Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Original Article

Predictive factors of insomnia during the COVID-19 pandemic in Bangladesh: a GIS-based nationwide distribution

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ABSTRACT

Background: In a densely populated country like Bangladesh, mental health-related burden and associated adverse outcomes are quite prevalent. However, exploration of sleep-related issues in general, and more specifically of insomnia during the COVID-19 pandemic has been scarce and restricted to a single location. The present study investigated the prevalence of insomnia and its predictive factors in the general population, and included Geographic Information System (GIS) analysis to identify regional heterogeneities of insomnia in Bangladesh.

Methods: This cross-sectional study was conducted during the early period of the COVID-19 pandemic. Information related to socio-demographics, knowledge of COVID-19, behaviors related to COVID-19, fear of COVID-19, and insomnia were included in a questionnaire, and coupled with GIS-based spatial analysis to identify regional susceptibility to insomnia.

Results: Approximately 30.4%, 13.1% and 2.8% of participants reported sub-threshold, moderate, and severe forms of insomnia, respectively. Independent predictive risk factors of insomnia symptoms included female gender, college education, urban residence, presence of comorbidities, using social media, taking naps during daytime, and fear of COVID-19. District-wide variations in the spatial distribution of fear of COVID-19 and insomnia were significantly associated.

Conclusion: Insomnia is frequently present during a pandemic, and exhibits regional variability along with multifactorial determinants. These analytic approaches should enable improved detection and targeting of at-risk sectors of the population, and enable implementation of appropriate measures to ensure improved sleep quality.

1. Introduction

Insomnia is a highly prevalent disorder in which one or more of the following are present, namely: (i) difficulty falling asleep, (ii) staying asleep or nonrestorative sleep, (iii) sleep difficulty is present despite adequate opportunity to sleep, (iv) the perturbations of nocturnal sleep are associated with daytime impairment or distress, and (v) the presence of sleep difficulty occurs at least 3 times per week for at least 1 month [1]. Evidence has rapidly emerged that insomnia-related complaints have been affecting people more severely during the COVID-19 pandemic [2–4]. The drastic changes in everyday life, such as reductions in social interactions, restricted mobility outside the home, telecommuting for office/school activities, along with the fear of being infected with the virus, have been implicated in decreased quality of life, and have also been associated with increases in the frequency and severity of sleep problems [5,6].

It is now well established that the presence of underlying insomnia is associated with higher psychological morbidity, including depression, stress, anxiety, mood disorder, and even suicidality, as well as increased risk for somatic illnesses such as hypertension, diabetes, and cardiovascular diseases [7,8]. Consequently, insomnia poses a substantial burden on the economy as well as on

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the healthcare system. Ozminkowski and colleagues [9] reported that both young and older adults diagnosed with or treated for insomnia endured significantly higher health-related costs.

In western countries, a one-year follow up study in a cohort of good sleepers sampled from the general population estimated that 30.7% will have developed insomnia symptoms, and that 7.3% will develop insomnia [10]. In addition, epidemiological evidence suggests an increment in insomnia prevalence in western countries (eg from 11.9% to 15.5% between 2000 and 2010 in Norway) [11]. However, the data on insomnia in lower- and middle-income countries such as Bangladesh is relatively scarce. In a recent study conducted in Bangladesh, 58.4% of university students were found to be poor sleepers [12]. In addition, another study of 3968 rural and urban area participants showed high proportion of insufficient sleepers although sleep problems or insomnia were not specifically surveyed, and instead only sleep duration was evaluated [13].

In the context of the pandemic caused by the novel coronavirus, a survey of 1128 people from the community reported that 33.2% had sleep disturbances during the lockdown period [6]. However, the study was limited in the scope of sleep assessments, since determination of sleep disturbance was predicated on a single question (do you have sleep problems? yes or no?) and did not use any validated instrument. When sleep problems were evaluated using the Insomnia Severity Index ($\geq$8 as a cutoff point out of a total 28 score), 44.2% of healthcare workers in Dhaka city reported significant sleep issues [14]. However, none of these studies evaluated (i) the regional distribution of insomnia, (ii) the role of COVID-19 knowledge and behaviors in insomnia, (iii) the role of COVID-19 preventive behaviors in insomnia, (iv) the role of fear of COVID-19 infection in insomnia. Thus, the present study was undertaken to evaluate such aims in a nationwide sample.

