

Association of socio-economic, gender and health factors with common mental disorders in women: a population-based study of 5703 married rural women in India

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Background There are few population-based studies from low- and middle-income countries that have described the association of socio-economic, gender and health factors with common mental disorders (CMDs) in rural women.

Methods Population-based study of currently married rural women in the age group of 15–39 years. The baseline data are from the National Family Health Survey-II conducted in 1998. A follow-up study was conducted 4 years later in 2002–03. The outcome of CMD was assessed using the 12-item General Health Questionnaire (GHQ-12). Due to the hierarchical nature and complex survey design, data were analysed using mixed-effect logistic regression with random intercept model.

Results A total of 5703 women (representing 83.5% of eligible women) completed follow-up. The outcome of CMD was observed in 609 women (10.7%, 95% confidence interval 9.8–11.6). The following factors were independently associated with the outcome of CMD in the final multivariable model: higher age, low education, low standard of living, recent intimate partner violence (IPV), husband's unsatisfactory reaction to dowry, husband's alcohol use and women's own tobacco use.

Conclusions Socio-economic and gender disadvantage factors are independently associated with CMDs in this population of women. Strategies that address structural determinants, for example to promote women's education and reduce their exposure to IPV, may reduce the burden of CMDs in women.

Keywords Women, depression, India, follow-up studies, social determinants, gender-based violence

Introduction

Common mental disorders (CMDs) is a term coined by Goldberg and Huxley¹ to describe disorders that are commonly encountered in community and primary-care settings, and whose occurrence signals a breakdown in normal functioning. Specific psychiatric syndromes incorporated in the concept of CMDs include depressive and anxiety disorders.² Unipolar depression is one of the leading causes of global burden of disease, measured using disability adjusted life years (DALYs), in developed as well as low- and middle-income countries,^{3,4} and is projected to be the leading cause of disease burden in Indian women, where the present study was carried out.

There is a growing evidence base pointing to the role of multiple determinants influencing the risk for CMDs. The first and most consistent factor is being a female.⁵ Women are one and half to two times more likely to suffer from CMDs as compared with men.^{6–10} Gender plays a major role in determining socio-economic position, access to resources and social status, which in turn influences mental health.^{8,11} Gender disadvantage and exposure to intimate partner violence (IPV) are commonly described correlates of CMDs in women.¹² IPV is the commonest type of inter-personal violence. In population-based surveys, between 10 and 69% of women reported being physically assaulted by an intimate male partner at some point in their lives.¹³ A 10-country WHO study found that women who experienced partner violence at least once in their life reported significantly more emotional distress, suicidal thoughts and attempts than non-abused women.¹⁴ In India, the practice of giving a dowry to the groom's family at marriage is widespread, and is frequently a source of dissatisfaction directed towards the bride, if there is a perceived shortfall in promised dowry. Lower dowry levels are associated with increased risk of domestic violence.^{15,16}

There is a robust and long-standing evidence base showing that individuals belonging to lower socio-economic classes, in both developed and less-developed countries, have greater exposure to more stressful life experiences, which contributes to a greater risk for CMDs.^{17–20} A cohort study in Pakistan, for example, showed that women from the lower socio-economic status (SES) category are three times as likely to have postnatal depression at 12-month follow-up compared with women from a higher SES category.²¹ In low- and middle-income countries, low education, food insecurity, poor housing and financial stress exhibit a relatively consistent and strong association with the risk for CMDs, whereas the association between other variables such as income, employment and consumption with CMDs is less robust.¹⁷ Tobacco and alcohol misuse,²² chronic physical health problems²³ and reproductive and sexual complaints¹² are other risk factors that have been shown to be associated with CMDs.

There are a few population-based, representative studies from low- and middle-income countries that have described the associations for CMDs in rural women. The aim of this article is to fill this gap in the evidence base, with the objective of describing the association of a range of socio-economic, gender and health factors with CMDs in a representative dataset of women's health in rural India. We were particularly interested in testing the hypotheses that factors indicative of social and gender disadvantage were independently associated with CMDs in women.

Methods

The data sources used for this study are the two linked data sets: the National Family Health Survey-II (NFHS-II) carried out in 1998–99, and a follow-up study for a subgroup of women in four states carried out in 2002–03.²⁴ NFHS-II (baseline study) is the Indian Demographic and Health Survey (DHS) designed to collect information related to demographic characteristics, health information and quality of public and private health services and perception of these services. The follow-up study was conducted to assess the quality of family planning services, to explore the relationship between service quality and contraceptive behaviour and to investigate aspects of women's health and well-being with emphasis on domestic violence and mental health.²⁵ Thus, the follow-up study was not planned a priori and the baseline assessments did not include measurement of CMD status.

