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ORIGINAL RESEARCH

Education Mitigates the Relationship of Stress and Mental Disorders Among Rural Indian Women

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Abstract

BACKGROUND Common mental disorders (CMD) are a constellation of mental health conditions that include depression, anxiety, and other related nonpsychotic affective disorders. Qualitative explanatory models of mental health among reproductive-aged women in India reveal that distress is strongly associated with CMD. The relationship of perceived stress and CMD might be attenuated or exacerbated based on an individual's sociodemographic characteristics.

OBJECTIVES To screen for Common Mental Disorders (CMD) among reproductive-aged women from rural western India and explore how the relationship between perceived stress and CMD screening status varies by sociodemographic characteristics.

METHODS Cross-sectional survey of 700 women from rural Gujarat, India. CMD screening status was assessed using Self-Reported Questionnaire 20 (SRQ-20). Factors associated with CMD screening status were evaluated using multivariable logistic regression. Effect modification for the relationship of perceived stress and CMD screening status was assessed using interaction terms and interpreted in terms of predicted probabilities.

FINDINGS The analytic cohort included 663 women, with roughly 1 in 4 screening positive for CMD (157, 23.7%). Poor income, low education, food insecurity, and recurrent thoughts after traumatic events were associated with increased risk of positive CMD screen. Perceived stress was closely associated with CMD screening status. Higher education attenuated the relationship between high levels of stress and CMD screening status (82.3%, 88.8%, 32.9%; *P* value for trend: 0.03). Increasing income and age attenuated the link between moderate stress and CMD.

CONCLUSIONS Our findings suggest a high burden of possible CMD among reproductive-aged women from rural western India. Higher education might mitigate the association between elevated stress and CMD. Future efforts to improve mental health in rural India should focus on preventing CMD by enhancing rural women's self-efficacy and problem-solving capabilities to overcome challenging life events and stressors, thereby reducing the risk of CMD.

The first two authors contributed equally to this work.

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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All listed authors had access to the data and primary results presented, contributed to the writing of the manuscript, and approved the final version for submission.

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KEY WORDS common mental disorders, epidemiology, perceived stress, rural India, SRQ-20, women's health

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INTRODUCTION

Mental illnesses are among the most common and disabling health conditions worldwide. With 7.4% of disability-adjusted life-years attributed to mental illness, they are more disabling than some physical illnesses.[1,2] Common mental disorders (CMD) are a constellation of mental health conditions that include depression, anxiety, and other related non-psychotic affective disorders.[3] The World Health Organization ranks CMD as the leading cause of disease burden in India among women in the 15- to 44-year age group.[4]

Previous studies from India have reported an association of CMD with age, sex, income, marital status, education, poverty, and deprivation.[5-7] Additionally, the presence of chronic obstetric and gynecologic comorbidities increase the risk of CMD.[8] Qualitative studies investigating explanatory models of mental health among women in India reveal that distress is strongly associated with CMD and common stressors include intimate partner violence, marital problems, difficulty making ends meet, and inability to care for children.[9,10] A quantitative understanding of the relationship between stress and CMD is currently lacking.

Stress perception by an individual is a function of one's reaction to challenging life events (stressors) in the context of prior experiences, belief systems, and coping mechanisms.[11-13] Stressors vary in severity and duration and elicit a response (stress) that can be adaptive (eustress) or maladaptive (distress) depending on individual coping abilities.[13] The relationship of perceived stress and CMD might be attenuated or exacerbated based on an individual's sociodemographic characteristics.[13,14] Identification of these attributes and the mechanisms through which they could mitigate the relationship of high perceived stress and CMD holds promise for developing new strategies to promote mental health in rural India.

To our knowledge, no study has reported how sociodemographic characteristics modify the relation between perceived stress and CMD among Indian women. Therefore, the purpose of this study was to determine the prevalence of CMD and explore how age, marital status, education, and household income influence the association between perceived stress and CMD among women of reproductive age in rural western India, an underserved and understudied population.

METHODS

Setting and Study Design. This prospective cross-sectional cohort study enrolled women currently living in rural settings in the Anand district, Gujarat, India. Seven hundred women between the ages of 18 and 45 years were surveyed in person by trained interviewers using a questionnaire in Gujarati, the local language. Study participants were randomly recruited from 2 different settings: (1) Shri Krishna Hospital (SKH), a tertiary care center that serves the rural population; and (2) 16 surrounding villages within a 20-kilometer radius from SKH. The study received approval from the Boston University Institutional Review Board and the Human Research Ethics Committee of HM Patel Center for Medical Care and Education.

