



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

Rahul Shidhaye, Vikram Patel

► To cite this version:

Rahul Shidhaye, Vikram Patel. 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. International Journal of Epidemiology, 2010, 39 (6), pp.1510. 10.1093/ije/DYQ179 . hal-00637029

HAL Id: hal-00637029

<https://hal.science/hal-00637029>

Submitted on 29 Oct 2011

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

**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**

Journal:	<i>International Journal of Epidemiology</i>
Manuscript ID:	IJE-2010-01-0058.R3
Manuscript Type:	Original Article
Key Words:	women, depression, India, follow-up studies, social determinants, gender based violence

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

Rahul Shidhaye and Vikram Patel

Rahul Shidhaye, MD (Psych), MHS: Lecturer, Public Health Foundation of India (India).

Vikram Patel, MRCPsych, PhD, FMedSci: Professor of International Mental Health and Wellcome Trust Senior Clinical Research Fellowship in Tropical Medicine, London School of Hygiene & Tropical Medicine (UK) and Sangath (India).

Acknowledgements: The work described in this paper was supported by a grant from the National Institutes of Health (USA). We are grateful to the Population Council and Johns Hopkins University for collaboration with regards to these analyses. We acknowledge with much appreciation the contribution of the late Michael Koenig, who not only envisioned this project but also provided constructive suggestions about the topics under study. We thank Rajib Acharya, Shireen Jejeebhoy, Emma Slaymaker and George Ploubidis for their guidance with the analysis and their comments on the drafts. VP is supported by a Wellcome Trust Senior Clinical Fellowship.

Word Count: 4508

Abstract

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

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

Results 5703 women (representing 83.5% of eligible women) completed follow-up. The outcome of CMD was observed in 609 women (10.7%, CI 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 common mental disorders in this population of women. Strategies which address structural determinants, for example to promote women's education and reduce their exposure to IPV, may reduce the burden of CMD in women.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

INTRODUCTION

Common mental disorders (CMD) are a term coined by Goldberg and Huxley (1) to describe disorders which are commonly encountered in community settings, and whose occurrence signals a breakdown in normal functioning. These disorders are typically encountered in community and primary care settings (1). Specific psychiatric syndromes included in the concept of CMD include depressive and anxiety disorders (2). Unipolar depression is one of the leading causes of Global Burden of Disease, DALYs in developed as well as low and middle income countries (3, 4) and is projected to be the leading cause of burden of disease in women in India, where the study described in this paper was carried out.

There is a growing evidence base pointing to the role of multiple determinants influencing the risk for CMD. The first, most consistent, factor is female gender (5). Women are one and half to two times more likely to suffer from CMD as compared to men (6-10). Gender plays 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 CMD in women (12). IPV is the commonest type of inter-personal violence. In population-based surveys, between 10 to 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 CMD (17-20). A cohort study in Pakistan, for example, showed that women in the low SES category are three times as likely to have postnatal depression at 12-month follow-up as women in a higher SES category (21). In low-middle income countries, low education, food insecurity, poor housing, and financial stress exhibit a relatively consistent and strong association with the risk for CMD, while the association between other variables such as income, employment and consumption with CMD is less robust (17). Tobacco and alcohol misuse (22), chronic physical health problems (23) and reproductive and sexual complaints (12) are other risk factors which have been shown to be associated with CMD.

There are few population-based, representative studies from low and middle income countries which have described the associations for CMD in women living in rural areas. The aim of this paper 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 CMD 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 CMD in women.

MATERIAL AND METHODS

The data source 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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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 behavior 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 National Family Health Survey-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 15–49 (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 program 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 while Maharashtra and Tamil Nadu are situated in western and southern part of India respectively. Women in Bihar and Jharkhand fare considerably worse relative to 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 age 40 the sample for the follow-up study did not include women older than 39 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 plans originally 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 consent form was read and consent obtained from all respondents at the time of the follow-up survey. Ethical approval for the study and resulting analysis was 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 CMD 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 language of the state and in English (24). A similar questionnaire was used in NFHS-II follow-up study