Sample selection

The NFHS-II sample covered 99% of India's population, residing in its 26 states, and ultimately included a total of 89 199 women residing in 91 196 households.²⁴ These were ever-married women in the age group of 15–49 years.²⁴ A two-stage stratified systematic design was used for selection of the NFHS-II sample.²⁴ The sample design adopted was uniform in all the states. Details regarding selection of sample are provided elsewhere.²⁴

The sample for the follow-up study was drawn from the original NFHS-II study sample. The follow-up survey was limited to the four states of Bihar, Jharkhand, Maharashtra and Tamil Nadu. These states were chosen to represent differing demographic, socio-economic and service programme contexts in India. There is a wide variation in socio-economic and women's status across these four states; Bihar and Jharkhand are north Indian states, whereas Maharashtra and Tamil Nadu are situated in western and southern parts of India respectively. Women in Bihar and Jharkhand fare considerably worse compared with women in Maharashtra and Tamil Nadu with respect to indicators of women's status such as age at marriage, literacy and ability to access child

health services.^{26,27} These, and other, data demonstrate the developmental, social and cultural divide that distinguishes these north Indian states from south and west Indian states.²⁵ The follow-up study was further restricted to rural NFHS-II respondents, in light of the diverse and complex nature of family planning service delivery points in urban India. The main focus of the follow-up study was to describe the relationship between quality of care and subsequent contraceptive use, and as most women complete their fertility by the age of 40 years, the sample for the follow-up study did not include women >39 years at baseline.²⁵

In Maharashtra and Tamil Nadu, women were explicitly asked if they would agree to be re-interviewed at the time of the baseline NFHS-II and those who did not agree were not approached for a re-interview. In Bihar/Jharkhand, where there were no prior plans for a follow-up study, consent for re-interview was not obtained at the time of the baseline.²⁵ In all study sites, a detailed informed consent was obtained from all respondents at the time of the follow-up survey. Ethical approval for the study and resulting analysis were provided by institutional review board at Johns Hopkins Bloomberg School of Public Health. Following WHO ethical recommendations that only one family member per household be interviewed for the IPV module,²⁸ the youngest eligible woman in the household was selected when multiple respondents existed within the household, and interviews were expected to be carried out in private.

Variables

Variables we use for testing associations with CMDs were assessed at baseline (NFHS-II study) and at the follow-up (NFHS-II follow-up study). The NFHS-II included two questionnaires: a household questionnaire and a woman's questionnaire. The questionnaires for each state were bilingual, with questions in both the state language and in English.²⁴ A similar questionnaire was used in NFHS-II follow-up study.²⁵ The data collected from these two questionnaires were organized in the following manner.

Socio-economic factors

A standard-of-living index (SLI) was computed on the basis of the household ownership of assets and possessions. The SLI was created by assigning scores to a range of 30 household goods and assets, including the type of house and toilet facilities, fuel used for cooking and ownership of durable goods.²⁴ Based on the above score, the SLI had three levels: high, medium and low. Other socio-economic variables were age, education, employment status and place of residence. The caste variable had three categories: scheduled caste/scheduled tribe, other backward caste and neither scheduled caste/scheduled tribe nor other backward caste. Scheduled castes and scheduled tribes are castes and tribes that the Government of India

officially recognizes as socially and economically disadvantaged. In our analysis, education was treated as a binary variable with two levels: less than middle school (below grade 7) and middle school or above (grade 7 or above). All socio-economic factors were measured at baseline.