Data Collection. Participants were approached and screened for eligibility based on their age, ability to comprehend and speak Gujarati, and rural residence within the Anand district. Clinic interviews were conducted in the outpatient waiting area of a variety of clinics at SKH, including pediatrics, obstetrics and gynecology, and general medicine. Eighteen participants interviewed while visiting an inpatient clinic at SKH were excluded from this analysis because their responses could reflect acute stress experienced by the hospitalization of a relative or friend.

Researchers developed a recruitment plan for the community placed surveys by assessing village layout, number of *fariyahs* (colonies) within each village, and number of *simvistar* communities (peripheral areas) before recruitment of the participants. Subsequently, the number of participants interviewed from each *fariyah* and *simvistar* was determined so that roughly 20 women were interviewed from each village. The first female from

each household that encountered the interviewer was recruited for study participation and screened for eligibility. In both the village and clinic setting, field supervisors implemented a protocol for random recruitment so that every third women in the clinical waiting area and every third house in each street-equivalent were approached. All surveys were conducted anonymously after obtaining written informed consent where provision of name was optional and, if provided, was only recorded on a separate informed consent form that was never linked to the survey questionnaire. On average, survey completion lasted 20-30 minutes, and 5 trained interviewers collected all of the data from clinic and village over the course of 15 days in October 2011.

Data Variables. The survey, first drafted in English, was translated to Gujarati and then translated back to English to check for fidelity in the translated language. Common Mental Disorders screening status was determined using the World Health Organization Self-Reported Questionnaire (SRQ-20), which consists of 20 yes/no questions and is recommended for use specifically in low- and middle-income countries.[15] Based on previous validation of SRQ-20 in western parts of India, participants who responded yes to 8 or more questions were considered as screening positive for CMD.[16,17] The internal reliability of SRQ-20 within our study participants was robust (Kuder-Richardson 20 score: 0.91).[18] Perceived daily stress was assessed using a single-item question, "How much stress do you experience in your daily life?" Perceived daily stress was considered to be high if the participant responded "a lot," moderate if the response was "somewhat," and minimal if "nominal," or "not at all." Other covariates included in the analysis were age, education, marital status, self-reported household monthly income, food insecurity, experience of traumatic events and subsequent recurrent thoughts, and disease burden. As described in detail elsewhere,[19] household income was standardized into income/person/day values to account for variation in the household size. Subsequently, income was converted to US dollars using currency exchange rate from 2011.[19] Food insecurity was defined as at least 1 or more incidence of the participant skipping meals in the previous week due to shortage of money. Experience of traumatic events was assessed by asking the participants, "Have you ever witnessed or had any experience, including accidents, where your life or someone else's was in danger, or where someone was seriously hurt or killed?" Participants who responded positively were subsequently asked, "Since this experience, have you ever been troubled by repeated thoughts or feelings about the experience(s)?" to assess recurrent thoughts after traumatic event. Disease burden was based on self-report of current and past diagnoses or conditions. Only diseases or conditions that were reported by at least 10% of participants were included in the analyses.

Statistical Analyses. Descriptive data analyses provided an assessment of covariate distributions with CMD screening status. Frequencies and percentages were calculated for categorical variables and association with CMD screening status was assessed using χ^2 test or Fischer's exact test where appropriate. Multivariable logistic regression analysis was performed to identify predictors of positive CMD screening. Unadjusted and adjusted odds ratios with 95% confidence intervals were calculated. Predictor variables in the first model included age, income, education, marital status, food insecurity, recurrent thoughts after traumatic events, and comorbid conditions based on the current knowledge of risk factors for CMD in rural India.[7,20] Because perceived stress may be considered a part of the causal pathway through which food insecurity and recurrent thoughts after traumatic events are associated with CMD, it was not included in the first multivariable model that sought to identify risk factors for CMD screening status in this population.[9,10] A separate model explored the interactions of sociodemographic characteristics, such as age, income, education, and marital status, with perceived stress in predicting positive outcome for CMD screen. Because effect estimates of interaction terms are difficult to interpret without additional computation, we reported the adjusted predicted probability for positive CMD screening across different levels of age, income, education, and marital status. The point estimates of probabilities were calculated using inverse logit calculations and the variance was estimated using delta method, which employs a Taylor linearization approach.[21] Trends for probability of positive CMD screen across different levels of sociodemographic characteristics within each level of perceived stress were assessed using linear polynomial tests for trend. Data entry was performed through forms created using Epi-Info software (CDC, Atlanta, GA) and all of the statistical analyses were carried out using STATA SE 13 (StataCorp LP, College Station, TX).[22,23]

