



# Poor sleep quality and associated determinants among textile and garment manufacturing workers in Addis Ababa, Ethiopia



Genanew Kassie Getahun<sup>a, \*</sup>, Adisu Genene<sup>b</sup>, Trhas Tadesse<sup>c</sup>

<sup>a</sup> Kotebe Metropolitan University, Menelik II Medical and Health Science College, Addis Ababa, Ethiopia

<sup>b</sup> Addis Ababa Medical and Business College, Addis Ababa, Ethiopia

<sup>c</sup> Yekatit 12 Medical College, Addis Ababa, Ethiopia

## ARTICLE INFO

### Article history:

Received 25 February 2023

Received in revised form

22 April 2023

Accepted 17 May 2023

Available online 18 May 2023

### Keywords:

Sleep quality

Garment and textile industry

Determinants

Ethiopia

## ABSTRACT

**Background:** Sleep is a physiological process that is essential to human physical, emotional, and mental health. Sleep difficulties affect an estimated 150 million individuals globally, with roughly 17% of the population in developing countries. As a result, the purpose of this study was to determine the prevalence and associated factors of poor sleep quality among textile and garment manufacturing workers in Addis Ababa, Ethiopia, in 2022.

**Methods:** A facility-based cross-sectional study was done from July 15th to August 15th, 2022, using a simple random sample technique. The degree of self-reported poor sleep quality was quantified using a validated, interviewer-administered, standardized Pittsburgh Sleep Quality Index. To determine the relationship between independent variables and poor sleep quality, multivariable logistic regression analysis was carried out with a p-value of less than 0.05 and a 95% confidence interval (CI).

**Results:** The prevalence of poor sleep quality was 75.4% (95% CI: 70.8, 80). Working more than 8 h per day (AOR = 2.83, 95% CI: 1.01, 7.94), work dissatisfaction (AOR = 3.27, 95% CI: 1.52–7.05), and using electronic materials before sleeping (AOR = 2.08, 95% CI: 1.01–4.30) were all associated with poor sleep quality.

**Conclusion:** Poor sleep quality was common among garment and textile industrial workers. Work dissatisfaction, working hours, and the utilization of electronic materials before bedtime were all substantially related to poor sleep quality, which should be taken into account and addressed early to reduce poor sleep quality.

© 2023 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## 1. Introduction

Sleep is a physiological process that is essential for physical, emotional, and mental wellbeing [1,2]. According to the National Institute of Health, sleep is a vital aspect of a person's daily routine and is as necessary for survival as food and water [3]. The American Academy of Sleep Medicine (AASM) and the Sleep Research Society (SRS) recommend that the average adult sleep seven or more hours per night on a regular basis to promote optimal health [4], and the National Sleep Foundation (NSF) provides similar consensus recommendations of seven to 9 h of sleep for adults and seven to 8 h of sleep for older adults [5]. Good sleep quality provides benefits such

as feeling rejuvenated, having normal reflexes, and maintaining healthy relationships [6].

According to the World Health Organization (WHO), the effects of a sleep problem include physical effects (sleepiness, fatigue), cognitive impairment (decreased performance, diminished mental concentration, intellectual capacity; and increased risk of workplace accidents), impairs the ability to think, handle stress, and mental health complications [7]. Sleep disorder is defined by difficulty with sleep quality, beginning or maintaining sleep, significant distress, and deficits in daily functioning [8]. Individuals who do not get enough sleep are more likely to experience diabetes, heart disease, stroke, dementia, and cancer [9–11].

Poor sleep quality is a worldwide phenomenon that relates to poor health, increased mortality risk, hormonal and biochemical alterations, higher healthcare costs, increased use of health resources, school dropouts, and an increased risk of psychological disorders and burnout [12,13]. Poor sleeping quality is a public

\* Corresponding author.

E-mail addresses: [genanaw21kassaye@gmail.com](mailto:genanaw21kassaye@gmail.com) (G.K. Getahun), [adisgen19@gmail.com](mailto:adisgen19@gmail.com) (A. Genene), [ttrhas@gmail.com](mailto:ttrhas@gmail.com) (T. Tadesse).

health concern and one of the most common complaints in medical practice [1]. Studies conducted across the world reported that the prevalence of sleep difficulties ranges from 1.6% to 56.0% [14,15], while some research has suggested that sleeping disorders may be on the rise in some countries or populations [16,17]. Previous studies in Ethiopia also discovered that the proportion of poor sleep quality ranged from 52.7% to 63.0% [18–20].