2. Methods

2.1. Study procedures, participants and ethics

A cross-sectional online survey was carried out among the general population of Bangladesh between April 1–10, 2020. Inclusion criteria for the participants consisted of (i) residing in Bangladesh (ii) being more than 10 years of age and (iii) being Bangladeshi. A total of 10,067 surveys were collected. The study protocol received ethical approval from two Bangladeshi institutes. For detailed information regarding the study sample, procedures, participants, ethics, as well as dataset access, please refer to the following publications [15,16].

2.2. Measures

2.2.1. Sociodemographic factors

Basic socio-demographic information such as age, gender, educational status, occupational status, current place of residence, marital status, current cigarette smoking behavior (yes/no), current alcohol drinking consumption (yes/no), current health status, social media use and its frequency. Current health status was assessed using a single question (ie *"Are you suffering from any of the following health-related issues?"*). The presence or absence of comorbidity was assessed using seven multiple choice questions (ie diabetes, high blood pressure, asthma/respiratory problems, heart disease, kidney problems, cancer, and any other condition not listed). A total comorbidity score was then calculated with a score of one point for each condition listed (eg someone with diabetes, asthma and high blood pressure would score 3 points).

2.2.2. COVID-19 knowledge-related questions

Participants knowledge regarding COVID-19 was evaluated based on four criteria: (i) spread of infection (six true/false statements; eg '*COVID-19 can spread by touching others*), (ii) symptoms (six true/false statements; eg '*The most common symptoms of COVID-19 are fever, tiredness and dry cough*'), (iii) prevention (six true/false statements; eg '*Washing hands regularly for 20 s*'), and (iv) treatment (two statements; eg '*Taking pills like antibiotics when you have a fever*'). Given one point for each correct answer and zero points for an incorrect, a subtotal score of 20 ranging from 0 to 20 evaluated the knowledge of the respondents where higher scores indicate better knowledge.

2.2.3. COVID-19 behavior-related questions

Participants' behavior regarding COVID-19 was evaluated based on four items (eg *"How often do you clean your hands with an alcohol-based hand rub or wash them with soap and water?"*) [17,18]. A five-point Likert scale from 1 (*never*) to 5 (*almost always*) with a score ranging from 4 to 20 was used for the response where higher scores indicate better preventive behaviors.

2.2.4. Bangla fear of COVID-19 scale

Participants' fear regarding COVID-19 was assessed using the "Bangla version of Fear of COVID-19 scale" [FCV-19S; [19]] which was previously validated and used in Bangladeshi populations [16,20]. The scale consisting of seven items (eg "*I am afraid of losing my life because of coronavirus-19*") based on a five-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*) with scores ranging from 7 to 35 [19]; was used for the response where a higher score indicates greater the fear of COVID-19. Cronbach's alpha was 0.88 in the present study.

2.2.5. Bangla Insomnia Severity Index

Participants' insomnia regarding COVID-19 was evaluated using the Bangla Insomnia Severity Index. The scale consists of seven items *(eg "How satisfied/dissatisfied are you with your current sleep pattern?")*. each consisting of a five-point Likert scale from 0 = very satisfied to 4 = very dissatisfied) with a score ranging from 0 to 28 during the past two weeks. A final score ranging from 0 to 7 indicates no insomnia, a score of 8–14 indicates sub-threshold insomnia, a score of 15–21 indicates moderate insomnia and a score of 22–28 indicates severe insomnia [21]. Cronbach's alpha was 0.88 in the present study.

2.3. Statistical analysis

Data were analyzed using the Statistical Package for Social Science (SPSS) version 25.0; Microsoft Excel 2019 was used for data entry and cleaning. Descriptive statistics (eg frequencies and percentages) were assessed among the studied variables. Insomnia mean score differences in terms of the studied variables were evaluated using analysis of variance (ANOVA). Considering insomnia as the dependent variable, all the studied variables were entered into hierarchical multiple linear regressions. The normality of distribution (skewness and kurtosis values) and multicollinearity (VIF and tolerance values) were investigated at a p-value <0.05 with a 95% confidence interval. ArcGIS version 10.5 was used for the mapping and spatial analysis of the COVID-19 cases, insomnia and fear of COVID-19 related data.

