

# Primary care

## Chronic fatigue in developing countries: population based survey of women in India

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### Abstract

**Objectives** To describe the prevalence of and risk factors for chronic fatigue in a developing country; in particular, to determine the association of anaemia, mental health, and gender disadvantage factors with chronic fatigue.

**Design** Community survey.

**Setting** Primary health centre catchment area in Goa, India.

**Participants** 3000 randomly sampled women aged 18 to 50 years.

**Main outcome measures** Data on the primary outcome (reporting of fatigue for at least six months) and psychosocial exposures elicited by structured interview; presence of anaemia determined from a blood sample.

**Results** 2494 (83%) women consented to participate; 12.1% (95% confidence interval 10.8 to 13.4%) complained of chronic fatigue. In multivariate analyses, older women ( $P=0.03$ ) and those experiencing socioeconomic deprivation—less education ( $P<0.001$ ), families in debt ( $P=0.09$ ), or hunger in the past three months ( $P=0.03$ )—were more likely to report chronic fatigue. After adjustment for these factors, factors indicating gender disadvantage (notably sexual violence by the husband;  $P<0.001$ ) and poor mental health ( $P<0.001$ ) were strongly associated with chronic fatigue. Although women with a high body mass index had a reduced risk, suggesting an influence of poor nutrition, no association was found between chronic fatigue and haemoglobin concentrations.

**Conclusions** Chronic fatigue was commonly reported by women in this community study from India. The strongest associations with chronic fatigue were for psychosocial factors indicative of poor mental health and gender disadvantage.

### Introduction

The epidemiology of chronic fatigue has mainly been described in developed countries.<sup>1</sup> In these settings, a significant proportion of people with chronic fatigue do not have a demonstrable physical disorder and are often found to have other somatoform disorders (disorders characterised by medically unexplained physical symptoms) or common mental disorders such as depression and anxiety. Fatigue is a common symptom among women in developing countries. In a survey in India, nearly a quarter of women complained of feeling weak or tired; more than half of them had had these problems for more than six months.<sup>2</sup> Fatigue in women has often been attributed to nutritional deficiencies and anaemia. Physicians are likely to prescribe iron, vitamins, and nutritional supplements to treat the

symptom presumptively. Such preparations account for the largest category of drugs dispensed in South Asia.<sup>3</sup>

Little research has been done on the associations of fatigue with psychological factors in developing countries, particularly in the context of the high prevalence of anaemia and poor nutrition. We hypothesised that the principal association of fatigue was with psychosocial risk factors, similar to patterns seen in developed countries,<sup>4</sup> and with factors reflecting gender disadvantage that are important determinants of women's health.<sup>5 6</sup>

### Methods

#### Participants

We recruited participants from the Aldona Primary Health Centre catchment area, north Goa, India. The sampling frame consisted of 8595 women aged 18-45 years listed in the family health registers; we randomly selected 3000 women. As the family registers varied in date, we expected that some women listed as aged 45 were likely to be older at the time of the study. Inclusion criteria for the study were age between 18 and 50 years, being resident in the area for the next 12 months, speaking one of the study languages, not having cognitive impairment, and not being pregnant. If a selected woman did not meet these criteria or was no longer living in the area, the researcher replaced her by using a priori steps to identify another eligible woman. Recruitment took place from November 2001 to May 2003.

We gave written information on the project to each selected woman. We scheduled a visit to her home soon after this, at which time consent was obtained. All participants were offered free care by the study gynaecologists and mental health professionals if needed.

#### Data collection

We used a semistructured interview to elicit data on personal history and health history. Items were derived from existing interviews used in other studies of reproductive and mental health in Goa.<sup>7-9</sup> We estimated haemoglobin concentration from a finger prick sample of blood, by using the Hemocue system. This system has been used in field surveys for estimating haemoglobin in capillary blood and gives results comparable to estimates obtained by sophisticated laboratory methods.<sup>8 10</sup> A gynaecologist did a general medical examination for participants who consented. We organised the data collected from these three sources as follows.

### *Socioeconomic risk factors*

We collected information on age, education, religion, and marital status from all participants sampled, including those who refused to participate. We measured economic status through type of housing, access to water and a toilet, household composition and income, employment status, indebtedness, and experience of hunger in the previous three months.