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RESULTS

Of the 700 women interviewed for the study, 663 participants contributed data to the analytic cohort; 19 surveys were excluded because of incompleteness and 18 because the respondent was the relative or companion of a hospitalized patient. The majority of respondents had at least a secondary education, and >80% were married. Two-thirds of the respondents reported household income below the World Bank's poverty line of $1.25 per person per day. Almost half of the participants reported experiencing "somewhat" or "a lot" of stress. Using the SRQ-20 to assess for presence of CMD, 157 (23.7%) women answered yes to at least 8 of the 20 questions and thus were considered as screening positive for CMD. As presented in Table 1, among women who endorsed high stress, 73.9% screened positive for CMD, whereas only 5.0% of women experiencing low levels of stress screened positive ($P < 0.01$). There was no association between the location of interview and the amount of stress experienced by the participants ($P = 0.21$). Increased age, being married, low education, low income, food insecurity, having recurrent thoughts after traumatic events, and suffering chronic comorbid conditions were all factors that were associated with higher levels of perceived stress.

Logistic regression results with positive CMD screening as the dependent variable are presented in Table 2. The multivariable model demonstrated a very good ability to accurately predict CMD screening outcome (c-statistic: 0.85). After adjusting for all other covariates, females who had less than a seventh grade education demonstrated a 3.7-fold increase (95% Cl: 1.6-8.8) and those who had grade 7-12 education experienced a 2.8-fold increase (95% Cl: 1.4-5.8) in the odds of screening positive for CMD compared with those who attended some college or more. Women who reported their daily family income as less than $0.25 per person had 2.4 times greater odds of screening positive for CMD than those living on family income of $0.25-$1.25 per person per day (95% Cl: 1.1-5.3). Women experiencing food insecurity had significantly elevated odds of screening positive for CMD (aOR 4.8; 95% CI: 1.8-12.8) compared with those without food insecurity. Among the participants who experienced a traumatic event, there were increased odds of screening positive only among those who had recurrent thoughts (aOR: 2.1; 95% CI 1.2-3.7), whereas those who experienced traumatic events but did not have recurrent thoughts did not have an increased odds for screening positive for CMD compared with those who never experienced traumatic events.

Table 3 shows the results of the interactions between sociodemographic characteristics and daily perceived stress in predicting the probability of screening positive for CMD after adjusting for confounders and comorbid conditions. Among women who experienced high levels of stress, higher levels of education decreased the probability of screening positive for CMD (82.3%, 32.9%; $P = 0.03$). Age, income, and marital status did not modify the relationship between high levels of stress and CMD screening status. Among women experiencing moderate level of stress, increasing education decreased the probability of positive CMD screen, but the trend was not significant (26.5%, 16.6%; $P = 0.39$). A significant decreasing trend in the probability of positive CMD screen among participants was observed with increasing levels of income (59.2%, 20.5%; $P = 0.05$) and age (34.2%, 15.6%; $P = 0.05$). Women who reported experiencing low levels of stress were less likely to screen positive for CMD and no significant trends were observed across any sociodemographic characteristics. However, increasing levels of education decreased the probability of CMD screen even among this subpopulation (7.2%, 2.3%, 0.6%; $P = 0.10$).

DISCUSSION

In this study of reproductive-aged women from rural western India, 23.7% of our respondents screened positive for CMD. By comparison, studies from other urban and rural parts of India have found a prevalence ranging from 10.7-18.0 among women of a similar age range.[7,17,24] Nearly 90% of the participants in our study who screened positive for CMD reported experiencing moderate to high levels of stress. This strong association between perceived stress and mental disorders is consistent with relevant literature.[13,14,25] However, we found that this relationship varies by education, age, and income of the individual. This finding has important implications for understanding mental health among women in India and can guide interventions to prevent CMD.

Education. For all levels of self-reported stress, increasing levels of education decreased the probability of screening positive for CMD, although statistical significance was observed only among women experiencing the highest levels of stress.

