Title: Diverse rates of depression among men who have sex with men (MSM) across India: Insights from a multi-site mixed method study

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Authors: Cecilia Tomori[1], Allison M. McFall[1], Aylur K. Srikrishnan[2], Shruti H. Mehta[1], Sunil S. Solomon[3], Santhanam Anand[2], Canjeevaram K. Vasudevan[2], Suniti Solomon[2], David D. Celentano[1]

[1] Johns Hopkins Bloomberg School of Public Health, Department of Epidemiology, Baltimore, Maryland, USA

[2] YR Gaitonde Centre for AIDS Research and Education, Chennai, India

[3] Johns Hopkins School of Medicine, Department of Medicine, Baltimore, Maryland, USA

Corresponding author:

Cecilia Tomori, PhD
Johns Hopkins Bloomberg School of Public Health
Department of Epidemiology
615 N. Wolfe Street, E6648
Baltimore, MD 21205
ctomori1@jhu.edu

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Running Head: Depression among MSM in India

ABSTRACT

Poor psychosocial health contributes to HIV risk behavior and reduced engagement in treatment and care. This study investigates depression and its correlates among 11,992 MSM recruited via respondent driven sampling in 12 cities across India using the Patient Health Questionnaire-9 and supplemented by analysis of qualitative research from 15 sites with 363 MSM. Overall prevalence of depression was 11%, with substantial variation across sites and subgroups of MSM, and high prevalence of suicidal thoughts among depressed MSM. In multivariable analyses identification as a *kothi* (feminine sexual identity) (adjusted odds ratio [aOR]=1.91), disclosure of being MSM to non-family (aOR=1.7) and family (aOR=2.4), disclosure of HIV-status (aOR=5.6), and substance use were associated with significantly higher odds of depression. Qualitative results emphasized dire social consequences of disclosing MSM- and HIV-status, especially to family, including suicidality. Combination prevention interventions should include mental health services that address disclosure, suicidality, and substance use.

Key Words: Men who have sex with men, HIV, depression, suicidality, India

RESUMEN

Título: Las diversas tasas de depresión entre hombres que tienen sexo con hombres (HSH) en la India: Perspectivas de un estudio multi-sitio con métodos mixtos

La mala salud psicosocial contribuye a los comportamientos de riesgo para el VIH y reduce la participación en el tratamiento y cuidado médico. Este estudio investiga la depresión y los factores que se encuentran correlacionados con ella en 11.992 HSH reclutados a través de un muestreo dirigido por entrevistados (MCE) en 12 ciudades de la India usando el Cuestionario sobre la Salud del Paciente-9 y complementado por una investigación cualitativa en 15 sitios con 363 HSH. La prevalencia general de la depresión fue del 11%, con una variación sustancial entre los sitios y subgrupos de HSH y con alta prevalencia de pensamientos suicidas entre los HSH deprimidos. En el análisis multivariable, el identificarse como *kothi* (identidad sexual femenina) (odds ratio ajustada [ORa]=1,91), el divulgarse como HSH a otra persona en el entorno familiar (ORa=1,7), o fuera del entorno familiar (ORa=2,4), el divulgar el estado serológico de VIH positivo (ORa=5,6), y el consumo de sustancias, fueron los factores que estuvieron asociados significativamente con mayores probabilidades de depresión. Los resultados cualitativos enfatizan que existen consecuencias sociales graves en cuanto a la divulgación de ser HSH o a la divulgación de un estado serológico de VIH positivo, especialmente a la familia, incluyendo el riesgo suicida. Las intervenciones de prevención combinadas deben incluir servicios de salud mental que abarquen la divulgación, el riesgo suicida, y el uso de sustancias.

INTRODUCTION

Men who have sex with men (MSM) experience a disproportionately high prevalence of HIV worldwide, with expanding epidemics despite the growing availability of effective HIV treatment[1,2]. In India, the prevalence of HIV is estimated to be 12 times higher among MSM than among men overall[3]. Homosexuality is criminalized in Section 377 of the Penal Code and stigmatization of homosexuality and discrimination remain pervasive, limiting access to HIV-related services and contributing to poor psychosocial health[4-8]. Qualitative research has found numerous negative life experiences among MSM, including childhood sexual abuse, lack of family- and community- acceptance, pressure to marry, harassment and violence. [6,8-13] Both qualitative and quantitative studies have identified significant psychosocial concerns among MSM in India, including high levels of psychological distress, depression, anxiety, suicidal ideation, and substance use[4,5,7,8,14-22]. These psychosocial factors are associated with increased HIV-risk behaviors and poorer HIV outcomes, including more frequent unprotected anal sex, lower testing rates, and reduced engagement in HIV care and treatment[4,7,9,11,19,20,23,24]. Following the minority stress model[25], depression has been conceptualized as a co-occurring condition with HIV risk-behaviors, constituting a "syndemic"[5,26].