### *Psychological factors*

We used two measures of psychological factors. The scale for somatic symptoms measures somatic symptoms that are features of somatoform disorders and has been used previously in India.<sup>11</sup> The scale elicits experience of four categories of somatic symptoms in the previous two weeks: pain related symptoms such as headache and body ache; sensory symptoms such as hot or cold sensations and tingling; non-specific symptoms such as tiredness and weakness; and biological function symptoms such as poor sleep and constipation. Each symptom is rated on a Likert-type scale of 0-2 indicating increasing severity. We summed the scores on the pain related symptoms and sensory symptom scales to generate a somatoform disorder symptom score for each participant (range 0-20). The second measure was the revised clinical interview schedule, a structured interview for the measurement of common mental disorders in community settings.<sup>12</sup> The Konkani language version of the schedule used in the study had been previously used in Goa.<sup>13</sup> The interview consists of 14 sections, each covering specific symptoms such as anxiety, depression, irritability, fatigue, obsessions, compulsions, and panic. The sum of the section scores, excluding the fatigue item scores, generated a total score (range 0-53), which we used as a measure of non-psychotic psychiatric morbidity.

### *Gender disadvantage and social support*

Questions on gender disadvantage and social support covered four domains. The first domain was the lifetime experience of verbal, physical, and sexual violence by the spouse and concerns about the spouse's extramarital relationships and substance use habits. The second domain inquired about the autonomy the participant had to make decisions about visiting her mother or a friend's home, seeing a doctor, keeping money aside for personal use, and having time to do things for herself. We summed these item scores to generate an autonomy score. The third domain inquired about the level of engagement, in the past three months, with four activities: religious activities, participation in a community or voluntary group, social outings to meet friends or relatives, and having friends or relatives visit her. We summed these items scores to generate a social integration score. The final domain consisted of five items relating to social support from family when faced with different situations (good news, a personal problem, needing to borrow a small amount of money, feeling low, and becoming ill). We summed these item scores to generate a family support score.

### *Physical health and anaemia*

We asked all participants about any pregnancies, age at first pregnancy, numbers of pregnancies, and their outcomes. Participants who were sexually active in the past year were asked about any experience of difficulty in conception in the previous 12 months (infertility) and their use of contraceptives. We evaluated anaemia as a categorical variable (absent,  $\geq 11$  g/dl haemoglobin; mild to moderate, 8-10.9 g/dl; severe,  $< 8$  g/dl). The relevant medical examination data were weight, height, and blood pressure. We categorised body mass index ( $\text{kg}/\text{m}^2$ ) values ( $< 17$ ; 17-19.9; 20-24.9; and  $\geq 25$ ). We measured disability by using the

World Health Organization 12 item disability assessment schedule, the precursor of which (the brief disability questionnaire) has been used in Goa.<sup>8</sup> The WHO schedule generates a total score and a measure of the number of days in the previous 30 days that the participant had to cut back her usual activities.

### *Outcome*

We defined the outcome on the basis of the responses to the fatigue section of the revised clinical interview schedule. This section has two optional questions on fatigue: (1) Have you noticed that you've been getting tired in the past month? (2) During the past month have you felt you've been lacking in energy? Participants who answer positively to either of these are asked a series of four questions about the severity of the problem: (1) In the past seven days, on how many days have you felt tired or lacking in energy? (2) Have you felt tired or lacking in energy for more than three hours in total, or most of the day, on any day in the past seven days? (3) Have you felt tired or lacking in energy so that you've had to push yourself to get things done during the past seven days? (4) Have you felt tired or lacking in energy when doing things that you enjoy during the past seven days?

Each question generates a score of 0 or 1 based on the severity of the problem, so that a participant may obtain a total score of 0-4. We defined the outcome of chronic fatigue as a score of at least 1 on the fatigue section of the revised clinical interview schedule (that is, participants who had experienced fatigue in the past month and had scored at least 1 on the severity questions) and having experienced fatigue for a minimum duration of the past six months.

