prevalence of HBV infection can be divided

into high (>8%), intermediate (2-8%) and low (<2%)²⁰. Hence, as the prevalence HBV among female commercial sex workers in the study area was found to be 6%, the prevalence is labeled as an intermediate occurrence.

In this study, the overall prevalence of HIV (11.9%) and HBV (6.0%) observed were lower than the study conducted in Gondar which was 28.9% and 11.8%, respectively¹⁸. A study conducted in female commercial sex workers in Italy showed that the prevalence of HIV and HBV was 4.6% and 3.5% respectively. However, the findings of the study showed that the prevalence of HIV and HBV in the study area was three fold and two fold higher, respectively²¹. A similar study done in Nigeria revealed that an overall prevalence of HBV among female commercial sex workers was 17.1% and the FCSW were between the ages of 16 and 50 years but the highest prevalence was obtained in female sex workers above the age of 31 years which was 21%²². This is similar with our study in that the prevalence was high among similar age groups.

Another study conducted in Cameroon in the most at risk population group such as female commercial sex workers showed that the prevalence was higher than the present finding which was 36%²³. This variation could be due to differences of sociodemographic characteristics of the study populations, study settings and other related factors. A health facility based study carried out in Addis Ababa illustrated that HIV prevalence among sex workers was 73.7%¹³ and it is significantly different as compared with the present finding. This could be probably due to the reason that the awareness of the FCSW has been increased over time.

The findings of this study also showed that HIV was closely associated with age of participants, educational status, educational level, having dependents, number of dependents, birth place, number of years in sex work, income level, inconsistent condom use, history of condom breakage, having steady partner, sex during menses, history of genital ulcer, history of STI, alcohol consumption and sexual abuse ($P < 0.05$).

This study is consistent with the study conducted in Addis Ababa which revealed that past history of sexually transmitted diseases, consumption of alcohol and sexual abuse had significantly associated with an increased risk of being HIV-infected⁽¹³⁾. Moreover, the current study also showed that past history of STD had significant association with HIV positivity which was 23 times more risky (OR= 23.1, 95% CI: 10.3-51.7) than who did not have history of STD. Similarly, the prevalence of HIV among study subjects who consumed alcohol and who were abused sexually was 11.5 times and 2.2 times more than the referent groups, respectively.

Sexual intercourse during menses is associated with acquiring HIV infection in sex workers⁹. This study goes in agreement with our finding that sex during menses was 7.3 times higher (AOR=7.5, 95% CI: 3.1-17.2) among those who had sex during menses compared to their counter parts.

The major determinants of HBV were work place of sex workers, inconsistent condom use, sex with male who use injectable drugs and use of injectable/oral drug by the female commercial sex worker ($P < 0.05$). Injecting drug use had been documented as a risk factor for HBV infection in FSWs in the study with $P < 0.05$ and statistically significant and is similar with the present study²².

A study conducted in Mexican female sex workers showed that work place of sex workers was associated with being HBV positive²⁴. Similarly, our findings showed that female sex workers who worked in hotels were almost five time risky than the referent groups (AOR1.4, 14.5).

In developed countries, both viruses are transmitted more or less at the same time, and primarily in teenagers and adults. Because the two viruses share major risk factors, a number of HIV-infected individuals will either have past exposure to, or be chronic carriers of HBV especially in sub-Sahara^{7, 25}. However, the finding of the present study contradicts with this report that there was no association between HIV and HBV positivity. In line with our finding, a study conducted in Jimma showed that there was no association between

Hepatitis B Virus, and Human Immunodeficiency Virus¹⁸.

Many of the previous studies have shown that HIV is associated with history of STI, consumption of alcohol, sexual abuse and sex during menses^{9,13}. In line with this report, the current study attempted to demonstrate some of the contributing factors for acquiring HIV and HBV among FCSWs in Mekelle City.

The main factors attributed for HIV are age of participants, both educational status and educational level, having dependents, number of dependents, birth place, number of years in sex work, income level, inconsistent condom use, history of condom breakage, having steady partner, sex during menses, history of genital ulcer, history of STI, alcohol consumption and sexual abuse while the major determinants of HBV were work place of sex workers, inconsistent condom use, sex with male who use injectable drugs and use of injectable/oral drug by the female commercial sex worker.

STRENGTHS: Many different variables considered being causes or differentials of HIV and HBV were assessed and analyzed to characterize their relative contribution for acquiring the diseases.

LIMITATIONS: As the study was community based cross-sectional study with analytic component, it didn't represent variation of HIV and HBV outcomes nor established causal relationship.

CONCLUSION AND RECOMMENDATIONS: This study showed that the prevalence of HIV and HBV were moderate and require of particular concern. Age of participants, educational status and level, having dependents, number of dependents, birth place, number of years in sex work, income level, inconsistent condom use, history of condom breakage, having steady partner, sex during menses, history of genital ulcer, history of STI, alcohol consumption and sexual abuse were among the factors associated with HIV while the major determinants of HBV were work place of sex workers, inconsistent condom use, sex with male who use injectable drugs and use of injectable/oral

drug by the female commercial sex worker. Therefore, to reduce the prevalence of HIV and HBV among FCSWs provision of condom, early treatment of STI, educating FCSWs on the importance of consistent condom utilization and not to have sex during menses needs serious attention.

ACKNOWLEDGMENTS: We would like to acknowledge the study participants and the staffs of Mekelle University's STI confidential clinic. The study was funded by Mekelle University.

