

# Somatic, mood, and vasomotor symptoms at midlife in relation to family structure and household workloads in Sylhet, Bangladesh

Taniya Sharmeen<sup>1</sup>, Lynnette Leidy Sievert<sup>2</sup>, Khurshida Begum<sup>1</sup>,  
Osul Chowdhury<sup>3</sup>, Shanthi Muttukrishna<sup>4</sup>, Gillian R. Bentley<sup>5</sup>

<sup>1</sup>Department of Anthropology, University College London, UK

<sup>2</sup>Department of Anthropology, University of Massachusetts Amherst, USA

<sup>3</sup>M.A.G. Osmani Medical College, Sylhet, Bangladesh

<sup>4</sup>Anu Research Centre, Department of Obstetrics and Gynaecology, University of Cork, Ireland

<sup>5</sup>Department of Anthropology, Durham University, UK

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**ABSTRACT:** The purpose of this study was to test whether the frequencies of vasomotor, somatic, and emotional symptoms at midlife were associated with household composition or workloads. Patrilocal family arrangements are common in Bangladesh and, since mothers-in-law hold a position of power *vis-à-vis* their daughters-in-law, we hypothesized that living with a mother-in-law would increase the likelihood of symptoms at midlife, while living with a daughter-in-law would decrease likelihood of symptoms. We also hypothesised that women with high levels of household workloads would be more likely to report symptoms associated with midlife.

Women aged 35–59 living in Sylhet, Bangladesh, (n=157) participated in interviews and anthropometric measures. Symptom frequencies during the past two weeks were collected. Household workloads were computed as minutes spent in housework, caring for dependents, and cooking. Daily values were multiplied by times per week the activity was carried out. Logistic regression was used to evaluate the association between family composition, workloads, and symptoms.

Dizzy spells, nervous tension, lack of energy, aches/stiffness in joints, and trouble sleeping were most frequent. Hot flashes were reported by 46% of participants. Women spent more hours caring for dependents than cooking or doing housework. The likelihood of hot flashes increased with time spent in housework and cooking, with daughters in the household, and with chewing betel nut. Daughters-in-law in the household decreased the likelihood of hot flashes. The likelihood of nervous tension increased with peri-menopausal status, stress, and sons in the household, and decreased with more hours spent caring for dependents.

The frequency of somatic symptoms and depressed mood exceeded the frequency of hot flashes. Household composition and workloads were more important than menopausal status in explaining variation in symptom frequencies. After controlling for other variables, the presence of mothers-in-law did not increase the likelihood of reporting symptoms at midlife; however, the presence of a daughter-in-law reduced the likelihood of hot flashes, perhaps because of fewer hours spent on housework and cooking.

**KEY WORDS:** Bangladesh, menopause, symptoms, activity patterns, hot flashes

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## Introduction

Midlife is often associated with higher frequencies of somatic, emotional, and vasomotor symptoms compared with younger and older life stages (Dennerstein et al. 2007; Sievert et al. 2007a). The reason for these symptoms may include the hormonal changes of menopause, the wear and tear of aging, or socio-cultural factors related to changing family roles (Hardy and Kuh 2002; Dennerstein et al. 2000; Gold et al 2000). Studies of menopausal symptoms in South Asia have been carried out in India (George 1996; Gupta et al. 2006; Kaur et al. 2004; Randhawa et al. 1987; Sengupta 2003; Singh and Arora 2005) and, less frequently, Pakistan (Nusrat et al. 2008; Yahya and Rehan 2003), Sri Lanka (Waidyasekara et al. 2009), and Nepal (Chuni and Sreeramareddy 2011). To our knowledge, this is the first study to focus on symptom experience at midlife in Bangladesh (Sievert et al. 2008).

Bangladesh emerged as an independent nation in 1971. It has a population of about 130 million people, making it one of the most densely populated countries of the world in terms of density per square kilometer. Most residents are Muslim (89.7%), with a minority of the population identifying as Hindu (9.2%), Buddhist (0.7%), Christian (0.3%), and believers in tribal faiths (0.1%). Over 98% of the people speak Bangla, and the literacy rate for those older than 14 is 47.5% (BANBEIS 2013; BBS 2013). Bangladesh ranks 146 in the 2013 Human Development Index, with a life expectancy of 69.2 year (UNDP 2013).