Marital and gender disadvantage factors

Questions related to the woman's marital status, husband's age, education, employment status and age at first marriage were included in the baseline questionnaire. Spousal inequality with respect to age was calculated by subtracting the woman's age at baseline from her husband's age at baseline. IPV was assessed at both baseline and follow-up. The baseline NFHS-II survey contained three questions about violence inflicted on the woman by her husband and by other family members. These questions were: 'Since you completed 15 years of age, have you been beaten or mistreated physically by any person?'; 'Who has beaten or mistreated you physically?'; and 'How often have you been beaten or mistreated physically in the last 12 months: once, a few times, many times, or not at all?'. The follow-up survey included several questions on violence inflicted by the husband covering a range of physical, verbal and sexual behaviours.²⁵ The specific questions were: 'Thinking about your own marriage, has your husband ever: pushed you, pulled you or held you down? Hit you with his fist or did something that could hurt you? Kicked you or dragged you? Tried to strangle or burn you? Threatened you with a knife, gun or other weapon? Attacked you with a knife, gun or other weapon? Used verbal threats to force you to have sex when you did not want to? Used physical force to force you to have sex when you did not want to?' and 'Thinking about all of these actions, how many episodes of violence occurred to you over the past 12 months?'. Baseline and follow-up data were used to compute a composite IPV variable with four rating values: no IPV, IPV only at baseline, IPV only at follow-up and IPV at both baseline and follow-up. Only responses to the question related to IPV in the previous 12 months were taken into account during this computation. Intergenerational exposure to violence was measured only at follow-up, through two questions on whether the respondent had witnessed violence by her father towards her mother. The question related to husband's reaction to dowry was: 'How would you describe the reaction of your husband's family to the cash, gifts, jewellery and other items you brought at the time of your marriage: very satisfied, satisfied, did not care, did not bring any, unsatisfied, very unsatisfied and unsure?'. For our analyses, we merged satisfied and very satisfied into one category ('satisfied'); merged very unsatisfied and unsatisfied into 'unsatisfied'; and merged the remaining three values into 'not applicable'. Husband's alcohol intake was also assessed at follow-up.

Physical and reproductive health factors

Information related to three risk behaviours—chewing *paan masala* or tobacco, drinking alcohol and smoking was elicited at baseline. Woman’s smoking status and intake of tobacco/*paan masala* were combined into a single composite variable assessing any tobacco use. Haemoglobin (Hb) levels were measured using portable equipment (the HemoCue).²⁴ Anaemia was defined as a categorical variable (absent if Hb >12 g/dl and present if Hb ≤12 g/dl). Height and weight for each woman was measured and Body Mass Index (BMI) calculated. BMI values were categorized as ≤20 kg/m², 20–25 kg/m² and >25 kg/m². Reproductive health variables were total number of children born (live births) and history of induced abortion. All physical and reproductive health factors were measured at baseline.

Outcome

CMDs were assessed using the 12-item General Health Questionnaire (GHQ-12) at follow-up. Although not a diagnostic instrument, the GHQ is one of the most widely used and validated screening questionnaires for the measurement of CMDs in primary care and community settings.²⁹ The longer 60-item and shorter 12-item versions of the GHQ have both been field tested and validated as a screening measure for current CMDs in India.^{30–32} The follow-up study utilized the 12-item version of the questionnaire. Each item was scored ‘1’ or ‘0’, thus a possible total score of 12 for each woman. The GHQ threshold score is partly determined by the prevalence of the disorders.³³ In this study we have used the cut-off point as ‘5’ to discriminate between presence or absence of a probable current CMD. This cut-off provided an optimal balance between sensitivity and specificity, when compared with a structured diagnostic interview for current depressive and anxiety disorders, confirming the criterion validity of the instrument.³⁰

Data analysis

Our analyses were guided by a conceptual framework constructed on the basis of previous literature,³⁴ but constrained to the factors that had been measured at each round of data collection. We followed a stepped model of analyses based on the hierarchy of factors as shown in Figure 1,³⁵ an approach that has been widely used to explore hierarchical relationships in observational data.^{36–38} In our model, socio-economic factors were considered most distal factors (level one of hierarchy), followed by marital and gender disadvantage factors (level two) and physical and reproductive health factors (level three) were the most proximal.

The association of each factor with the outcome of CMDs was first assessed using mixed-effect simple logistic regression (univariable analysis). In Model 1, socio-economic factors whose association showed a level of statistical significance at $P \leq 0.1$ in

