

# IMS study of Climate, Altitude, Temperature and vasomotor symptoms in the United Arab Emirates

E. Stefanopoulou, P. Gupta, R. **Mohamed Mostafa, N. Nosair, Z. Mirghani, K. Moustafa, G. Al Kusayer,** D.W. Sturdee and M. S. Hunter

Writing Research Group of the Council of Affiliated Menopause Societies for the International Menopause Society Study (IMS-CAT)

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## ABSTRACT

**Objective** To examine the relationships between temperature, season (summer versus winter), lifestyle, health, mood, beliefs, and experience of hot flushes and night sweats (HFNS), amongst mid-aged women living in the United Arab Emirates (UAE).

**Methods** The UAE climate is hyper-arid, being a hot desert climate, with warm winters and hot summers. A total of 372 peri- and postmenopausal women, aged from 45 to 55 years, from urban UAE regions were included. Data were collected during both summer and winter months. Participants completed questionnaires eliciting information about sociodemographics, HFNS (prevalence, frequency and problem-rating), health and lifestyle (body mass index (BMI), diet, exercise), mood (Women's Health Questionnaire) and menopause attributions and beliefs (Menopause Representations Questionnaire).

**Results** HFNS were currently being experienced by 46.5% of women, with an average weekly frequency of five and problem-rating of 5.7/10. Seasonal variation in temperature was not associated with prevalence, frequency or problem-rating. Hot flush prevalence was associated with poor health, life satisfaction, mood, employment, lower BMI and diet. Higher frequency was associated with higher BMI and more years since the last period. HFNS were more problematic mainly for women who reported lower life satisfaction and held more negative beliefs about the menopause.

**Conclusions** In this UAE study, temperature and seasonal temperature variation did not appear to influence HFNS-reporting, but health, life satisfaction, BMI, beliefs and lifestyle factors partially explained women's experiences of menopausal symptoms. A qualitative study might provide further information about the meanings of HFNS and menopause amongst UAE women.

## INTRODUCTION

Hot flushes and night sweats (HFNS) are vasomotor symptoms associated with reducing estrogen plasma concentrations during the menopause transition and early postmenopause, which influence temperature-regulating mechanisms in the hypothalamus<sup>1</sup>. While HFNS are common, there is wide variation in women's experience of menopause, as well as attitudes and perceptions of menopause, between women of different cultural and ethnic backgrounds<sup>2,3</sup>.

In general, HFNS prevalence tends to be lower amongst peri- than postmenopausal women, and amongst Asian women compared with American, African-American and European women<sup>2,4–7</sup>. Various explanations have been proposed to explain these ethnic differences, including body mass index (BMI), educational level, parity, diet, exercise, attitudes and beliefs toward the menopause, climate as well as genetic factors<sup>2</sup>. However, symptom prevalence has been shown to vary within ethnic groups, depending on their country of residence, suggesting that environmental

Correspondence: Professor M. S. Hunter, Health Psychology Section, 5th Floor Bermondsey Wing, Guy's Campus, King's College London, London SE1 9RT, UK; E-mail: myra.hunter@kcl.ac.uk

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factors may be more important. For instance, women who migrate from Eastern to Western countries report higher levels of HFNS, suggesting that women might experience more HFNS as a result of dietary changes, a more sedentary lifestyle, or even different expectations about this life event<sup>8-10</sup>. Environmental factors such as climate have also been reported to influence reporting of menopausal symptoms, but evidence so far remains inconclusive<sup>6,7,11</sup>. The climate of the United Arab Emirates (UAE) is classified as hyper-arid, being a hot desert climate with warm winters and hot summers, thus being particularly interesting in this regard.

