

## Research Article

### Depression and Its Relation with HIV Risk and Social Well-Being among the Brothel-Based Female Sex Workers in Kolkata, India

Smarajit Jana<sup>1\*</sup>, Protim Ray<sup>1</sup>, Soma Roy<sup>1</sup>, Joel Piduttia<sup>2</sup>,  
Toorjo Ghose<sup>3</sup> and Samaita Jana<sup>4</sup>

<sup>1</sup>Durbar Mahila Samanwaya Committee, Sonagachi Research & Training Institute, Kolkata, West Bengal, India

<sup>2</sup>Dalla Lana School of Public Health, University of Toronto, Ontario, Canada

<sup>3</sup>University of Pennsylvania, School of Social Policy and Practice, USA

<sup>4</sup>Usha Multipurpose Cooperative Society Ltd, Kolkata, West Bengal, India

#### Abstract

The overall objective of the research study, called DRISHTI, is to assess the effectiveness of the use of community based caregivers to address mental health related problems among the sex workers. As designed the first phase of the study looked into the prevalence of depression among the FSWs, and to find out any association between socio demographic and sex related factors with depression. The other objective of the study is to find out the relative contribution of depression in inducing unsafe sex practices among the FSWs. The research findings has shown high rate of depression (38.3%) in varying degrees (mild, moderate and severe) among the participants (total 400). No socio-demographic factors found to be associated with depression. Whereas sex workers who are depressed are less likely to use condoms, having high prevalence of STIs and poor treatment seeking behaviour in comparison to those are not depressed. Study findings also suggest that depressed FSWs are not putting importance to good financial planning for future and more likely to engage in conflicts with other community members.

**Keywords:** Condom use; Depression; HIV; Social well-being

#### Introduction

Mental health is increasingly being recognized as a major global contributor to poor health and well-being. The burden of illness resulting from psychiatric and behavioral disorders is enormous in nature. Yet it remains grossly under-presented in public health discourse.

**\*Corresponding author:** Smarajit Jana, Durbar Mahila Samanwaya Committee, Sonagachi Research & Training Institute, Kolkata, West Bengal, India, Tel: +91 9831835001; E-mail: smarajitjana@gmail.com

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It is estimated that sufferings from psychiatric disorders accounted for 5 of the 10 leading causes of disability as measured by years lived with disability [1].

The overall DALYs (Disability Adjusted Life years) burden for neuropsychiatric disorders are projected to increase by 15% more by the year 2020 [2,3]. In the recent past the significance of mental health and its social impact has drawn greater attention at UN Policy making bodies. The agenda for Sustainable Development Goal [SDG] has included mental health and substance use as an important development issue for which specific indicators have been identified under health and well-being Goal 3 of SDG [4]. In India, the respective ministry has developed national policy of mental health, and is committed to implement a national level program to integrate mental health with the primary health care services, the largest such effort in a developing country [5]. It is estimated that 1% to 2% (around 10 to 20 million) of the Indian population is suffering from major mental disorders, and around 5% (50 million) of Indian citizen suffer from minor mental health disorders [6].

Poor mental health plays a significant role in influencing high-risk behavior among individuals [7]. Studies suggest that depressed individuals can be more prone to engage in unprotected sex, substance abuse and other unsafe behavior [8]. Being in the sex work women do suffer from occupational hazards which includes varied kinds of stress and injuries including sexually transmitted infections. It is more so important as FSWs are considered as an important high-risk group in HIV transmission dynamics [9,10].

FSWs have been found to be at higher risk for mental health disorders, including depression. Consequently, FSWs suffering from mental health disorders might be at an increased risk of engaging in unsafe behavior such as unprotected sex [11] or substance use. They show little interest and less aspiration in planning future-oriented activities such as financial planning [12]. Importantly, FSWs may thus be at higher risk in acquiring HIV infection as well as would face higher degree of challenges in accessing care or support services due to their stigmatized and marginalized status. Moreover, FSWs are the commonest victim of violence, abuse and social discriminatory practices. All these underlying factors act as barrier in accessing treatment and other support services [13]. Therefore depression may have a far-fetched implication in sex workers life and could adversely affect the well-being of FSWs [14]. Studies in the USA have identified high level of mental illnesses such as depression among sex workers [15]. Scholars have noted that depression is significantly associated with the high risk of becoming HIV infected [16,17].

Sex workers in India are especially at higher risk of suffering from depression due to the constellation of cultural challenges that they face [18]. The situation is exacerbated by the stigma attached to mental health including social isolation which is often confronted by individuals suffering from depression [19-21]. However, there is very little scholarship on depression with specific focus to sex workers in India, and its association with the elevated levels of HIV risk. Moreover, there is no specific strategy and intent to initiate mental health interventions targeting sex workers to address depression including its

association with HIV risk taking behavior. Given the high prevalence of HIV-related risk behavior among those with depression, and the fact that sex work is one of the primary engine driving the spread of HIV in India, the dearth of mental health interventions for sex workers can severely undermine outcome of HIV initiative in the country. The present research seeks to address these gaps by designing and testing DRISHTI; 'Depression reduction Implemented by Sex workers to stop HIV Transmission Intervention' (DRISHTI, or "vision" in Bengali) aimed at managing depression to improve attitude, motivation and self efficacy with major focus to sexual practices. DRISTI has evolved a strategy to engage trained community members who could be playing an important role as mental health counselor to handle cases of depression. The community counselor would be inducted in the subsequent phases of the ongoing study.