Table 1. Sociodemographic and Health Characteristics by Level of Perceived Stress for 663 Reproductive-aged Women from Rural Gujarat, India Interviewed in October 2011

	Total N (Col %)	Levels of perceived stress			*P*
		Low	Moderate	High	
		337 (51.0)	236 (35.7)	88 (13.3)	
Common mental disorders	661				
Positive screen (SRQ-20 ≥ 8)	157 (23.8)	17 (5.0)	75 (31.8)	65 (73.9)	<0.01
Negative screen (SRQ-20 < 7)	504 (76.3)	320 (95.0)	161 (68.2)	23 (26.1)	
Location of interview	661				
Clinic	311 (47.1)	165 (49.0)	110 (46.6)	36 (40.9)	0.21
Village (Fariyah)	223 (33.7)	113 (33.5)	83 (35.2)	27 (30.7)	
Village (Simvistar)	127 (19.2)	59 (17.5)	43 (18.2)	25 (28.4)	
Age (years)	659				
18-25	227 (34.5)	123 (36.6)	89 (37.9)	15 (17.1)	<0.01
26-35	253 (38.2)	126 (37.5)	88 (37.5)	38 (43.2)	
36-45	181 (27.3)	87 (25.9)	58 (24.7)	35 (39.8)	
Marital status	660				
Single	97 (14.7)	59 (17.5)	33 (14.0)	5 (5.8)	0.01*
Married	544 (82.4)	269 (79.8)	199 (84.3)	76 (87.4)	
Divorced or widowed	19 (2.9)	9 (2.7)	4 (1.7)	6 (6.9)	
Education	659				
Less than grade 7	162 (24.6)	71 (21.1)	56 (23.9)	35 (39.8)	<0.01
Grades 7-12	357 (54.2)	184 (54.6)	128 (54.7)	45 (51.1)	
More than high school	140 (21.2)	82 (24.3)	50 (21.4)	8 (9.1)	
Income	639				
<$0.25/person/day	49 (7.6)	19 (5.8)	19 (8.4)	11 (13.1)	0.04
$0.25-1.25/person/day	372 (58.2)	186 (56.4)	133 (59.1)	53 (63.1)	
>$1.25/person/day	218 (34.1)	125 (37.9)	73 (32.4)	20 (23.8)	
Food insecurity	659				
No meals skipped	629 (95.2)	332 (98.8)	222 (94.1)	73 (83.9)	<0.01*
1+ meals skipped	32 (4.8)	4 (1.2)	14 (5.9)	14 (16.1)	
Traumatic experience (TE)	660				
No TE	435 (65.9)	247 (73.3)	144 (61.3)	44 (50.0)	<0.01
No recurrent thoughts after TE	117 (17.7)	62 (18,4)	39 (16.6)	16 (18.2)	
Recurrent thoughts after TE	108 (16.4)	28 (8.3)	52 (22.1)	28 (31.8)	
Chronic back problems	661				
No	424 (64.2)	257 (76.3)	134 (56.8)	33 (37.5)	<0.01
Yes	237 (35.8)	80 (23.7)	102 (43.2)	55 (62.5)	
Arthritis	661				
No	565 (85.5)	305 (90.5)	201 (85.2)	59 (67.1)	<0.01
Yes	96 (14.5)	32 (9.5)	35 (14.8)	29 (32.9)	
Anemia	659				
No	481 (73.0)	282 (83.7)	158 (67.5)	41 (46.6)	<0.01
Yes	178 (26.9)	55 (16.3)	76 (32.5)	47 (53.4)	
Hypertension	660				
No	534 (80.8)	299 (88.7)	171 (72.5)	64 (72.7)	<0.01
Yes	127 (19.2)	38 (11.3)	65 (27.5)	24 (27.3)	
Chronic allergies	661				
No	534 (80.8)	299 (88.7)	171 (72.5)	64 (72.7)	<0.01
Yes	127 (19.2)	38 (11.3)	65 (27.5)	24 (27.3)	
Abdominal pain	661				
No	568 (85.9)	301 (89.3)	199 (84.3)	68 (77.3)	0.01
Yes	93 (14.1)	36 (10.7)	37 (15.7)	20 (22.7)	

SRQ, Self-Reported Questionnaire.
Diseases or health conditions reported by at least 10% of participants are listed.
* Fischer's exact test.