Sleep quality is influenced by a number of factors, including demographic characteristics such as age, gender, marital status, work position, monthly income, educational status, religion, and work experience [21,22], personal factors such as body mass index, dietary intake, physical exercise, habit of taking breaks at work, drinking of caffeinated drinks, and use of electronics before sleeping, and environmental factors (working hours, shift work, work stress, work satisfaction, work load, noise duration, and noise level) (alcohol drinking, cigarette smoking, and khat chewing) [23–26].

Poor sleep quality has been a common occurrence throughout the different working conditions [27,28]. While poor sleep quality is considered a public health concern, it typically remains unnoticed, is underreported, and has significant economic consequences [7,14]. Although the manufacturing industry has been identified as a workplace associated with a high risk of poor sleep quality [29], little research has been conducted to quantify the prevalence and risk factors of poor sleep quality among the textile and garment population in low and middle-income countries, including Ethiopia [30,31]. As a result, this study was conducted to assess the prevalence and associated determinants of sleep quality among the garment and textile sectors in Addis Ababa, Ethiopia.

## 2. Materials

### 2.1. Study setting and population

The study was conducted in a garment and textile manufacturing company in Bole Lemi Industrial Park, in Addis Ababa. Addis Ababa is the capital and largest city of Ethiopia. The population of Addis Ababa was estimated to be 2,738,248 in 2007, of which 52.4% were females, and women between 15 and 49 years of age were estimated to be 34.6% [32]. It has a total area of 530.21 square kilometers and is located in the foothills of the Entoto Mountains, standing 7726 feet (2355 m) above sea level. Bole Lemi Industrial Park is Ethiopia's first public industrial park that specializes in textile, garment, rubber, and leather products. Currently, it has six garment and textile manufacturing companies and more than 20,000 employees working in these companies. A cross-sectional study was carried out among garment and textile manufacturing workers who had at least one year of working experience from July 15th to August 15th, 2022.

### 2.2. Eligibility criteria

Employees who had at least one year of work experience and were available throughout the data collection period were included. Employees who were critically ill, on maternity leave, or on annual leave, as well as those diagnosed with sleep disorders, were not eligible.

### 2.3. Sample size determination and sampling procedure

The sample size was determined using a single population proportion formula. By taking the 33.7% prevalence of poor sleep quality among industrial workers [29], with the following assumptions: level of significance ( $\alpha$ ) = 5% (at a confidence level of 95%), marginal error  $d = 5\%$ , and  $p = 0.337$ , the  $z$  value is 1.96

( $n =$  sample size,  $p =$  proportion, and  $d =$  marginal error).

$$n = \frac{(Z_{\frac{\alpha}{2}})^2 P(1 - P)}{d^2}$$

By adding a 10% non-respondent rate, the sample size required was 379.

In Bole Lemi garment and textile manufacturing, there were six companies and 21600 workers. Garment and textile workers who satisfied the inclusion criteria were selected based on a simple random sampling technique, using the human resources department of each company's list as a sampling frame. To ensure representativeness of the sample size, proportional allocation was implemented for all garment and textile manufacturing companies.

### 2.4. Study variables and definitions

Sleep quality (poor or good) was considered an outcome variable, along with socio-demographic factors such as age, sex, marital status, monthly income, educational level, work experience, work position, personal factors such as BMI (body mass index), dietary intake, physical exercise, the habit of taking breaks in the workday, the drinking of caffeinated drinks, and the use of electronics before sleeping, and environmental factors like working hours and shift work. Work stress, work satisfaction, work load, and disturbing noise during sleeping time were all taken as explanatory variables. The relationship between these variables is illustrated below (Fig. 1) (see Fig. 2

**Sleeping quality:** individuals who get a Pittsburgh Sleep Quality Index (PSQI) global score of 5 or less were classified as “good sleepers,” and those who get  $>5$  were classified as “poor sleepers” [33].