Sylhet is a major city situated in north-eastern Bangladesh. Located on the bank of the Surma River, Sylhet is nestled among picturesque tea planta-

tions and lush green tropical forests. Sylhet is also the origin of most of the Bangladeshi migrants living in the United Kingdom, United States, and the rest of the world. Consequently, Sylhet receives a steady flow of remittances from non-resident Bangladeshis, and this attracts migrant workers and families from other parts of Bangladesh. The steady flow of foreign currency along with natural resources, such as crude oil, natural gas, and coal, makes Sylhet the wealthiest division in Bangladesh (BBS 2013). Sylhet is also known as the most conservative and religious part of Muslim Bangladesh. It was from here that, in early 1303 under the spiritual leadership of Hazrat Shah Jalal and his 360 companions, Islam spread in this part of subcontinent (Murshid 2007).

In Sylhet, generally speaking, a woman's place is in the home. This is in part related to low literacy rates, the wealth of the community, gender roles associated with Islam, and the patriarchal social structure. Women in Sylhet observe some of the practices associated with *pardha*, which literally means curtain. *Purdah* refers to the physical segregation of living space and restrictions on public mobility, as well as the covering of body and face (Chowdhury 1993). Although women in Bangladesh generally do not cover their face, *purdah* is a way in which a family signals its economic superiority. Traditionally, when a family improves its financial position, it attempts to enhance its social standing by enforcing a stricter compliance with the rules of female seclusion (Aziz 1989; Chen and Ghaznavi 1980). Hindu women residing in Sylhet are not subject to the same restrictions due to the declining practice of a rigorous caste system (Chowdhury 1993; Blanchet 1987).

Patrilocal marriage patterns result in families of multiple generations. A daughter-in-law is brought into the home of her husband's family, and much of the responsibility for household work falls to her. Researchers have written about positive changes in women's status as they become "imposing," "respected," and "authoritative" mothers-in-law in Bengali and Chinese societies (Brown 1992; Raybeck 1992), traditional Mayan and Greek cultures (Beyene 1989), and among the Bakgalagadi of Botswana (Solway 1992). However, women at midlife continue to serve as daughters-in-law while their own mother-in-law is alive, even as they themselves become mothers-in-law. This role dichotomy may have relevance for symptom frequencies. Unrelated domestic helpers are expected to assist Sylheti women with cooking, cleaning, washing and sometimes with childcare, but not with care of the elderly. Wives, not servants, are expected to take care of their ailing in-laws.

Factors associated with somatic, emotional, and vasomotor symptom experience at midlife include menopausal status (Avis et al 2001; Kuh et al 1997; Guthrie et al. 2004; Melby et al. 2011), smoking, socioeconomic status (Avis et al. 1997), education (Schwingl et al. 1994; Brambilla et al. 1989), culture/cultural significance (Beyene 1989; Lock 1998; Robinson 1996; Melby et al. 2005), diet (Nagata et al. 2000) and environment/climate and seasonality (Sievert and Flanagan 2005). Studies of midlife have also suggested that psycho-social stress is a significant correlate of symptom frequencies in Canada (Kaufert et al. 1992), the UK (Kuh et al. 1997), the U.S. (McKinlay et al. 1987; Thurston et al. 2008), Spain (Sievert et al. 2007b), Japan (Igarashi et al. 2000), and Chile (Binfa et al. 2004).

Hot flashes are among the most ubiquitous menopausal symptoms (Gold et al. 2004). Hot flash reports among women at midlife range from 15% in Bombay, India (Bharadwaj et al. 1983) to 32% in Delhi, India (Gupta et al. 2006). In Northern India, hot flash frequencies range from 17% (Kaur et al. 2004) to 50% (Singh and Arora 2005). In Pakistan, hot flash frequencies range from 10% (Baig and Karim 2006) to about 35% (Wasti et al. 1993; Yahya and Rehan 2002). A hospital-based study in Hyderabad Pakistan found a hot flash frequency of 59% (Nusrat et al. 2008). In Sri Lanka, a community-based, cross-sectional study of 683 women, aged 45 to 60 years, reported a frequency of hot flashes of 39% (Waidyasekara et al. 2009).

Apart from hot flashes, women living in South Asian countries report psychological and somatic symptoms during the peri and post menopausal period. Among the top five symptoms reported in India were weakness/fatigue, body aches, and headaches (Kaur et al. 2004; Singh and Arora 2005). The same symptoms were reported in Pakistan where backache was the most frequently experienced menopausal symptom, followed by body aches, and insomnia (Nusrat et al. 2008). In Sri Lanka, the most prevalent menopausal symptoms were joint and muscular discomfort and exhaustion (Waidyasekara et al. 2009).

The purposes of this study were (1) to examine frequencies of somatic, emotional, and vasomotor symptoms at midlife, (2) to test whether women living with a daughter-in-law were less likely to report hot flashes or other midlife symptoms, (3) whether women living with a mother-in-law were more likely to report midlife symptoms, and (4) whether women with low, medium, or high levels

of household workloads were more likely to report symptoms associated with midlife.