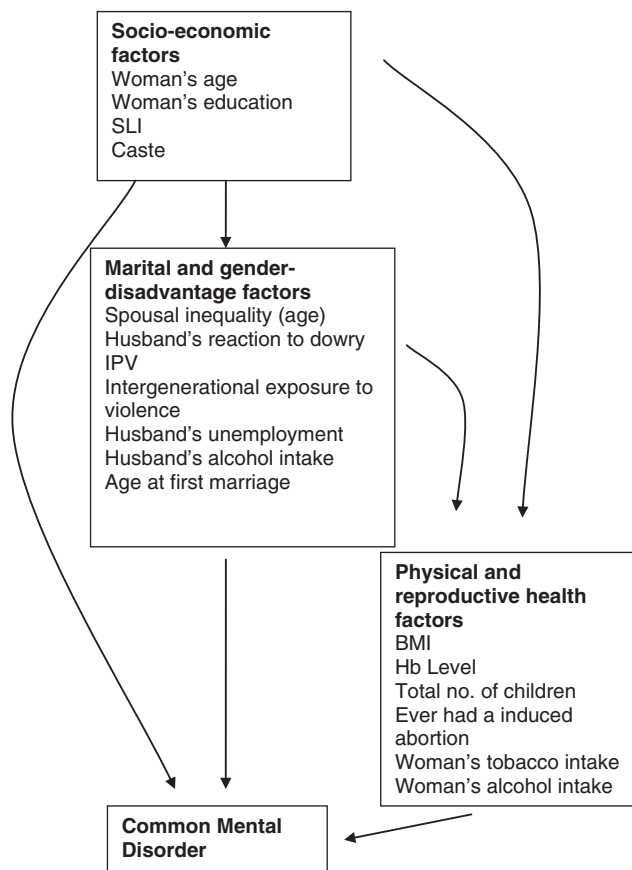


Figure 1 Conceptual framework for the analysis

univariable analysis were included. The factors that showed an association at $P \leq 0.1$ in this multivariable model were retained for inclusion in Model 2. Woman’s age was an a priori variable included in all models. Model 2 included the retained socio-economic factors and marital and gender disadvantage factors whose association showed a level of statistical significance at $P \leq 0.1$ in univariable analysis; those whose associations remained at $P \leq 0.1$ on adjustment, together with the socio-economic factors, were retained for inclusion in Model 3. Similarly, Model 3 included socio-economic, marital and gender disadvantage and physical and reproductive health factors. The variables retained in Model 3 were used in final Model 4. Further retention of the variables in this model was based on backward selection and likelihood ratio test. Mixed-effect simple and multiple logistic regression with random intercept was used for analyses. In multi-level modelling three levels were considered: individual, village [Primary Sampling Unit (PSU)] and strata. Thus, while estimating standard errors we took into account design effects due to clustering of women at the level of the primary sampling unit and clustering of PSUs at the level of strata.³⁹ Weights were applied to all the observations to account for over-sampling of certain categories of respondents in the study design. Svysset

and `gllamm`⁴⁰ commands were used in STATA IC 10 for analyses.⁴¹

Results

Participants

In the NFHS-II study, 11 100 ever-married rural women in the age group of 15–49 years from Bihar, Maharashtra and Tamil Nadu (Bihar and Jharkhand were one state at the time of study) were interviewed. The overall response rates in the baseline study for sampled women respondents were very high (95.5%), and ranged from 94.1 to 99.7% in the states included in the follow-up study. As the follow-up study was restricted to currently-married rural women aged 15–39 years, the overall target sample reduced to 7785 women.²⁴ These were the women who were usual residents of the selected households at the time of the baseline NFHS-II survey. In the states of Bihar and Jharkhand, 82 women were not interviewed during the NFHS-II study; thus, the eligible sample of women for the follow-up study was 7703. In Maharashtra, 250 women and in Tamil Nadu, 30 women refused consent for re-interview during NFHS-II study. Follow-up

interviews could not be completed in the case of 1013 women due to various reasons; for example, that the households were not identified, the woman was unavailable or refused interview and the woman had died or migrated. Thus, interviews were completed with 6437 women (83.6% of the eligible sample of 7703 women). After applying a priori exclusion criteria based on WHO ethical guidelines,²⁸ interviews were completed for 5703 women (Figure 2).

The sample of women interviewed in the follow-up survey is generally representative of the original target sample.²⁵ With the exception of lower levels of baseline contraceptive use and IPV prevalence in Bihar and Tamil Nadu, the re-interviewed and non-re-interviewed samples of women are generally similar in characteristics.²⁵ In the sample of 5703 women, the outcome of CMDs was observed in 609 women [10.7%, 95% confidence interval (CI) 9.8–11.6].

Univariable analysis of associations with CMD

Woman's age, education and SLI were associated with CMDs in univariable analysis (Table 1), but no association was observed between caste and CMDs. Higher SLI and higher level of women's education were inversely associated with CMDs. Among marital