### *Analysis*

We used logistic regression for all analyses, with chronic fatigue coded as a binary outcome (present or absent). Firstly, we estimated the association of each socioeconomic factor with the outcome; all determinants for which the association reached significance at  $P \leq 0.1$  were included in a multivariate model. All factors that remained significantly associated with the outcome in this model were included in subsequent steps. Next, we estimated the association of the outcome with factors in the domains of gender disadvantage, mental health, and physical health, adjusting for socioeconomic factors identified in the previous step. We restricted analysis of risk factors associated with contraception and spousal relationships to married women as only a small number (12/744) of unmarried, divorced, or widowed women had had a sexual relationship in the previous year. We converted continuous outcomes, such as the revised clinical interview schedule scores, somatoform symptom scores, and autonomy scores, to categories on the basis of the distribution of scores. Finally, we formed a composite multivariate model covering all domains. This consisted of the subset of socioeconomic factors in the first multivariate model; any mental health, gender disadvantage, and physical health factors for which the P value adjusted for the socioeconomic factors was  $\leq 0.1$ ; and haemoglobin concentrations on an a priori basis.

We reached the final multivariate logistic regression model by dropping factors one at a time until all remaining factors were significant at the  $P \leq 0.1$  level. Odds ratios and 95% confidence intervals are presented for the main findings.

## Results

Of the 3000 randomly selected women, 2494 (83.1%) consented to participate in the study. The most common reasons for refusal

were that the woman did not have time to participate (265, 52.4%) or that a family member had not given permission (95, 18.8%). Compared with participants, women who refused were less likely to be ethnic non-Goans (8 (1.6%) *v* 247 (9.9%),  $P < 0.001$ ), more likely to be Christian (201 (59.5%) *v* 553 (22.2%),  $P < 0.001$ ), more likely to be unmarried (209 (41.4%) *v* 665 (26.7%),  $P < 0.001$ ), younger (mean 31.3 *v* 32.3 years,  $P = 0.01$ ), and more educated (years of education completed 10.2 *v* 8.4 years,  $P < 0.001$ ). Of those who participated, 957 (38.4%) replaced a randomly selected woman; the most common reasons for replacement were that the selected woman was no longer resident (400, 41.8%) or was unlikely to be resident for the duration of the study (45, 4.7%) and errors in the records of the family health register (381, 39.8%).

Fatigue was reported by 423 (17.0%) participants, of whom 301 (12.1%, 95% confidence interval 10.8% to 13.4%) had experienced it for at least six months. Participants who were experiencing chronic fatigue had significantly poorer WHO disability assessment schedule scores (mean score 14.1 (SD 2.5) *v* 12.4 (1.3);  $t = -19.03$ ,  $P < 0.0001$ ); they reported having to cut back on their daily activities on an average of 3.0 (2.2 to 3.9) days in the previous month compared with an average of 0.5 (0.3 to 0.6) days for participants who had not experienced chronic fatigue ( $P < 0.001$ ).

#### Associations with socioeconomic risk factors

Table 1 shows the prevalence of socioeconomic risk factors. Older participants, participants living in households with more than three children under the age of 18, and those facing socioeconomic difficulties (less education, poorer housing conditions, financial difficulties) were significantly more likely to be experiencing chronic fatigue. However, we found no association with household income. Compared with married participants, single participants had a lower risk, whereas divorced or widowed participants had a higher risk. In multivariate analyses, the following factors were significantly associated with chronic fatigue: lower education (school completers *v* no education; odds ratio = 0.57, 0.4 to 0.8); families in debt (1.27, 1.0 to 1.6); hunger in the previous three months (1.61, 1.1 to 2.6); and older age (age 40-50 *v* 18-24 years, odds ratio = 2.0, 1.3 to 3.1).

#### Associations with gender disadvantage and mental health factors

Table 2 presents the prevalence of the risk factors associated with gender disadvantage and mental health in the sample, as well as the adjusted associations of each risk factor with chronic fatigue. Participants who lived in unhappy marriages, indicated by spousal violence and concerns about the husband's extramarital relationships and substance use habits (mainly alcohol), were significantly more likely to experience chronic fatigue. Participants whose lives were marked by restrictions on personal freedoms and decision making and those who had low support from their families were significantly more likely to complain of chronic fatigue. The associations with the two mental health risk factors (common mental disorders and somatoform disorder symptom scores) were strong. Table 3 shows the frequency of pain and sensory symptoms. All symptoms were between two and 10 times more commonly reported by participants with chronic fatigue.

