Original Article

Risk Assessment of Noncommunicable Diseases among Commercial Sex Workers of a Metropolitan City of India

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Abstract

Aims: In the backdrop of the huge and increasing burden of noncommunicable diseases (NCD) and unaddressed needs among the marginalized population, the study was conducted for risk assessment of NCD among commercial sex workers (CSWs) and to find out the detrimental effects of its associates. **Materials and Methods:** A descriptive cross-sectional study was conducted for 6 months (July–December 2021) among 440 Kolkata-based CSWs, females and males, and intermediaries attending clinics run by the nongovernment organization providing outpatient department-based services inside the area. With systematic random sampling, every 3rd patient was interviewed with pretested questionnaire comprising sociodemographics, Community-Based Assessment Checklist for risk assessment of NCDs, and anthropometric measurement was done. The proportion was done for prevalence estimation, with SPSS Amos 26.0, structural equation modeling was done for testing the relation between high Community-Based Assessment Checklist score and risk factors. **Results:** Majority 411 (93.4%) of the study participants were female sex workers and 14 were men having sex with men (MSMs). Age of the female participants was 39.08 ± 5.02 years. More than two-third are smokers, and more than one-third are alcoholics on regular basis. For NCDs, a score ≥ 4 was found among 302 (68.6%) of participants, and a significant association ($P < 0.05$) was found with tobacco use, alcohol consumption, higher body mass index, and physical inactivity. Structural equation also shows a positive relationship with NCD risk factors. **Conclusion:** CSWs in Kolkata have a high prevalence of NCD risk with a significant association of lifestyle factors. More intensive screening and regular treatment are needed to lower premature mortality and morbidity among them.

Keywords: Female sex workers, lifestyle factors, noncommunicable diseases, risk assessment, structural equation model

INTRODUCTION

According to the World Health Organization (WHO), "commercial sex is the exchange of money or goods for sexual services and sex workers are women, men, and transgendered people who receive money or goods in exchange for sexual services, and who consciously define those activities as income generating even if they do not consider sex work as their occupation."[1] There are an estimated 42 million commercial sex workers (CSWs) over the different developed and developing nations with a multimillion currency sex trade running all over the globe with its varied legality.[2] Having one of the largest and fast-growing sex industries of the World, India has more than 7 million CSW. Majority of them belong to Mumbai which is closely followed by Kolkata with over 1 million CSW.[3] As an impact of awareness generation, prevention, and targeted intervention programs running since 1992, HIV, STIs, and various infections have reduced a lot among them. Noncommunicable diseases (NCDs) are new epidemics growing rapidly.[2,4] According to the Indian Council of Medical Research, major NCDs account for more than 6.0 million annual deaths with 58% premature mortality.[5] WHO has identified tobacco use, physical inactivity, alcohol intake, and unhealthy diets all increase the morbidity and mortality from NCDs. These behavioral and environmental attributes

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which are modifiable risk factors of NCDs are intricate parts of the lifestyle of the CSWs. Sheltered and secluded nature of life and work hinders their accessibility and availability of health-care services for various diseases including NCDs. National AIDS Control Organization, Phase 3 Program estimated between 8.3 and 12 lakhs people in sex work in India, of which over 1.5 lakhs are from Delhi, Maharashtra, and West Bengal. Despite comprising a big chunk, there is a paucity of exploration of NCD risk factors in the current study area.

In this backdrop, the current study was conducted to assess the prevalence of risk factors of NCDs among CSWs working in Asia's largest red-light district and to find out its determinants.