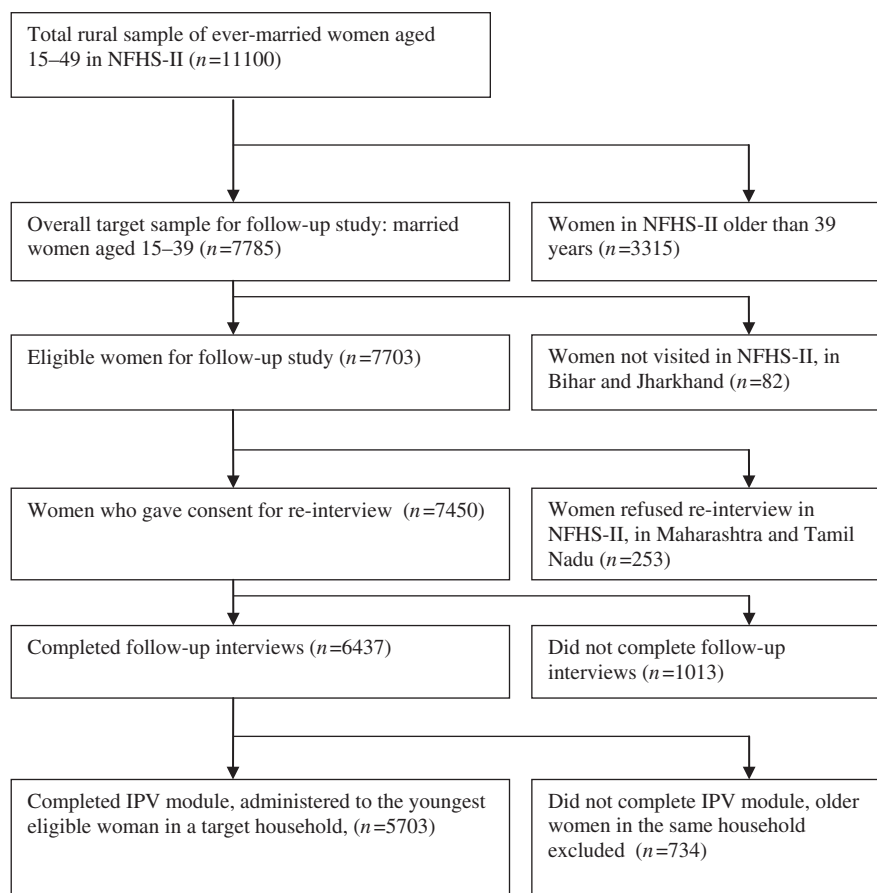


Figure 2 Flow chart of sample selection

Table 1 Univariable analysis of association of factors associated with CMDs (*N* = 5703, unless otherwise specified)

Variable	Prevalence <i>n</i> (%)	Presence of CMD	Timeline of measurement	Unadjusted OR with 95% CI	<i>P</i> -value
Socio-economic factors					
Woman's age in years			Baseline		
15–22	1477 (25.7)	144 (9.8)		1	
23–27	1442 (25.3)	144 (10.1)		1.1 (0.8–1.3)	0.613
28–32	1392 (24.5)	161 (11.6)		1.3 (1.0–1.6)	0.055
33–39	1392 (24.5)	160 (11.6)		1.3 (1.1–1.6)	0.006
Women's educational status			Baseline		
Less than middle school	4843 (84.9)	570 (11.8)		1	
Middle school or more	860 (15.1)	39 (4.5)		0.4 (0.3–0.5)	<0.001
SLI (<i>n</i> = 5669)			Baseline		
Low	3059 (54.0)	391 (12.9)		1	
Medium	2176 (38.3)	192 (8.8)		0.7 (0.5–0.8)	<0.001
High	434 (7.7)	21 (4.9)		0.4 (0.2–0.6)	<0.001
Caste (<i>n</i> = 5694)			Baseline		
Scheduled caste/scheduled tribe	1639 (29.1)	207 (12.5)		1	
Other backward class	2972 (51.9)	285 (9.6)		0.8 (0.7–1.1)	0.128
None	1083 (19.0)	116 (10.7)		0.9 (0.6–1.2)	0.35
Marital and gender disadvantage factors					
Spousal inequality in age (years)			Baseline		
Woman elder or of same age	182 (3.2)	20 (11.3)		1	
Difference up to 5	2528 (44.4)	284 (11.3)		1.1 (0.6–1.8)	0.779
Difference of 5–10	2160 (37.8)	211 (9.8)		1.0 (0.6–1.7)	0.985
Difference of >10	833 (14.6)	94 (11.4)		1.2 (0.7–2.0)	0.615
Husband's reaction to dowry (<i>n</i> = 5701)			Follow-up		
Satisfied	4358 (76.4)	403 (9.3)		1	
Unsatisfied	208 (3.6)	54 (26.0)		4.0 (2.7–6.0)	<0.001
NA	1135 (20.0)	151 (13.3)		1.7 (1.4–2.1)	<0.001
Husband's employment			Baseline		
Employed	5602 (98.2)	597 (10.7)		1	
Unemployed	101 (1.8)	12 (11.8)		0.9 (0.6–1.4)	0.758
Husband's alcohol intake (<i>n</i> = 5699)			Follow-up		
No	3382 (59.2)	296 (8.8)		1	
Yes	2317 (40.8)	312 (13.6)		1.5 (1.3–1.8)	<0.001
IPV			Baseline and follow-up		
None	2883 (50.4)	217 (7.6)		1	
Only baseline	497 (8.6)	45 (9.1)		1.3 (0.9–2.0)	0.164
Only follow-up	1785 (31.4)	257 (14.5)		2.2 (1.7–2.9)	<0.001
Both	538 (9.5)	90 (16.8)		2.7 (1.9–3.8)	<0.001
Intergenerational exposure to violence (<i>n</i> = 5690)			Follow-up		
No	4411 (77.4)	451 (10.3)		1	
Yes	1279 (22.6)	156 (12.3)		1.3 (1.1–1.6)	0.006