Prior quantitative research on depression among MSM in India (from Chennai[7,15], Kumbakonam[7], Mumbai[20], Kolkata[16] and Ahmedabad[22]) indicates that MSM are at risk for depression, with estimates ranging from 29-55%[7,15,20]. These reports mainly rely on convenience sampling, usually collected in the context of HIV- and MSM-related outreach work by non-governmental organization (NGOs) and at STD clinics. The interpretation of these results is complicated by India's geographic, cultural and religious diversity, which may shape MSM psychosocial health on a local level[7], and by the sociocultural context of male-to-male sexual

behavior in India[12,27-33]. Research has focused on three main Indian MSM sexual identities: *kothi* (more feminine in behavior and dress, who predominately engage in receptive anal intercourse (AI)), *panthi* or *girya* (more masculine in appearance, who predominately engage in insertive AI) and *double deckers* (may have masculine or feminine appearance, and engage in both receptive and insertive AI), alongside *gay*, *bisexual*, and *MSM* identities, which may be situationally fluid and change over time[12,27-34]. Qualitative studies indicate that *kothis* may be particularly vulnerable to multiple levels of stigmatization, discrimination, and violence in their families and communities[8,9,11,24]. *Kothis* are more likely to participate in transactional sex and sex work for economic support, which contributes to higher risk of violence and greater vulnerability to HIV [9,11,24,35-37]. *Kothis'* feminine gender expression makes them recognizable [9,11,24], marking them as a visible target of stigmatization and discrimination[38]. Beyond identified high depression rates among *kothi*[7,15], data on depression across sexual identities remains limited[15]. The purpose of this research is to assess depression and its correlates among a diverse sample of MSM in 12 cities across India using data from a large-scale, multi-sited mixed-methods study. Since previous research suggested that the prevalence of depression may be higher among *kothis*[7,15], assessing the burden of depression across sexual identities among Indian MSM was an additional issue of interest.

METHODS

Data for this research are drawn from a cluster-randomized HIV-prevention trial among MSM in India (ClinicalTrials.gov Identifier: NCT01686750) [39]. The primary aims of the trial are to provide an in-depth qualitative and quantitative characterization of MSM in relation to HIV-risk and uptake of HIV-related services in India and to assess the impact of an intervention to

establish MSM-friendly HIV-services on HIV-risk behavior. Qualitative data for the present study are drawn from formative research for the cluster-randomized trial, which was used to inform the development of the baseline survey and recruitment for the trial and the design of the intervention arm of the study. The quantitative data are drawn from the baseline survey for the same trial.

Qualitative Data Collection and Analysis

As part of the formative qualitative research for the cluster-randomized trial, thirty-one focus group discussions (FGDs) and 121 in-depth interviews (IDIs) were conducted by trained interviewers with 363 MSM from 12 study sites and 3 additional sites (Chittoor, Andhra Pradesh; Tumkur, Karnataka; Trichy, Tamil Nadu) in local languages (**Table 1**). Participants were identified by local NGOs who provide services for MSM and by peers based on their knowledge about and/or involvement in outreach work with MSM. FGDs and IDIs addressed a wide-range of topics related to the experiences of MSM in their communities and the availability and accessibility of HIV-related services for MSM, using open-ended questions whenever possible. Participants who reported high levels of distress and possible suicidality were referred to trained counselors for assistance. Participants were compensated for their time. FGDs and IDIs were transcribed, translated into English and entered into Atlas.TI qualitative software (version 7, Scientific Software Development GmbH, Eden Prarie, MN). Transcripts were read multiple times, emergent themes were identified through the constant comparison method, refined, and used to develop a preliminary codebook that was elaborated based on discussion [40,41]. In presenting the qualitative results below, we specifically summarize the main themes that either directly address or are related to depression. Quotations were selected to illustrate each of

these themes. Finally, qualitative findings provided insight into possible interpretations of the results from the quantitative analyses below.

Quantitative Methods

Study Design

The quantitative study was conducted in 12 cities from six states of India as part of the baseline assessment of the cluster-randomized trial referenced above (**Figure 1**)[39]. Study participant eligibility criteria included: (1) age ≥ 18 years; (2) self-identify as male; (3) report oral or anal sex with another man in the prior 12 months; (4) provide informed consent; and (5) possess a valid RDS referral coupon (except for "seeds"). Participants who self-identified as female or transgender (*hijra*) were excluded.

Study Procedures

Detailed study procedures for the baseline assessment have been published elsewhere[42]. Briefly, the study population was recruited utilizing respondent-driven sampling (RDS), a chain-referral strategy for recruiting hard-to-reach participants whereby the resulting sample is considered representative of the target population [39,43,44]. We initiated recruitment at each site with two 'seeds' – individuals identified in the qualitative phase as well connected in the MSM communities. Target recruitment was 1000 per site. After verbal consent, participants completed an interviewer-administered survey and underwent rapid HIV testing and pre- and post-test counseling on-site. Each participant who completed the study was given two coupons to recruit other individuals from his network. Participants were reimbursed for participating in the study and for each eligible participant they recruited. Coupons were bar-coded to track recruitment

chains and imprinted with a holographic image to hinder duplication. Enrollment was stopped when each site reached the target sample size.