MATERIALS AND METHODS

A descriptive study with a cross-sectional design was conducted for 6 months (July to December 2021) in Kolkata, being one of the global largest sex industries, has seven red-light districts, namely Bowbazar, Garia, Kalighat, Kidderpore, Lelu Bagan, Sonagachi, and Tollygunge.[6,7] Sonagachi is located in the northern part of Kolkata, the largest in Asia with more than 50,000 CSWs.[7] In the area, many government and nongovernment organizations (NGOs) run projects aiming at empowerment, education, and health-care service provision. The CSWs, both males and females currently in occupation or retired, and the intermediaries such as pimps, relatives of CSWs as well as their clients who attend outpatient departments (OPDs) run by NGOs in Sonagachi area were considered the study population. Among them, who were aged above 18 years were only included in the study, whereas those found to have already diagnosed with NCDs were excluded from participation. Considering the prevalence of high risk of NCD as 57.7%,[8] 95% of confidence level, 5% of absolute precision, and 15% of nonresponse rate, the sample size was calculated as 432 which was rounded to 440. Systematic random sampling was done, and every 3rd patient was approached for the collection of data. With computer-generated random number table, 1st participant was chosen, and thereafter each one was taken accordingly until the total sample size is reached. Participants were interviewed with predesigned, pretested questionnaire containing sociodemographic, lifestyle, and behavioral factors. Community-Based Assessment Checklist (CBAC)[9] was used for risk factors screening of the participants for NCD risk assessment. It contains score-based risk determinants such as age, behavioral factors such as tobacco consumption, alcoholism, activity level, family history of NCDs, mental health factors, and environmental factor as the usage of solid fuel as the primary source of energy for cooking in the household. CAGE questions were adapted to include drug use (CAGE-AID).[10] CAGE-AID contains four questions (Have you ever felt that you ought to cut down on your drinking or drug use? Have people annoyed you by criticizing your drinking or drug use? Have you ever felt bad or guilty about your drinking or drug use? Have you ever had a drink or used drugs first thing in the morning to steady your nerves or to get rid of a hangover [Eye opener]?) for assessing alcohol and drug problem. This was developed by Richard Brown, MD and Laura Saunders at the University of Wisconsin. Here, one or more positive response indicates possible addiction and necessitates further evaluation. Anthropometric measurement was done with equipment such as weighing scale and measuring tape for body mass index (BMI) following the Asian Indian classification. The OPD runs 3 days in a week, Monday, Wednesday, and Friday. From the OPD register, it was found that per day on average thirty patients visit the OPD. Hence, monthly around 360 patients get services. Data were collected for initial 4 consecutive months and adopting systematic random sampling. CBAC score was considered dependent, and age, tobacco consumption, alcohol intake, inadequate physical activity, and high BMI were taken as independent variables. The participants were interviewed for sociodemographics, lifestyle, and environmental factors, mental health conditions and anthropometric measurements were done. With help of opportunistic screening, those visited the clinic for any health ailment. The study was embarked upon clearance from Institutional Ethics Committee (Ethical permission number IE. KPCM/2021/25/7) and consent from the study participants was obtained. Maintenance of confidentiality and self-esteem of the participants and data protection were kept at high priority. Data were analyzed with IBM SPSS Amos statistical software 26.0 (New York, USA) using two-proportion z-test, multiple logistic regression to have confounder-controlled effects that may mediate the effect of one variable on another and structural equation modeling (SEM). Kolmogorov–Smirnov test was done for checking the normality of data distribution. The model was tested by the comparative fit index (CFI) and Tucker-Lewis index (TLI).

RESULTS

Among the total 440 participants, 411, who were female sex workers (FSWs), were found to belong age 39.08 ± 5.02 years (mean ± standard deviation), and for the rest of the participants, it was 41.11 ± 3.44 years. Smoking is very common among the participants, though some of them are having an addiction to smokeless products as "gutkha" or "khaini" and "guraku." Among the study participants, 285 (64.7%) are currently in regular tobacco consumption though mostly they told that it is their professional obligation except for very few who stated that smoking has been an integral part of their lives and they cannot survive without it. None of them were in the contemplation stage of quitting smoking despite knowing its ill effects rather in favor of rationalizing the usage of this harmful lifestyle factor. One hundred fifty-nine (36.1%) have a habit of harmful intake for alcohol and 35 (22.0%) of them had CAGE-AID score ≥2 indicating alcohol and drug problems. Physical activity of at least 150 min a week was found in less than one-third of the participants. Moreover, for professional factors, many of them have a habit of standing for quite a long time. Regarding

dietary habits, a big chunk of the participants especially many of the FSWs have no cooking arrangement in their cramped dwelling. As a result, fruits and vegetables comprise far below that of recommendation. Although the majority told that they do not add extra salt or salty sauce to foods before consumption, overall intake of processed food high in salts such as prickles, salty packaged snacks, and street foods are very much common here. On interview, a substantial level of positive family history of any of the NCDs was found and obesity is considerably high [Table 1].