The authors are part of the International Menopause Society studies of Climate, Altitude and Temperature (IMS-CAT) which were set up to investigate the possible role of climate, as well as lifestyle and psychosocial factors, upon the experience of menopausal symptoms in urban settings in different countries<sup>6,12</sup>. The first IMS-CAT study of Spanish/Latin American women, living in Spain and Latin America, found associations between higher temperatures and increased HFNS prevalence, frequency and problem-rating<sup>6</sup>. There is some evidence that HFNS incidence might increase as the difference in temperatures between seasons increases, suggesting that women living in climates of greater seasonal variation have greater sensitivity to elevated temperatures<sup>11</sup>, but in the first IMS-CAT study comparing Spanish/Latin American centers with high (12–19°C) and low (2–3°C) variation in temperature between seasons, there were no differences found in HFNS reporting<sup>6</sup>. In the second IMS-CAT study of women living in eight urban Indian regions, the impact of seasonal temperature was examined by collecting data during the summer (37–41°C) and during the winter (21–29°C) months in each center, but there were no temperature or seasonal effects found upon reporting of symptoms<sup>12</sup>. The effect of temperature on HFNS, and whether women report more symptoms in hot rather than cold seasons of the year, warrants further research. In both Spanish/Latin American and Indian studies, frequent and problematic HFNS were associated with poor general health and low life satisfaction, anxiety, negative beliefs about menopause and diet including spicy foods. Consistent with previous findings<sup>9,13</sup>, women from Spain and Latin America reported average prevalence rates of 58% and frequent and moderately problematic HFNS, whereas prevalence rates for the Indian women were much lower (34%) and HFNS were rated as less problematic.

The current study reports findings from the IMS-CAT study of women living in the UAE. This study aimed to examine (1) the prevalence, frequency and problem-rating of HFNS amongst UAE women, and (2) the influence of climate, i.e. temperature and season (winter/summer), as well as BMI, diet, parity, exercise, employment, educational level, mood, menopause beliefs, general health and life satisfaction upon prevalence, frequency and problem-rating of HFNS.

## METHODS

### Participants

We aimed to recruit 200 women during each season (winter/summer). All participants in this study were healthy volunteers recruited from the general population. The sampling method included advertisements to recruit general university academic and administrative staff (not medical staff) and students' parents (parents of medical and non-medical staff), recruitment via TV and radio medical programs on menopause, and recruitment of women via the Emirates Menopause Society.

### Design

This was a cross-sectional survey of the experience of vasomotor symptoms amongst perimenopausal and postmenopausal women in Sharjah, Dubai, Ajman and Abu Dhabi (Figure 1). The climate of the UAE is classified as hyper-arid, being a hot desert climate, with warm winters and hot summers. Over the course of a year, the temperature typically varies from 15°C to 41°C and is rarely below 12°C or above 44°C. The *warm season* lasts from May to September with an average daily high temperature above 37°C. The *colder season* lasts from December to March with an average daily high temperature below 21°C. Average daily temperature in coastal regions such as Dubai varies between 33 and 44°C during the summer months (May–September) and between 19 and 25°C during winter (December–March).

Women completed questionnaires, with researchers' support, which included questions about their health, lifestyle, experience of menopausal symptoms and use of treatments. Researchers were native to the region and shared common language (Arabic) and resources to carry out the research. Interviews were carried out during winter (December–March) and summer (May–September) months. Ethical approval was obtained from the Ethics and Research Committee (ERC/23/06/2010) University of Sharjah.

### Inclusion and exclusion criteria

Perimenopausal (i.e. having irregular and infrequent menstrual periods) or postmenopausal women (i.e. no menstrual period in the last 12 months), aged between 45 and 55 years, belonging to the native ethnic group (Emirati), and speaking the main language of the region (Arabic) were recruited.

Exclusion criteria consisted of women with severe physically disabling medical or surgical conditions, major psychiatric disorders such as dementia, psychotic or affective disorder, premature menopause (i.e. attained before the age of 40 years) and surgical or iatrogenic menopause (i.e. attained as a result of surgical and medical treatments such as hysterectomy, oophorectomy, chemotherapy or radiotherapy). Women not



**Figure 1** Map of United Arab Emirates showing the four participating emirates in the study – Abu Dhabi, Ajman, Dubai and Sharjah

having menstrual periods as a result of continuous progesterone treatment (e.g. Mirena IUS, progesterone contraceptive pill, progesterone injection or progesterone implant) were also excluded.

## Measures

Information on menopause status, lifestyle habits, BMI, general health, experience of menopausal symptoms, current and past treatments for HFNS was obtained. All questionnaires were translated and linguistically validated into the local language using forward-and-backward translation methodology<sup>6,9</sup>.