Assessment of Depression

The presence of depression was measured using the Patient Health Questionnaire-9 (PHQ-9), a self-reported questionnaire completed in the interviewer-administered survey, which measures depression severity over the last two weeks[45]. Each symptom or problem is scored from 0 (not at all) to 3 (nearly every day) and the 9 items are summed to calculate an overall depression score, ranging from 0 to 27, which corresponds to none (0-4), mild (5-9), moderate (10-14), moderately severe (15-19), and severe (20-27). As part of the depression assessment, the PHQ-9 contains one item on suicidal ideation. This item provides preliminary information on suicidality[45], and a potential screen for additional evaluation[46,47], but not a full assessment that would entail the evaluation of suicidal intent and planning[48]. Men who reported frequent thoughts of personal harm or suicide were actively referred for counseling to a trained counselor or psychiatrist. The PHQ-9 has been validated and extensively used in India and found to have good internal reliability, (Cronbach's $\alpha = 0.84$ and 0.79), validity (sensitivity ≥ 0.87 and specificity ≥ 0.57), and discrimination properties (area under receiver operator curve = 0.84)[49-51]. Within our sample of Indian MSM, internal reliability of the PHQ-9 was high (Cronbach's $\alpha = 0.86$). A meta-analysis on the optimal cut-off score for diagnosing depression using the PHQ-9 found that there were no substantial differences in the pooled sensitivity and specificity for cut-offs between 8 and 11[52]. Consistent with current depression research utilizing the PHQ-9 instrument, a cut-off of 10 or higher was used to characterize the presence of depression.

Statistical Analyses

Site-level prevalence of depression is estimated using the RDS-II estimator (Volz-Heckathorn estimator), which weights estimates for network size (i.e., the number of MSM in the city whom the participant saw in the prior 30 days). Population summary statistics for demographic, behavioral, and psychosocial factors are estimated with a composite weight, which accounts for the relative population size of adult men 15-59 years of age in each city[53] (assuming a similar proportion of MSM across cities) in addition to the RDS-II weight. Unweighted estimates are provided in supplemental tables.

Correlates of depression were identified using multi-level logistic regression models (using odds ratios [OR]). Models included random-intercepts for each site (to account for clustering) and incorporated scaled RDS-II sampling weights. Previous research on depression, with a focus on MSM both in India and in other settings, guided the development of a multivariable model[7,15,17,20,54-57]. Several variables associated with depression in prior research, including sex work[15], stigma[7], and experiences of violence,[57,58] have also been previously noted to be more prevalent among certain sexual identity groups in India[7,9,11,24,35-38]. Since sexual identity was a variable of interest, we examined the association between these variables and sexual identity to inform our final multivariable model. Collinearity between variables was assessed using 2x2 tables and variance inflation factors. Correlates were considered statistically significant if p-value<0.05. All statistical analyses were performed using the RDS Analyst Software version 0.1 (http://hpmrg.org) and STATA version 12.0 (STATA Corp., College Station, Texas, USA).

RESULTS

Qualitative Results

Qualitative findings across study sites suggest that MSM experience high levels of distress, anxiety, sadness, psychological injury, depression and suicidality. Reports of these negative psychological experiences clustered around several key areas: the psychological impact of stigmatization and harassment of MSM, and the inter-related fears and consequences of disclosure of same-sex sexual behavior and HIV-positive status. Participants overwhelmingly concurred that same-sex sexual behavior remains highly stigmatized in India and reported widespread harassment, violence, and resulting negative emotional consequences. Reports of violence were particularly common in the context of sex work. K*othis* and some *DDs* specifically identified their feminine appearance or behavior as the basis for their systematic stigmatization, harassment, and violence, which led to emotional distress. Some participants explicitly linked these experiences to depression:

> "Your son is like this, he behaves like a girl, can't he be like a man," and they also mock me and talk ill about me as well. When they treat men like that I get hurt and I feel very sad. For an example when I was in the college in my college I faced lots of discriminations, they used ask me whether am I girl or a boy finally I was in depression and due to that my education got discontinued. (Karnataka, Bangalore, 23, *kothi*)

As in the case of the above participant, these experiences of stigmatization and harassment had a profound impact on the ability of MSM to participate in everyday life, and often led MSM to maintain a more normative masculine appearance and conceal their sexual behavior.