Scholars have noted that individuals with mental illness are at greater risk of HIV infection [22]. Studies have observed high rates of infection among those newly admitted to inpatient psychiatric facilities [23]. Psychiatric patients tend to be less well informed about STIs [24], poorly motivated to adopt risk reduction strategies [25,26], and lacking the interpersonal and social skill needed to negotiate safer sex [27]. Kalichman and Weinhardt [28] noted that the negative impact of depression on HIV risk behavior has largely been ignored. A meta-analysis on the modifying effects of depression on HIV interventions found that individuals are less likely to engage in HIV risk taking behavior if they are not depressed [29]. Few studies have examined the influence of depression on HIV risk in India. HIV prevalence is observed to range between 2% to 3% among people with depression, compared to 0.7% prevalence in the general population in India [30]. Sahay et al., [31] found that Indians who are engaged in high-risk behavior are almost 3 times more likely to be depressed and anxious. Similarly, scholars have found that stigma, violence, conflict with clients and poverty significantly compromise mental health among sex workers in Hong Kong [32], Great Britain [33], China [34] and Canada [35]. A recent study in India observed that almost 35% of a sample of sex workers reported suicidal ideation, and 19% of them attempted suicide at least in one occasion in the past [36].

This formative research has been undertaken in the first phase of this study to find out the relative contribution of depression behind unsafe sex practices among sex workers. The research is duly implemented by Durbar Mahila Samanwaya Committee (DMSC) with the support of the ICMR (Indian Council of Medical Research) and the National Institute of Health (NIH), based on an objective to make an assessment of depression among FSWs and its potential impact in the Sonagachi red light district in Kolkata, India as a part of Indo-USA collaboration. Unfortunately, mental health care is often inaccessible for approximately one third of the population living below the poverty line as well as those who are otherwise socially marginalized [36]. The overall objective of the study (DRISHTI) is to test a strategy to deal with mental health related issues through involving community members as the caregivers. For the ongoing study field workers who have been selected from among the community members would be retained and trained further to play their role as caregivers. As planned the second phase of the study would throw light on how to develop a viable model to handle mental illnesses in resource poor settings, with special focus to sex workers' community.

## Materials and Methods

### Setting

Durbar Mahila Samanwaya Committee (DMSC) is a collective of sex workers based in West Bengal, India, which represents the voices

of 60,000 sex workers (female, male and transgender). DMSC demands decriminalization of adult sex work in all its aspects and social recognition of sex work as a service sector occupation. DMSC promote sex workers' rights to self-determination and also seeks to abolish or reform laws and policies that restrict human rights of sex workers and limit their enfranchisement as full citizen.

DMSC is directly involved in improving the quality of life of around three hundred thousand sex workers including their family members across the state of West Bengal who are otherwise socially, economically and politically marginalized and ostracized. The said sex workers collective deliver a comprehensive package of services which includes health, education, financial security in addition to steering Anti trafficking program of their own. Under health interventions; services delivered by DMSC includes primarily health care, sexual health in addition to reproductive health care services. The said sex workers collective also support career building opportunities as well as creating space for cultural expression for sex workers and their children [37]. Side by side the sex workers collective has undertaken operation and intervention research to comprehend issues and challenges with an objective to improve quality of health and other development program. However DMSC is yet to initiate any intervention program centering Mental Health among the sex workers. Before initiating such intervention it was a felt necessity to assess quantum of burden and to assess the state of mental health among the sex workers community. In line with the objective, the largest red light district namely Sonagachi having more than 10,000 sex workers, based in city Kolkata, the capital of the state of West-Bengal was chosen to conduct this study.

### Sampling

All sex workers in Sonagachi who visit community-embedded health clinics run by DMSC are registered and documented. The 'master register', of the clinic keeps records of female sex workers who reside in Sonagachi, and availed services from the centre since 2001 till 2013 was taken as the universe.

In Sonagachi, most of the buildings are multi-storied in nature; by and large each building accommodates several brothels. The number of rooms in each building varies from 5 to 25. Usually one sex worker occupies one room, but exceptions are there where one room is shared by two or more sex worker. There are three categories of sex workers as per the contractual agreement with land lord or with the Madams

1. Self-employed, who pays their rent directly to the landlord or land ladies and work according to their wishes
2. Adhiya System, under these system sex workers who work under a Malkin (Madam) and share half of their income with her
3. Third category of sex workers work are those who on contractual basis where she pays a fixed sum of money to madam based on number of client served

### Research ethics approval

The study was cleared by the Durbar Research Ethics Review Board-an independent ethics committee followed by the ICMR

### Preparation of the field

Multiple community meetings were held in the red light district to introduce FSWs regarding the objective of the study. Meetings were held with the members of the sub-committees of DMSC, who are in close contact with the members of the brothel.

## Selection criteria

Sex-workers aged 18 years and above were recruited for the research. Minor and who are unable to communicate verbally were excluded from the study

Sample Frame: 10,100 (from the Register)

Expected prevalence rate of HIV was taken as 12.5%, based on which Sample Size was calculated as 400 [taking into the Confidence level=99.99% and Confidence interval= $\pm 6.30$ ]

Sample size was adjusted upward to allow for non-response and other factors. Incorporating 5% for possible non-participation and 5% for non-respondent the adjusted sample size turns out to be 440.