#### Associations with physical health factors

The only significant associations with physical health factors were a reduced risk with high body mass index and having had a pregnancy in the previous year (table 4). Blood samples collected from 11 participants were not adequate for estimation of haemoglobin. We found no association between haemoglobin

concentrations and chronic fatigue. Haemoglobin concentrations were also not associated with chronic fatigue in participants who had no symptoms of common mental disorders or somatoform disorders. We found no interaction ( $P = 0.5$ ) between anaemia (haemoglobin  $< 11$  g/dl) and common mental disorders (revised clinical interview schedule score  $> 11$ ).

In the final multivariate model, the following variables were independently associated with chronic fatigue: having experienced spousal sexual violence (odds ratio = 1.96, 1.0 to 3.7); high revised clinical interview schedule scores (highest fifth *v* lowest fifth; 24.3, 14.3 to 41.3); high somatoform symptom scores (highest quarter *v* lowest quarter; 11.6, 4.5 to 30.1); low body mass index ( $\geq 25$  *v*  $< 17$ ; 0.49, 0.3 to 0.9); and older age (40-50 *v* 18-24 years; 2.1, 1.2 to 3.7).

## Discussion

This paper reports the prevalence and associations of chronic fatigue in a community sample of women in India. Our principal findings were that more than 1 in 10 women reported chronic fatigue and that common mental disorders and symptoms associated with somatoform disorders were the strongest risk factors. Sexual abuse by the husband and a low body mass index were also independently associated with chronic fatigue; however, haemoglobin concentrations were not associated with the problem. Women with chronic fatigue had significantly increased levels of disability and were more likely to report other physical symptoms.

Strengths of our study include the use of a population sample, the use of standardised and validated measures of risk factors and outcome, and the evaluation of both psychosocial and physical health risk factors. Our definition of chronic fatigue was based on responses by participants to the fatigue section of the revised clinical interview schedule, a method used by previous investigators.<sup>14</sup> One limitation is the possibility of a selection bias, given the differences between refusers and participants in the study and the relatively high proportion of participants who were recruited through replacement of an ineligible randomly selected woman. We did not, however, find an association of replacement status with chronic fatigue. In the context of a developing country with a relatively high burden of infectious diseases, some of the morbidity could have been attributable to diseases that we were unable to diagnose within the scope of this study.

A WHO multinational study in primary care reported that the prevalence of unexplained fatigue of one month's duration varied widely across centres, with a range of 2.3-15.1%; participants from more developed countries were more likely to report unexplained fatigue.<sup>15</sup> However, the rates of chronic fatigue lasting for at least six months that we report are similar to or higher than those reported in community studies from developed countries.<sup>1</sup> For example, the UK population study that used similar criteria reported a point prevalence rate of chronic fatigue of 9%; the rates were higher in women.<sup>14</sup> The socioeconomic risk factors independently associated with chronic fatigue were older age and indicators reflecting socioeconomic deprivation. Compared with married women, being single was a protective factor, whereas being widowed or separated increased the risk. Although studies in developed countries have shown some of these associations (for example, with older age), the association with economic difficulties is less consistent.

Gender disadvantage is a major social determinant of health in developing countries.<sup>6, 16</sup> Our study shows a strong association

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**Table 1** Association of socioeconomic factors with chronic fatigue in women in a community sample from Goa, India (n=2494). Values are numbers (percentages) unless stated otherwise