The *Hot Flush Rating Scale* (HFRS)<sup>14</sup> records the number of HFNS (frequency) experienced in the previous week and has good test–retest reliability ( $r = 0.8$ ) and validity, with significant correlations with diary recordings for hot flushes ( $r = 0.97$ ,  $p < 0.001$ ) and night sweats ( $r = 0.94$ ,  $p < 0.001$ ). Problem rating is determined by the mean of three items: ‘To what extent do you regard your HFNS as a problem?’, ‘How distressed do you feel about your HFNS?’, and ‘How much do your HFNS interfere with your daily routine?’, giving a score on a 10-point scale with higher scores indicating more problematic HFNS.

The *Women’s Health Questionnaire* (WHQ)<sup>15</sup> measures perceptions of physical and emotional symptoms in the evaluation of interventions for menopausal women. The following subscales were used: depressed mood and anxiety/fears (scores ranging from 0 to 1). The WHQ has been standardized on mid-aged women and has high internal reliability (Cronbach’s  $\alpha = 0.7–0.84$ ) and test–retest reliability (0.78–0.96).

The *Menopause Representations Questionnaire* (MRQ)<sup>16</sup> includes subscales assessing the number of symptoms attributed to menopause (identity), women’s beliefs about time frame (short time estimations), negative beliefs about the

impact of menopause upon a woman’s sense of self, and positive beliefs about menopause (as a relief from periods and pregnancy). The above subscales had good internal reliability in our sample (Cronbach’s  $\alpha = 0.82$  for negative impact, 0.67 for relief and 0.86 for short time subscales).

## Data analysis

All completed questionnaires were sent to the coordinating center in the UK for analysis. Quantifiable data were analyzed using the SPSS statistical software package (version 18.0). Predictors of HFNS prevalence (currently experiencing HFNS) were analyzed using binary logistic regression analysis (odds ratio (OR) with 95% confidence interval (CI) are reported). Stepwise linear regression analyses were used to analyze predictors of HFNS frequency (unstandardized beta values,  $\beta$ , with 95% CIs are reported). The following variables were included as possible predictors based on literature and significant associations in preliminary analyses: temperature, season (winter/summer), age, BMI ( $\text{kg}/\text{m}^2$ ), employment status (employed full- or part-time/unemployed), lifestyle habits including diet (regular intake of soya, meat, fish, vegetables and hot/spicy foods), exercise (weekly frequency of any or strenuous exercise), general health (poor, fair, good, very good), life satisfaction (6-point scale from unhappy to delighted), menopause status (post/perimenopausal), level of education, parity, years since last menstrual period, depressed mood and anxiety (WHQ) and beliefs about menopause (MRQ).

Due to significant interrelationships amongst independent variables, hierarchical regression was computed as required. Predictors of HFNS problem-rating included health-related variables on the first block (life satisfaction, overall health), behaviors (exercise) on the second block, mood (anxiety, depression) on the third, and beliefs (negative impact, relief,

short time) on the fourth block. The procedure was then repeated, but with life satisfaction replacing overall health on the first block, any exercise replacing strenuous exercise on the second block and anxiety replacing depression on the third block. The variables were entered in this order as it seemed theoretically plausible on the basis of the results of a recent study testing a theoretical model of HFNS<sup>17</sup>.

## RESULTS

### Sociodemographics

A total of 400 questionnaires were collected. Data from 28 questionnaires were excluded due to file error or missing data. Consequently, data from 372 women in total (178 for summer and 194 for winter) were used in the analyses.