## Materials and Methods

This study is part of a larger comparison of reproductive aging and symptom frequency among Bangladeshi women living in Sylhet, Bangladesh, and Bangladeshi immigrants in London, UK (Murphy et al. 2013). During the spring of 2007, 157 women were recruited from the city of Sylhet with the help of undergraduate students from Shahjalal University and well-connected community members (Sievert et al. 2008). Random methods are not conducive to the recruitment of women in Sylhet; therefore participants were contacted through personal networks and snowball techniques. Eligibility criteria were ages 35 to 59 years, no use of exogenous hormones in the past three months (including oral or injection contraceptives), not pregnant or lactating, and no history of hysterectomy or oophorectomy. Because of the goals of the larger study, women in Sylhet were recruited if they had the resources to emigrate to London; therefore the sample represents middle to upper class women, not the country of Bangladesh as a whole. Ethical approval was obtained from the Institutional Review Boards of UMass Amherst, and the Ethics Committees at University College London, Durham University, and the M.A.G. Osmani Medical College, Sylhet, Bangladesh.

Questionnaires were administered by Bangladeshi researchers (KB, TS) in the Sylheti dialect or in Bangla. The questionnaires collected information on symptom experience, demographic information, household composition, re-

productive history, and activity patterns. Anthropometric measures were carried out for height, weight, triceps skinfolds, waist and hip girths. Age at interview was known by 60% of the participants, and was estimated for the remainder using a calendar of political events and environmental disasters (described in Murphy et al. 2013).

Symptom experience was assessed by asking "During the past 2 weeks, have you experienced...?" The symptom list presented 26 somatic, emotional, and general symptoms that included hot flashes and night sweats. Later in the questionnaire, 7 additional symptoms related to reproductive health were queried. Women were asked whether their symptom experience was best described as "not at all," "a little," "quite a bit," or "extremely." The symptom list was developed on the basis of a validated checklist that has been used in many countries (Avis et al. 1993). Symptoms associated with menopause were embedded in the list of everyday complaints (Lock 1998), and the instrument was translated, back translated, and piloted in Sylhet. Women were also asked if they had any long-term illness, health problems, or disability that limited their daily activities or the work they could do.

Household workloads were computed as minutes per day spent in a particular activity multiplied by the number of times per week that the activity was carried out. Three groups of activity were created: (1) "housework" computed from mopping, sweeping, dusting, cleaning bathroom, cleaning kitchen, and washing clothes by hand, (2) "caring" computed from caring for children, caring for elderly, and taking children to school, and (3) "cooking". These groups of activity were then divided into approx-

imate tertiles of low, medium, and high levels of workload.

Women who had menstruated within the past two months were defined as pre-menopausal, within the past three to twelve months as peri-menopausal, and without menses for 12 months as post-menopausal (WHO 1996). Education was divided into categories of 0–6 years, 7–10 years, and 11 or more years of formal schooling. Marital status was divided into married and not married (2% of the entire sample were divorced or separated, 13% were widowed).

Hot flashes, headaches, and the five most frequently reported complaints (dizziness, nervous tension, lack of energy, aches/stiffness in joints, and trouble sleeping) were transformed into binary variables (yes/no). They were first examined by t-tests in relation to age at interview, minutes of housework per week, minutes of caring for children and the elderly, minutes spent cooking, number of children, number of members permanently in the household, number of sons in the household, number of daughters in the household, number of grandchildren, number of household helpers, BMI, waist to hip ratio, level of life stress (scale of 1–6), and ability to handle stress. Chi-square tests were used to examine the symptoms in relation to menopausal status, marital status, religion, current financial status (struggling, OK, comfortable, well-off), mother-in-law in the household (yes/no), daughter-in-law in the household (yes/no), exercise (yes/no), limits on daily activities (yes/no), having been ill in the last 6 months (yes/no), having had parasites in the last 6 months (yes/no), and chewing betel nut (yes/no). Due to the large number of tests, only a p value of <0.01 is treated as significant in univariate analyses.

Based on the literature of symptoms at midlife and the results of univariate tests, each of the seven symptoms were examined by logistic regression in relation to age, menopause status, workload, marital status, number of children, number of sons in household, number of daughters in household, number of domestic helpers, mother-in-law in the household, daughter-in-law in the household, BMI, level of stress, level of education, limits on activities, illness in the past 6 months, parasites in the past 6 months, and chewing betel nut. Because of the intercorrelation of factors, backwards stepwise regression was applied.