### 2.5. Data collection and analysis

The data was collected using a structured and pretested questionnaire that was written in English, translated to Amharic, and then back to English to ensure consistency. The questionnaire had four parts, including socio-demographic, behavioral/personal, environmental, and Pittsburgh Sleep Quality Index (PSQI), a self-rated questionnaire used to assess sleep quality over a one-month time interval. PSQI studies seven components of sleep, the sum of which gives the global PSQI score ranging from 0 to 21, where lower scores denote a healthier sleep quality and higher

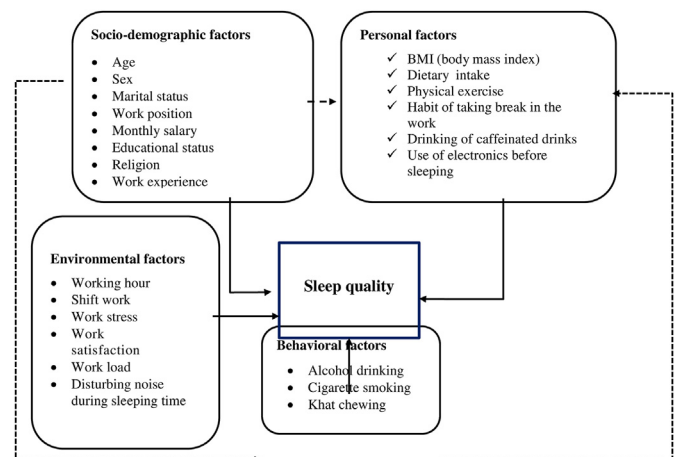
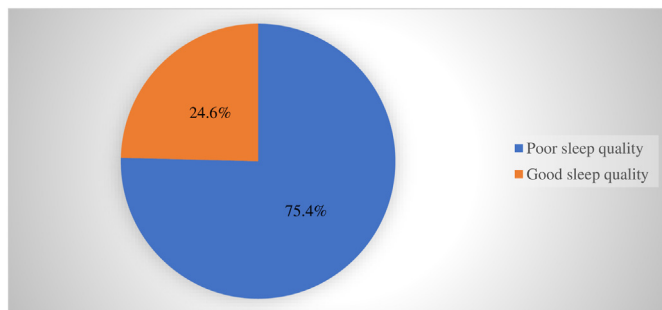


Fig. 1. Conceptual framework of poor sleep quality among textile and garments manufacturing workers in Addis Ababa, Ethiopia, 2022.



**Fig. 2.** Prevalence of poor sleep quality among Garment and textiles manufacturing workers in Addis Ababa, Ethiopia, 2022.

scores indicate worse sleep quality. Individuals who get a PSQI global score of 5 or less were classified as “good sleepers,” and those who get >5 were classified as “poor sleepers.”

The information was gathered through face-to-face interviews. Every day, trained data collectors conducted interviews to incorporate samples from each shift and each company. Sleep quality was assessed with a self-rated Pittsburgh Sleep Quality Index (PSQI) questionnaire. A pre-test was administered to 5% of garment workers at the Yirgalem Addis garment factory in Addis Ababa, which was later excluded from the study. Training was given for the data collectors and supervisor for one day on the purpose of the study, data collection tools, and ethical principles. The collected data were checked for completeness, accuracy, and clarity by the principal investigators and supervisors.

The data entry was made using Epidata software and analyzed using SPSS version 20. Descriptive statistics were analyzed using frequency and percentage. The binary logistic regression analysis was computed with a 95% confidence interval (CI) to examine the presence and strength of association between sleep quality and independent variables. In the multivariable logistic model, a p-value of less than 0.05 was considered a significant factor for sleep quality, along with its corresponding 95% CI, which was applied to show the strength and direction of association.

### 3. Results

#### 3.1. Socio-demographic characteristics of participants

The current study involved 370 participants, giving a response rate of 97.6%. The majority of the study participants (70.30%) were female. The mean (standard deviation) age of the respondents was 25.3 years ( $\pm$ SD 2.4). The majority (81.9%) of the study participants were orthodox by religion. More than two thirds of the study participants (67.8%) were unmarried. The median (interquartile range (IQR)) monthly income of the participants was 4000 ETB (2950–6625 ETB) (Table 1).

#### 3.2. Personal and behavioral characteristics of participants

The bulk of the study participants, 250 (67.60%), had normal body mass index, while 196 (53%) had low nutritional intake in the previous 24 h of evaluation. Two hundred thirteen (57.6%) of the study participants took regular breaks throughout working hours, with a mean estimated break time of 28.89 min. Only 17 (4.6%) of garment and textile employees in the research smoke cigarettes, while nearly half (44.9%) use any type of alcohol at least once a month (Table 2).