3. Results

3.1. Characteristics of the participants

The present study included a total of 10,067 participants (56.1% were male; n = 5650). More than two-thirds were aged between 20 and 29 years and were single, more than half were students, and more than 75% had tertiary educational status (Table 1). About one-

fourth of the respondents reported the presence of comorbidity, almost 91% used social media, and 44.2% used it several times a day. Additionally, 45.3% were somewhat likely to take naps during the daytime (Table 1).

3.2. Distribution of the insomnia prevalence rates

The overall prevalence of insomnia was 36.4% (n = 3669 out of a total of 10,067 participants) using ≥10 as a cutoff point [21]. Additionally, Fig. 1 (a) shows that 53.6% of the participants had no insomnia, whereas 30.4%, 13.1% and 2.8% reported sub-threshold, moderate, and severe forms of insomnia, respectively. Female participants reported higher insomnia symptom severities than males ($\chi^2 = 139.435$, $p < 0.001$).

Table 1
Distribution of the insomnia mean score according to the variables.

Study variables	Total (n, %)	Insomnia (Mean ± SD)	F value	*p*-value
Age (year)				
10 to 19	685, 6.8%	7.38 ± 6.24	8.627	<0.001
20 to 29	7175, 71.3%	8.15 ± 6.26		
30 to 39	1221, 12.1%	7.64 ± 6.23		
40-49	410, 4.1%	7.16 ± 5.96		
50-59	371, 3.7%	6.63 ± 5.81		
≥60	196, 1.9%	7.04 ± 6.17		
Gender				
Male	5650, 56.1%	7.21 ± 6.00	164.925	<0.001
Female	4402, 43.7%	8.81 ± 6.41		
Educational status				
No formal education	197, 2.0%	7.19 ± 6.64	7.435	<0.001
Primary school	169, 1.7%	6.43 ± 5.83		
Secondary school	427, 4.2%	6.89 ± 5.74		
Higher secondary level	1139, 11.3%	7.66 ± 6.29		
Tertiary education	8135, 80.8%	8.05 ± 6.24		
Occupational status				
Unemployed	361, 3.6%	8.30 ± 6.80	4.002	0.003
Employed	2586, 25.7%	7.51 ± 6.15		
Retired	92, 0.9%	7.50 ± 5.94		
Housewife	1150, 11.4%	8.04 ± 6.11		
Student	5878, 58.4%	8.05 ± 6.26		
Residence				
Village	2336, 23.2%	6.44 ± 5.62	62.397	<0.001
Sub-district town	1359, 13.5%	8.12 ± 6.20		
District town	2334, 23.2%	8.06 ± 6.40		
Divisional town	4038, 40.1%	8.61 ± 6.35		
Marital status				
Single	7081, 70.3%	8.01 ± 6.23	8.27	<0.001
Married	2839, 28.2%	7.59 ± 6.20		
Divorced/widowed/others	147, 1.5%	9.30 ± 6.80		
Currently smoker				
Yes	1486, 14.8%	8.19 ± 6.35	3.369	0.066
No	8581, 85.2%	7.87 ± 6.21		
Alcohol use				
Yes	267, 2.7%	8.34 ± 6.27	1.308	0.253
No	9800, 97.3%	7.90 ± 6.23		
Perceived health status				
Very good	6909, 68.6%	7.02 ± 5.92	162.574	<0.001
Acceptable	2811, 27.9%	9.71 ± 6.41		
Poor	312, 3.1%	11.12 ± 6.73		
Very poor	35, 0.3%	10.94 ± 6.83		
Comorbidity status				
Yes	2477, 24.6%	9.25 ± 6.42	154.149	<0.001
No	7590, 75.4%	7.47 ± 6.11		
Social media user				
Yes	9152, 90.9%	8.02 ± 6.24	29.175	<0.001
No	915, 9.1%	6.85 ± 6.04		
Frequency of Social media use				
More than 4 day a week	292, 2.9%	7.10 ± 5.45	27.440	<0.001
2/3 days a week	318, 3.2%	7.11 ± 6.30		
Everyday	4082, 40.5%	7.54 ± 5.94		
Several times a day	4451, 44.2%	8.65 ± 6.53		
Taking Naps at daytime				
Very likely	3042, 30.2%	7.61 ± 6.08	5.067	0.006
Somewhat likely	4563, 45.3%	8.04 ± 6.12		
Not likely	2462, 24.5%	8.05 ± 6.62		

3.3. Distribution of the insomnia across the studied variables

Table 1 reports the associations between insomnia and the studied variables. Participants aged between 20 and 29 years were more likely to report higher insomnia scores than the other age groups. As mentioned, females had higher insomnia scores than males (8.81 ± 6.41 vs 7.21 ± 6.00, F = 164.925, $p < 0.001$), and mean insomnia scores increased with increasing educational levels (F = 7.435, $p < 0.001$). Among all the respondents, being unemployed, residing in a divisional town, being divorced/widowed, having poor health status, having comorbidity, using social media, and using it frequently several times a day were all associated with increased risk of insomnia. Mean differences of the studied variables with insomnia are shown in Table 1.