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

(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 standard of living index (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 and 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 2 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 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 woman's age at baseline from husband's age at baseline. Intimate Partner Violence (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 behaviors (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 behaviors—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 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 or less kg/m², 20 to 25 kg/m² and more than 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

Common mental disorders 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 CMD 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 CMD in India (30-32). The follow-up study utilized the 12-item version of the questionnaire. Each item was scored one or zero, thus a possible total score of twelve 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 of 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 against 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 which 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 which 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 CMD 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 univariable analysis were included. The factors which 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 effects simple and multiple logistic regression with random intercept was used for analyses. In multi-level modeling three levels were considered; individual, village (PSU) and strata. Thus while estimating standard errors we took into account design effects due to clustering of

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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. Svyset and gllamm (40) commands were used in STATA IC 10 for analyses (41).

RESULTS

Participants

In the NFHS-II study, 11100 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 here]

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-reinterviewed samples of women are generally similar in characteristics (25). In the sample of 5703 women, the outcome of CMD was observed in 609 women (10.7%, 95% CI, 9.8-11.6%).

Univariable analysis of associations with CMD (Table 1)

Woman's age, education and SLI were associated with CMD in univariable analysis, but no association was observed between caste and CMD. Higher SLI and higher level of women's education were inversely associated with CMD. Among marital 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 (OR, 4.0; 95% CI, 2.7-6.0). No association was found between baseline IPV and CMD, but follow-up IPV was strongly associated with CMD (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 CMD and higher BMI and higher haemoglobin levels were inversely associated with CMD.

[Table 1 here]

Multivariable analysis of associations with CMD (Table 2)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

In model 1, all socio-economic factors (woman's age, woman's education and SLI) retained an independent association with CMD. 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 CMD. 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 CMD; 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 CMD (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 CMD.

[Table 2 here]

DISCUSSION

We describe the findings of one of the largest population-based studies examining the association of socio-economic, gender disadvantage and health factors with women's mental health in rural settings in India. The prevalence of probable CMD 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 which 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

CMD in rural, married women in the age group of 15 to 39 years. We did not find any association between other physical and reproductive health factors with CMD.

Our study findings support the robust evidence regarding the role of socio-economic position and education as factors associated with CMD. There is high level of inequity in the distribution of CMD 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 CMD, 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 CMD 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 CMD 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 which systematically disadvantages women's opportunities and status. Dowry is a long standing (but illegal) practice which is prevalent in India; in our sample, about 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 CMD, similar to reports from another Indian study (46). We found a robust association between IPV and CMD, a widely documented finding (14, 38, 46, 50-52). Our finding of no association between remote IPV and CMD but a strong association between recent IPV and CMD 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 and second, the association with CMD subsides with time after exposure. The association of CMD 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 CMD 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 CMD. 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 illness (58) 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 CMD. No association between anaemia and CMD is consistent with other Indian studies (12) (53). Thus, although CMD and anaemia are both relatively common and often co-morbid, the symptoms of CMD 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 CMD 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 CMD were constrained to the variables measured. The outcome of CMD 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 CMD, it shows very high discriminating ability against ICD10 diagnostic criteria for CMD (30). As the study sample consisted only of rural, married women in the age group of 15-39, 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 to 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 CMD in women. In order to reduce the burden of women's mental health problems in India it is vital to strengthen interventions which address structural determinants, notably woman's education, the practice of dowry, spousal alcohol abuse and IPV.

REFERENCES:

1. Goldberg D, Huxley P. Common Mental Disorders: A Biosocial Model. London:Tavistock/Routledge 1992.
2. Skapinakis P. Commentary: Socioeconomic position and common mental disorders: what do we need to know? *International journal of epidemiology* 2007 Aug;**36**(4): 786-8.
3. Lopez A, Mathers C, Ezzati M, Jamison D, Murray C. Global burden of disease and risk factors. Washington, DC, Oxford University Press and World Bank 2006.
4. Phillips MR, Zhang J, Shi Q, et al. Prevalence, treatment, and associated disability of mental disorders in four provinces in China during 2001-05: an epidemiological survey. *Lancet* 2009 Jun 13;**373**(9680): 2041-53.
5. Patel V, Araya R, de Lima M, Ludermitr A, Todd C. Women, poverty and common mental disorders in four restructuring societies. *Social science & medicine (1982)* 1999 Dec;**49**(11): 1461-71.
6. Kessler RC, Berglund P, Demler O, et al. The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). *Jama* 2003 Jun 18;**289**(23): 3095-105.
7. Kessler RC, McGonagle KA, Nelson CB, Hughes M, Swartz M, Blazer DG. Sex and depression in the National Comorbidity Survey. II: Cohort effects. *Journal of affective disorders* 1994 Jan;**30**(1): 15-26.
8. Maier W, Gansicke M, Gater R, Rezaki M, Tiemens B, Urzua RF. Gender differences in the prevalence of depression: a survey in primary care. *Journal of affective disorders* 1999 Jun;**53**(3): 241-52.
9. Kuehner C. Gender differences in unipolar depression: an update of epidemiological findings and possible explanations. *Acta psychiatrica Scandinavica* 2003 Sep;**108**(3): 163-74.
10. Mirza I, Jenkins R. Risk factors, prevalence, and treatment of anxiety and depressive disorders in Pakistan: systematic review. *BMJ (Clinical research ed)* 2004 Apr 3;**328**(7443): 794.
11. Jenkins R. Sex differences in minor psychiatric morbidity: a survey of a homogeneous population. *Social science & medicine (1982)* 1985;**20**(9): 887-99.
12. Patel V, Kirkwood BR, Pednekar S, et al. Gender disadvantage and reproductive health risk factors for common mental disorders in women: a community survey in India. *Arch Gen Psychiatry* 2006 Apr;**63**(4): 404-13.
13. Heise L. Violence against women: the hidden health burden. *World health statistics quarterly* 1993;**46**(1): 78-85.
14. Ellsberg M, Jansen HA, Heise L, Watts CH, Garcia-Moreno C. Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study. *Lancet* 2008 Apr 5;**371**(9619): 1165-72.
15. Jejeebhoy SJ, Cook RJ. State accountability for wife-beating: the Indian challenge. *Lancet* 1997 Mar;**349** Suppl 1: s110-2.
16. Rao V. Wife-beating in rural south India: a qualitative and econometric analysis. *Social science & medicine (1982)* 1997 Apr;**44**(8): 1169-80.
17. Lund C, Breen A, Flisher AJ, et al. Poverty and common mental disorders in low and middle income countries: A systematic review. *Social Science & Medicine* 2010;**71**(3): 517-28.