For CBAC, among 440 participants, more than two-thirds had scores above 4 indicating a higher risk for NCDs. Regarding early detection of cancer, one FSW was found to have a breast lump, one reported postmenopausal bleeding per vagina, and two men having sex with men (MSMs) were found on ATDs. For risk factors of COPD, exposure to indoor and/or occupational air pollution was among 225 (51.1%). Thirty-seven (8.4%) had a score of ≥3 for perceived depression.

Statistically significant association ($P < 0.05$) of high NCD risk among the participants was found with age ≥30 years (adjusted odds ratio [AOR] 3.21, 95% confidence interval [CI] 1.01–9.72), tobacco consumption (AOR 2.63, 95% CI 1.18–5.95), alcohol intake (AOR 2.33, 95% CI 1.37–9.84), physical inactivity (AOR 2.19, 95% CI 1.43–4.74), and BMI ≥23 kg/m^2 (AOR 3.16, 95% CI 1.19–5.73) in binary logistic regression [Table 2].

The structural model was tested for model fit and the CFI score was 0.84 and TLI was 0.86 hence proved for fit. SEM shows that all the risk factors have a positive relationship impacting increased NCD risk [Figure 1].

Table 1: Distribution of risk factors among the study participants (*n*=440)

Variable (s)	*n* (%)	*P*
Gender		
FSWs	411 (93.4)	0.61
MSM and others*	29 (6.6)	
Tobacco consumption		
Yes	285 (67.5)	0.04
No	155 (35.2)	
Alcohol intake		
Yes	159 (36.1)	0.05
No	281 (63.9)	
Sedentary habit		
Yes	408 (92.7)	0.001
No	32 (7.3)	
Family history of NCD		
Present	38 (8.6)	0.06
Absent	402 (91.4)	
BMI (kg/m^2)		
≥23	309 (70.2)	0.02
<23	131 (29.8)	

*Intermediaries, clients, relatives of CSWs. CSWs: Commercial sex workers, BMI: Body mass index, NCD: Noncommunicable diseases, FSWs: Female sex workers, MSM: Men having sex with men

DISCUSSION

Over the last 25 years, there has been a steady rise in the number of CSWs. In 1997, there were documented 2 million FSWs in India which has increased nearly 4 times.[11] In accordance to the current study, Achwoka *et al*. also considered both of the FSWs and MSMs in their study conducted in Sex Workers Outreach Program clinics in Nairobi, Kenya,[12] whereas Blondeel *et al*. worked among "sexual and gender minorities" namely, MSMs and transgender.[13] In Kenyan study, in line with the current study, FSWs were the majority of CSWs, but age-wise, their participants were found as somewhat younger.[12] A study by Oli *et al*. from urban slums of Kathmandu also found NCD risk factors among younger age groups which are alarming enough.[14] this one considered for comparison having similar sociodemography and lifestyle factors though the latter one was among slum dwellers of varied occupations. The present study revealing more than two-thirds of the participants having some form of tobacco addiction has been supported by Achwoka *et al*.,[12] Oli *et al*.,[14] Lancaster *et al*.[15] Waingankar and Pandit also found smoking among 66.7% and more than 50% as tobacco chewers.[16] Nakamura *et al*. have presented evidence-based beneficial effects of smoking cessation among the Asian population. It showed a high enough pooled relative risk of death from lung and other cancers, stroke, and heart disease among current compared to never smokers.[17] Regarding alcohol consumption, studies by Waingankar and Pandit,[16] Oli *et al*.,[14] Thankappan *et al*.,[18] Premanandh and Shankar from Salem[19] and Kadiyala *et al*. from Karnataka.[20] Chhoun *et al*. reported significantly higher alcohol intake among their study participants.[21] As in the current study, physical activity level far below than WHO recommendation has been found in a study from Cambodia,[22] Nepal,[14] and slums of Kerala.[18] In contrast to the current study, Nath *et al*. showed better intake of fruits and vegetables among their study participants from urban settlement areas hence sharing demographically similar characteristics with current
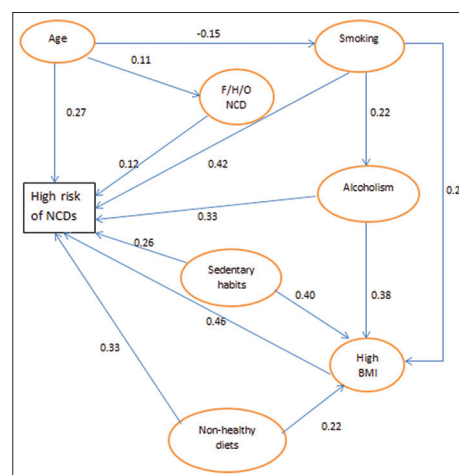