Table 2 shows the differences in age, comorbidities, fear of COVID-19 infection, knowledge about COVID-19, and preventive behaviors related to COVID-19 in respondents with insomnia (score ≥15, as cutoff point). Participants fulfilling the criteria for insomnia had a significantly higher mean score for total number of comorbidities (0.40 ± 0.66 vs 0.28 ± 0.59, F = 55.744, $p < 0.001$), fear of COVID-19 (24.57 ± 5.73 vs 20.67 ± 5.85, F = 603.610, $p < 0.001$) and knowledge about COVID-19 (11.63 ± 2.31 vs 11.45 ± 2.28, F = 7.965, $p = 0.005$) and significantly lower mean score for age (26.23 ± 8.69 vs 27.08 ± 9.80, F = 10.374, $p = 0.001$) than those participants without insomnia (Table 2).

3.4. Correlation among the continuous variables

Table 3 presents correlations between continuous variables. There was a significant positive correlation between age and total comorbidities and negative correlations were identified between insomnia, knowledge about COVID-19 and preventive behavior towards COVID-19 (Table 3).

3.5. Predictive factors of the insomnia

Table 4 depicts the findings regarding hierarchical multiple regression analysis aiming to identify the risk factors of insomnia. A total of two models were included in the analysis: model 1 included only socio-demographic information, and model 2 included socio-demographics, taking naps during the daytime, fear of COVID-19, knowledge about COVID-19 and preventive behaviors towards COVID-19 related variables. After entering all the variables, issues regarding normality and multicollinearity were not detected. All of the models showed a significant relationship with insomnia. Model 1 accounted for 9.1% of the variance in insomnia, while model 2 accounted for 19% of the variance in insomnia (Table 4).

3.6. District-wise mapping of the insomnia and its associations

District-wise distribution of insomnia is presented in Fig. 1 (b). District wise variations in spatial distribution of insomnia showed a significant relationship (F = 6.500, $p < 0.001$ respectively). Insomnia problems during the COVID-19 pandemic were more prevalent in Joypurhat, Bogra, Bandarban and Patuakhali, whereas lower problems were found in the district of Lalmonirhat, Barguna, Khagrachari, Chapainawabganj, Sherpur, Kustia, and Rangpur. Fig. 1 (c) displays the relationship between COVID-19 cases and insomnia, whereas Fig. 1 (d) shows regional relationships between fear of COVID-19 cases and insomnia. Interestingly we found no