Ref.: Epi info package

## Data collection tools

A questionnaire was developed in consultation with the community members. The questionnaire was then translated into Bengali and pre-tested on a sample of sex worker to uncover any lack of consistency, incongruity, incompleteness, or ambiguities in the set of questions. The English translation of the questionnaire was retranslated into Bengali to find out any differences between the two translations followed by necessary modification was done to finalize the questionnaire. The final quantitative questionnaire thus developed consists of two sections. The first section deals with socio demographic profile of sex workers, family structure of sex workers including their dependants etc. in addition to that few questions were framed to understand structure and functioning of sex trade related issues. The research tool also includes questions to collect information on sexual practices, use of condom, STI related symptoms and others. There are altogether 39 questions in the first section.

The second section of the tool was meant to assess depression using the Inventory of Depressive Symptomatology-Self Report (IDS-SR) [38,39]. The IDS is a validated structured self-inventory that is used by trained professionals but lay interviewers are capable of assessing mental disorder according to the definition and criteria of the Diagnostic and Statistical Manual of Mental Disorders 4<sup>th</sup> edition (DSM-IV) [40]. The IDS-SR contains 28 questions rated on a scale of 0-3, with a maximum total of 84 ( $28 \times 3 = 84$ ). A score less than or equal to 13 signifies no depression, score ranging in between 14-25 denotes mild depression, score ranging in between 26-38 qualify moderate depression, and score in the range of 39-48 signify severe depression, and more than or equal to score 49 denotes very severe depression. We used the tool based on DSM-IV for the reason that the same tool has been tried and tested in community settings both in India and in Mexico.

## Ethical issues

For the interviews, respondents were asked to give verbal consent followed by they are asked to put their signature in the consent form, (written in Bengali - mother tongue of the participants) after being read the form aloud which describe objectives, risks and benefits to the participants. Followed by interview was taken maintaining full confidentiality of the participants.

## Data collection methods

Trained research staff conducted face to face interview with the respondents to complete the survey. Interviews were conducted either in a health clinic or in the FSW's residence. Out of the 442 individuals selected, 20 refused to join, 15 of them could not respond to the full

set of questionnaire and 7 migrated out of the area. Participant's response was recorded in hard copies by the interviewers. All collected information was entered in the software. All hard copies were subsequently destroyed after carrying out all necessary analysis and finalization of the report. Data was entered in the software by the data entry operator under the strict supervision of the project manager. All interview notes and data collection instruments were kept under lock and key and all requisite measure was taken to maintain confidentiality of the participants.

Participants detected to have severe or very severe depression (according to the IDS-SR) were offered and provided with treatment with the help of consultant psychiatrist.

## Analysis

Quantitative analysis was conducted using chi-square tests of independence. An alpha level of 0.05 was used to determine significance. Participants having depression as derived from the IDS-SR was put in cross tables against parameters obtained from different socio-demographic and risk behavior to find out any association between depression and sexual risk behavior, STIs, health-seeking behavior, substance abuse, financial savings, and individuals having disputes with others. Proportions of participants engaging in specific risk behavior were calculated and graphed against the degree of depression to see any association between them.

## Results

### Depression rates

Among participants, 62% did not show any depression according to the IDS-SR scale. Amongst the remaining 38% showed depression, out of which 11% had mild, 15.3% moderate, 8% severe, and 4% had very severe depression.

### Sample characteristics and associations with depression

All study participants were biological females engaged in sex work and practicing in the Sonagachi red-light district.

**Age:** The majority (76%) of participants belong to the age group of 19 and 34 years. Of these, 20% are in the age group of 19-24 years, 35% are in 25-29 years, and 21% are in the age group of 30-34 years. The remaining 24% belong to 35 years and older. Refer to table 1, 2 and 3.

**Education level:** Approximately 40% of participants are illiterate, 25% of them have some literacy (categorized by those who can write her name or ever attended school), and 25% of them found to have completed primary school. The remaining 10% of them reported that they have completed Middle School (Madhyamik) or above. Refer to tables 1, 4 and 5.

**Number of children:** Amongst participants, 18% have no children. Out of the 82% those who have children, 71% of sex workers found to have in between 1-2 children and the remaining 11% of participants is having 3+ children. Refer to tables 1, 2 and 3.

**Years in sex profession:** Participants working in the sex trade are fairly evenly dispersed amongst the FSWs, ranging between <1 year to >10 years.

Using Chi-square analysis, no significant association was found to exist between depression and age ( $p=0.09$ ), with the level of education ( $p=0.83$ ), number of children ( $p=0.99$ ), or years practicing in the sex trade ( $p=0.12$ ). Refer to tables 1, 2 and 3.

Factor	No. (n=400)	Percent (%)	X <sup>2</sup>	P-value
Age				
19-24	80	20	8.1685	p=0.09
25-29	140	35		
30-34	84	21		
35-39	63	15.8		
40 and above	33	8.3		
Education Level among sex workers				
Illiterate (Cannot read or write)	155	38.8	2.169	p=0.83
Just literate (Can sign but cannot read)	106	26.5		
Primary	99	24.8		
Madhyamik	34	8.5		
H.S.	4	1		
Graduate	2	0.5		
Sex workers having number of children				
0	72	18	0.012	p=0.99
1	166	41.5		
2	119	29.8		
3	34	8.5		
4	9	2.3		
Time in sex work (years)				
<1	62	15.5	7.423	p=0.12
2-Jan	116	29		
4-Mar	56	14		
9-May	84	21		
10 & above	82	20.5		