Participants across different sexual identities feared the potential disclosure of their same-sex sexual behavior and its grave consequences, and expressed considerable

emotional distress in relation to potential disclosure. Thoughts of suicide as a response in case of disclosure were common:

> [My family] will be very upset and personally I would do something to myself rather than others coming to know about it. There is no use of me living in this world once people come to know about me. My family has supported me till now and if they come to know about me definitely they will be ashamed of me and in the society they will be tortured and so I have decided to commit suicide once they come to know. (Andhra Pradesh, Hyderabad, 23, *DD*)

Several married participants identified suicide as the only possible response to disclosure, since they believed that they had no alternative:

> [If it is disclosed that I have sex with men] I can simply commit suicide, that's all. If it's known to the family members then first of all I have to commit suicide only, no other way. If I leave my wife and children then there will be quarrel in family and will have some hurdles also. As well I can't leave my children, wife and go somewhere, so only possibility is to commit suicide. (Andhra Pradesh, Hyderabad, 26, *kothi*)

Several participants reported previous suicide attempts because of their family's knowledge of them being an MSM and many more heard of others who had attempted suicide:

> Yes my parents know my status [being an MSM]; they used to scold me often regarding this one. Vexed, I even tried to commit suicide by, I drank pesticide, since then they stopped scolding me fearing that I may try something like that again. In 2011 I was forced into marriage. (Andhra Pradesh, Visakhapatnam, 27, *kothi*)

Despite concern about the participant's suicidality, this family and some others in our study forced the participant into marriage, compounding these men's difficulties.

Qualitative findings also underscored the psychosocial consequences of HIV-infection. MSM were very distressed about the potential consequences of becoming infected and the social consequences of disclosure:

> If I am known as a HIV positive everyone will abandon me. My friends and family both will leave me. Sometimes even the MSM are spared by the society but once they know we are positive it will be highly discriminated. Once the non-community comes to know the person's status it will stop talking to him and think he has a contagious disease and it may spread to them. This will pain the person and he will become very depressed. If a person does not talk to a HIV positive person he will become more mentally depressed. "No one is talking to me. My friends are avoiding me. Why should I live?", and there are chances for them to commit suicide also. (Karnataka, Bangalore, 27, *DD*)

The material consequences of HIV-disclosure were realized in numerous reports of suicide when families discovered MSM's HIV status:

> One *kothi* I know, was tested positive, he did not reveal this at home but they came to know about it by someone else, and bombarded him with questions such as, "Where did you get this disease from? Are you going to the prostitutes?" Unable to answer the questions he committed suicide by hanging himself the very night. So no MSM will ever reveal his real HIV status. (Andhra Pradesh, Visakhapatnam, 28, *kothi*)

Participants stated that there were few resources for psychological counseling or medical treatment for depression available to MSM in their communities. Sex was mentioned as one coping mechanism for dealing with depression and feelings of sadness:

> Some people come there who are mentally depressed and if they find any client there they will indulge in sex and go. This way they can get relief of their depression. (Karnataka, Bangalore, 40, *bisexual*)

Participants described alcohol use as very widespread among MSM, and there were some indications that those experiencing mental health concerns were more vulnerable to alcohol use, and consequent unsafe sex:

> They drink a lot when they undergo any kind of mental discomfort like in their family, when they have no money, any kind of discrimination. When they are drunk they get indulged in unsafe sex. It can be with *MSM*, *kothi* or any other clients. They will not inquire and will have sex for money. (Karnataka, Tumkur, 21, *kothi*)

Those infected with HIV were also seen as particularly at risk for alcohol use to cope with the distress of the infection.

Quantitative Results

Demographics and Risk Behaviors

Median age of the 11,992 men was 25 years (interquartile range [IQR]: 21 - 32 years) (**Table 2**). 45.0% self-identified as *panthi*, 14.0% as *kothi*, and 18.0% as *double deckers (DDs);* 15.2% self-identified as *bisexual*, 5.9% as *MSM*, and 1.8% as *gay*. 35.3% were currently married to a woman or living with a partner. Half (50.3%) of the respondents reported unprotected anal intercourse with a man in the prior 6 months. Few had injected illicit drugs in the prior 6 months

(0.8%); however, 34.4% had evidence of harmful or hazardous alcohol use, and 15.3% were alcohol dependent. More than half (58.0%) had disclosed being an MSM to someone though only 5.9% disclosed to their spouse and/or other family members. Of those ever married, 3.9% reported disclosing to their wife. Most were HIV uninfected (93.0%); of those HIV-infected, 35.2% were aware of their HIV-status. See **Supplementary Table 1** for unweighted estimates.

Prevalence of Depression

Overall prevalence of depression was 11.0% (95% confidence interval [CI]: 10.6, 11.2%); 7.7% had moderate, 2.2% moderately severe, and 1.1% severe depression. The prevalence of depression differed by sexual identity; 18.1% of *kothis*, 12.0% of *DDs*, and 9.8% of *panthis* were depressed. Severe depression was most common among *kothis* (2.2%) and *DDs* (1.3%). Depression varied considerably across regions/states and cities. Tamil Nadu had the highest prevalence of depression (16.9%) with two of its cities, Coimbatore and Madurai at 23.7%, and 20.1%, respectively, while Andhra Pradesh and Karnataka both had approximately 6% prevalence. (**Table 2 and Figure 1**). Suicidal ideation among those with depression was common; 33.9% had frequent thoughts (i.e., more than half the days in the prior 2 weeks) of being better off dead or of hurting themselves. Among depressed men who were aware of their HIV status, 55.6% had frequent suicidal thoughts and 32.3% of those depressed who had disclosed their MSM behavior had frequent suicidal thoughts.