Factor	Total	Prevalence of chronic fatigue	Crude odds ratio (95% CI)	P value
<b>Demographic variables</b>				
Age (years):				
18-24	504 (20.2)	34 (6.7)	1	
25-29	460 (18.4)	51 (11.1)	1.72 (1.1 to 2.7)	
30-34	499 (20.0)	65 (13.0)	2.07 (1.3 to 3.2)	<0.001
35-39	473 (19.0)	66 (13.9)	2.24 (1.4 to 3.5)	
40-50	558 (22.4)	85 (15.2)	2.48 (1.6 to 3.8)	
Participant type:				
Randomly selected	1537 (61.6)	178 (11.6)	1	
Replacement	957 (38.4)	123 (12.8)	1.13 (0.9 to 1.4)	0.3
Education (years):				
None	241 (9.7)	44 (18.3)	1	
1-9	995 (40.0)	145 (14.6)	0.76 (0.5 to 1.1)	<0.001
10-14	989 (40.0)	97 (9.8)	0.49 (0.3 to 0.7)	
15-23	269 (10.8)	15 (5.6)	0.26 (0.1 to 0.5)	
Literate:				
Yes (read and write)	2138 (85.7)	238 (11.1)	1	
No	356 (14.3)	63 (17.7)	1.72 (1.3 to 2.3)	<0.001
Religion:				
Hindu	1860 (74.6)	229 (12.3)	1	
Christian	553 (22.2)	64 (11.6)	0.93 (0.7 to 1.2)	0.6
Muslim	81 (3.2)	8 (9.9)	0.78 (0.4 to 1.6)	0.5
Occupation:				
Homemaker	1663 (66.7)	211 (12.7)	1	
Employed	521 (20.9)	56 (10.7)	0.83 (0.6 to 1.1)	0.2
Other	310 (12.4)	34 (11.0)	0.85 (0.6 to 1.2)	0.4
Marital status:				
Married	1750 (70.2)	231 (13.2)	1	
Single	665 (26.7)	53 (8.0)	0.57 (0.4 to 0.8)	<0.001
Divorced/widowed	79 (3.2)	17 (21.5)	1.80 (1.0 to 3.1)	0.04
Household size:				
1-3	417 (16.7)	50 (12.0)	1	
4-5	1339 (53.7)	160 (11.9)	0.99 (0.7 to 1.4)	1.0
6-9	649 (26.0)	81 (12.5)	1.05 (0.7 to 1.5)	
10-17	89 (3.6)	10 (11.2)	0.93 (0.4 to 1.9)	
Number of children <18 years in the household:				
None	659 (26.4)	74 (11.2)	1	
1	620 (24.9)	68 (11.0)	0.97 (0.7 to 1.4)	0.08
2	755 (30.3)	87 (11.5)	1.03 (0.7 to 1.4)	
≥3	460 (18.4)	72 (15.6)	1.47 (1.0 to 2.1)	
<b>Economic variables</b>				
Housing:				
Own home	2220 (89.0)	270 (12.2)	1	
Other	274 (11.0)	31 (11.3)	0.92 (0.6 to 1.4)	0.2
Toilet access:				
In house	1013 (40.6)	105 (10.4)	1	
Outside house	1481 (59.4)	196 (13.2)	1.32 (1.0 to 1.7)	0.03
Tap water in house:				
Yes	1107 (44.4)	118 (10.7)	1	
No	1387 (55.6)	183 (13.2)	1.27 (0.9 to 1.6)	0.05
Total monthly household income (Indian Rupees):				
<2000	857 (34.4)	104 (12.1)	1	
2000-2999	433 (17.4)	63 (14.5)	1.23 (0.9 to 1.7)	0.23
3000-4999	613 (24.6)	67 (10.9)	0.89 (0.6 to 1.2)	
5000-9999	399 (16.0)	49 (12.3)	1.01 (0.7 to 1.4)	
>10 000	190 (7.6)	17 (8.9)	0.71 (0.4 to 1.2)	
Family in debt:				
No/don't know	1664 (66.7)	180 (10.8)	1	
Yes	830 (33.3)	121 (14.6)	1.41 (1.1 to 1.8)	0.007
Hunger in the past three months:				
No	2364 (94.8)	273 (11.5)	1	
Yes	130 (5.2)	28 (21.5)	2.10 (1.3 to 3.2)	0.001



**Table 2** Association of gender disadvantage and mental health variables with chronic fatigue in a community sample of women in Goa, India (n=2494 unless stated otherwise). Values are numbers (percentages) unless stated otherwise