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Table 2. Multivariable Logistic Regression Models that Predict Positive Screening (SRQ-20 score ≥ 8) for Common Mental Disorders

	Unadjusted	Adjusted* (n = 632)
	OR (95% CI)	OR (95% CI)
Age: 18-25	1.0	
26-35	1.31 (0.85-2.03)	1.19 (0.66-2.15)
36-45	1.5 (0.95-2.38)	1.07 (0.55-2.09)
Education: > high school (ref)		
None-grade 6	3.91 (2.11-7.22)	3.71 (1.57-8.78)
Grades 7-12	2.51 (1.41-4.45)	2.79 (1.35-5.77)
Income: $1.25-$2.0/day (ref)		
<$0.25/day	2.61 (1.35-5.02)	2.40 (1.09-5.27)
$0.25-1.25/day	1.10 (0.74-1.66)	1.24 (0.72-2.13)
Marital status: single (ref)		
Married	2.19 (1.18-4.04)	0.61 (0.27-1.39)
Divorced or widowed	2.31 (0.71-7.48)	0.99 (0.23-4.29)
No traumatic events (TE) (ref)		
No recurrent thoughts after TE	1.13 (0.68-1.89)	0.96 (0.52-1.77)
Recurrent thoughts after TE	4.08 (2.69-6.39)	2.09 (1.17-3.74)
No meals skipped (ref)		
1+ meals skipped	8.05 (3.72-17.41)	4.76 (1.81-12.51)
c-Statistic	N/A	0.845

SRQ, Self-Reported Questionnaire.
* Also adjusted for chronic comorbidities: back problems, arthritis, anemia, hypertension, chronic allergies, and chronic abdominal pain.

Education enhances self-esteem and autonomy of women, which might be the underlying mechanism for the observed protective effects of increasing levels of education for the risk of CMD in the context of elevated stress levels.[26] Our findings suggest that education is an effective marker for coping skills that equip women to better manage stress and problem solve.

Age. We found that increased age is associated with a reduction in probability for a positive CMD screening among women experiencing moderate levels of stress. This finding is noteworthy because other studies from India and elsewhere have reported that older age is associated with increased risk for CMD.[7,20,24] We are of the belief that the protective trend observed with increasing age for positive CMD screen is based on the change in women's position in the patriarchal social construct of rural Gujarat. A rural woman progresses within the hierarchy of her family and society over her lifetime. Thus, older women might experience greater autonomy and play a larger role in household decision making, which enables them to navigate stressful situations more effectively.

Income. Increasing income levels significantly reduce the probability of positive CMD screening only among women who experience moderate levels of stress. However, we believe that this observation mostly is due to an elevated risk for CMD among the poorest respondents. To illustrate this point, consider that the probability of a positive CMD screening among women experiencing moderate levels of stress across almost all of the sociodemographic characteristics ranged from 15.6%-34.8% (Table 3). However, women who live on less than 25 cents per day per person had a predicted probability of 59.2% for positive CMD screening. Thus, in extreme poverty, lack of resources exacerbates the relationship between stress and CMD, and this population should be considered a priority for safety net programs and mental health interventions.

Our findings of education, age, and income modifying the relationship between stress and CMD screening status may be best understood in the context of a single unifying model: the transactional model of stress. According to this model, the stressors-distress pathway is dependent on an individual's cognitive appraisal and coping of stress.[27] The stressors, chronic or single event, are evaluated by an individual (perceived stress) and the psychological response elicited is in the context of the individual's resources. Within this framework, our findings suggest that increasing education, age, and income may provide resources to women of

Table 3. Predicted Probabilities (%) of a Positive Common Mental Disorders (CMD) Screening for a Given Level of Perceived Stress (Columns) by Differing Sociodemographic Characteristics* (Rows)

% Predicted probability of positive CMD screen	Levels of perceived stress		
	Low	Moderate	High
Education in grade level (*P* trend†)	0.1	0.39	0.03
Less than grade 7	7.2% (0.0-14.8)	26.5% (10.2-42.9)	82.3% (66.0-98.6)
Grades 7-12	2.3% (0.3-04.4)	30.9% (21.1-40.7)	88.8% (79.3-98.2)
More than grade 12	0.6% (0.0-01.7)	16.6% (04.2-29.1)	32.9% (00.0-71.5)
Age group in years (*P* trend†)	0.41	0.05	0.33
18-25	2.1% (0.0-04.7)	34.2% (20.1-47.5)	82.5% (61.3-100)
26-35	1.2% (0.0-02.8)	26.7% (15.6-38.3)	91.6% (82.3-100)
36-45	4.6% (0.0-09.1)	15.6% (04.8-26.5)	64.6% (41.8-87.5)
Income (*P* trend†)	0.1	0.05	0.86
<$0.25/person/day	2.8% (0.0-08.7)	59.2% (29.3-89.2)	80.2% (50.6-100)
$0.25-1.25/person/day	0.9% (0.0-02.0)	26.0% (17.1-34.8)	84.1% (73.1-95.1)
>$1.25/person/day	6.4% (1.4-11.4)	20.5% (9.1-31.8)	80.3% (58.5-100)
Marital status (*P* trend†)	0.51	0.47	0.47
Single	4.6% (0.0-12.5)	34.8% (10.8-58.7)	90.5% (69.1-100)
Married	1.8% (0.3-3.3)	25.0% (17.4-32.7)	82.0% (72.1-91.9)

SRQ, Self-Reported Questionnaire.