**Table 1:** Depression among different age groups.

**Note:** \* denotes significant association

Group Statistics					
	Depression	N	Mean	Std. Deviation	Std. Error Mean
Age	Present	109	28.9	6.208	0.595
	Absent	291	29.99	6.35	0.372
Duration in profession in years	Present	109	56.7	65.458	6.27
	Absent	291	64.92	68.463	4.013
Total number of child	Present	109	1.53	1.041	0.1
	Absent	291	1.29	0.902	0.053

**Table 2:** T-Test among different age groups, duration in profession and number of children.

		Levene's Test for Equality of Variances		T-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Age	Equal variances assumed	0.05	0.83	-1.54	398	0.124	-1.094	0.709	-2.488	0.299
	Equal variances not assumed			-1.56	197.93	0.12	-1.094	0.702	-2.477	0.289
Duration in profession in years	Equal variances assumed	1.14	0.29	-1.08	398	0.28	-8.227	7.598	-23.17	6.71
	Equal variances not assumed			-1.11	202.01	0.27	-8.227	7.444	-22.91	6.451
Total number of child	Equal variances assumed	7.03	0.01	2.302	398	0.022	0.243	0.106	0.036	0.451
	Equal variances not assumed			2.157	172.1	0.032	0.243	0.113	0.021	0.466

**Table 3:** Independent Samples Test among different age groups, duration in profession and number of children.



		Count						
		Educational status						Total
		Illiterate	Just literate	Primary	Madhyamik	H.S.	Graduate	
Depression	Absent	112	77	73	24	4	1	291
	Present	43	29	26	10	0	1	109
Total		155	106	99	34	4	2	400

**Table 4:** Crosstab of depression vs educational status.

	Value	df	Asymptotic significance (2-sided)
Pearson chi-square	2.169 <sup>a</sup>	5	0.825
Likelihood ratio	3.156	5	0.676
No. of valid cases	400		

**Table 5:** Chi-Square tests of depression vs educational status.

a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is 0.55

## Risk behaviors

**Type of sexual intercourse:** All FSWs reported that they have participated in peno-vaginal intercourse whereas only 3.5% said that they have participated in peno-anal intercourse in addition to peno-vaginal at some points of time since they have been engaged in the sex work. As all FSWs engaged in peno-vaginal intercourse, no association with depression could be ascertained. There is no differences in depression rate between FSWs who engaged in peno-anal intercourse and those who do not ( $p=0.18$ ). Refer to tables 6, 7 and 8.

Risk Behavioural Factors	Depression			
	Yes (%)	No (%)	X <sup>2</sup>	P-value
Peno-vaginal intercourse	100	0	N/A	N/A
Peno-anal intercourse	3.5	96.5	1.783	0.18
Refusing clients if they do not want condom	96	4	19.169	<0.01*
100% condom use previous day	91.8	8.2	96.023	<0.01*
Substance use (self-reported addiction)	65.5	34.5	5.148	0.02*
No. Clients Seen Previous Day	Frequency	Percentage	X <sup>2</sup>	P-value
0-1 clients	29	7.3	5.696	0.22
2-3 clients	145	36.3		
4-5 client	126	31.5		
6-9 clients	97	24.2		
10+ clients	3	0.8		
Depression and STI Rates and Health Seeking Behaviours	Yes (%)	No (%)	X <sup>2</sup>	P-value
Suffering from STI within previous year	34	66	157.502	< 0.01*
If yes, sought treatment for STI	75.7	24.2	22.271	< 0.01*
Depression and Social Well-being	Yes (%)	No (%)	X <sup>2</sup>	P-value
Financial savings	72.2	27.8	27.088	< 0.01*
Dispute with others in previous month	46.8	53.2	89.54	< 0.01*

**Table 6:** Type of sexual intercourse and rate of depression.

**Note:** All percentages calculated out of entire sample (400), unless otherwise specified.

\* indicates a significant p-value

		Count		
		History of anal sex		Total
		No	Yes	
Depression	Absent	283	8	291
	Present	103	6	109
Total		386	14	400

**Table 7:** Crosstab of depression vs history of anal sex.

	Value	df	Asymptotic Significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	1.783 <sup>a</sup>	1	0.182		
Continuity correction <sup>b</sup>	1.06	1	0.303		
Likelihood ratio	1.633	1	0.201		
Fisher's exact test				0.221	0.151
Linear-by-linear association	1.778	1	0.182		
No. of valid cases	400				

**Table 8:** Chi-Square tests of depression vs history of anal sex.

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.82

b. Computed only for a 2×2 table

**Condom use and negotiation:** 92% of FSWs reported that they have used condom during all sexual encounters with the clients in the previous day whereas 8% of them reported that they have not used condom in all sex encounter. Similarly, refusal of clients who cannot be convinced to use a condom was self-reported by 96% of FSWs

		Count		
		What usually you do if any client do not agree to use condom		Total
		Attend the Client without Condom	Refuse the Client	
Depression	Absent	4	287	291
	Present	12	97	109
Total		16	400	

**Table 9:** Crosstab of depression vs what usually the sex worker do if any client do not agree to use condom.

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	19.169 <sup>a</sup>	1	0		
Continuity correction <sup>b</sup>	16.742	1	0		
Likelihood ratio	16.532	1	0		
Fisher's exact test				0	0
Linear-by-linear association	19.121	1	0		
No. of valid cases	400				

**Table 10:** Chi-Square tests of depression vs what usually the sex worker do if any client do not agree to use condom.

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.36  
b. Computed only for a 2x2 table

sampled. Thus only 4% of FSWs appears to have willingly accepted clients without using condom. Refer to tables 6, 9 and 10.