Sample characteristics are presented in Table 1. The total sample was homogeneous in terms of religion (Islam) and language (Arabic) and living in Sharjah, Dubai, Ajman and Abu Dhabi Emirates in the UAE. Two-thirds of the women held a professional qualification or graduate/postgraduate degree, and approximately one-third were employed either full or part-time. Regarding BMI, 7% had normal weight, 39% were overweight while over half the sample were obese (overweight 25–29 kg/m<sup>2</sup>; obese  $\geq$  30 kg/m<sup>2</sup>). The majority reported low levels of regular exercise, were non-smokers and none used alcohol. Most women reported regularly eating meat (78%), fish (72%) and vegetables (66%), whilst fewer reported eating hot spicy food (17%) or soya beans (1.6%). Women who were employed were more likely to be single, separated or divorced ( $\chi^2(1) = 24.23, p < 0.0001$ ), had lower BMI ( $t(368) = -2.25, p = 0.02$ ) and had lower ratings of life satisfaction ( $t(365) = 3.42, p < 0.001$ ). Interestingly, in this sample, women who had a higher BMI reported higher levels of life satisfaction ( $r = -0.14, p < 0.01$ ) and better general health ( $r = -0.21, p < 0.0001$ ) than women with lower BMI.

In terms of menopausal status, 45.6% were perimenopausal (mean number of months since last period 7.78; standard deviation (SD) 3.14) and 54.4% were postmenopausal. The mean duration of menopause was estimated to be 2.4 years (SD 1.39 years), with a median of 2 years. Only a few women had used vitamins or minerals (11.8%), home remedies (4.4%), herbal medicines or phytoestrogens (1.6%) for HFNS and conventional medication rates were low; hormone replacement therapy was only used by 1.4%.

### HFNS prevalence

On average, 46.5% (173/372) of women were currently experiencing HFNS; 35.5% (132/372) of women were currently experiencing hot flushes and 24.7% (92/372) night sweats.

Women experiencing HFNS were compared with those not experiencing symptoms. In univariate analyses, (poor) general health (OR 1.80, 95% CI 1.20–2.70), (less) life satisfaction (OR 1.66, 95% CI 1.22–2.26), (full or part-time) employment

**Table 1** Sample characteristics in whole sample ( $n = 372$ ). Data are given as mean  $\pm$  standard deviation or as percentages

Age (years)	49.84 $\pm$ 2.33
<i>Marital status</i>	
Single	2.4
Married/with a partner	85.4
Divorced/separated/widowed	12.2
<i>Parity</i>	
< 3 children	28.2
3–4 children	61.6
> 4 children	10.2
<i>Educational level</i>	
Degree or postgraduate education	60.3
School education (up to 18 years)	33.7
No formal qualification	6.0
<i>Employment status</i>	
Full time	27.8
Part-time	6.5
Not employed	65.7
<i>Smoking status</i>	
Current smoker	0.6
Ex-smoker	1.1
Never smoked	98.3
<i>Any exercise</i>	
Rarely/never	45.9
$\leq 1$ /week	43.1
2–7/week	11.0
<i>Strenuous exercise</i>	
Rarely/never	67.8
$\leq 1$ /week	28.5
2–7/week	3.7
<i>Body mass index</i>	
Normal	7.5
Overweight	39.2
Obese	53.3
<i>Menopausal status</i>	
Perimenopausal	45.6
Postmenopausal	54.4

(OR 2.22, 95% CI 1.43–3.44), less regular meat intake (OR 0.42, 95% CI 0.26–0.70), more vegetables (OR 2.61, 95% CI 1.66–4.11), as well as lower BMI (OR 0.92, 95% CI 0.87–0.97) and higher anxiety (OR 3.76, 95% CI 1.62–8.72) scores were all associated with HFNS prevalence, but temperature and season were not. All variables that were significantly associated with prevalence were entered into a logistic regression model which explained 19% of the variance (Nagelkerke *R* square statistic); in the final adjusted model, prevalence was best predicted by (full or part-time) employment (OR 1.82, 95% CI 1.08–3.07), as well as a diet including less regular meat protein (OR 0.50, 95% CI 0.27–0.92) and more vegetables (OR 2.13, 95% CI 1.28–3.56).



When we repeated the analysis without the dietary variables, lower BMI (OR 0.92, 95% CI 0.87–0.97) and employment (OR 1.96, 95% CI 1.17–3.26) were the strongest predictors of HFNS prevalence. The variance accounted for in this model was 14%. Further exploratory analyses showed that women with higher BMI tended to have a diet including more meat (OR 2.20, 95% CI 1.19–3.21) and fewer vegetables (OR –0.74, 95% CI –1.62 to –0.13).