## Results

Sample characteristics are shown in Table 1. Women were most often married, Muslim, and described themselves to be financially “OK” or “comfortable.” The number of individuals living permanently in the household ranged from 1 to 19, with a mean of 6 (s.d., 2.5). Mothers-in-law were present in 11% of the households, and daughters-in-law were present in 14% of households. The number of household helpers ranged from 0 to 8 with a mean of 1 (s.d. 1.0). About half of the participants were post-menopausal. Only 26% of participants said that they exercised or played sports, and the mean body mass index (BMI) was slightly overweight (26.1 kg/m<sup>2</sup>).

Participants reported the most time spent caring for children and the elderly (1996 minutes or 33.3 hours) each week, compared to cooking (753 minutes or 12.6 hours) or housework (415 minutes or 6.9 hours). On average, moderate levels of stress were reported (3.9 on a scale of 1 to 6).

Table 1. Sample characteristics (n=157)

	Mean (standard deviation) or percentage
Mean age at interview	46.8 (7.1)/range 35–59
Marital status	
Married	85%
Separated/Divorced	2%
Widowed	13%
Religion	
Muslim	77%
Hindu	22%
Other	1%
Years of education	
0 to 6	25%
7 to 10	39%
11 or more	36%
Financial status	
Struggling	11%
OK	38%
Comfortable	30%
Well off	21%
Menopause status	
Pre-menopausal	50%
Peri-menopausal	6%
Postmenopausal	44%
Number of children	3.2 (1.8)/range 0–9
Number of individuals in household	5.9 (2.5)/range 1–19
Number of sons in household	1.2 (0.9)/range 0–3
Number of daughters in household	1.1 (1.1)/range 0–5
Number of grandchildren in household	0.3 (0.7)/range 0–4
Number of household helpers	0.8 (1.0)/range 0–8
Mother-in-law in household	11%
Daughter-in-law in household	14%
BMI kg/m <sup>2</sup>	26.1 (4.1)
Waist to hip ratio	0.86 (0.07)
Exercise or play sports	26%
Limits on daily activities	31%
Illness in last 6 months	44%
Parasites in last 6 months	14%
Chew betel leaf	54%
Housework (minutes/week)	415.3 (456.3)
Caring (minutes/week)	1996.3 (1902.2)
Cookload (minutes/week)	753.4 (513.8)
Stress in life (scale of 1–6, none to extreme)	3.9 (1.5)
Ability to handle stress (scale of 1–6)	3.5 (1.3)



Women living with their mother-in-law tended to spend more time on housework than women not living with their mother-in-law (709 minutes per week vs. 387 minutes,  $p < 0.05$ ). Women living with a daughter-in-law tended to spend less time on cooking (380 minutes per week vs. 813 minutes,  $p < 0.05$ ) and on housework (245 minutes per week vs. 446 minutes,  $p = 0.06$ ), compared to women not living with a daughter-in-law.

As one might expect, there was a significant decline in minutes spent on housework in relation to number of domestic helpers, from no household help (623 minutes per week) to 1 helper (270 minutes), 2 helpers (155 minutes), and 3 helpers (32 minutes) ( $p < 0.01$ ). Cook-load similarly tended to decrease from 887 minutes per week to 642 minutes, 725 minutes, and 367 minutes ( $p < 0.05$ ) with domestic help. Time spent caring for children and the elderly did not decline with number of household helpers.

The most frequent symptoms during the past two weeks among Sylheti women were dizzy spells and nervous tension, followed by lack of energy, aches/stiffness in joints, and trouble sleeping. Headaches and hot flashes were reported by 47% and 46% of the participants, respectively. Table 2 shows symptom frequencies, and how often a symptom was characterized as "extreme." Nervous tension, aches/stiffness in joints, leg cramps, headaches and trouble sleeping appear to be the most bothersome symptoms.

The top five symptoms plus headaches and hot flashes were examined in relation to household work categorized into approximate tertiles (low, moderate, high). Women with the highest levels of housework were significantly more likely to report headaches ( $p < 0.01$ ) and tended to be more likely to report nervous tension ( $p < 0.05$ ) and less likely to report trouble sleeping ( $p < 0.05$ ). Wom-

Table 2. Percent symptom frequencies reported in Sylhet, Bangladesh (n=157)