Through Chi-Squared analysis, significant association was established between 100% condom use (the previous day) with depression ( $p < 0.01$ ). Refer to tables 6, 11 and 12. The depressed FSWs are less likely to use condoms in 100% of sexual encounters. Similarly, there is a significant association between refusal of clients and depression ( $p < 0.01$ ). As seen in figure 1, depressed FSWs are more likely to accept clients without using a condom than non-depressed FSWs.

Count				
		Condom usage during every sexual encounter on previous day		Total
		No	Yes	
Depression	Absent	0	291	291
	Present	33	76	109
Total		33	367	400

**Table 11:** Crosstab of depression vs condom usage during every sexual encounter on the previous day.

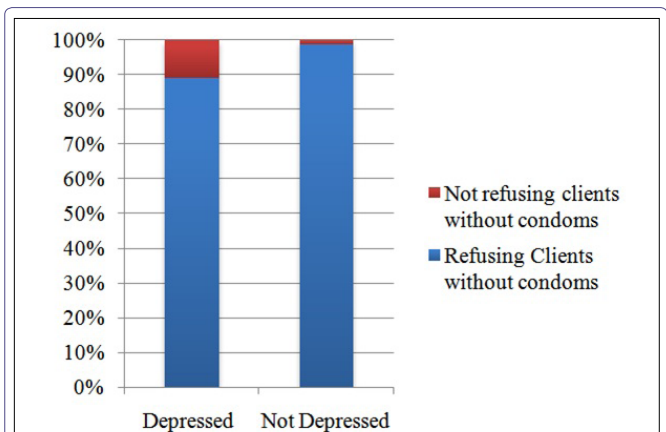
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	96.023 <sup>a</sup>	1	0		
Continuity correction <sup>b</sup>	92.065	1	0		
Likelihood ratio	94.194	1	0		
Fisher's exact test				0	0
Linear-by-linear association	95.783	1	0		
No. of valid cases	400				

**Table 12:** Chi-Square tests of depression vs condom usage during every sexual encounter on the previous day.

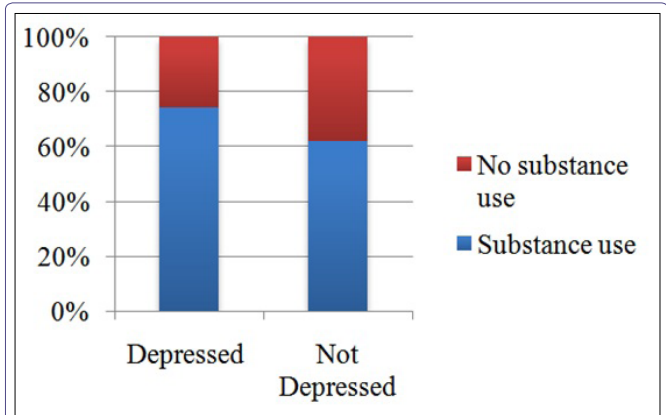
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.99  
b. Computed only for a 2x2 table

**Substance use:** As shown in table 6 65% of the participants self-reported substance use. Table 13 and figure 2 shows, 60% of FSWs regularly use alcohol, 25% of them use tobacco products as part of their habit, and only 0.3% use opiates.

**Number of clients served per day:** Approximately 36.3% of FSWs entertained 2-3 clients per day, 31.5% provided sexual services to



**Figure 1:** Percentages of refusal of clients without condoms for depressed vs non-depressed FSWs.



**Figure 2:** Percentages of substance use for depressed vs non-depressed FSWs.

Substances	No. (n=400)	Percent (%)
Do not use	138	34.5
Substance use	262	65.5
Alcohol	240	60
Tobacco	99	24.8
Opiates	1	0.3

**Table 13:** Substance use rates amongst FSWs with or without depression.

4-5 clients per day, and 24.25% of sex workers received 6-9 clients per day. Only 7.3% received 0-1 clients per day and only 1% of sex workers served 10 or more clients per day. Statistical analysis showed no significant association between depression and the numbers of clients served by a FSW per day (Refer to tables 6, 14 and 15).

Group Statistics					
	Depression	N	Mean	Std. Deviation	Std. Error Mean
No. of client attended on the previous working day	Present	109	4.01	1.984	0.19
	Absent	291	4.15	2.164	0.127

**Table 14:** T-Test among sex workers attending to number of clients.

## Incidents of STI and health seeking behavior

Within the previous year, 34% of participants experienced STIs. Amongst these (n=136/400), ~75% of them sought treatment from

		Levene's Test for Equality of Variances		T-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-Tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
No. of client attended on the previous working day	Equal variances assumed	2.607	0.11	-0.61	398	0.541	-0.145	0.238	-0.613	0.322
	Equal variances not assumed			-0.64	210.19	0.525	-0.145	0.228	-0.596	0.305

**Table 15:** Independent samples test among sex workers attending number of clients.

a health clinic or hospital. Chi-square analysis showed a significant association between having an STI and depression ( $p < 0.01$ ). It showed that those who are depressed are more likely to have an STI than non-depressed one. Refer to tables 6, 16 & 17. Moreover, there is significant association between depression and seeking STI treatment amongst those who suffered from an STI since the previous year ( $p < 0.001$ ). Depressed FSWs with an STI are less likely to seek medical treatment, whereas FSW who are not depressed but has suffered from an STI found to seek treatment more in comparison to depressed ones. Refer to tables 6, 18 & 19 and figures 3 & 4.