## HFNS frequency and problem rating

On average, women reported 5.15 (SD 3.75) HFNS per week (Table 2). Hot flushes were more frequent (mean 3.53, SD 2.83) than night sweats (2.47, SD 1.91). On average, women reported an average problem rating score of 5.66/10 (SD 2.60), reflecting moderately problematic HFNS.

In terms of HFNS frequency, univariate analyses showed that (more) years since last menstrual period (unstandardized  $\beta$  0.10, 95% CI 0.05–0.14), (higher) BMI ( $\beta$  0.34, 95% CI 0.13–0.55) and (less frequent) strenuous exercise ( $\beta$  –1.01, 95% CI –1.74 to –0.28) were significantly associated with higher frequency but temperature and season were not. In the final adjusted model, hot flush frequency was best predicted (accounting for 38% of the variance) by higher BMI ( $\beta$  0.38; 95% CI 0.10–0.65) and more years elapsed since last period ( $\beta$  0.08; 95% CI 0.04–0.12).

For HFNS problem-rating, (poor) general health ( $\beta$  0.81; 95% CI 0.35–1.26), (lower) life satisfaction ( $\beta$  0.94; 95% CI 0.63–1.26), depression ( $\beta$  1.44; 95% CI 0.32–2.56) and anxiety ( $\beta$  2.92; 95% CI 2.05–3.79), more frequent exercise (any or strenuous:  $\beta$  0.42; 95% CI 0.20–0.64 and  $\beta$  0.39; 95% CI 0.13–0.66, respectively), as well as MRQ (higher) negative impact ( $\beta$  0.84; 95% CI 0.58–1.09), (less) relief ( $\beta$  –0.51; 95% CI –0.78 to –0.25) and (higher) short time ( $\beta$  0.61; 95% CI 0.44–0.77) subscale scores were associated with more problematic HFNS, but temperature and season were not. The results of hierarchical regression analyses indi-

cated that problem-rating was best predicted (accounting for 36% of the variance) by lower life satisfaction (unstandardized  $\beta$  0.43; 95% CI 0.16–0.69), as well as beliefs about menopause having a negative impact (unstandardized  $\beta$  0.60; 95% CI 0.35–0.84) and bringing less relief from stopping menstrual periods and pregnancy (unstandardized  $\beta$  –0.34; 95% CI –0.56 to –0.12). Steps of the analysis are shown in Table 3.

## Mood and menopause beliefs

Means and standard deviations for anxiety and depressed mood (WHQ) as well as MRQ menopause beliefs are presented in Table 2. For anxiety and depressed mood, scores were lower than UK norms<sup>15</sup>, suggesting relatively low levels of anxiety and depressed mood. UAE women reported similar ratings of beliefs about menopause to a UK sample; however, they did attribute more symptoms to the menopause than UK women<sup>16</sup>. The most common symptoms attributed to the menopause were: hot flushes (51.4%), night sweats (39.2%), tiredness (38.5%), stiff joints (33.4%), aches and pains (30.1%), irregular periods (29.9%) and sleep problems (25.8%).

## DISCUSSION

The median age of natural menopause in UAE is 48 years and the average life expectancy of women is 76.2 years<sup>18</sup>. The improved health services and recent affluence have enabled UAE women to live longer and therefore experience one-third of their lifespan after the menopause<sup>19</sup>. The prevalence of HFNS in this study is similar to that of previous reports of vasomotor symptom prevalence in UAE (45% and 40%)<sup>19,20</sup> and is comparable to those found in other Arabic nations such as Lebanon (49%)<sup>21</sup>, but lower than Morocco (61%)<sup>22</sup>. The frequency of HFNS being on average five per week was lower than that reported in previous IMS-CAT studies in India and Spain/Latin America<sup>6,12</sup> and lower than in a study of 10 000 women in the UK<sup>23</sup>. However, the current sample of Emirati women rated their HFNS as quite problematic (5.7/10) compared with other samples (UK 4/10; Spain/Latin America 5/10; India 2.7/10)<sup>6,12,23</sup>.