REFERENCES:

1. World Health Organization (WHO): Regional Office for Eastern Mediterranean. Regional strategy for the prevention and control of sexually transmitted infections 2009–2015. Fifty fifth session, Agenda item 6 (C), August 2008.
2. Kelsi K, Adrienne T, Mohamed O, et al: HIV prevalence and characteristics of sex work among female sex workers in Hargeisa, Somaliland, Somalia. *AIDS* 2010;24.
3. Vickerman P, Watts C, Peeling W, Mabey D and Alary M: Modelling the cost effectiveness of rapid point of care diagnostic tests for the control of HIV and other sexually transmitted infections among female sex workers. *Sex Transm Infect* 2006;82:403–412.
4. Thuong V, Nguyen M, et al: Sexually Transmitted Infections and Risk Factors for Gonorrhoea and Chlamydia in Female Sex Workers in Soc Trang, Vietnam. *Sex Transm Dis* 2008; 35(11): 935–940.
5. Das A, Prabhakar P, Narayanan P, et al. Prevalence and Assessment of Clinical Management of Sexually Transmitted Infections among Female Sex Workers in Two Cities of India: *Infectious Diseases in Obstetrics and Gynecology* 2011.
6. World Health Organization (WHO): Regional Office for Eastern Mediterranean. Regional Committee for the Eastern Mediterranean: Regional strategy for the prevention and control of sexually transmitted infections 2011–2015. Fifty seventh session, Agenda item 4(C), August 2010.
7. Franco E, Bagnato B, Marino MG, et al: Hepatitis B: Epidemiology and prevention in developing countries. *World Journal of Hepatology* 2012; 4(3):74-80.
8. World Health Organization (WHO): *World Health Statistics* 2013.
9. Scorgie F, Chersich FM and Ntaganira I: Socio-Demographic Characteristics and Behavioral Risk Factors of Female Sex Workers in Sub-Saharan Africa: A Systematic Review. *AIDS Behav.* 2012; 16(4):920-33.
10. Bea V and Smarajit J: *Reducing HIV Risk in Sex Workers, Their Clients and Partners*, 2009.
11. Remple VP, Patrick DM, Johnston C, et.al: Clients of Indoor Commercial Sex Workers Heterogeneity in Patronage Patterns and Implications for HIV and STI Propagation through Sexual Networks Sexually Transmitted Diseases. *Sex Transm Dis.* 2007; 34(10):754-60.
12. Seidlin U: European Study Group on Heterosexual Transmission of HIV, comparison of female to male and

- male to female transmission of HIV in 563 stable couples, 2004.
13. Atalay A, Derege K, et al: Unprotected sex, sexually transmitted infections and problem drinking among female sex workers in Ethiopia. *Ethiop. J. Health Dev* 2006; 20(2): 93-98.
 14. World Health Organization (WHO): Preventing HIV among sex workers in sub-Saharan Africa. A literature review, 2011.
 15. World Health Organization (WHO): Sexually transmitted infections fact sheet number110, 2007. http://www.who.int/topics/sexually_transmitted_infections/en/. Accessed April 15, 2013.
 16. Federal HIV/AIDS Prevention and Control Office: Country Progress Report on HIV/AIDS Response, 2012.
 17. Federal HIV/AIDS Prevention and Control Office: Federal Ministry of Health Addis Ababa, Ethiopia, 2010.
 18. Feleke M, Yenew K, A fework K, et al: Sero prevalence of HIV, Hepatitis B infections and Syphilis among street dwellers in Gondar city, Northwest Ethiopia. *Ethiop.J.HealthDev*2006; 20(3).
 19. Tigray National Regional State: Mekelle Municipality consultancy service for preparation of transportation plan and implementation strategies for Mekelle City and MCI social sector working paper series. Health needs assessment for Mekelle City, Ethiopia, 2012.
 20. World Health Organization (WHO): Department of Communicable Diseases Surveillance and Response. WHO/CDS/CSR/LYO 2002. Hepatitis B. Available at <http://www.who.int/emc>.
 21. Zermiani M, Mengoli C and Rimondo C: Prevalence of Sexually Transmitted Diseases and Hepatitis C in a Survey of Female Sex Workers in the North-East of Italy. *The Open AIDS Journal*2012; 6:60-64
 22. Forbi JC and Onyemauwa N: High Prevalence of Hepatitis B Virus among Female Sex Workers in Nigeria. *Rev. Inst. Med. trop. S. Paulo* 2008; 50(4):219-221.
 23. President's Emergency Plan for AIDS Relief (PEPFAR).Cameroon Operational plan report: 2011.
 24. Juarez L and Uribe-Salas F: Low prevalence of hepatitis B markers among Mexican female sex workers. *Sex Transm Infect.* 1998; 74(6): 448-450.
 25. Yami A, Alemseged F and Hassen A: Hepatitis B and C viruses Infections and Their association with Human Immunodeficiency Virus: A cross-sectional study among blood donors in Ethiopia. *Ethiop J Health Sci.* 2011; 21(1): 67-75.

How to cite this article:

Bugssa G, Dessalegn B, Dimtsu B and Berhane Y: Prevalence and Factors Associated with HIV and Hepatitis B Virus Infections among Female Commercial Sex Workers in Mekelle, Ethiopia: Cross sectional Study. *Int J Pharm Sci Res* 2015; 6(1): 135-46.doi: 10.13040/IJPSR.0975-8232.6 (1).135-46.

All © 2013 are reserved by International Journal of Pharmaceutical Sciences and Research. This Journal licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.

This article can be downloaded to **ANDROID OS** based mobile. Scan QR Code using Code/Bar Scanner from your mobile. (Scanners are available on Google Playstore)