Correlates of Depression

In univariable regression analysis, older age, being married or widowed/divorced, recent sex work, unprotected anal sex in the prior 6 months, more male sex partners, alcohol

dependence, alcohol use before sex, and recent injection drug use were associated with higher odds of depression (**Table 3**). Men who identified as *kothi*, reported disclosure of being an MSM to spouse/family or others, and those who experienced forced sex and intimate partner violence had more than 2 times higher odds of depression. Those reporting more MSM-related stigma were 1.3 times more likely to be depressed. MSM who were aware of their HIV-positive status and had disclosed their status to someone had 3.8 times higher odds of depression compared to HIV-uninfected men.

In multivariable analysis, age, marital status, unprotected anal sex in the prior 6 months, number of male sex partners, and alcohol use before sex did not remain associated with depression (**Table 3**). *Kothis* (compared to *panthis*) had nearly two-fold the odds of depression (adjusted odds ratio =1.91, 95% confidence interval [CI]: 1.42 - 2.56). Disclosure of MSM-status to non-family members carried 1.7-times higher odds of depression (95% CI: 1.01 - 2.75), while disclosure to a spouse or other family member was associated with 2.4-times higher odds (95% CI: 1.56 - 3.78), compared to those who have not disclosed to anyone. Those aware of their HIV-positive status but did not disclose it had almost 4-times higher odds (95% CI: 1.26 - 11.6), and those who disclosed it had nearly 6-times higher odds of depression compared to HIV-uninfected men (95% CI: 2.76 - 11.6). Recent injection drug use and alcohol use were independently associated with depression after adjustment for other correlates. Sex work in the prior 6 months, stigma, a history of forced sex and intimate partner violence were significantly associated with sexual identity, with both *kothis* and *DDs* at increased odds of reporting these experiences as compared to *panthis* (results not shown). Therefore, these factors are considered mediators of the sexual identity-depression relationship and were excluded from the final multivariable model.

DISCUSSION

In this large, multi-site study of MSM in India the prevalence of depression was 11%. Consistent with previous research that has found higher prevalence of depression among MSM compared with the general population, these findings are higher than the 9% lifetime prevalence, and much higher than the 4.5% 12-month prevalence of major depressive episode in the general population in India reported in the World Mental Health Survey using the World Health Organization Composite International Diagnostic Interview (CIDI)[59]. The difference between the findings of our studies is even more pronounced when we consider only men in the World Mental Health Survey, since they had nearly half the odds of depression compared with women[59]. The prevalence of depression in our study is significantly lower compared with previous estimates of depression prevalence between 29-55% among MSM in India[7,15,20]. However, we found substantial differences in the likelihood of depression across study sites, with cities in Tamil Nadu and the Central/North region having a higher prevalence of depression, which were more similar to the lower end of these estimates. Moreover, there were additional differences in the prevalence of depression among specific groups of MSM within our sample. Therefore, geographic variation, along with the specific composition of smaller, usually convenience- or clinic-based samples, may have produced these differences between our findings and those from prior studies of depression among MSM in India. Our estimates of depression are also lower than those from large studies of MSM in other settings, such as in the U.S. (47.3%)[54] and in Latin America (28%)[60]. These cross-national differences may partly reflect broader trends in the prevalence of depression across settings in the general population[59], as well as more specific

differences between MSM populations. More rigorous comparison, however, is hindered by different sampling strategies and choices in the instruments used to measure depression.

One-third (33.9%) of depressed MSM reported frequent suicidal thoughts. Moreover, suicidal thoughts and reports of suicide constituted a prominent theme in the qualitative findings. Previous studies have documented high prevalence of suicide in India in the general population, especially among men[61], and markedly high levels (45%) of suicidality among MSM in particular[17]. Similarly, in other settings MSM have been identified at elevated risk for suicidality[62,63]. While our study only assessed suicidal ideation instead of a full assessment of suicidality, our data point to a high vulnerability of MSM to suicide in India and the importance of a fuller investigation of suicidality among MSM in India and the potential use of the PHQ-9 as a preliminary indicator for further screening and prevention efforts.

Overall, our findings are consistent with the minority stress model that links psychological stress associated with societal homophobia with mental health disorders[25], and draws attention to the importance of considering depression, along with other co-occurring psychosocial factors, in relation to HIV. Qualitative results provided insight into the specific social dynamics that may contribute to depression among MSM in the Indian context. These findings highlighted the negative psychological effects of persistent stigmatization, harassment, and violence; the specific vulnerabilities of more visibly identifiable groups of MSM; and the related pressure to conceal same-sex sexual behavior; and the devastating impact of disclosure of same-sex sexual behavior and HIV-positive status.