18. Srole L, Langner TS, Michael ST, Opler MK, Rennie TAC. Mental Health in the Metropolis: The Midtown Study. *McGraw-Hill, New York* 1962;**vol.1**.
19. Leighton DC, Harding JS, Macklin DB, Hughes CC, Leighton AH. Psychiatric findings of the Stirling Country Study. *The American journal of psychiatry* 1963 May;**119**: 1021-6.
20. Lorant V, Deliege D, Eaton W, Robert A, Philippot P, Ansseau M. Socioeconomic Inequalities in Depression: A Meta-Analysis. *Am J Epidemiol* 2003 January 15, 2003;**157**(2): 98-112.
21. Rahman A, Creed F. Outcome of prenatal depression and risk factors associated with persistence in the first postnatal year: prospective study from Rawalpindi, Pakistan. *Journal of affective disorders* 2007 Jun;**100**(1-3): 115-21.
22. Breslau N, Schultz LR, Johnson EO, Peterson EL, Davis GC. Smoking and the risk of suicidal behavior: a prospective study of a community sample. *Archives of general psychiatry* 2005 Mar;**62**(3): 328-34.
23. Evans DL, Charney DS, Lewis L, et al. Mood disorders in the medically ill: scientific review and recommendations. *Biological psychiatry* 2005 Aug 1;**58**(3): 175-89.
24. International Institute for Population Sciences and ORCMacro. National Family Health Survey (NFHS—2) 1998-99: India. Mumbai: IIPS. <http://www.nfhsindiaorg/data/india/indch1pdf> 2000;**Accessed online on June 26, 2010**.
25. International Institute for Population Sciences (IIPS) and Johns Hopkins Bloomberg School of Public Health. Quality of Care in Indian Family Planning Programme and Reproductive Behaviour of Women in Four Indian States: A Follow-up Study of NFHS-2 .Mumbai: IIPS. http://www.iipsindiaorg/publications05_b_09ahtm 2005;**Accessed online on June 26, 2010**.
26. International Institute for Population Sciences and ORCMacro. National Family Health Survey (NFHS—2) 1998-99: India. Mumbai: IIPS. Factsheet and summary of findings. <http://www.nfhsindiaorg/data/india/indfctsmpdf> 2000;**Accessed online on June 26, 2010**.
27. International Institute for Population Sciences and ORCMacro. National Family Health Survey (NFHS—2) 1998-99: India. Mumbai: IIPS. NFHS-2 Factsheet: State Findings. <http://www.nfhsindiaorg/data/india/statfindpdf> 2000;**Accessed online on June 26, 2010**.
28. World Health Organization (WHO). Putting women's safety first: ethical and safety recommendations for research on domestic violence against women. Geneva. *Global Programme on Evidence for Health Policy Publication no WHO/EIP/GPE/992* 1999.
29. Goldberg D. Manual of the General Health Questionnaire. *Windsor: NFER Publishing Company* 1978.
30. Patel V, Araya R, Chowdhary N, et al. Detecting common mental disorders in primary care in India: a comparison of five screening questionnaires. *Psychological medicine* 2008 Feb;**38**(2): 221-8.
31. Shamasundar C, Sriram T, Murali Raj G. Standardisation of the Hindi version of Goldberg's General Health Questionnaire. *Indian Journal of Psychiatry* 1987;**29**: 63-6.
32. Gautam S, Nijhawan M, Kamal P. Standardisation of the Hindi version of Goldberg's General Health Questionnaire. *Indian Journal of Psychiatry* 1987;**29**: 63-6.
33. Goldberg DP, Oldehinkel T, Ormel J. Why GHQ threshold varies from one place to another. *Psychological medicine* 1998 Jul;**28**(4): 915-21.
34. Patel V, Lund C, Hatherill S, et al. Social determinants of mental disorders. In: *Equity, social determinants and public health programmes Edited by Erik Blas and Anand Sivasankara Kurup, World Health Organization, Geneva* 2010.