Most frequently reported symptoms	Percent with any experience of symptom	Percent who said symptom experience was "extreme"
Vasomotor symptoms		
Hot flashes	46%	7%
Night sweats	26%	5%
Somatic symptoms		
Dizzy spells	69%	6%
Lack of energy	65%	8%
Aches/stiffness in joints	64%	12%
Trouble sleeping	60%	9%
Leg cramps	60%	11%
Back aches	59%	8%
Rapid heartbeat	52%	3%
Headaches	47%	10%
Emotional/mental symptoms		
Nervous tension	67%	13%
Feeling depressed	57%	7%
Irritability	53%	3%
Difficulty concentrating	51%	8%

en with the lowest number of minutes spent cooking during a week reported the lowest frequency of hot flashes (22%) compared with women with an intermediate number of minutes (46%) and women with the greatest number of minutes spent cooking (69%), ( $p < 0.01$ ). Headaches tended to be similarly less frequent among those with the lowest number of minutes spent cooking (30%) compared with women in the top two tertiles of time spent cooking (52% and 53%,  $p = 0.05$ ). Table 3 shows symptom frequencies in relation to household work. Although only  $p$  values  $< 0.01$  are considered significant, given the large number of tests,  $p$  values of  $< 0.05$  are given in Tables 3 and 4 for additional information.

In univariate analyses, women with a daughter-in-law in the household were significantly less likely to report hot flashes (18% vs. 50%,  $p < 0.01$ ) compared with women who did not have a daughter-in-law in the household. In contrast, women with hot flashes had significantly more daughters of their own in the household (1.4 vs. 0.9,  $p < 0.01$ ). Women with a mother-in-law in the household

tended to be more likely to report nervous tension (88% vs. 65%,  $p < 0.05$ ). See Table 4 for a summary of univariate results.

In terms of socio-demographic variables, women with 0 to 6 years or 7 to 10 years of formal education were significantly more likely to report lack of energy (85% and 67% vs. 49%,  $p < 0.01$ ) and aches/stiffness (74% and 77% vs. 42%,  $p < 0.001$ ) compared to women with 11 or more years of schooling.

With regard to health, women who replied with limits on their activities due to long-term illness or disability were significantly more likely to report aches/stiffness in joints (81% vs. 19%,  $p < 0.01$ ), lack of energy (87% vs. 56%,  $p < 0.01$ ), and trouble sleeping (78% vs. 53%,  $p < 0.01$ ) compared with women who did not have limits on activities. Similarly, women who experienced an illness within the past 6 months were significantly more likely to report aches/stiffness in joints (78% vs. 22%,  $p < 0.01$ ) and trouble sleeping (75% vs. 47%,  $p < 0.01$ ) compared with women who did not experience an illness within the past 6 months. Finally, women who chewed betel nut were significantly more likely

Table 3. Percent reporting symptoms in relation to hours spent doing housework, caring for children and the elderly, and cooking

Symptoms	Housework			Caring			Cookload		
	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Hot flashes	34	53	46	44	44	47	22	46	69**
Dizziness	61	67	82	68	81	57	62	77	58
Lack of energy	54	70	71	58	79	54*	57	68	72
Aches/pains in joints	57	64	71	67	65	66	55	70	59
Trouble sleeping	70	67	43*	66	60	64	70	53	57
Headaches	34	36	64**	40	54	35	30	52	53
Nervous tension	49	74	76*	66	75	49	60	81	53*

\*\*  $p < 0.01$ ; \*  $p < 0.05$ .



to report aches/stiffness in joints (77% vs. 24%,  $p < 0.01$ ) and tended to report dizziness ( $p < 0.05$ ).

In logistic regression analyses, consistent with the univariate results, each daughter in the household more than doubled the likelihood of reporting hot flashes (OR 2.533, 95% CI 1.323–4.850), while the presence of a daughter-in-law reduced the likelihood of reporting hot flashes (OR

0.134, 95% CI 0.021–0.862). In addition, women who reported hot flashes were likely to be older. Women who did a moderate amount of housework were 6 times more likely to report hot flashes compared to women who did less housework (OR 6.079, 95% CI 1.515–24.400). Women who spent the most time cooking were almost 9 times more likely to report hot flashes compared to women who were in

Table 4. Summary of univariate results to identify symptom correlates

	Household composition	Household workload	Socio-demographic characteristics	Health/lifestyle characteristics
Hot flashes	More daughters** Fewer household helpers* No daughters-in-law**	High levels of cooking**	More life stress *	
Dizziness	Not married*		Less education*	Activity limits* Recent illness* Chew betel nut*
Lack of energy	More children* Not married*	Moderate levels of caring for dependents*	Less education**	Limits on activities**
Aches/stiffness in joints	More children*		Less education**	Parasites* Higher BMI* Higher waist to hip ratio* Activity limits** Recent illness** Chew betel nut**
Trouble sleeping		Low levels of housework*		Higher BMI* Activity limits** Recent illness**
Headaches	More sons* More daughters *	High levels of housework** High levels of cooking*		
Nervous tension	Mother-in-law*	High levels of housework*	More life stress**	

Menopausal status, religion, exercise, and financial status were not significantly associated with any of the above symptoms. \*  $p < 0.05$ ; \*\*  $p < 0.01$ .