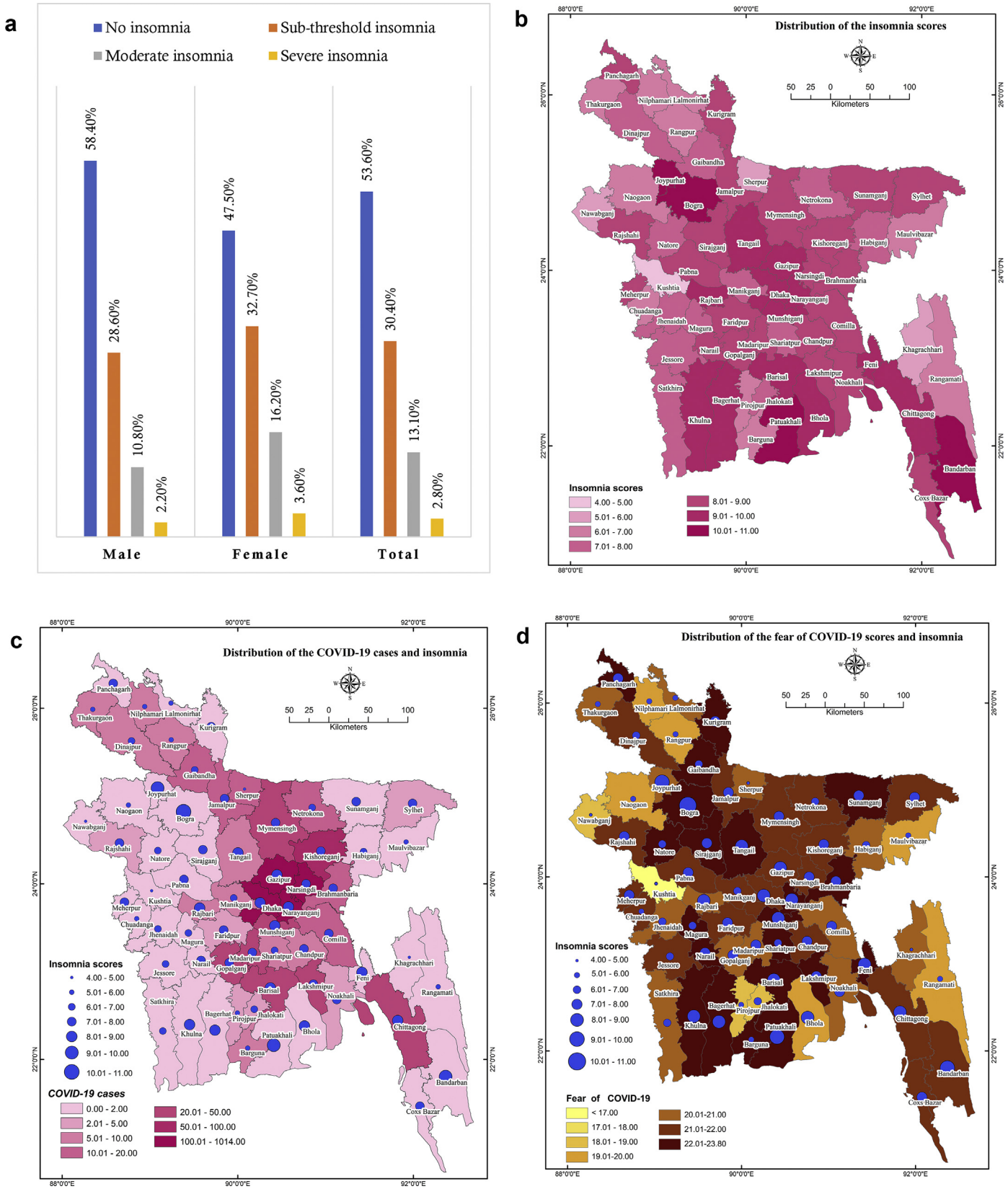

Fig. 1. **(a)** Gender-based distribution of insomnia severities; **(b)** Distribution of insomnia scores across the entire Bangladesh; **(c)** Distribution of COVID-19 cases and insomnia across the entire Bangladesh; and **(d)** Distribution of fear of COVID-19 and insomnia across the entire Bangladesh.

Table 2
Mean differences across selected variables in insomnia.

Study variables	Total (n, %)	Normal (Mean ± SD)	Insomnia (Mean ± SD)	F value	*p*-value
Age	26.94 ± 9.63	27.08 ± 9.80	26.23 ± 8.69	10.374	0.001
Total Comorbidity	0.30 ± 0.61	0.28 ± 0.59	0.40 ± 0.66	55.744	<0.001
Fear of COVID-19	21.30 ± 6.01	20.67 ± 5.85	24.57 ± 5.73	603.610	<0.001
Knowledge about COVID-19	11.48 ± 2.29	11.45 ± 2.28	11.63 ± 2.31	7.965	0.005
Preventive behavior towards COVID-19	4.22 ± 0.72	4.22 ± 0.73	4.24 ± 0.68	1.079	0.299

consistent patterns between higher numbers of COVID-19 cases and insomnia or between fear of COVID-19 and insomnia.

4. Discussion

Several studies have been conducted addressing psychological problems among the Bangladeshi people during the pandemic [22–29], but as indicated above, few have addressed insomnia, despite the adverse effects of insomnia on a multitude of aspects related to wellbeing and disease [7,8,30]. Therefore, reliable and representative information related to insomnia in Bangladesh is critically needed to formulate informed and effective interventions.