(continued)

Table 1 Continued

Variable	Prevalence <i>n</i> (%)	Presence of CMD	Timeline of measurement	Unadjusted OR with 95% CI	<i>P</i> -value
Age in years at first marriage			Baseline		
≤15	2241 (39.2)	274 (12.2)		1	
16–18	2315 (40.7)	233 (10.2)		0.9 (0.7–1.0)	0.091
≥19	1147 (20.1)	102 (9.0)		0.8 (0.7–1.1)	0.153
Physical and reproductive health factors					
BMI in kg/m ² (<i>n</i> = 5576)			Baseline		
≤20	3582 (64.2)	409 (11.5)		1	
20–25	1753 (31.4)	166 (9.6)		0.9 (0.7–1.0)	0.150
>25	241 (4.3)	15 (6.2)		0.6 (0.4–1.0)	0.084
Hb levels in g/dl (<i>n</i> = 5363)			Baseline		
≤12	3492 (65.1)	394 (11.4)		1	
>12	1871 (34.9)	165 (8.8)		0.8 (0.6–0.9)	0.028
Total no. of children			Baseline		
0	694 (12.2)	83 (12.1)		1	
1	872 (15.3)	98 (11.3)		1.0 (0.7–1.5)	0.873
2	1170 (20.5)	105 (9.0)		0.8 (0.6–1.1)	0.196
≥3	2967 (52.0)	323 (10.9)		0.9 (0.7–1.3)	0.600
Ever had a induced abortion			Baseline		
No	4683 (82.1)	503 (10.8)		1	
Yes	1020 (17.9)	106 (10.5)		1.1 (0.9–1.4)	0.346
Woman's alcohol intake (<i>n</i> = 5702)			Baseline		
No	5599 (98.0)	586 (10.5)		1	
Yes	103 (2.0)	23 (22.7)		1.7 (1.2–2.5)	0.005
Woman's tobacco intake			Baseline		
No tobacco	5204 (91.2)	536 (10.3)		1	
Smoking/chewing	499 (8.8)	73 (15.1)		1.7 (1.2–2.2)	<0.001

OR: odds ratio; NA: not applicable.

and gender disadvantage factors, husband's alcohol intake, IPV and intergenerational exposure to violence were associated with CMD. Husband's unsatisfactory reaction to dowry was strongly associated with CMD [odds ratio (OR) 4.0; 95% CI 2.7–6.0]. No association was found between baseline IPV and CMDs, but follow-up IPV was strongly associated with CMDs (OR 2.2; 95% CI 1.7–2.9) as was IPV at both time points (OR 2.7; 95% CI 1.9–3.8). Husband's employment status, spousal inequality in age and woman's age at first marriage were not associated with CMD. Women's alcohol and tobacco intake were associated with CMDs and higher BMI and higher Hb levels were inversely associated with CMDs.

Multivariable analysis of associations with CMD

In Model 1, all socio-economic factors (woman's age, woman's education and SLI) retained an independent association with CMDs. The largest effects were

observed for woman's education and SLI. In Model 2, husband's reaction to dowry, husband's alcohol intake and IPV retained an independent association with CMDs. In Model 3, only woman's tobacco intake met the criteria for inclusion in the final multivariable model. In the final model (Model 4), woman's education showed the strongest association with CMDs; women who had been schooled up to or beyond middle school were 40% less likely to have a CMD (OR 0.6; 95% CI 0.4–0.8). Higher SLI was inversely associated with CMD. Husband's unsatisfactory reaction to dowry retained a strong association with CMDs (OR 3.1; 95% CI 2.0–4.6), as did IPV at follow-up (OR 2.0; 95% CI 1.5–2.6). Husband's alcohol intake and woman's tobacco intake also retained independent associations with CMDs (Table 2).