**Table 1**  
Socio-demographic characteristics of respondents in Addis Ababa, Ethiopia, 2022.

Variables	Frequency	Percent (%)
<b>Sex</b>		
Female	260	70.30
Male	110	29.70
<b>Age (years)</b>		
≤24	170	45.9
25–26	94	25.4
≥27	106	28.7
<b>Religion</b>		
Orthodox	303	81.90
Muslim	28	7.60
Protestant	39	10.50
<b>Marital status</b>		
Single	251	67.80
Married	111	30.00
Divorced	8	2.20
<b>Educational status</b>		
Not able to read and write	22	5.90
Primary school	49	13.20
Secondary school	73	19.70
Diploma	94	25.40
Degree	126	34.10
Masters and above	6	1.60
<b>Working experience (in years)</b>		
≤3	223	60.30
>4	147	39.70
<b>Monthly income (ETB)</b>		
≤3000	124	33.50
3001–5000	132	35.70
>5001	114	30.80
<b>Work position</b>		
Operator	253	68.4
Supervisory level	104	28.1
Managerial Level	13	3.5

#### 3.3. Working environment-related characteristics of respondents

The workload of the majority of study participants (70.3%) was medium. Work stress was experienced by more than half of the participants (54.3%). In terms of working hours, 330 (89.2%) of respondents work 8 h or less every day (Table 3).

#### 3.4. Prevalence of poor sleep quality

The proportion of poor sleeping quality over the past one month among garment and textile manufacturers in Bole Lemi industrial park was 75.4% (95% CI: 70.8, 80.0). Females (194; 52.4%) and people under the age of 25 (173; 46.7%) had poorer sleep quality. The average sleep latency of the respondents was 22 min, and only 8 (2.2%) of the participants reported that their subjective sleep quality was very bad. The majority of the study participants (246, or 66.5%) reported that they had more than 7 h of sleep per night. Moreover, at the time of the interview, 317 (85.7%) of the respondents hadn't used sleep medication during the past month (Figure 2). *Factors associated with sleep quality*

We discovered that religion, marital status, monthly income, work experience, work position, work dissatisfaction, work stress, working hours, work load, work shift, disturbing noise during sleeping time, consumption of caffeinated drinks, nutritional intake, and use of electronic materials before bedtime were all associated with sleep quality in a binary logistic regression analysis with a p-value of less than 0.2. However, in a multivariate logistic regression analysis, only work dissatisfaction, working hours, and usage of electronic materials before bedtime were revealed to be substantially associated with sleep quality.

Subsequently, workers who worked more than 8 h per day had nearly three times the odds of developing sleeping difficulty

**Table 2**  
Personal and behavioral characteristics of the study participants (n = 370).

Variables	Frequency	Percent (%)
<b>Dietary intake</b>		
Good intake	174	47
Poor intake	196	53
<b>Body mass index</b>		
Underweight	50	13.5
Normal Weigh	250	67.6
Over weight	58	15.7
Obesity	12	3.2
<b>Physical exercise</b>		
Yes	150	40.5
No	220	59.5
<b>Habit of taking break in the work</b>		
Yes	213	57.6
No	157	42.4
<b>Length of break</b>		
≤30	185	50.0
>30	28	7.6
<b>Use of electronic (TV, smart phone, tablet etc.) materials before sleeping</b>		
Yes	318	85.9
No	52	14.1
<b>Smoking cigarette or any tobacco</b>		
Yes	17	4.6
No	351	94.9
<b>Previously smoked</b>		
	2	0.5
<b>Alcohol drinking</b>		
Never	175	47.3
Rarely (once in month)	166	44.9
Regularly in small amount (1 drink per week)	24	6.5
Regularly many drinks (4 drinks/week)	5	1.4
<b>Chewing khat</b>		
Yes	15	4.1
No	355	95.9
<b>Drinking of caffeinated drinks</b>		
Yes	315	85.1
No	55	14.9