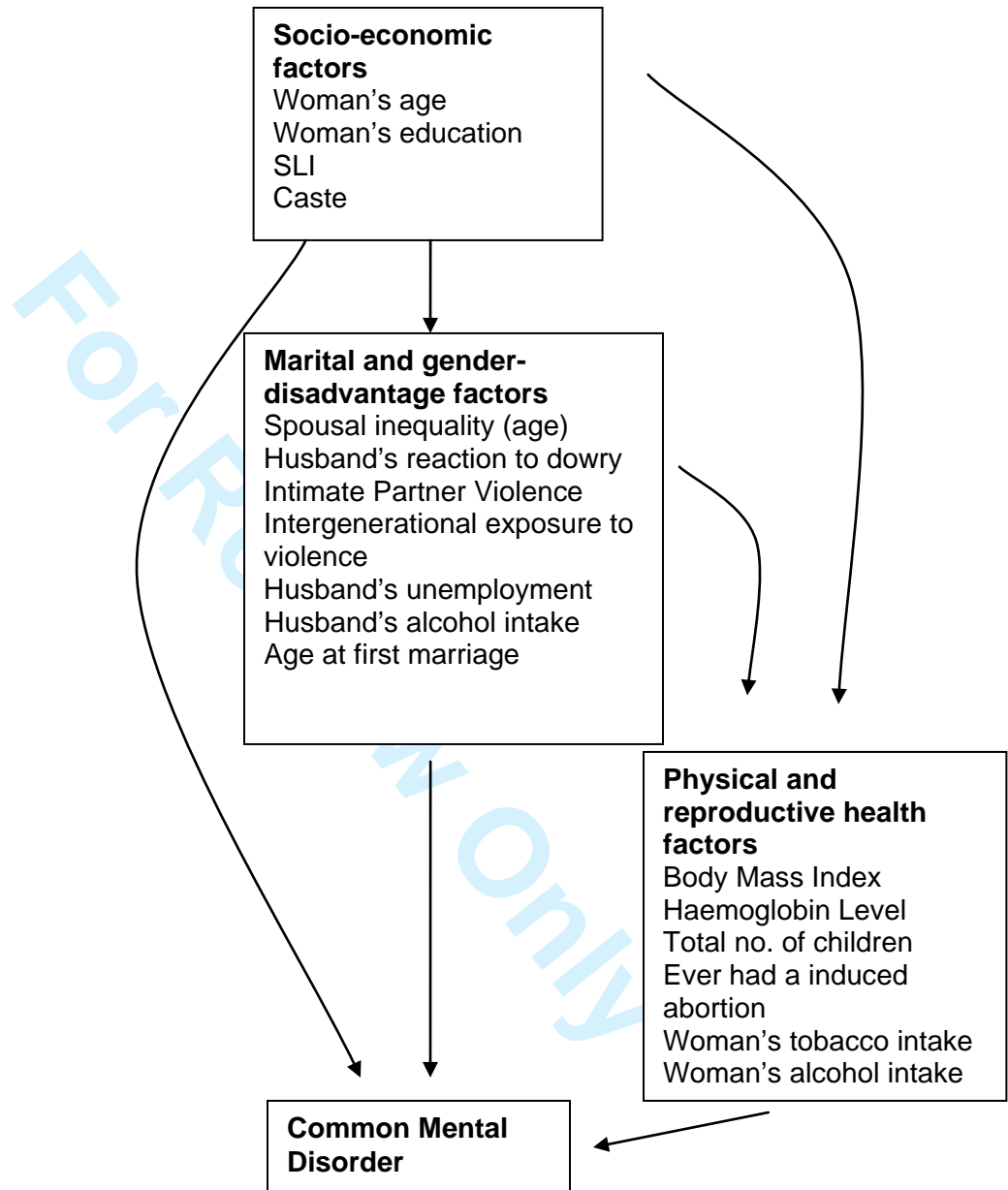
35. Victora CG, Huttly SR, Fuchs SC, Olinto MT. The role of conceptual frameworks in epidemiological analysis: a hierarchical approach. *Int J Epidemiol* 1997;**26**(1): 224-7.
36. Patel V, Weiss HA, Kirkwood BR, et al. Common genital complaints in women: the contribution of psychosocial and infectious factors in a population-based cohort study in Goa, India. *Int J Epidemiol* 2006 December 1, 2006;**35**(6): 1478-85.
37. Pillai A, Andrews T, Patel V. Violence, psychological distress and the risk of suicidal behaviour in young people in India. *Int J Epidemiol* 2009 April 1, 2009;**38**(2): 459-69.
38. Patel V, Pednekar S, Weiss H, et al. Why do women complain of vaginal discharge? A population survey of infectious and psychosocial risk factors in a South Asian community. *International journal of epidemiology* 2005 Aug;**34**(4): 853-62.
39. Mishra V, Dai X, Smith KR, Mika L. Maternal exposure to biomass smoke and reduced birth weight in Zimbabwe. *Ann Epidemiol* 2004;**14**(10): 740-7.
40. Rabe-Hesketh S, Pickles A, Taylor C. Generalized linear latent and mixed models. *Stata Technical Bulletin, StataCorp LP* 2000;**vol. 9**(53).
41. StataCorp. Stata Statistical Software: Release 10. College Station, TX: StataCorp LP. 2007.
42. Demyttenaere K, Bruffaerts R, Posada-Villa J, et al. Prevalence, severity, and unmet need for treatment of mental disorders in the World Health Organization World Mental Health Surveys. *Jama* 2004 Jun 2;**291**(21): 2581-90.
43. Ganguli H. Epidemiological findings on prevalence of mental disorders in India. *Indian Journal of Psychiatry* 2000;**42**, 14-20.
44. Araya R, Rojas G, Fritsch R, Acuna J, Lewis G. Common mental disorders in Santiago, Chile: prevalence and socio-demographic correlates. *Br J Psychiatry* 2001 Mar;**178**: 228-33.
45. Luderer AB, Lewis G. Links between social class and common mental disorders in Northeast Brazil. *Social psychiatry and psychiatric epidemiology* 2001 Mar;**36**(3): 101-7.
46. Kumar S, Jeyaseelan L, Suresh S, Ahuja RC. Domestic violence and its mental health correlates in Indian women. *Br J Psychiatry* 2005 Jul;**187**: 62-7.
47. Kumari R. Brides Are Not for Burning: Dowry Victims in India. *New Delhi:Radiant* 1989.
48. Jeyaseelan L, Kumar S, Neelakantan N, Peedicayil A, Pillai R, Duvvury N. Physical spousal violence against women in India: some risk factors. *J Biosoc Sci* 2007 Sep;**39**(5): 657-70.
49. Rocca CH, Rathod S, Falle T, Pande RP, Krishnan S. Challenging assumptions about women's empowerment: social and economic resources and domestic violence among young married women in urban South India. *Int J Epidemiol* 2009 Apr;**38**(2): 577-85.
50. Diaz-Olavarrieta C, Ellertson C, Paz F, de Leon SP, Alarcon-Segovia D. Prevalence of battering among 1780 outpatients at an internal medicine institution in Mexico. *Social science & medicine (1982)* 2002 Nov;**55**(9): 1589-602.
51. Chowdhary N, Patel V. The effect of spousal violence on women's health: findings from the Stree Arogya Shodh in Goa, India. *J Postgrad Med* 2008 Oct-Dec;**54**(4): 306-12.
52. Luderer AB, Schraiber LB, D'Oliveira AF, Franca-Junior I, Jansen HA. Violence against women by their intimate partner and common mental disorders. *Social science & medicine (1982)* 2008 Feb;**66**(4): 1008-18.
53. Patel V, Kirkwood BR, Pednekar S, Weiss H, Mabey D. Risk factors for common mental disorders in women. Population-based longitudinal study. *Br J Psychiatry* 2006 Dec;**189**: 547-55.