Our study also identified a number of important differences in the prevalence of depression by sexual identity, disclosure of MSM- and HIV-positive status, and substance use. First, *kothi*-identifying MSM were almost twice as likely to be depressed than *panthis.* Previous

research has found that *kothis* experience high levels of stigmatization, discrimination, and violence in their families and communities, partly due to their visible femininity, and have few employment options beyond sex work[9,10,24,35]. Our results similarly found an association with *kothi*-identity and stigma, forced sex, intimate partner violence and recent sex work. Therefore, it is likely these experiences are located in the pathway between sexual identity, specifically *kothi*-identity, and depression. Qualitative findings emphasized *kothis*' and some feminine *DD*s' heightened vulnerability to stigmatization and harassment based on their greater visibility due to their feminine gender expression. In prior research gender non-conformity stigma has been specifically linked to higher rates of depression[7]. Our findings highlight the connections between *kothi* sexual identity, gender non-conformity, and depression, which contribute to structural vulnerabilities to HIV [7,9,10,24].

Second, disclosure of being an MSM to a non-family member was associated with greater likelihood of depression, and an even higher likelihood when disclosed to a spouse or other family member, compared with undisclosed MSM. Similarly, while all HIV-positive MSM aware of their infection were at elevated odds of depression compared to HIV-uninfected peers, disclosure of their infection was associated with nearly six-fold odds of depression versus four-times greater odds of depression for those who remained undisclosed. Due to the cross-sectional nature of our study, we cannot determine the direction of these associations. Qualitative findings, however, identified pervasive fear and severe consequences of disclosure of being an MSM and being HIV-positive, including community-, and especially family-level rejection, which could lead to depression. An HIV-positive status itself could make MSM vulnerable to disclosure of their same-sex sexual behavior. The prominence of suicidal thoughts and suicide itself as potential consequences of disclosure in the qualitative data is particularly notable. These findings

suggest that depression may be, at least in part, a consequence of disclosure. Although disclosure of sexual orientation and HIV-positive status could improve access to social support, these potential benefits may be outweighed by severe stigmatization of homosexuality and HIV in some settings[54]. In India, family rejection may result in the withdrawal of social and material support, and social exclusion equivalent to a form of social death[64]. The relatively high prevalence of suicidal ideation in our sample, as well as previous research that found high levels of suicidality among MSM in Mumbai[17] suggest the need for further studies to evaluate this potential association between disclosure, depression, and suicidality, and indicate the importance of suicide prevention and family incorporation as part of mental health services. Since the possibility of disclosure could also act as a deterrent to HIV testing in order to avoid the potential consequences of a positive diagnosis, integrating mental health services and outreach support should be ideally incorporated into the entire HIV care continuum.

Finally, quantitative results highlight the association of injection drug and alcohol use with increased likelihood of depression. Although relatively few MSM injected drugs, this population merits additional attention, especially in light of recent evidence from Delhi [65], which found that one-third of male PWID sampled engaged in MSM behavior and also had significant psychosocial vulnerabilities. While our qualitative results did not yield insight into injection drug use, perhaps due to the relatively low overall prevalence of injection among MSM, they support pervasive alcohol use and its role in managing psychological stress associated with being MSM. Other studies among MSM have also highlighted the diverse uses of alcohol and its role in high-risk sexual behavior[14,18,20,21,66]. Since substance use is both a cause and consequence of poor psychosocial health, including depression, these associations are difficult to disentangle[17,65]. Nevertheless, our findings support the expansion of substance use services to MSM.

Strengths and Limitations

This large, multi-site study found higher overall prevalence of depression (11%) among MSM across diverse geographic regions and sexual identities in India compared with the general population, but found lower prevalence of depression compared with previous estimates from smaller studies of Indian MSM. Our study identified substantial differences in the likelihood of depression across study sites and specific groups of MSM, supplemented by qualitative insights about the sociocultural context that contributes to the vulnerability of MSM to depression in India. Previous research on depression among MSM in India has employed a variety of different instruments to assess depression. Although consistent with previous literature, the PHQ-9 cutoff used to ascertain depression in our study excluded those with mild depression, and therefore may result in a conservative estimate of the burden of depression. Clinical interviews were not available to confirm the presence of depression. At the same time, elevated risks of depression among certain MSM groups in our findings may explain prior reports of higher depression prevalence based on smaller convenience and venue-based samples, which may overestimate the depression prevalence by reaching MSM at high risk for depression, particularly more visible *kothis* [9-11,35].

Although a cross-sectional design does not enable us to establish the causal roots of depression or directionality of associations found in our quantitative analysis, this limitation is mitigated by qualitative research insights. Quantitative data on suicidal ideation came from one question within the PHQ-9 instrument, limiting our ability to address suicidality in more detail. A fuller investigation of suicidality, entailing an assessment of suicidal intent, planning, and prior attempts is needed to explore suicidality among MSM and to develop potential suicide prevention services. Additionally, while adjustment for data collected via RDS attempts to

produce valid population estimates, we were unable to verify that our sample is representative of the underlying population and its associated characteristics. However, the RDS was efficient in recruiting a more diverse sample of MSM compared to those previously collected by convenience or venue-based sampling. Our study underscores the importance of structural interventions that address stigmatization and discrimination, with attention to gender non-conformity, and integrated mental health services that address suicidality and substance use, and incorporate family members to increase acceptance of MSM and mitigate the impact of family rejection. Since HIV-positive MSM were particularly vulnerable to depression, and lack of support after disclosure may play a role in this dynamic, mental health support services would be particularly important components of community HIV services in high-prevalence settings. Although our study does not provide insight about the causes of geographic disparities in depression, previous historical and ethnographic literature has identified substantial variation in sexual identities and the treatment of MSM in different cities and regions of India[27-30,34]. The causes of geographic disparities should be investigated in future studies, with specific attention to the availability and accessibility of local resources and cultural attitudes towards MSM.