**Table 3**  
Working environment-related factors of the study participants.

Variables	Frequency	Percent (%)
<b>Work load</b>		
Low	21	5.7
Medium	260	70.3
High	89	24.1
<b>Work shift</b>		
Night shift only	10	2.7
Day shift only	310	83.8
Both shifts interchangeably	50	13.5
<b>Disturbing noise during sleeping time</b>		
Yes	71	19.2
No	299	80.8
<b>Working Hours</b>		
≤8	330	89.2
>8	40	10.8
<b>Satisfied with work</b>		
Satisfied	278	75.1
Dissatisfied	92	24.9
<b>Work stress</b>		
Yes	169	45.7
No	201	54.3

compared with their counterparts (2.83; AOR = 2.83; 95% CI: 1.01, 7.94). The proportion of participants who were dissatisfied with their jobs was 3.27 (AOR = 3.27, 95% CI: 1.517–7.051) times more likely to experience poor sleeping quality compared to those satisfied workers. The chance of poor sleeping quality was 2.079 (AOR = 2.079, 95% CI: 1.006–4.299) times greater in those who used electronic materials (TV, smart phone, computer, etc.) before bedtime compared to those who did not use electronic materials

(TV, smart phone, computer, etc.) before bedtime. (Table 4).

#### 4. Discussion

The primary goal of this study was to assess the prevalence of poor sleep quality and its associated characteristics among garment and textile workers in Addis Ababa's Bole Lemi industrial park. According to this study, the prevalence of poor sleep quality was 75.4% (95% CI: 70.8–80.0). Work discontent, working hours per day, and prior usage of electronic materials (TV, smart phone, computer, etc.) were the determining factors.

The prevalence of poor sleep quality found in this study is consistent with previous studies conducted in Ohio, USA (69.9% [34]) and Riyadh, Saudi Arabia (76% [35]). It was, however, higher than many previous studies conducted in Jimma, Ethiopia (65.4% [20]), Gondar (24% [36]) and Haramaya (68.4% [37]). In contrast, according to our assessment, no study report was higher than the current prevalence report. The disparities could be explained by variances in the study population, study settings, socioeconomic factors, and data collection methods.

Long working hours per day (>8 h) were found to be significantly associated with poor sleep quality in this study. The discovery confirms the findings of prior studies [38,39]. A possible justification for this report might be that employees with lengthy working hours may require more time to recover from work-induced exhaustion since long working hours reduce the amount of private time available to them and may contribute to sleep deprivation.

The use of electronic devices before bedtime was linked to poor sleep quality. Individuals who used electronic devices before bedtime had two times the odds of developing sleeping difficulty compared with their counterparts. Other previous research found similar findings [40,41]. This could be explained by the fact that when people use digital devices for an extended period of time, their sleep quantity and quality are considerably affected. Cell phones, tablets, readers, computers, and laptops, for example, emit short-wavelength enhanced light that has been shown to block or delay the normal production of melatonin in the evening and reduce sensations of tiredness [42].

This study additionally showed that job dissatisfaction was statistically associated with poor sleep quality. Participants who were dissatisfied with their jobs had more than three times the odds of having poor sleeping quality as those who were satisfied. Previous similar research has also discovered that work unhappiness is a strong related factor [43,44]. This conclusion could be explained by the fact that satisfaction is a component of subjective well-being and a sign of psychological functioning. Reduced job satisfaction, on the other hand, is connected with worse overall health, disability, and emotional trauma. It predicts negative health consequences such as long-term mortality, suicide, and depressive symptoms. Furthermore, job discontent contributes to persistent weariness, which can have a detrimental impact on sleep quality.

Moreover, even though the current study didn't found a statistical association between Khat chewing and poor sleep quality previous studies from different parts of Ethiopia reported a positive association [18,19]. This could be due to the fact that khat has a psychostimulant and euphorogenic effects which interferes with the sleep center. It's frequently reported that khat has qualitatively similar effects to amphetamine like increased blood pressure, euphoria, and elation, as well as feelings of increased alertness and arousal.