Factor	Total	Prevalence of chronic fatigue	Adjusted odds ratio (95% CI)*	Two tailed P value
Verbal abuse by husband†:				
No	1491 (85.2)	175 (11.7)	1	
Yes	259 (14.8)	56 (21.6)	1.81 (1.3 to 2.6)	0.001
Physical abuse by husband†:				
No	1585 (90.6)	199 (12.6)	1	
Yes	165 (9.4)	32 (19.4)	1.42 (0.9 to 2.2)	0.11
Sexual abuse by husband†:				
No	1686 (96.3)	207 (12.3)	1	
Yes	64 (3.7)	24 (37.5)	3.76 (2.2 to 6.5)	<0.001
Concerns about husband's extramarital affair†:				
No	1726 (98.6)	223 (12.9)	1	
Yes	24 (1.4)	8 (33.3)	2.71 (1.1 to 6.6)	0.03
Concerns about husband's habits†:				
No	1379 (78.8)	159 (11.5)	1	
Yes	371 (21.2)	72 (19.4)	1.57 (1.1 to 2.2)	0.005
Social integration:				
High	785 (31.5)	89 (11.3)	1	
Medium	819 (32.8)	101 (12.3)	1.06 (0.8 to 1.4)	0.85
Low	890 (35.7)	111 (12.5)	0.97 (0.7 to 1.3)	
Autonomy:				
High	832 (33.4)	84 (10.1)	1	
Medium	1062 (42.6)	131 (12.3)	1.27 (0.9 to 1.7)	0.07
Low	600 (24.1)	86 (14.3)	1.46 (1.0 to 2.0)	
Support from family:				
Minimal	482 (19.3)	78 (16.2)	1	
Moderate	706 (28.3)	83 (11.8)	0.78 (0.5 to 1.1)	0.10
High	1306 (52.4)	140 (10.7)	0.72 (0.5 to 1.0)	
Revised clinical interview schedule score:				
0	1530 (61.3)	23 (1.5)	1	
1-2	346 (13.9)	74 (21.4)	17.16 (10.5 to 27.9)	
3-4	222 (8.9)	49 (22.1)	17.24 (10.2 to 29.1)	<0.001
5-8	191 (7.7)	54 (28.3)	23.92 (14.2 to 40.4)	
>8	205 (8.2)	101 (49.3)	60.83 (36.8-100.6)	
Somatic symptom score:				
0	580 (23.3)	5 (0.9)	1	
1-2	825 (33.1)	39 (4.7)	5.57 (2.2 to 14.2)	<0.001
3-4	551 (22.1)	73 (13.2)	16.52 (6.6 to 41.3)	
5-19	538 (21.6)	184 (34.2)	53.96 (21.9 to 133.1)	

\*Adjusted for independent socioeconomic risk factors: age, debt, hunger, education.

†Married women only (n=1750).

between gender disadvantage and chronic fatigue—in particular, oppressive restrictions on women's lives, lack of a trusting relationship with a spouse, and marital violence. Chronic fatigue may be the result of heavy physical work, which might be experi-

enced by women in such circumstances. Excess physical work and gender disadvantages in access to food are perhaps the most likely explanation for the association of fatigue with low body mass index. Ironically, having had a pregnancy in the previous 12 months was associated with a reduced risk, perhaps because women were more likely to receive help with household activities in the period after childbirth.

Mental health factors, notably the comorbidity with other physical problems, and symptoms of depression and anxiety, had the strongest associations with chronic fatigue. Common mental disorders and medically unexplained symptoms are among the most common causes of morbidity in developing countries.<sup>17-19</sup> Most people with these mental disorders seek health care in primary care; however, less than a third of clinically significant morbidity is detected.<sup>20</sup> Our study indicates that fatigue may be a key problem in these disorders. Although psychological symptoms and attributions are commonly elicited on inquiry,<sup>13-21</sup> most doctors do not inquire about such symptoms and tend to prescribe drugs to treat symptoms.

In conclusion, our main finding is that the strongest association of chronic fatigue in developing countries is with mental ill-

**Table 3** Comorbidity of chronic fatigue with other somatic symptoms (n=2494). Values are numbers (percentages)

Symptom*	Participants with chronic fatigue (n=301)	Participants without chronic fatigue (n=2193)
<b>Pain related symptoms</b>		
Headache	38 (12.6)	112 (5.1)
Backache	46 (15.3)	75 (3.4)
Pain in extremities	21 (6.9)	20 (0.9)
Abdominal pain	11 (3.6)	14 (0.6)
Generalised body ache	21 (7.0)	11 (0.5)
<b>Sensory symptoms</b>		
Tingling-numbness	20 (6.6)	21 (1.0)
Hot-cold sensations	7 (2.3)	8 (0.4)
Palpitations	12 (4.0)	9 (0.4)
Bloating sensation	9 (3.0)	27 (1.2)
Burning sensation	3 (1.0)	3 (0.1)

\*Symptoms reported as being severe, continuous, or both over the previous two weeks.