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Table 1: Formative research participant characteristics among 363 men who have sex with men in 15 Indian cities

State	N	IDI[a]	FGD[b]	Marital Status		Sexual Identity				
			N groups/ N individuals	Single	Ever Married	*Kothi*	*Panthi/ Girya*	*Double Deckers*	*Bisexual*	*Gay*
Madhya Pradesh	24	8	2/16	15	9	4	6	3	2	9
Uttar Pradesh	23	8	2/15	18	5	9	3	8	3	0
Delhi	20	8	2/12	12	8	8	6	5	1	0
Andhra Pradesh	96	32	8/64	55	41	46	19	26	5	0
Karnataka	107	33	9/74	62	45	41	6	35	23	2
Tamil Nadu	93	32	8/61	52	41	40	15	37	0	1
Total (%)	363	121 (33.3)	31/242 (66.6)	214 (59.0)	149 (41.0)	148 (40.8)	55 (15.2)	114 (31.4)	34 (9.4)	12 (3.

[a]IDI=in-depth interviews
[b]FGD=focus group discussions

Table 2: Characteristics[a] by depression status among 11,992 men who have sex with men in 12 Indian cities

	No/mild depression[b] (N=10388)	Depression[b] (N=1604)	Total (N=11992)
Region/State, n (row %)			
Andhra Pradesh	2728 (93.7)	270 (6.3)	2998
Karnataka	2754 (93.3)	244 (6.7)	2998
Tamil Nadu	2295 (83.1)	706 (16.9)	3001
Central/North	2611 (87.1)	384 (12.9)	2995
Median age (IQR)	25 (21-32)	27 (22-34)	25 (21-32)
Marital Status, n (%)			
Never married	6078 (61.5)	758 (48.5)	6836 (60.1)
Currently married/living with partner	3931 (34.4)	706 (42.7)	4637 (35.3)
Widowed/divorced/other	379 (4.1)	137 (8.9)	516 (4.6)
Sexual identity, n (%)			
Panthi	3470 (45.6)	461 (40.5)	3931 (45.0)
Kothi	2252 (12.9)	562 (23.3)	2814 (14.0)
Double Deckers (DD)	2401 (17.8)	396 (19.6)	2797 (18.0)
Gay	179 (1.6)	17 (3.4)	196 (1.8)
MSM	698 (6.3)	30 (2.6)	728 (5.9)
Bisexual	1388 (15.8)	135 (10.6)	1523 (15.2)
Education, n (%)			
Primary school or less	2285 (20.8)	376 (22.3)	2661 (21.0)
Secondary school	4478 (44.8)	726 (49.1)	5204 (45.3)
High school and above	3625 (34.4)	499 (28.6)	4124 (33.8)
Employment, n (%)			
Monthly/weekly wages	5102 (50.2)	792 (52.1)	5894 (50.4)
Daily/seasonal wages	3640 (29.5)	605 (33.1)	4245 (29.9)
Unemployed	396 (4.0)	67 (3.4)	463 (4.0)
Other (student or retired)	1250 (16.3)	137 (11.4)	1387 (15.8)
Median monthly income (IQR) (Indian rupees)	6000 (3000-8000)	6000 (3000-8000)	6000 (3000-8000)
Disclosure of being MSM, n (%)			
No	4192 (43.6)	457 (28.9)	4649 (42.0)
Disclosure to spouse/family	804 (5.2)	264 (11.4)	1068 (5.9)
Disclosure to others but not to spouse/family	5392 (51.1)	880 (59.8)	6272 (52.1)
HIV status awareness and disclosure, n (%)			
Negative	9540 (94.1)	1307 (83.7)	10847 (93.0)
Known positive, undisclosed status	63 (0.5)	25 (1.5)	88 (0.6)
Known positive, disclosed status	259 (1.3)	155 (6.6)	414 (1.9)
Unknown positive	526 (4.1)	117 (8.3)	643 (4.5)
Sex work in prior 6 months, n (%)			
No	7896 (85.2)	955 (72.3)	8851 (83.8)
Yes	2468 (14.8)	633 (27.7)	3101 (16.2)
Unprotected anal sex in prior 6 months, n (%)			
No	4154 (42.2)	498 (27.9)	4652 (40.7)
Yes	5667 (48.9)	980 (62.0)	6647 (50.3)
No anal sex in prior 6 months	567 (8.9)	123 (10.1)	690 (9.0)
Median number of male partners in prior 6 months (IQR)	1 (1-2)	1 (1-2)	1 (1-2)
Injection drug use in prior 6 months, n (%)			
No	10279 (99.3)	1557 (97.9)	11836 (99.2)
Yes	101 (0.7)	41 (2.1)	142 (0.8)