Discussion

We describe the findings of one of the largest population-based studies examining the association

Table 2 Multivariable analyses of factors associated with CMDs

Variables	Model 1	P-value	Model 2	P-value	Model 3	P-value	Model 4	P-value
Socio-economic factors								
Woman's age in years								
15–22	1		1		1		1	
23–27	1.0 (0.8–1.3)	0.801	1.0 (0.8–1.3)	0.752	1.0 (0.8–1.3)	0.990	1.0 (0.8–1.3)	0.938
28–32	1.2 (0.9–1.5)	0.168	1.3 (0.9–1.6)	0.067	1.3 (1.0–1.6)	0.103	1.2 (1.0–1.5)	0.111
33–39	1.2 (1.0–1.5)	0.101	1.3 (1.0–1.7)	0.005	1.3 (1.1–1.6)	0.052	1.3 (1.0–1.5)	0.017
Woman's status (education)								
Less than middle school	1		1		1		1	
Middle school or more	0.5 (0.3–0.7)	<0.001	0.6 (0.4–0.8)	0.003	0.6 (0.4–0.8)	0.003	0.6 (0.4–0.8)	0.004
SLI								
Low	1		1		1		1	
Medium	0.7 (0.6–0.9)	0.002	0.8 (0.6–0.9)	0.016	0.8 (0.7–1.0)	0.058	0.8 (0.7–1.0)	0.029
High	0.5 (0.3–0.9)	0.009	0.7 (0.4–1.1)	0.124	0.7 (0.4–1.1)	0.147	0.7 (0.4–1.1)	0.137
Marital and gender disadvantage factors								
Husband's reaction to dowry								
Satisfied			1		1		1	
Unsatisfied			3.1 (2.0–4.7)	<0.001	3.0 (2.0–4.4)	<0.001	3.1 (2.0–4.6)	<0.001
NA			1.6 (1.3–2.0)	<0.001	1.6 (1.3–2.1)	<0.001	1.6 (1.3–2.1)	<0.001
IPV								
None			1		1		1	
Only baseline			1.1 (0.8–1.7)	0.524	1.0 (0.7–1.6)	0.851	1.1 (0.7–1.7)	0.571
Only follow-up			2.0 (1.5–2.6)	<0.001	2.0 (1.6–2.5)	<0.001	2.0 (1.5–2.6)	<0.001
Both			2.1 (1.4–3.2)	<0.001	2.2 (1.6–3.1)	<0.001	2.1 (1.4–3.2)	<0.001
Husband's alcohol intake								
No			1		1		1	
Yes			1.2 (1.0–1.4)	0.032	1.2 (1.0–1.4)	0.094	1.2 (1.0–1.4)	0.031
Intergenerational exposure to violence								
No			1					
Yes			1.1 (0.9–1.4)	0.427				
Physical and reproductive health factors								
BMI (kg/m ²)								
≤20					1			
20–25					0.9 (0.8–1.1)	0.505		
>25					0.9 (0.5–1.6)	0.611		
Hb levels (g/dl)								
≤12					1			
>12					0.9 (0.7–1.1)	0.158		
Woman's alcohol intake								
No					1			
Yes					1.4 (0.8–2.6)	0.264		
Woman's tobacco intake								
No tobacco					1		1	
Smoking/chewing					1.3 (1.0–1.9)	0.077	1.3 (1.0–1.8)	0.033

Model 1: socio-economic factors adjusted for each other (only factors significant in univariable analysis at $P \leq 0.1$). Model 2: marital and gender disadvantage factors adjusted for each other (only factors significant in univariable analysis at $P \leq 0.1$) and factors from Model 1 at $P \leq 0.1$. Model 3: physical and reproductive health factors adjusted for each other (only factors significant in univariable analysis at $P \leq 0.1$) and factors from Model 2 at $P \leq 0.1$. Model 4: final multivariable model.

NA: not applicable.

of socio-economic, gender disadvantage and health factors with women's mental health in rural settings in India. The prevalence of probable CMDs among women in our study sample was 10.7%. The prevalence of CMD varies widely between populations, as has been shown in the World Mental Health surveys which used identical methods in more than two dozen settings.⁴² The rates of CMDs also vary greatly between populations in India, with a median rate of 10% in adult populations, a figure that closely approximates our estimate.⁴³ We found that older age, lower education, lower SLI, exposure to IPV, husband's unsatisfactory reaction to dowry, husband's alcohol intake and tobacco consumption were independently associated with CMDs in rural, married women in the age group of 15–39 years. We did not find any association between other physical and reproductive health factors with CMDs.