Figure 1: Structural Equation model with coefficients showing effect of NCD risk factors. NCD: Noncommunicable diseases

Table 2: Binary logistic regression showing association between high risk for noncommunicable diseases and determining factors (*n*=440)

Variables	Category	*B*	Significance	AOR	95% CI for AOR	
					Lower	Upper
Age (years)	<30	*	*	1.00	*	*
	≥30	0.41	0.05	3.21	1.01	9.72
Tobacco consumption	No	*	*	1.00	*	*
	Yes	0.69	<0.001	2.63	1.18	5.95
Alcohol intake	No	*	*	1.00	*	*
	Yes	0.55	0.03	2.33	1.37	9.84
Adequate physical activity	Yes	*	*	1.00	*	*
	No	0.32	0.02	2.19	1.43	4.74
BMI (kg/m²)	<23	*	*	1.00	*	*
	≥23	0.67	0.05	3.16	1.19	5.73

*Intermediaries, clients, relatives of CSWs. CSWs: Commercial sex workers, BMI: Body mass index, AOR: Adjusted odds ratio, CI: Confidence interval

study participants.[22] This is also supported by WHO survey findings from Myanmar.[23] However, Oli *et al.* from Nepal,[14] Chhoun *et al.* had similar findings as the present study.[21] Positive family history, a nonmodifiable risk factor for NCD indicating the need for screening is present in the current study and also found from Oli *et al.*,[14] Bansal *et al.*[24] High BMI among CSWs in the present study is in accordance to Idris IB,[25] Oli *et al.*,[14] Achwoka *et al.*,[12] and Kaur *et al.*[8] but Pedersen *et al.* from Denmark found low BMI among CSWs.[26] High risk of NCD as reflected by the high CBAC score in the current study have similarities with Kaur *et al.*[8] and age and alcohol intake have a significant association to NCD risk in both of the studies.

CONCLUSION

The present study has started an exploration of risk factors of the "current century pandemic" NCDs among the population with limited health service availability and restricted accessibility for researchers for work. Still as it has been undertaken in only one, though largest of its kind, the red-light district of Kolkata, the generalization and hence extrapolation of findings toward other places may be limited, especially for other states. Moreover, it directs toward the future further need of this type of work for providing betterment of lives of these deprived sections. Lifestyle factors, long-standing stress, and less accessibility and availability of health-care services work as pulling forces to trigger the development of NCDs among the CSWs working in red-light districts of Kolkata. CBAC-based high score among more than 2/3rd of them is a clear indication of planning of more intensive community-based screening and implementation of integrated preventive, promotive, and control strategies as need of the hour.