* Adjusted for food insecurity, recurrent thoughts after traumatic events, chronic comorbidities: back problems, arthritis, anemia, hypertension, chronic allergies, and chronic abdominal pain.

† Linear observation weighted contrast for trend. *P* values <0.05 signify a trend in the proportion across sociodemographic characteristics for a given level of perceived stress.

reproductive age to cope with stress. However, education appears to be a more robust protective factor in coping with stress than age and income. Women with increased age and income are able to manage moderate levels of stress, but high levels of stress might overwhelm these coping skills.

The transactional model of stress is often used in the occupational research literature on work-related stress.[27,28] To our knowledge, it has not been used to explain the mental health paradigm among rural Indian women, although several parallels can be drawn between the environment experienced by them and a traditional worker that makes them both vulnerable to maladaptive stress responses. It is common for rural Indian women to relocate and live with their in-laws after marriage and work primarily as homemakers.[29] Therefore, women assume new responsibilities within an environment that has pre-existing dynamics. They strive to establish their role in their new family. This integration is often ongoing and requires self-efficacy as well as adaptability. A breakdown of resources and coping mechanisms or an excess of stressors can make them vulnerable. Previous studies of factors that deter the stress-distress pathway have identified self-esteem as an effective resource that can prevent occurrence of mental disease caused by stressors.[14] Thus, enhancing problem-solving abilities by promoting autonomy and self-esteem is particularly important for women in these settings to be able to negotiate their needs within the complex family and social structure in India.

In addition to our main finding that the relationship of stress and CMD screening status is modified by different sociodemographic characteristics, we also found that food insecurity and experience of recurrent thoughts after traumatic events were associated with positive CMD screening. These findings are largely consistent with previous studies done in India and other low- and middle-income countries.[6,20,30-33] One out of 3 women reported experiencing or witnessing a life event where someone's life was in danger. Among these women, increased association for positive CMD screening was found only if they reported experiencing recurrent thoughts because of the traumatic event. Five percent of our participants were food insecure and experienced nearly a 5-fold increase in the odds of screening positive for CMD. Three months after the survey was conducted, the government of India announced a plan to provide subsidized food for two-thirds of India's population based on income level. However, the bill was not promulgated until December 2014. Furthermore,

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logistical, financial, and political barriers continue to pose a challenge for the law to reach its intended beneficiaries.[34] Several studies have found an association between post-traumatic stress disorder and food insecurity.[35,36] Therefore, future efforts to improve mental health should address post-traumatic stress disorder and food insecurity because they present modifiable risk factors that adversely affect mental health.

Although promising, the findings from our study should be interpreted in the context of some important limitations. The outcome of CMD is measured using a validated questionnaire instead of a gold standard (ie, structured clinical interview) and therefore our findings describe associations with screening status of CMD rather than definitive diagnoses. Our primary exposure of perceived stress was measured using a single item, which, despite high face validity, is vulnerable to a loss of reliability. However, unlike other multi-item perceived stress instruments that are prone to ceiling effect in measuring stress,[37] our study reported that half of the women experienced nominal or no stress, and thus a single-item question may be an appropriate instrument in this population. Although the stratified randomization strategy for recruiting participants reduces the likelihood of selection bias, it cannot be ruled out completely. As with any cross-sectional study design, this study reveals the observed associations and it is not possible to interpret causal relationships. Further research is necessary across different settings in India to investigate how the relationship between perceived stress and CMD differs in societies that are predominantly matriarchal (south India) or have low literacy levels (east India).

CONCLUSIONS

In conclusion, our findings identify the high burden of possible CMD among rural Indian women and suggest that higher education, income, and age might mitigate the association between stress and CMD screening status. However, the link between high stress and CMD screening was mitigated only by high levels of education; additionally, education is more modifiable than age or income. Therefore, future efforts to improve mental health in rural India should focus on preventing CMD by enhancing women's self-efficacy and problem-solving capabilities to overcome challenging life events and stressors, thereby reducing the risk of CMD.

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