##### 4.1. Limitations of the study

The study's main limitation is that it is a single-institution

**Table 4**  
Factors associated with poor sleep quality in Addis Ababa, Ethiopia, 2022.

Variables	Sleep quality		COR with 95% CI	AOR with 95% CI	P-value
	Good	Poor			
<b>Religion</b>					
Orthodox	82	221	0.396 (0.150–1.048)	0.391 (0.135–1.132)	0.083
Muslim	4	24	0.882 (0.214–3.632)	0.696 (0.147–3.296)	0.648
Protestant	5	34	1	1	
<b>Marital status</b>					
Single	69	182	1	1	
Married	21	90	1.625 (0.938–2.816)	1.507 (0.808–2.813)	0.197
Divorced	1	7	2.654 (0.321–21.967)	1.850 (0.192–17.804)	0.594
<b>Monthly income (ETB)</b>					
≤3000	32	92	1.171 (0.662–2.072)	1.666 (0.686–4.047)	0.260
3001–5000	26	106	1.661 (0.921–2.996)	2.125 (0.947–4.766)	0.067
>5001	33	81	1	1	
<b>Work position</b>					
Worker level	58	195	2.101 (0.662–6.671)	2.052 (0.487–8.646)	0.327
Supervisory level	28	76	1.696 (0.512–5.623)	1.689 (0.428–6.665)	0.455
Managerial level	5	8	1	1	
<b>Work Experience</b>					
<3 years	63	160	0.598 (0.361–0.990)	0.572 (0.305–1.073)	0.082
>4 years	28	119	1	1	
<b>Dietary intake</b>					
Good intake	48	126	1	1	
Poor intake	43	153	0.738 (0.459–1.185)	0.886 (0.516–1.524)	0.663
<b>Work load</b>					
Low	8	13	1	1	
Medium	66	194	0.384 (0.137–1.072)	1.529 (0.542–4.316)	0.422
High	17	72	0.694 (.382–1.262)	2.431 (0.749–7.885)	0.139
<b>Work shift</b>					
Night shift only	3	7	0.259 (0.050–1.334)	0.335 (0.055–2.035)	0.235
Day shift only	83	227	0.304 (0.117–0.792)	0.387 (0.139–1.078))	0.069
Both interchangeably	5	45	1	1	
<b>Disturbing noise sleeping</b>					
Yes	11	60	1.993 (0.997–3.980)	1.694 (0.787–3.649)	0.178
No	80	219	1	1	
<b>Working Hours</b>					
≤8	86	242	1	1	
>8	5	35	0.402 (0.153–1.059)	<b>2.833(1.011–7.941)</b>	0.048*
<b>Work satisfaction</b>					
Yes	81	197	1	1	
No	10	82	0.297 (0.146–0.601)	<b>3.270(1.517–7.051)</b>	0.003*
<b>Work stress</b>					
Yes	36	133	1.392 (0.860–2.252)	1.221 (0.690–2.160)	0.493
No	55	146	1	1	
<b>Consumption of Caffeine</b>					
Yes	6	49	3.018 (1.24–7.302)	2.046 (0.772–5.427)	0.150
No	85	230	1	1	
<b>Habit of watching TV, Phone</b>					
Yes	74	244	1.602 (0.849–3.023)	<b>2.079(1.006–4.299)</b>	0.048*
No	17	35	1	1	

Key: 1 = reference category AOR = adjusted odds ratio, CI = confidence interval, COR = crude odds ratio, \* = statistically significant at a p-value <0.05.

report. If a comparable study is conducted in the future, a multi-center investigation would help detect the hidden burden of sleep quality and thus strengthen the findings. Furthermore, because the study is a cross-sectional one, it does not establish a temporal association between independent variables and poor sleep quality.

## 5. Conclusion and recommendation

According to this study, poor sleep quality was common among garment and textile industrial employees in Addis Ababa. Work dissatisfaction, long working hours, and the habit of watching electronic devices before going to bed were discovered to be factors that were substantially associated with poor sleeping quality. Therefore, lowering working hours and exposure to electronic devices is critical to minimizing difficulties. Finally, we recommend that future research should investigate the interrelationships

between the significant variables studied that influence sleep quality.

## Ethical consideration

Ethical approval was first secured from the research and ethical review board of Addis Ababa Medical and Business College. Then a permission letter was obtained from Addis Ababa health bureau. Written informed consent was obtained from each study participant immediately before the interview. Moreover, all the study participants were informed that the participation was voluntary and of the potential benefits, confidentiality, and possibility of withdrawing from the interview at any time.

## Consent for publication

Not applicable



## Data availability

The datasets used to support the findings of this study are attached with the manuscript.

## Funding

The study has no funding source.