Count				
		Sex worker suffering from any STI during the previous year		Total
		Yes	No	
Depression	Absent	46	245	291
	Present	90	19	109
Total		136	264	400

**Table 16:** Crosstab of depression vs the sex worker suffering from any STI during the previous year.

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	157.502 <sup>a</sup>	1	0		
Continuity correction <sup>b</sup>	154.541	1	0		
Likelihood ratio	157.946	1	0		
Fisher's exact test				0	0
Linear-by-linear association	157.108	1	0		
No. of valid cases	400				

**Table 17:** Chi-Square tests of depression vs the sex worker suffering from any STI during the previous year.

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 37.06

b. Computed only for a 2x2 table

Count				
		The sex worker taking any treatment		Total
		Yes	No	
Depression	Absent	46	0	46
	Present	57	33	90
Total		103	33	136

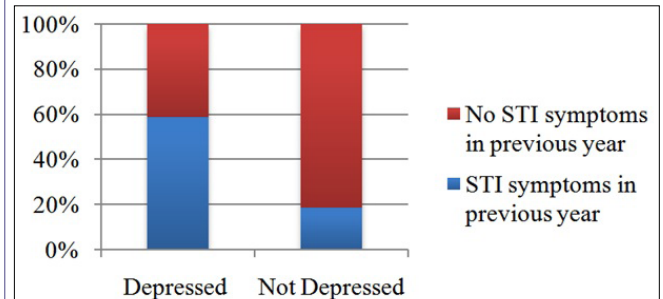
**Table 18:** Crosstab of depression vs the sex worker taking any treatment.

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	22.271 <sup>a</sup>	1	0		
Continuity correction <sup>b</sup>	20.32	1	0		
Likelihood ratio	32.43	1	0		
Fisher's exact test				0	0
No. of valid cases	136				

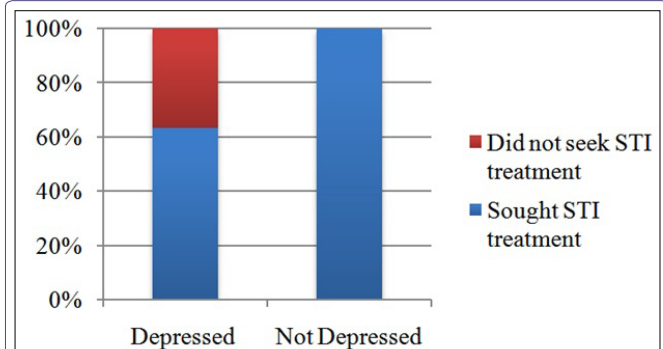
**Table 19:** Chi-Square tests of depression vs the sex worker taking any treatment.

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.16

b. Computed only for a 2x2 table



**Figure 3:** Percentages of STI symptoms within the past year for depressed vs non-depressed FSWs.



**Figure 4:** Percentages of seeking STI treatment for depressed vs non-depressed FSWs who suffered STI symptoms during the past year.

## Social well-being

**Financial saving behavior:** Among FSWs surveyed, 72% has undertaken some form of financial savings, including being part of sex workers' collective run cooperative, or savings through bank deposits, or purchasing land or property. In contrast, 28% of them do not have

any form of financial savings for the future. Chi-square analysis revealed a significant association between depression and financial savings behavior ( $p < 0.01$ ). A greater proportion of depressed FSWs do not have any savings plan as compared to non-depressed FSWs. In fact, nearly all non-depressed FSWs do have some form of savings for future. Refer to tables 6, 20 & 21 and figure 5.

Count				
Depression		The sex worker having any savings		Total
		Yes	No	
		Absent	Present	
	Absent	231	60	291
	Present	58	51	109
Total		289	111	400

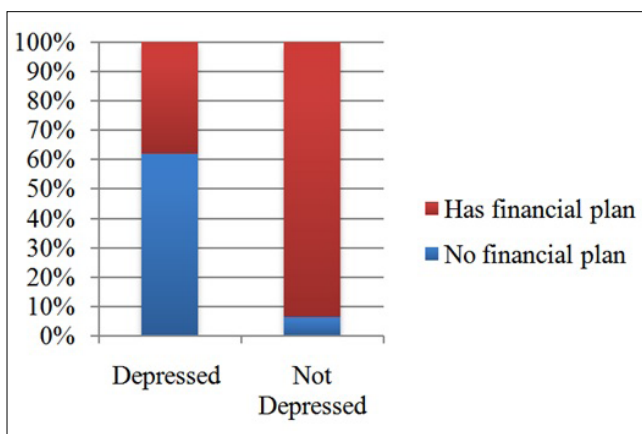
**Table 20:** Crosstab of depression vs the sex worker having any savings.

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	27.088 <sup>a</sup>	1	0		
Continuity correction <sup>b</sup>	25.799	1	0		
Likelihood ratio	25.649	1	0		
Fisher's exact test				0	0
Linear-by-linear association	27.021	1	0		
No. of valid cases	400				

**Table 21:** Chi-Square tests of depression vs the sex worker having any savings.

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 30.25

b. Computed only for a 2×2 table



**Figure 5:** Percentages of FSWs having savings plans amongst depressed vs non-depressed FSWs.

**Disputes with others:** 47% of FSWs shared that they have involved in one or other kind of dispute with others living in the red-light areas in the previous month, while 53% of them reported not having any dispute with others during previous month. A significant association was found to exist between depression and having disputes with others ( $p < 0.01$ ). A greater proportion of depressed FSWs are more likely to involve in one or other kind of disputes compared to non-depressed FSWs. Refer to tables 6, 22 & 23 and figure 6.