- 1
2
3 54. Bonomi AE, Thompson RS, Anderson M, et al. Intimate partner violence and
4 women's physical, mental, and social functioning. *American journal of preventive*
5 *medicine* 2006 Jun;**30**(6): 458-66.
6
7 55. Foran HM, O'Leary KD. Alcohol and intimate partner violence: a meta-analytic
8 review. *Clin Psychol Rev* 2008 Oct;**28**(7): 1222-34.
9
10 56. Wagena EJ, van Amelsvoort LG, Kant I, Wouters EF. Chronic bronchitis,
11 cigarette smoking, and the subsequent onset of depression and anxiety: results from a
12 prospective population-based cohort study. *Psychosom Med* 2005 Jul-Aug;**67**(4): 656-
13 60.
14 57. Boden JM, Fergusson DM, Horwood LJ. Cigarette smoking and depression: tests
15 of causal linkages using a longitudinal birth cohort. *Br J Psychiatry* 2010 Jun;**196**(6):
16 440-6.
17 58. Munafo MR, Araya R. Cigarette smoking and depression: a question of
18 causation. *Br J Psychiatry* 2010 Jun;**196**(6): 425-6.
19 59. McCabe CJ, Thomas KJ, Brazier JE, Coleman P. Measuring the mental health
20 status of a population: a comparison of the GHQ-12 and the SF-36 (MHI-5). *Br J*
21 *Psychiatry* 1996 Oct;**169**(4): 516-21.
22 60. Hoeymans N, Garssen AA, Westert GP, Verhaak PF. Measuring mental health of
23 the Dutch population: a comparison of the GHQ-12 and the MHI-5. *Health and quality of*
24 *life outcomes* 2004 May 7;**2**: 23.
25 61. Politi PL, Piccinelli M, Wilkinson G. Reliability, validity and factor structure of the
26 12-item General Health Questionnaire among young males in Italy. *Acta psychiatrica*
27 *Scandinavica* 1994;**90**(6): 432-7.
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For Review Only

Figure 1: Conceptual framework for the analysis



1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Figure 2: Flow chart of sample selection