The current study examined the possible effects of climate, specifically temperature and season (summer versus winter), upon HFNS-reporting. Interestingly, we found no significant effects of either on HFNS frequency, prevalence or problem-reporting. In a previous IMS-CAT study of women living in Spain and Latin America, we found a higher prevalence of HFNS (58%) and associations between higher temperatures and increased HFNS prevalence, frequency and problem-rating<sup>6</sup>. However, this was not the case for women living in hot urban Indian regions; as expected, the Indian women reported low prevalence of HFNS, but there was no association with temperature or season<sup>12</sup>. The findings of these studies suggest that hot climates alone are not sufficient to

**Table 2** Results of Hot Flush Rating Scale (HFRS), Women's Health Questionnaire (WHQ) and Menopause Representations Questionnaire (MRQ) in whole sample ( $n = 372$ ). Data are given as mean  $\pm$  standard deviation

<i>HFRS</i>	
Total frequency/week	5.15 $\pm$ 3.75
Problem rating	5.66 $\pm$ 2.60
<i>WHQ</i>	
Depressed mood	0.16 $\pm$ 0.17
Anxiety/fear	0.19 $\pm$ 0.25
<i>MRQ</i>	
Identity	24.98 $\pm$ 7.88
Negative impact	2.24 $\pm$ 0.83
Relief	3.63 $\pm$ 0.88
Time – short	2.06 $\pm$ 1.05

**Table 3** Hierarchical regression findings of problem-rating scores

	<i>R</i>	<i>R</i> <sup>2</sup>	<i>R</i> <sup>2</sup> change	Unstandardized $\beta$	Standard error	$\beta$	<i>t</i>
<i>Step 1</i>	0.44	0.19**					
Life satisfaction				1.02**	0.12	0.44	8.13
<i>Step 2</i>	0.46	0.21*	0.018				
Life satisfaction				0.99**	0.12	0.42	7.96
Exercise				0.25*	0.10	0.13	2.53
<i>Step 3</i>	0.51	0.26**	0.045				
Life satisfaction				0.79**	0.13	0.34	6.04
Exercise				0.25*	0.09	0.13	2.56
Anxiety				1.55**	0.38	0.23	4.07
<i>Step 4</i>	0.60	0.36**	0.105				
Life satisfaction				0.43**	0.13	0.18	3.18
Exercise				0.12	0.09	0.06	1.27
Anxiety				0.71	0.38	0.10	1.86
Negative impact				0.60**	0.12	0.30	4.84
Relief				-0.34**	0.10	-0.18	-3.15
Short term				0.11	0.11	0.07	1.04

\*,  $p < 0.01$ ; \*\*,  $p < 0.001$

explain different levels of symptom-reporting amongst populations, since the three IMS-CAT studies included countries with hot climates; nor did the extent of seasonal variation or seasonal temperature predict reporting of HFNS. In terms of seasons, the summer and winter temperatures in the current UAE study had marked temperature variation, but both seasons had warm to hot weather. It is possible that women living in regions with colder climates and greater seasonality might have greater sensitivity to elevated temperatures and hence more symptoms<sup>11</sup>, but this was not supported in the South/Central American IMS-CAT study<sup>6</sup>.

The factors that were associated with HFNS prevalence included general health and life satisfaction, anxiety, employment, diet and lower BMI – factors that have been found to be associated with reports of HFNS in previous studies<sup>6,12,13,23</sup>. We found that more employed women reported symptoms than unemployed women, supporting the results of a previous study of Arabian Gulf women<sup>20</sup>. Such findings may be due to higher work-related stress in employed women<sup>24</sup> or reflect the lower socioeconomic status of working women compared to women staying at home<sup>25,26</sup>. It is not uncommon for women not to seek employment or to leave work after marriage, if they follow traditional social norms<sup>27</sup>. Indeed, in the current study, employed women were more likely to be single (or divorced/widowed) and reported poorer general health and lower life satisfaction. Educational level was not a significant predictor of HFNS-reporting, possibly as a result of the homogeneity of the sample in terms of educational attainment. It is estimated that 70% of Emirati women now go on to higher education<sup>28</sup>, which is consistent with our findings. The association of lower BMI with increased HFNS prevalence is consistent with the ‘thin hypothesis’, i.e. that women with less body fat would have lower circulating estrogen and hence more HFNS<sup>29</sup>.