Table 5. Results of backwards stepwise logistic regression analyses

Symptom	Variables in final model	OR	95% CI	p-value
Hot flashes	Age	1.117	1.013–1.232	0.026
	Housework			
	Low (reference)			
	Moderate	6.079	1.515–24.400	0.011
	High	1.452	0.381–5.541	0.585
	Cookload			
	Low (reference)			
	Moderate	3.803	0.957–15.112	0.058
	High	8.846	1.751–44.690	0.008
	Number of sons in household	1.840	0.903–3.753	0.093
	Number of daughters in household	2.533	1.323–4.850	0.005
	Daughter-in-law in household	0.134	0.021–0.862	0.034
	Parasite in past 6 month	4.386	0.931–20.674	0.062
Use of betel nut	4.182	1.380–12.670	0.011	
Aches/stiffness in joints	BMI	1.133	0.996–1.290	0.057
	Years of education			
	0–6 (reference)			
	7–10	0.778	0.197–3.067	0.719
	11+	0.273	0.077–0.974	0.045
	Illness in past 6 months	2.875	1.063–7.778	0.038
	Use of betel nut	2.637	0.970–7.167	0.057
Nervous tension	Number of children	0.557	0.367–0.846	0.006
	Number of sons in household	2.259	1.079–4.726	0.031
	Menopause status			
	Pre- (reference)			
	Peri-	80.951	3.506–1868.885	0.006
	Post-	4.603	0.988–21.444	0.052
	Use of betel nut	0.312	0.086–1.137	0.078
	Hours spent caring			
Low (reference)				
Moderate	1.465	0.323–6.633	0.621	
High	0.210	0.053–0.841	0.027	

the lowest tertile for cookload (OR 8.846, 95% CI 1.751–44.690). Finally, women who chewed betel nut were 4 times more likely to report hot flashes compared to women who did not chew betel nut (OR 4.182, 95% CI 1.380–12.670). See Table 5

for results of backwards stepwise logistic regression analyses.

The likelihood of reporting aches/stiffness in joints decreased in women with 11 or more years of schooling compared to women who only had a primary

Table 5. cont.

Symptom	Variables in final model	OR	95% CI	p-value
	Cookload			
Dizziness	Cookload			
	Low (reference)			
	Moderate	2.344	0.751–7.316	0.142
	High	0.650	0.199–2.118	0.475
Nervous tension	Use of betel nut	3.397	1.290–8.943	0.013
	Low (reference)			
	Moderate	2.724	0.705–10.518	0.146
	High	0.525	0.121–2.272	0.388
Lack of energy	Amount of stress	1.979	1.246–3.144	0.004
	Caring			
	Low (reference)			
	Moderate	3.411	1.097–10.609	0.034
Trouble sleeping	High	0.953	0.325–2.792	0.930
	Limits on activity	7.921	2.127–29.498	0.002
	Limits on activity	3.334	1.179–9.426	0.023
	Household help	1.785	1.055–3.018	0.031
Headaches	Caring			
	Low (reference)			
	Moderate	1.154	0.371–3.592	0.805
	High	0.219	0.057–0.847	0.028
	Number of children	0.623	0.410–0.947	0.027
	Number of sons in household	3.775	1.736–8.209	0.001
Number of daughters in household	3.644	1.850–7.175	<0.001	
	Parasite in past 6 months	4.170	0.976–17.819	0.054

education (OR 0.273, 95% CI 0.077–0.974), and the use of betel nut more than doubled the likelihood of reporting aches/stiffness in joints (OR 2.637, 95% CI 0.970–7.167).

Contrary to expectations, as the number of children increased, the likelihood of reporting nervous tension declined (OR 0.557, 95% CI 0.367–0.846). Perhaps related to that result is the finding that women in the top tertile of time spent caring for dependents were less likely to report nervous tension compared to women in the bottom ter-

tile (OR 0.210, 95% CI 0.053–0.841). On the other hand, with every son in the household there was an increase in the likelihood of reporting nervous tension (OR 2.259, 95% CI 1.079–4.726). Peri-menopausal women were much more likely to report nervous tension than pre-menopausal women. And, as the amount of self-reported stress increased, so did the likelihood of reporting nervous tension.