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**Table 4** Association of reproductive and somatic health variables with chronic fatigue in a community sample of women in Goa, India (n=2494 unless stated otherwise). Values are numbers (percentages) unless stated otherwise

Factor	Total	Prevalence of chronic fatigue	Adjusted odds ratio (95% CI)*	P value
Ever pregnant:				
No	765 (30.7)	65 (8.5)	1	
Yes	1729 (69.3)	236 (13.6)	1.00 (0.7 to 1.5)	1.0
Age (years) at first pregnancy†:				
<20	257 (14.9)	48 (18.7)	1	
20-29	1320 (76.3)	173 (13.1)	0.75 (0.5 to 1.1)	0.2
30-39	152 (8.8)	15 (9.9)	0.56 (0.3 to 1.1)	
Pregnancy in past year‡:				
No	1469 (85.0)	215 (14.6)	1	
Yes	260 (15.0)	21 (8.1)	0.61 (0.4 to 1.0)	0.06
Number of pregnancies‡:				
1	771 (44.6)	85 (11.0)	1	
2	782 (45.2)	122 (15.6)	1.26 (0.9 to 1.7)	0.3
≥3	176 (10.2)	29 (16.5)	1.24 (0.8 to 2.0)	
Life time induced abortions‡:				
No	1355 (78.4)	186 (13.7)	1	
Yes	374 (21.6)	50 (13.4)	0.98 (0.7 to 1.4)	0.91
Infertility in past year‡:				
No	1596 (91.2)	215 (13.5)	1	
Yes	154 (8.8)	17 (11.0)	1.17 (0.7 to 2.0)	0.55
Use of intrauterine contraceptive device‡:				
No	1677 (95.8)	223 (13.3)	1	
Yes	73 (4.2)	8 (11.0)	0.96 (0.4 to 2.0)	0.91
Sterilised‡:				
No	1300 (74.3)	152 (11.7)	1	
Yes	450 (24.7)	79 (17.6)	1.29 (0.9 to 1.8)	0.11
Body mass index (n=1736):				
<17	201 (11.6)	37 (18.4)	1	
17-19.9	376 (21.7)	64 (17.0)	0.91 (0.6 to 1.4)	0.05
20-24.9	771 (44.4)	112 (14.5)	0.67 (0.4 to 1.0)	
≥25	388 (22.3)	50 (12.9)	0.57 (0.3 to 0.9)	
Systolic blood pressure (mm Hg) (n=1788):				
<101	309 (17.3)	50 (16.2)	1	
101-120	1168 (65.3)	167 (14.3)	0.76 (0.5 to 1.1)	0.3
121-140	246 (13.8)	34 (13.8)	0.63 (0.4 to 1.0)	
≥141	65 (3.6)	12 (18.5)	0.86 (0.4 to 1.8)	
Diastolic blood pressure (mm Hg) (n=1788):				
<70	99 (5.5)	11 (11.1)	1	
70-79	1063 (59.5)	151 (14.2)	1.24 (0.6 to 2.4)	0.9
80-89	511 (28.6)	80 (15.7)	1.23 (0.6 to 2.4)	
≥90	115 (6.4)	21 (18.3)	1.37 (0.6 to 3.1)	
Haemoglobin (g/dl) (n=2483):				
<8	35 (1.4)	4 (11.4)	1	
8.0-10.9	430 (17.3)	60 (13.9)	1.24 (0.4 to 3.7)	0.6
≥11	2018 (81.3)	237 (11.7)	1.06 (0.4 to 3.1)	

\*Adjusted for independent socioeconomic risk factors: age, debt, hunger, education.

†Women who have ever been pregnant (n=1729).

‡Married women only (n=1750).

ness.<sup>22</sup> Chronic fatigue is often comorbid with other medically unexplained physical symptoms, suggesting that such symptoms are part of a medically unexplained somatic syndrome.<sup>4</sup> Practitioners in developing countries should investigate the psychological and social determinants of chronic fatigue before assuming that it is the result of anaemia or a nutritional deficiency. The growing evidence for effective treatments for common mental disorders and medically unexplained physical symptoms should provide the basis for guidelines for management of such symptoms in healthcare settings.<sup>23 24</sup>

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### What is already known on this topic

Chronic fatigue is common in developed countries and is strongly associated with psychological factors

In developing countries, fatigue in women is often attributed to anaemia and nutritional deficiencies

### What this study adds

Chronic fatigue is common in women in developing countries

Psychological factors, notably symptoms of common mental disorders and somatoform disorders, and marital sexual violence are strongly associated with chronic fatigue

Low body mass index is associated with chronic fatigue, but anaemia is not

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