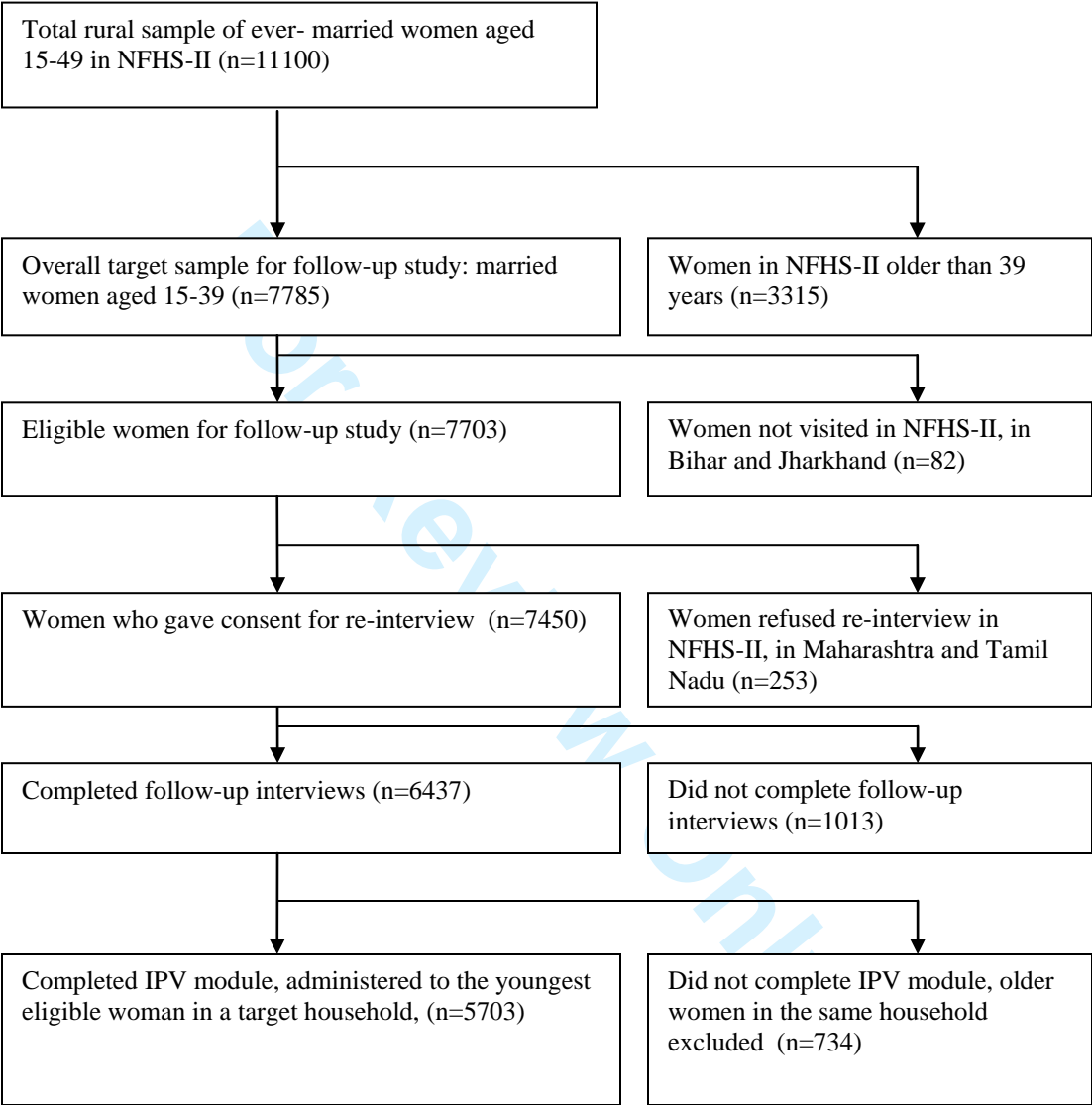


Table 1: Univariable analysis of association of factors associated with Common Mental Disorders (N= 5703, unless otherwise specified)