Our study findings support the robust evidence regarding the role of socio-economic position and education as factors associated with CMDs. There is high level of inequity in the distribution of CMDs across socio-economic strata within societies, with significantly increased rates of depression among lower socio-economic groups.^{17,44,45} Our finding of independent associations between education and SLI with CMDs, indicators of social disadvantage in childhood and adulthood respectively, provides support to the social causation theory. We also found an association between woman's age and CMDs, as reported from other studies.¹² The higher prevalence for depression in older women may be associated with multiple stressors of income generation and child-rearing.³⁴ We did not find any association between caste and CMDs even in univariable analysis; this was a surprising finding given that our data confirmed strong associations between caste and indicators of socio-economic disadvantage.

In most of the South Asian cultures there is a dominant patriarchal social matrix that systematically disadvantages women's opportunities and status. Dowry is a long-standing (but illegal) practice, which is prevalent in India; in our sample, ~80% of women reported that dowry had been exchanged. Harassment by in-laws on issues related to dowry is a major factor associated with poor mental health and suicides in women^{46,47} and is also a determinant of IPV.^{15,16,48,49} Notably, we found that husband's unsatisfactory reaction to dowry was strongly associated with CMDs, similar to reports from another Indian study.⁴⁶ We found a robust association between IPV and CMDs, a widely documented finding.^{14,38,46,50–52} Our finding of no association between remote IPV and CMDs, but a strong association between recent IPV and CMDs, is also consistent with other studies^{53,54} and can be explained in two ways. First, the association with past violence is confounded by recent violence. Secondly, the association with CMDs subsides with time after exposure. The association of

CMDs with IPV can be explained by the fact that the experience of violence is likely to lead to insecurity, hopelessness, helplessness and low self-esteem.³⁴ Our study also replicated the finding that husband's alcohol intake is an important factor associated with poor mental health in women.⁴⁶ Husband's alcohol intake also has indirect impact on CMDs by increasing the risk of IPV.^{48,55} This constellation of factors, in addition to low education, comprises indicators of the structural disadvantages faced by women in India.

Our other findings indicate that tobacco use (which, in this sample, was predominantly in the form of chewed tobacco) is associated with CMDs. These findings replicate a growing literature from studies in developed countries^{56,57} and at least one other Indian study.⁵³ The effects of tobacco are probably mediated through multiple pathways, including the pharmacological effects of nicotine on the central nervous system and the experience of tobacco-related illness⁵⁸ as well as common or correlated risk factors.⁵⁷ We did not find an independent association between any other physical (BMI and anaemia) or reproductive health factors (total number of live births and history of induced abortion) with CMDs. No association between anaemia and CMDs is consistent with other Indian studies.^{12,53} Thus, although CMDs and anaemia are both relatively common and often co-morbid, the symptoms of CMDs experienced by women with anaemia are not attributable to the anaemia.

A major limitation of our study is that the follow-up and baseline were not planned as a prospective study a priori and there are important differences in the measurements of exposures and outcomes. In particular, we did not have a measure of CMDs at baseline and are therefore unable to adjust for baseline mental health in our analyses. In addition, the selection of baseline factors for analyses of association with CMDs were constrained to the variables measured. The outcome of CMDs was measured using a screening questionnaire rather than a lengthier diagnostic interview; however, this is a common practice in the context of a large population-based study where multiple outcomes are being assessed alongside mental health. Several population-based studies have reported good construct validity for the GHQ-12.^{59–61} Although the GHQ score does not in itself represent a diagnosis of a CMD, it shows very high discriminating ability against International Classification of Diseases 10 (ICD10) diagnostic criteria for CMD.³⁰ As the study sample consisted only of rural, married women in the age group of 15–39 years, our findings may not generalize to other groups of women (for example, those who are separated from their husbands and older women). During the follow-up, only one woman (the youngest) from each household was selected, which makes the sample biased towards younger age group. The estimates of IPV in the baseline and follow-up surveys are not strictly comparable as there were only two questions in the baseline survey compared with a

battery of questions in the follow-up survey. This might have resulted in under-reporting of IPV at baseline.

The strength of this study is that it is based on one of the largest, nationally-representative, datasets of women's mental health in a rural setting in the developing world. We observed a high response rate despite the long follow-up period. Our study confirms that both social disadvantage related to social class inequalities and gender disadvantage, are independently associated with CMDs in women. In order to reduce the burden of women's mental health problems in India, it is vital to strengthen interventions that address structural determinants, notably woman's education, the practice of dowry, spousal alcohol abuse and IPV.

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Conflict of interest: None declared.

KEY MESSAGES

- Socio-economic and gender disadvantage are independently associated with common mental disorders in women.
- Tobacco use is independently associated with common mental disorders in women.
- Strategies which address structural determinants, for example to promote women's education and reduce their exposure to IPV, may reduce the population burden of common mental disorders in women.

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