Count				
Depression		The sex worker having any dispute with any one during the previous month		Total
		Yes	No	
		Absent	Present	
	Absent	94	197	291
	Present	93	16	109
Total		187	213	400

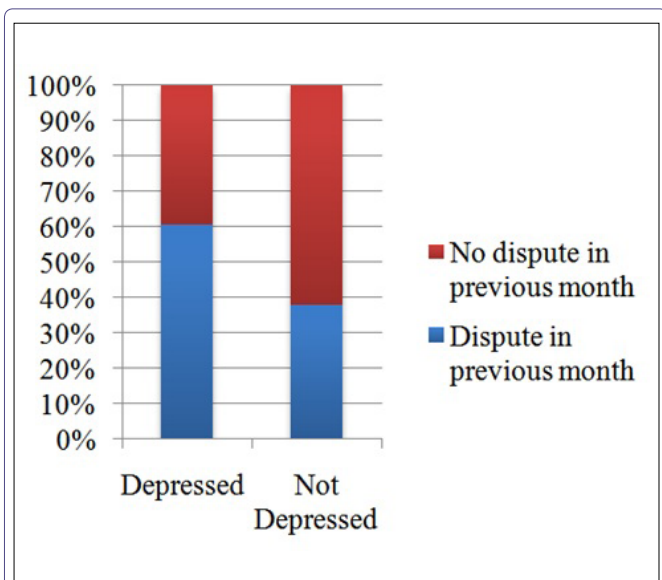
**Table 22:** Crosstab of depression vs the sex worker having any dispute with any one during the previous month.

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	89.540 <sup>a</sup>	1	0		
Continuity correction <sup>b</sup>	87.423	1	0		
Likelihood ratio	95.747	1	0		
Fisher's exact test				0	0
Linear-by-linear association	89.316	1	0		
No. of valid cases	400				

**Table 23:** Chi-Square tests of depression vs the sex worker having dispute with any one during the previous month.

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 50.96

b. Computed only for a 2×2 table



**Figure 6:** Percentages of FSWs involved in a dispute with other in the past month amongst depressed vs non-depressed FSWs.

## Discussion

### Depression rates

Globally, the World Psychiatric Association has stated that 1 out of 10 people suffer from depression, while 17% of the population will suffer from depression at points in their lives [41]. However, studies have suggested FSWs suffer from depression at higher rates than the general population. While few studies have established rates of depression



amongst FSWs in India, our findings are consistent with those previous studies conducted elsewhere in India. In our study, 38.3% of FSWs suffered from some degree of depression, with 27.3% having moderate to severe depression requiring treatment. Similarly, studies from Andhra Pradesh, Chennai, and Mumbai assessed rate of depression ranging between 28-45% amongst FSWs [42,43].

Depression amongst FSWs in India and globally found to be associated with certain socio-demographic and sex trade related factors. Of note, studies have found that sex work itself may not be a casual factor behind depression. Rather, the constellation of challenging socio economic condition and marginalization of FSWs might be playing as the contributing or predisposing factor behind increase rate of depression. For instance, studies have found that FSWs' poor mental well-being is associated with family-and partner-related burdens, stigma, discrimination, social isolation, loneliness, and violence [44].

In our study, there is no clear association between various demographic characteristics of sex workers and the rates of depression. These included age, education, number of children supported by them, and on the number of years they are in the sex work. Therefore, none of these factors contribute or predispose depression among the sex workers in Sonagachi. However there is a need to carry out further research, including the use of qualitative methods, to identify factors that may pre-dispose to depression and to verify its association with depression.

### Sexual behaviors and HIV risk

Depression amongst FSWs has been a focus of study due to the potential risk of engaging into unprotected sex leading to enhancement of HIV transmission. Depression adversely affects motivation, sense of self-worth, interest in one's daily life, and positive orientation towards the future. As a result, depression may predispose FSWs in taking less precaution towards protecting themselves or placing less value or significance on the consequences of risky behavior. Studies from both India and abroad have shown increased rates of risky sexual behavior, primarily inconsistent condom use amongst FSWs with depression when compared to those who are not suffering from depression [45-48].

Similarly, in the present study, depression is found to be associated with the decrease rates of refusal of clients who is not inclined to use condom and less use of condom with their clients. However, depression has no association with the number of clients being served by a sex worker in the previous day. Study findings shows that depression is associated with inconsistent condom use [49]. While the exact manner in which depression impacts on condom use rate is unclear, it may be due to reduced energy and motivation on the part of the individual to engage into condom negotiation or putting less value to the consequences of not using condoms. It could also be linked with her reduced sense of self-worth and hopelessness. Regardless, reduced condom use among depressed FSWs will certainly increase risks of acquiring HIV infection. Consequently, identifying individuals with depression and providing counseling and other services to FSWs suffering from depression would help motivating them to use condom which will decrease HIV transmission risk [50,51].

### STI rates and health seeking behavior

As depression is associated with inconsistent condom use, the risk of STI transmission may be increased as well. Studies in Puerto Rico have shown FSWs with depression are more likely to test positive

for syphilis than FSWs without depression. Similarly, in this study, depressed FSWs are more likely to report symptoms related to STI more than non-depressed FSWs. This increase rate of STI could be explained on the fact that they are less motivated to enforce condom use by their clients. However, this study also indicates that FSWs with STI symptoms are less likely to seek medical treatment if they are depressed. While it is not clear from this study why FSWs with depression is less likely to seek medical treatment, but it is possible that depression impacted FSWs' levels of motivation, energy, and self-efficacy which are required to bring them in the clinics. Additionally, FSWs with depression may not be in a mental state conducive to place value on personal health. Regardless, study findings suggest that identifying and providing treatment to FSWs suffering from depression may decrease rate of STIs in addition to motivating condom use.