Variable	Prevalence n (%)	Presence of CMD	Timeline of measurement	Unadjusted odds ratio with 95% CI	p value
Socio-Economic factors					
Woman's age			Baseline		
15-22 years	1477 (25.7)	144 (9.8)		1	
23-27 years	1442 (25.3)	144 (10.1)		1.1 (0.8-1.3)	0.613
28-32 years	1392 (24.5)	161 (11.6)		1.3 (1.0-1.6)	0.055
33-39 years	1392 (24.5)	160 (11.6)		1.3 (1.1-1.6)	0.006
Woman's status (education)			Baseline		
Less than middle school	4843 (84.9)	570 (11.8)		1	
Middle school or above	860 (15.1)	39 (4.5)		0.4 (0.3-0.5)	<0.001
Standard of Living Index (n=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 (n=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)	0.350
Marital and gender disadvantage factors					
Spousal Inequality (years of age) woman elder or of same age			Baseline		
diff upto 5yrs	182 (3.2)	20 (11.3)		1	
diff bet 5 to 10	2528 (44.4)	284 (11.3)		1.1 (0.6-1.8)	0.779
diff more than 10	2160 (37.8)	211 (9.8)		1.0 (0.6-1.7)	0.985
	833 (14.6)	94 (11.4)		1.2 (0.7-2.0)	0.615
Husband's reaction to dowry (n=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
Not applicable	1135 (20.0)	151 (13.3)		1.7 (1.4-2.1)	<0.001
Husband's			Baseline		

employment					
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					
(n=5699)					
No	3382 (59.2)	296 (8.8)	1		
Yes	2317 (40.8)	312 (13.6)	1.5 (1.3-1.8)	<0.001	
IPV					
None	2883 (50.4)	217 (7.6)	Baseline and Follow-up	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					
(n=5690)					
No	4411 (77.4)	451 (10.3)	1		
Yes	1279 (22.6)	156 (12.3)	1.3 (1.1-1.6)	0.006	
Age at first					
marriage (years)					
15 or less	2241 (39.2)	274 (12.2)	1		
16-18	2315 (40.7)	233 (10.2)	0.9 (0.7-1.0)	0.091	
19 or more	1147 (20.1)	102 (9.0)	0.8 (0.7-1.1)	0.153	
Physical and reproductive health factors					
Body Mass Index					
(n=5576)					
20 or less	3582 (64.2)	409 (11.5)	1		
20-25	1753 (31.4)	166 (9.6)	0.9 (0.7-1.0)	0.150	
More than 25	241 (4.3)	15 (6.2)	0.6 (0.4-1.0)	0.084	
Haemoglobin					
levels (gm/dl)					
(n=5363)					
Less than 12	3492 (65.1)	394 (11.4)	1		
More than 12	1871 (34.9)	165 (8.8)	0.8 (0.6-0.9)	0.028	
Total no. of					
children					
None	694 (12.2)	83 (12.1)	1		
One	872 (15.3)	98 (11.3)	1.0 (0.7-1.5)	0.873	
Two	1170 (20.5)	105 (9.0)	0.8 (0.6-1.1)	0.196	
Three or more	2967 (52.0)	323 (10.9)	0.9 (0.7-1.3)	0.600	
Ever had a					
terminated					
pregnancy					
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 (n=5702)			Baseline		
No					
Yes	5599 (98.0)	586 (10.5)	1		
	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	

For Review Only

Table 2: Multivariable analyses of factors associated with Common Mental Disorders

Variables	Model 1	p-value	Model 2	p-value	Model 3	p-value	Model 4	p-value
Socio-economic factors								
Woman's age								
15-22 years	1		1		1		1	
23-27 years	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 years	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 years	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 above	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
Standard of Living Index								
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
Not applicable			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								
Body Mass Index								
20 or less					1			
20-25					0.9 (0.8-1.1)	0.505		
More than 25					0.9 (0.5-1.6)	0.611		

Heamoglobin
levels (gm/dl)
Less than 12
More than 12

1
0.9 (0.7-1.1) 0.158

Woman's
alcohol intake
No
Yes

1
1.4 (0.8-2.6) 0.264

Woman's
tobacco
intake
no tobacco
smoking/che
wing

1
1.3 (1.0-1.9) 0.077 1 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