In terms of HFNS frequency, time since the last menstrual period was associated with HFNS frequency. Higher BMI was also associated with more frequent HFNS, consistent with thermoregulatory models of HFNS in which increased insulation resulting from excess body fat raises core body temperature and consequently HFNS frequency<sup>29,30</sup>. It is also possible that women might report HFNS more frequently because of physical discomfort associated with excess weight<sup>31</sup>. Women who had higher BMI were also more likely to consume more meat and fewer vegetables than women with lower BMI. UAE women do not generally smoke or drink alcohol<sup>18,19</sup>, but obesity tends to be prevalent<sup>25</sup>, possibly due to increases in income in recent decades resulting in high fat and processed food consumption. In the UAE, traditional diets (e.g. vegetables, fruits, rice and fish) are gradually being replaced with diets higher in animal fat and refined and processed foods, especially amongst high-income families<sup>25,32,33</sup>. Such nutritional changes have also been associated with reduced levels of physical activity and increased obesity<sup>25,33</sup>. Indeed, obesity rates found in this study were similar to those in another study of Emirati women showing rates close to 90%<sup>28</sup>. Interestingly, a recent review suggested a positive relationship between married status, higher income and BMI in UAE<sup>34</sup>. Women’s commitments to work/home, pregnancy and lactation, sociocultural norms restricting outdoor activities and lack of culturally sensitive facilities are considered to be further barriers to exercise and weight management<sup>35,36</sup>. On the other hand, although ‘traditional’ attitudes in UAE have previously considered heavier women as more attractive<sup>26</sup>, Emirati women are also exposed to western ideals of body image and weight<sup>34</sup>. Such changes might introduce better nutrition and health awareness for women but also possible conflict associated with social transitions<sup>28</sup>.

Consistent with previous studies<sup>6,12,23</sup>, HFNS were more likely to be perceived as problematic in the context of poor general health and life satisfaction, stress, anxiety and depressed mood and negative HFNS beliefs<sup>31,37</sup>. There is some evidence suggesting that UAE women of higher parity report fewer symptoms than those of lower parity<sup>20</sup> although we did not find such differences. The ‘medicalization of menopause’ has been thought to contribute to higher symptom-reporting in Western societies<sup>2,31</sup>. In this study, the overall frequency of HFNS was relatively low and few Emirati women were having treatment for HFNS, although, when HFNS did occur, they were rated as quite problematic. The Emirati women also attributed a large number of symptoms to the menopause, suggesting that health educational interventions might be helpful to clarify what is due to menopause and what is due to age or lifestyle<sup>3</sup>. In terms of implications, women with troublesome symptoms might benefit from the availability of related information, as well as health-care interventions for menopausal symptoms and general health.

In terms of limitations, BMI was assessed from self-report data (height and weight); waist circumference and objective measurements should be included in future research. Further research examining the same women across different seasons and/or from more diverse climate zones might clarify the role of seasonal temperature on HFNS further. We did not control for factors that might have influenced the experience of ambient temperature such as use of air conditioning or time spent outside home. While we assessed attributions and beliefs about the menopause, we did not examine cultural meanings of the menopause in detail, nor did we measure all the potential variables that could have influenced symptom perception and appraisal of menopausal

symptoms. A qualitative study of Emirati women would be helpful to provide more information about the meanings of HFNS and menopause.

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## LIST OF INVESTIGATORS AND AFFILIATIONS/PARTICIPATING COUNTRIES

Myra S. Hunter, King’s College London, UK; Evgenia Stefanopoulou, King’s College London, UK; David W. Sturdee, Solihull Hospital, Heart of England NHS Foundation Trust, UK; Pratima Gupta, Solihull Hospital, Heart of England NHS Foundation Trust, Birmingham, UK; Randa Mohamed Mostafa, College of Medicine, University of Sharjah, UAE; Nermin Nosair, College of Medicine, University of Sharjah, UAE; Zein Mirghani College of Medicine, University of Sharjah, UAE; Kareem Moustafa, College of Medicine, University of Sharjah, UAE; Gader Al Kusayer, College of Medicine, University of Sharjah, UAE.

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