The prevalence of symptoms of insomnia is remarkably lower to that reported outside of Bangladesh (46.4%) (Qi et al., 2020), but was higher than previous studies conducted during the pandemic both in Bangladesh [6,31] and outside [5,32]. Indeed, insomnia prevalence is approximately -two -fold higher than the 18.6% prevalence reported among Bangladeshi physicians caring for COVID-19 patients [31]. The discrepant findings may likely derive from different populations (healthcare professionals vs. general population), as well as the use of different instruments used to evaluate insomnia among the participants. Of note, several systematic reviews depict the pooled prevalence rate for insomnia among healthcare workers and general population as 34.32% (95% CI 27.45–41.54, $I^2 = 98\%$) [33] and 23.87% (CI 95% [15.74–34.48]), respectively [34], suggesting the possibility that the COVID-19 pandemic has imposed significant increases in the prevalence.

In the present study, we have found age group-based heterogeneity as related to the risk of manifesting insomnia symptoms. But as reported in a prior study from Bangladesh conducted during the COVID-19 pandemic, whereby those aged less than 30 years were at higher risk of insomnia [31], while a decade older subjects were identified at higher risk by Ara and colleagues [6]. Consistent with other study results, both outside [3,35–37] and inside Bangladesh [6,14]; the present study revealed that females were significantly more likely to suffer from insomnia. The gender dimorphism in insomnia with a significant preponderance of women is now well established [38] even if sleep duration and poor-quality sleep are also reported more frequently in females [39], suggesting that overall sleep is more susceptible to disruption among women. Besides, being unemployed adversely associated with insomnia among the participants. This observation may reflect anxiety related to the uncertainty of being able to secure a job during to COVID-19 pandemic, along with both financial and family pressures, while being in a couple or marital relationship can alleviate the risk of insomnia among the unemployed participants. It is clear that both social and cultural factors can impose complex effects on insomnia via other mediators, and exploration of these elements is clearly beyond the scope of the current work.

During the COVID-19 pandemic individuals rely on social media to obtain information. However, the misinformation regarding the COVID-19 pandemic in social media is also rampant, and surfing social media several times a day can increase the risk of psychological distress, which in turn can influence insomnia [40,41]. For example, a study assessing 1078 Iranian adults indicated that problematic social media use had a strong association with insomnia, which is consistent with the present findings [40]. It is also evident that the presence of fear is associated with the occurrence of sleep problems [42], and as such, the same appears to apply for the fear related to COVID-19 [40]. GIS-based distribution showed that there was substantial regional district-based heterogeneity in insomnia prevalence in the country, and that such heterogeneity was highly correlated with fear of COVID-19. It is expected that residing in COVID-19 more affected areas will increase the risk of insomnia and fear. However, not all regions corroborated such assumption, and in fact we identified some districts where despite very low COVID-19 rates, insomnia scores and prevalence of insomnia were higher than in other areas in which COVID-19 infection rates were much higher. Notwithstanding, the overall national GIS-based overlay would support the contention that the presence of fear of COVID-19 fostered increases in either insomnia scores or of insomnia disease prevalence.

Some limitations of the present study deserve mention. First, this was a cross-sectional study, and surveying respondents via social media could have introduced an important selection bias due to the necessity to have internet access to participate. Therefore, less economically favored sectors of the population may be underrepresented. Due to the pandemic situation, face to face interviews were not possible, and therefore, a self-reporting questionnaire was necessary with the attendant subjectivity in the understanding and interpretation of the survey items. Nevertheless, this was a large nationally representative cohort being surveyed during the peak of an unprecedented pandemic in the country and around the world. Further studies are clearly needed to monitor the trajectory outcomes of insomnia during and after the pandemic in order to evaluate changes over time in insomnia rates,

Table 3
Correlation coefficients between selected variables and insomnia.

Variables	1	2	3	4	5	6
Age (1)	1					
Total comorbidities (2)	0.451**	1				
Fear of COVID-19 (3)	−0.034**	0.014	1			
Insomnia (4)	−0.046**	0.095**	0.359**	1		
Knowledge about COVID-19 (5)	−0.074**	−0.055**	0.037**	0.026*	1	
Preventive Behavior towards COVID-19 (6)	−0.170**	−0.162**	0.155**	0.003	0.151*	1

*Correlation is significant at the 0.05 level (2- tailed).
**Correlation is significant at the 0.01 level (2- tailed).

Table 4
Predictive models for insomnia in stepwise logistic regression models.