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Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. WHO. Overs C. SEX WORKERS: PART OF THE SOLUTION. An Analysis of HIV Prevention Programming to Prevent HIV Transmission during Commercial Sex in Developing Countries; 2002. Available from: https://www.who.int/hiv/topics/vct/SW toolkit/115solution.pdf. [Last accessed on 2021 Jun 30].
2. Pereira R. The Unheard Voices of Sex Workers in India: A Qualitative Study on the Rehabilitation and Reintegration Back into Society. Halifax, Nova Scotia: Dalhousie University; 2021.
3. Commercial Sex Workers in India. Available from: http://www.legalserviceindia.com. [Last accessed on 2022 Apr 21].
4. Non-Communicable Diseases. Searo.who.int; 2021. Available From: http://www.searo.who.int/entity/noncommunicable_diseases/en. [Last accessed on 2022 Apr 17].
5. Kant R, Sharma L, Gupta ED. Pandemic Management to Continue along with Work on other Diseases. e-Samvaad: Indian Council of Medical Research; 2021.
6. Dasgupta S. Commercial Sex Work in Calcutta: Past and Present. Selling Sex in the City: A Global History of Prostitution, 1600s-2000s. p. 519-37. https://doi.org/10.1163/ 9789004346253_021.
7. Ghosal S, Jana S, Mani A, Mitra S, Roy S. "Sex workers, stigma and self-image: Evidence from Kolkata brothels". Rev Econ Stat 2020. p. 1-45.
8. Kaur P, Jaswal P, Sarin J. Predicting risk for non-communicable disease (NCDs) using community based assessment checklist (CBAC) form among adults of Haryana. Ann Roman Soc Cell Biol 2021;25:17623-30.
9. Training Manual for NCD Programme Manager at State and District Level. National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke. New Delhi: Ministry of Health and Family Welfare. Government of India; 2017.
10. Hinkin CH, Castellon SA, Dickson-Fuhrman E, Daum G, Jaffe J, Jarvik L. Screening for drug and alcohol abuse among older adults using a modified version of the CAGE. Am J Addict 2001;10:319-26.
11. Biswas S. BBC report on number of female sex workers in India Archived 4 March 2022 at the Wayback Machine BBC News.
12. Achwoka D, Oyugi JO, Mutave R, Munywoki P, Achia T, Akolo M, *et al.* High prevalence of non-communicable diseases among key populations enrolled at a large HIV prevention & treatment program in Kenya. PLoS One 2020;15:e0235606.
13. Blondeel K, Say L, Chou D, Toskin I, Khosla R, Scolaro E, *et al.* Evidence and knowledge gaps on the disease burden in sexual and gender minorities: A review of systematic reviews. Int J Equity Health 2016;15:16.
14. Oli N, Vaidya A, Thapa G. Behavioural Risk factors of non-communicable diseases among Nepalese urban poor: A descriptive study from a slum area of Kathmandu. Epidemiol Res Int 2013. 1-13. [doi.org/10.1155/2013/329156].

15. Lancaster KE, Lungu T, Mmodzi P, Hosseinipour MC, Chadwick K, Powers KA, *et al.* The association between substance use and sub-optimal HIV treatment engagement among HIV-infected female sex workers in Lilongwe, Malawi. AIDS Care 2017;29:197-203.

16. Waingankar P, Pandit D. A cross sectional study of coronary heart disease in urban slum population of Mumbai. Int J Med Clin Res 2012;3:180-9.

17. Nakamura K, Huxley R, Ansary-Moghaddam A, Woodward M. The hazards and benefits associated with smoking and smoking cessation in Asia: A meta-analysis of prospective studies. Tob Control 2009;18:345-53.

18. Thankappan KR, Shah B, Mathur P, Sarma PS, Srinivas G, Mini GK, *et al.* Risk factor profile for chronic non-communicable diseases: Results of a community-based study in Kerala, India. Indian J Med Res 2010;131:53-63.

19. Premanandh K, Shankar R. Predicting 10-year cardiovascular risk using WHO/ISH risk prediction chart among urban population in Salem. Int J Community Med Public Health 2018;5:5228-34.

20. Kadiyala P, Renuka M, Kulkarni P, Narayanamurthy M. Prevalence of risk factors and 10 year risk estimation of cardiovascular diseases among rural population of Mysuru, Karnataka. Int J Community Med Public Health 2019;6:1178.

21. Chhoun P, Ngin C, Tuot S, Pal K, Steel M, Dionisio J, *et al.* Non-communicable diseases and related risk behaviors among men and women living with HIV in Cambodia: Findings from a cross-sectional study. Int J Equity Health 2017;16:125.

22. Nath A, Garg S, Deb S, Ray A, Kaur R. A study of the profile of behavioral risk factors of non-communicable diseases in an urban setting using the WHO steps 1 approach. Ann Trop Med Public Health 2009;2:15-9.

23. World Health Organization. Non-Communicable Disease Risk Factor Survey Myanmar 2009. SEARO, New Delhi, India: World Health Organization; 2011.

24. Bansal P, Chaudhary A, Wander P, Satija M, Sharma S, Girdhar S *et al.* Cardiovascular risk assessment using WHO/ISH risk prediction charts in a rural area of North India. J Res Med Dent Sci 2016;4:127.

25. Idris IB, Azit AN, Ghani AS, Nor SF, Nawi AM. A systematic review on non-communicable diseases among working women. Ind Health 2021;59:146-60.

26. Pedersen PV, Arnfred A, Algren MH, Juel K. Comparison of health behaviors among women brothel workers to those of the general population of women in Denmark. Women Health 2016;56:376-94.