Lack of energy was associated with a moderate amount of caring for dependents, and with limits on activity due to

long-term illness or disability. Having limits on activity also more than tripled the likelihood of reporting trouble sleeping. Finally, the likelihood of reporting headaches decreased with more time spent caring for dependents (OR 0.219, 95% CI 0.057–0.847), there was an increase in the likelihood of headaches with each son living in the household (OR 3.775, 95% CI 1.736–8.209) and with each daughter living in the household (OR 3.644, 95% CI 1.850–7.175).

## Discussion

The purpose of this study was to examine frequencies of somatic, emotional, and vasomotor symptoms at midlife in Sylhet, Bangladesh, and to test whether household composition or household workloads were associated with midlife symptoms. The multigenerational nature of households in Sylhet is reflected in the relatively high number of individuals living in the home (mean 6, range 1–19) despite a mean parity of 3.2 children. Mothers-in-law were present in 11% of the households, and daughters-in-law were present in 14% of households. On average, each household had one domestic helper (range 0–8). As expected, women living with their mother-in-law reported more household work compared to women not living with their mother-in-law. Moreover, as expected, women spent less time on household work if they lived with a daughter-in-law or had a domestic helper. While domestic helpers reduced the time spent on housework and cooking, they did not reduce a woman's time spent caring for children and the elderly. Participants reported spending more time caring for children and the elderly (33.3 hours/week) than cooking (12.6

hours/week) or doing housework (6.9 hours/week).

Forty-six percent of the participants reported the experience of hot flashes during the two weeks before interview, with only 7% saying that the experience was "extreme." Twenty-six percent of women reported night sweats, with a similar number (5%) reporting the experience as extreme. The frequency of hot flashes in Sylhet (46%) is higher than the frequencies reported in some (Bharadwaj et al. 1983; Gupta et al. 2006; Kaur et al. 2004) but not all (Singh and Arora 2005) studies of midlife in India. The frequency was higher than frequencies reported in Pakistan (Baig and Karim 2006; Wasti et al. 1993; Yahya and Rehan 2002) and Sri Lanka (Waidyasekara et al. 2009), but lower than a hospital-based study in Hyderabad Pakistan (Nusrat et al. 2008).

Hot flashes were not the most frequent symptom reported in Sylhet. Instead, the most frequent symptoms during the past two weeks were dizzy spells (69%) nervous tension (67%), lack of energy (65%), aches/stiffness in joints (64%), and trouble sleeping (60%). The symptoms most likely to be described as "extreme" were nervous tension (13%), aches/stiffness in joints (12%), leg cramps (11%), headaches (10%), and trouble sleeping (9%). These most frequent symptoms were also reported in other studies carried out in South Asia. For example, weakness/fatigue, body aches, and headaches were among the most frequent symptoms in India (Kaur et al. 2004; Singh and Arora 2005) and Pakistan, where insomnia was also frequently experienced (Nusrat et al. 2008). Joint/muscular discomfort and exhaustion were the most prevalent menopausal symptoms in Sri Lanka (Waidyasekara et al. 2009).

With the exception of nervous tension, menopausal status was not significantly associated with the seven symptoms of interest in this study. This suggests that socio-cultural, lifestyle or health-related variables were more important than hormonal changes in explaining symptom frequency. For example, heavier BMI was associated with aches/stiffness in joints. Extra weight has been associated with osteoarthritis (Felson and Chaisson CE 1997; Issa and Griffin 2012), suggesting that the physical pressure of extra weight, rather than hormonal changes at midlife, result in an increased likelihood of some symptoms. In addition, the health of women in Bangladesh – even those in the upper socioeconomic classes – is affected by difficult environmental conditions such as excessive workloads and insufficient health care.

The existing patriarchal and partilineal social structure of Bangladesh society, together with class, status, and *purdah*, determine a woman's role. In addition to the physical segregation of space, and the covering of body and face, *purdah* also refers to beliefs and values about the behavior of women, restrictions on their movements, and requirements that their appearance and behavior be respectful and deferential (Abdullah 1974; Arens and van Beurden 1980; Chowdhury 1993). A set of norms govern the behavior of women in the presence of all males and toward female elders. Thus, a daughter-in-law will cover her head even in the presence of her mother-in-law and an adolescent daughter will assume a respectful posture when her father arrives (Chowdhury 1993).

This study focused on a possible association between symptoms and household composition. In logistic regression analyses, each daughter in the household

more than doubled the likelihood of reporting hot flashes and headaches. A girl in her parental home may help her mother with household chores and sometimes help her with cooking, but these are neither her responsibilities nor mandatory (Chowdhury 1993). Each son also more than doubled the likelihood of reporting nervous tension and headaches. A son is regarded as the prospective head of the household, and is not expected to take part in any of the household chores/domestic work.