Variables	Model 1 [$R^2 = 0.091$, F = 76.426, adjusted $R^2 = 0.090$, $p < 0.001$]					Model 2 [$R^2 = 0.190$, F = 133.849, adjusted $R^2 = 0.189$, $p < 0.001$]				
	B	S.E.	β	95% Confidence interval		B	S.E.	β	95% Confidence Interval	
				Lower bound	Upper bound				Lower bound	Upper bound
Constant	0.538	1.349		−2.107	3.183	−3.649	1.353		−6.301	−0.998
Age[a]	−0.590	0.115	−0.065	−0.815	−0.365	−0.521	0.108	−0.057	−0.733	−0.308
Gender[b]	1.533	0.141	0.121	1.257	1.809	0.757	0.136	0.060	0.491	1.024
Educational status[c]	0.196	0.131	0.015	−0.060	0.453	0.123	0.125	0.010	−0.121	0.368
Occupational status[d]	−0.014	0.053	−0.003	−0.118	0.089	0.043	0.050	0.010	−0.055	0.141
Residence[e]	0.476	0.056	0.089	0.367	0.586	0.563	0.053	0.105	0.458	0.667
Marital status[f]	−0.021	0.177	−0.002	−0.368	0.326	−0.199	0.167	−0.014	−0.527	0.129
Smoking[g]	−0.857	0.200	−0.048	−1.250	−0.465	−0.837	0.189	−0.047	−1.208	−0.466
Alcohol[g]	0.034	0.420	0.001	−0.788	0.857	−0.011	0.397	0.000	−0.789	0.767
Current health[h]	1.243	0.067	0.193	1.112	1.373	1.066	0.064	0.166	0.941	1.191
Comorbidity[i]	1.415	0.161	0.094	1.100	1.731	1.228	0.152	0.081	0.930	1.527
Social media user[g]	1.865	0.663	0.029	0.565	3.165	1.240	0.629	0.019	0.007	2.473
Social media use frequency[j]	0.498	0.091	0.056	0.320	0.676	0.472	0.087	0.053	0.302	0.642
Taking naps during daytime[k]						0.379	0.082	0.044	0.217	0.540
Fear of COVID-19						0.346	0.010	0.324	0.325	0.366
Knowledge about COVID-19						0.025	0.028	0.009	−0.029	0.080
Preventive behaviors toward COVID-19						−0.487	0.093	−0.052	−0.670	−0.304

[a] 1 = 10–19, 2 = 20–29, 3 = 30–39, 4 = 40–49, 5 = 50–59, 6 = 60 and above.
[b] 1 = Male, 2 = Female.
[c] 1 = No formal education, 2 = Primary level up, 3 = Secondary level up, 4 = Higher secondary level, 5 = Tertiary level.
[d] 1 = Unemployed, 2 = Employed, 3 = Retired, 4 = Housewife, 5 = Student.
[e] 1 = Village, 2 = Sub-district, 3 = District, 4 = Divisional.
[f] 1 = Single, 2 = Married, 3 = Divorced/widow/others.
[g] 1 = Yes, 2 = No.
[h] 1 = Very good, 2 = Acceptable, 3 = Poor, 4 = Very poor.
[i] 0 = No, 1 = Yes.
[j] 1 = More than 4 days a week, 2 = 2/3 days a week, 3 = Everyday, 4 = Several times a day.
[k] 1 = Very likely, 2 = Somewhat likely, 3 = Not likely.

and potentially devise interventional strategies that will effectively reduce insomnia prevalence in the population, particularly in the more affected regions of the country.

5. Conclusions

A higher prevalence of insomnia symptoms and of insomnia was identified in the general population of Bangladesh during the COVID-19 pandemic. Younger age, female gender, higher education, urban residence, presence of comorbidities, social media use, and fear of COVID-19 were all factors associated with on the prevalence of insomnia. Furthermore, the geographic distribution of insomnia was not homogeneous and was strongly associated with the regional distribution of fear of COVID-19.

Credit author statement

MAM conceptualized the study; All authors partook in data analysis and interpretation; FaM drafted the initial manuscript with the guidelines provided by MAM; IH& JMM contributed to the draft with subsequent writing; Extensive review and edits were performed by MAM & DG; Final version was approved by all the authors.

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Conflict of interest

The authors do not have any conflict of interest to declare in relation to this project.

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: https://doi.org/10.1016/j.sleep.2021.04.025.

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