	No/mild depression[b] (N=10388)	Depression[b] (N=1604)	Total (N=11992)
Any drug use in prior 6 months, n (%)			
No	7942 (84.5)	1284 (82.5)	9226 (84.3)
Yes	2441 (15.5)	317 (17.5)	2758 (15.7)
Alcohol use and dependence, n (%)			
None/mild	6393 (67.0)	783 (54.1)	7176 (65.6)
Harmful/hazardous	2211 (19.3)	259 (18.2)	2470 (19.2)
Alcohol dependence	1784 (13.7)	559 (27.7)	2343 (15.3)
Alcohol use before sex in prior 6 months, n (%)			
No	4406 (47.3)	532 (38.4)	4938 (46.3)
Yes	4413 (32.5)	778 (43.7)	5191 (33.7)
No sex in prior 6 months	1565 (20.2)	284 (17.9)	1849 (20.0)
Median social support score[c] (IQR)	6 (2-11)	7 (4-11)	6 (2-11)
Median composite stigma score[d] (IQR)	4 (2-6)	7 (4-11)	4 (2-7)
Ever forced sex, n (%)			
No	7821 (83.6)	856 (62.5)	8677 (81.3)
Yes	2509 (16.4)	735 (37.5)	3244 (18.7)
Adult intimate partner violence, n (%)			
No	8960 (91.9)	1060 (74.5)	10020 (90.0)
Yes	1402 (8.1)	535 (25.5)	1937 (10.0)

[a]Percentages and median (IQR) are presented as RDS-II weighted. Percentages are column percentages, unless otherwise noted.

[b]No or mild depression defined by a score of 9 or less on the PHQ-9 depression scale, depression defined as a score of 10 or more.

[c]Social support score ranged from 0 to 20 with higher scores reflecting more social support.

[d]Composite stigma score was estimated by averaging stigma scores from 4 scales: vicarious stigma, enacted stigma, felt normative stigma, and internalized stigma; scores ranged from 0 to 20 with higher scores reflecting more stigma.

Table 3: Correlates of depression[a] among 11,997 men who have sex with men in 12 Indian cities[b]

	Unadjusted		Adjusted	
	Odds Ratio	**95% Confidence Interval**	**Odds Ratio**	**95% Confidence Interval**
Age (per 10 years)	1.27	1.06, 1.52	--	--
Marital Status				
Never married	REF			
Currently married/living with partner	1.39	1.05, 1.84		
Widowed/divorced/other	1.65	1.05, 2.57	--	--
Sexual identity				
Panthi	REF		REF	
Kothi	2.16	1.56, 2.98	1.91	1.42, 2.56
Double Deckers (DD)	1.27	0.77, 2.10	1.22	0.73, 2.03
Gay	1.57	0.40, 6.17	1.67	0.42, 6.58
MSM	0.63	0.30, 1.33	0.65	0.35, 1.19
Bisexual	1.26	0.87, 1.84	1.23	0.88, 1.71
Disclosure of being MSM				
No	REF		REF	
Disclosure to spouse/family	3.56	2.26, 5.60	2.43	1.56, 3.78
Disclosure to others but not to spouse/family	1.87	1.11, 3.15	1.67	1.01, 2.75
HIV status awareness and disclosure				
Negative	REF		REF	
Known positive, undisclosed status	3.08	1.86, 5.12	3.83	1.26, 11.6
Known positive, disclosed status	3.77	3.01, 4.72	5.64	2.76, 11.6
Unknown positive	1.61	1.29, 2.01	1.36	0.90, 2.08
Sex work in prior 6 months	2.20	1.36, 3.55	--	--
Number of male sex partners in prior 6 months (per 5 partner increase)	1.03	1.01, 1.05	--	--
Unprotected anal sex in prior 6 months				
No	REF			
Yes	1.65	1.01, 2.68		
No anal sex in prior 6 months	1.55	0.96, 2.51	--	--
Alcohol use and dependence (AUDIT)				
None/mild	REF		REF	
Harmful/hazardous	1.18	0.94, 1.47	1.35	1.09, 1.68
Alcohol dependence	2.33	1.91, 2.85	2.73	2.16, 3.45
Alcohol use before sex in prior 6 months	1.61	1.02, 2.52	--	--
Injection drug use in prior 6 months	2.75	1.86, 4.08	2.03	1.05, 3.91
Social support (per 1 point increase)	1.03	0.97, 1.10	--	--
Composite stigma (per 1 point increase)	1.30	1.22, 1.38	--	--
Ever forced sex	2.86	1.86, 4.41	--	--
Adult intimate partner violence	3.04	1.79, 5.16	--	--

[a]Depression defined as a score of 10 or more on the PHQ-9.

[b]With scaled RDS-II weights.