### Substance use

The association between depression and substance use disorders appears consistent in many other studies [52]. While substance use, regardless of substance, poses a health risk and financial burden in itself, it often predisposes users to other health and social risks due to altered behavior as a result of intoxication, or of altered social surroundings, or encouraging socially unacceptable activities to procure the substance. Depression found to be associated with increased rates of substance use amongst FSWs. Moreover, substance use is also associated with increased risk taking behavior, such as reduced condom use, amongst FSWs in India and globally [53-57].

In this study, approximately two-thirds of FSWs self-reported substance abuse with 60% of them reported use of alcohol and 25% of them are addicted to tobacco products. Only one participant found to use opioids. Furthermore, depression found to be associated with increased rate of substance use among FSWs. While tobacco use is a risk factor for cardiovascular, respiratory, and malignant diseases, alcohol may contribute to unsafe sex practices as it hinders condom use. Additionally, finances spent on alcohol consumption may divert resources away from establishing or maintaining financial stability. Therefore, identifying and treating both depression and substance use disorders among FSWs may positively impact on areas of physical, mental, and social well-being including cardio-pulmonary health, cancer risk, STI/HIV risk, and financial stability [58,59].

### Financial and social well-being

Financial stability and savings are essential to the social well-being and future prospect of FSWs as well as the family members whom they support. Dedicating earnings towards savings, land purchases, or property ownership represents a positive valuation and orientation towards the future amongst FSWs. Moreover, it is an endeavor actively encouraged by DMSC through its co-operative venture. It is more so important because the sex workers collective own and operate financial cooperative of their own in the study area. Thus all FSWs within Sonagachi have access to some means of financial savings. Whereas this study indicates that FSWs suffering from depression are less likely than their peers to save money and plan for the future. Not only does this impact FSWs individually, but also their family members who are supported by sex workers which include parents, children, and other extended family members. Depression decreases FSW's positive outlook towards life and hopes for the future. Thus, it is possible that depressed FSWs spend their income which is not productive in nature as for example spending money on alcohol or buying other wasteful commodities. It is highly likely that by addressing depression among

FSW's, positive impacts could be made for the individual FSW as well as their beneficiaries, with special focus to their children.

In this study, depressed FSWs found more likely to be involved in significant number of disputes with others in the previous month, representing a disruption of social harmony and community well-being. While the current study cannot elaborate on why depressed FSWs are more likely to be engaged into varied kinds of disputes, it is possible that depression increases FSW's levels of irritability, sense of isolation, and positive self-image, as well as motivation and energy to address potential conflicts to maintain social and community harmony. Thus depressed FSWs may be more prone to getting into conflicts but are also less likely to address those in a healthy manner. Thus addressing depression amongst FSWs may also impact social harmony and better integration with the community.

## Limitations

This present study has its limitations in drawing conclusion to other sex-work contexts. DMSC has been operating in Sonagachi for last 20 years and altered the context in which brothel-based sex workers operate, including increase in condom use, decrease in STI rates, stabilization of HIV. DMSC through offering opportunities for financial savings, educational opportunities and increasing community cohesion and sex worker's self-efficacy has helped empowering sex workers community. Thus findings from this study population may not be generalized to contexts where a similar long-term health and social interventions are not in operation. Moreover, these findings may be specific to brothel-based sex worker only.

It is important to note that data collected on symptoms consistent with STIs, is not a full proof as it is not confirmed by laboratory tests. As a result, the study findings may not equivocally represent true STI cases among the FSWs in the study population [60].

In terms of assessing depression, the IDS-SR used in this study may not be comparable to other studies that utilize different tools to assess depression. Moreover, HIV rates are not collected from the study participants, thus HIV risk extrapolated based on previous reports and is not truly applicable to the study population.

## Conclusion

This study contributes to the estimation of depression rate amongst brothel-based FSWs and probable association with depression and factors impacting FSW health and social well-being. Depression rate is found around 38.3% among sex workers in Sonagachi red light area. Depression is found to be associated with inconsistent condom use, increased STI rates, less interest in seeking STI treatment, increased substance use, and decreased financial planning and incidence of increased number of disputes with other family and community members. As a result, FSWs suffering from depression may be at increased risk of acquiring HIV. Of note, this study did not find any association between depression and demographic factors including age, education, number of children, or years in sex work profession. Thus further research is needed to focus on plausible social and sex trade related factors and its association with depression amongst brothel-based FSWs as well as probing and identifying the relationship and manner in which depression results in increased risk of poor health and social well-being. Considering the impacts of depression on FSW's well-being, future work could focus on designing interventions to address depression through incorporating prevention, screening, and treatment. Community-based, peer-led interventions proved to be highly

effective among brothel-based FSWs, in India and in other regions, HIV prevention program needs to incorporate the findings of this study to include mental health interventions as one of the element of HIV prevention program to enhance the outcome of HIV control program developed and implemented by the National AIDS Control Organization in India or in other countries.

Potential community based programming in the context of brothel-based sex work could include prevention initiatives, including screening program, as well as counseling and group therapy, utilizing both peers and multidisciplinary teams of health and social workers.

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