After marriage, a young woman moves to her husband's home where cooking for the family members and taking care of the elderly in-laws or her own children are her major responsibilities. It appears that the number of children overall, not necessarily the number living at home, and a higher number of hours spent caring for dependents, reduced the likelihood of nervous tension and headaches. This may be because of concordance between role expectations and behaviors which decreases stress within the household.

In this study, the presence of a daughter-in-law reduced the likelihood of reporting hot flashes, suggesting that help with housework reduced the hot flash triggers associated with physical activity. In logistic regression analyses, women who did a moderate amount of housework were 6 times more likely to report hot flashes compared to women who did less housework (OR 6.079, 95% CI 1.515–24.400). Contrary to our expectations, having a mother-in-law in the household did not increase the risk of hot flashes, even though women living with a mother-in-law reported higher levels of housework, caring and cooking.

Not surprisingly, women with the highest levels of housework were more

likely to report headaches and nervous tension, and least likely to report trouble sleeping. Caring for children and the elderly was associated with lack of energy. In spite of the presence of the domestic helpers, a good daughter-in-law is expected to take care of her ailing or elderly in-laws by herself. Women who spent the most time cooking were almost 9 times more likely to report hot flashes compared to women in the lowest tertile for cookload (OR 8.846, 95% CI 1.751–44.690). Cooking may increase the likelihood of hot flashes because of increased ambient temperature in the kitchen which can trigger hot flashes (Kronenberg and Barnard 1992; Molnar 1981). In Sylhet, home cooking involves standing in front of the flame of a propane burner, stirring, checking and re-checking the food over and over again, wearing a sari covering almost all the body, often in a small room without any window or proper ventilation to circulate the air.

In addition, use of areca nut (or “betel nut”) more than doubled the likelihood of reporting aches/stiffness in joints, and more than tripled the likelihood of reporting dizziness. In addition, women who chewed betel nut were 4 times more likely to report hot flashes compared to women who did not chew betel nut. Chewing betel nut, or “*paan*” as locally known in Bangladesh, is very popular with women in Sylhet and from our observations habitual users chew betel nut during virtually all waking hours (Nunez-de la Mora et al. 2007). The quantity and frequency of use, as well as the age that one starts chewing betel nut, vary from person to person. Traditionally the betel nut is consumed with betel leaf and lime and sometimes with dried tobacco leaf and spices (e.g. fennel seed, clove, or

cardamom). The nut is consumed in its raw and ripe form, in a processed form (boiled and dried/ sundried), or in a fermented form (soaked in water for a few days when it is ripe). Recent studies on humans have shown that the predominant effects of betel quid chewing appear to be exerted on the central and autonomic nervous systems, and these effects are habit related and dose dependent (Chu 2002; Deng et al. 2001). Betel chewing produces an increase in heart rate, blood pressure, sweating and body temperature (Wyatt et al 1996; Chu 1993). Betel chewers claim that betel chewing produces facial flushing and a warm sensation in the body. Dizziness, hot sensations, palpitations and sweating are associated with betel nut consumption in habitual users (Chu 2002; Deng et al 2001; Norton 1998). These findings might shed light on the interesting association between chewing betel nut and an increased likelihood of experiencing hot flashes, although careful inspection and systematic study is required on this topic.

Limitations of this study include the small number of participants ( $n=157$ ). The findings reported here represent the experiences of middle to upper class women and cannot be generalized to all Bangladeshi women at midlife.

The results of this study reveal factors associated with symptoms at midlife, in particular the relationship between symptoms and household composition and workload. Future research is needed to further examine the perception, beliefs, attitudes and experiences of women, with a focus on their cultural and religious backgrounds, in order to understand and comprehend the socio-cultural implications of the menopausal experience. Such future research would be beneficial for ensuring the pro-



vision of culturally sensitive women's health care.

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### Author contribution

TS and LLS wrote the article; LLS, SM and GRB designed the study, supervised data collection and analyses; GRB edited the manuscript; TS and KB collected the data; KB reviewed the manuscript; OCh provided logistical support during data collection and reviewed the manuscript.

### Conflict of interest

The authors declare there is no conflict of interests.

### Corresponding author

Lynnette Leidy Sievert, Department of Anthropology, Machmer Hall, 240 Hicks Way, University of Massachusetts Amherst, Amherst, MA 01003-9278, USA  
e-mail address: leidy@anthro.umass.edu

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