## CRedit authorship contribution statement

**Genanew Kassie Getahun:** Conceptualization, Data curation, Visualization, Investigation, Writing – original draft, Writing – review & editing. **Adisu Genene:** Conceptualization, Supervision, Data curation, Formal analysis, Writing – review & editing. **Trhas Tadesse:** Methodology, development, Supervision, Writing – review & editing.

## Declaration of competing interest

The authors declare they have no competing conflicts of interest.

## Acknowledgment

We would like to acknowledge the study participants and data collectors of this study.

## References

- [1] Ramar K, Malhotra RK, Carden KA, et al. Sleep is essential to health: an American Academy of Sleep Medicine position statement. *J Clin Sleep Med* 2021 Oct 1;17(10):2115–9.
- [2] Crivello A, Barsocchi P, Girolami M, Palumbo F. The meaning of sleep quality: a survey of available technologies. *IEEE Access* 2019;7:167374–90.
- [3] Basics B. Understanding sleep. 2014. p. 2015. Retrieved September, . [Accessed 24 December 2014].
- [4] Watson NF, Badr MS, Belenky G, et al. Joint consensus statement of the American Academy of Sleep Medicine and Sleep Research Society on the recommended amount of sleep for a healthy adult: methodology and discussion. *J Clin Sleep Med* 2015 Aug 15;11(8):931–52.
- [5] Hirshkowitz M, Whiton K, Albert SM, Alessi C, et al. National Sleep Foundation's updated sleep duration recommendations. *Sleep health* 2015 Dec 1;1(4):233–43.
- [6] Amarnath R, Verma G, Jenitha S, Rajan C, Prasanthi J, Elizabeth A. Improving sleep quality through mindfulness meditation-technical aspects and benefits. *Int J Health Sci Res* 2017;7(5):368–81.
- [7] World Health Organization. WHO technical meeting on sleep and health: Bonn Germany, 22–24 January 2004. World Health Organization. Regional Office for Europe; 2004.
- [8] Buysse DJ. Sleep health: can we define it? Does it matter? *Sleep* 2014 Jan 1;37(1):9–17.
- [9] Sambou ML, Zhao X, Hong T, et al. Associations between sleep quality and health span: a prospective cohort study based on 328,850 UK biobank participants. *Front Genet* 2021 Jun 15;12:663449.
- [10] Spira AP, Kaufmann CN, Kasper JD, et al. Association between insomnia symptoms and functional status in US older adults. *J Gerontol B Psychol Sci Soc Sci* 2014 Nov 1;69(Suppl\_1):S35–41.
- [11] Foley D, Ancoli-Israel S, Britz P, Walsh J. Sleep disturbances and chronic disease in older adults: results of the 2003 National Sleep Foundation Sleep in America Survey. *J Psychosom Res* 2004 May 1;56(5):497–502.
- [12] Paunio T, Korhonen T, Hublin C, et al. Longitudinal study on poor sleep and life dissatisfaction in a nationwide cohort of twins. *Am J Epidemiol* 2009;169(2):206–13.
- [13] Musa NA, Moy FM, Wong LP. Prevalence and factors associated with poor sleep quality among secondary school teachers in a developing country. *Ind Health* 2018.
- [14] Koyanagi A, Stickley A. The association between sleep problems and psychotic symptoms in the general population: a global perspective. *Sleep* 2015;38(12):1875–85.
- [15] Léger D, Poursain B, Neubauer D, Uchiyama M. An international survey of sleeping problems in the general population. *Curr Med Res Opin* 2008;24(1):307–17.
- [16] Alexander M, Ray MA, Hébert JR, et al. The national veteran sleep disorder study: descriptive epidemiology and secular trends, 2000–2010. *Sleep* 2016;39(7):1399–410.
- [17] Altevogt BM, Colten HR. Sleep disorders and sleep deprivation: an unmet public health problem. 2006.
- [18] Lemma S, Patel SV, Tarekegn YA, et al. The epidemiology of sleep quality, sleep patterns, consumption of caffeinated beverages, and khat use among Ethiopian college students. *Sleep Disorders* 2012;2012.
- [19] Berhanu H, Mossie A, Tadesse S, Geleta D. Prevalence and associated factors of sleep quality among adults in Jimma Town, Southwest Ethiopia: a community-based cross-sectional study. *Sleep Disorders* 2018;2018.
- [20] Getachew Y, Azale T, Necho M. Poor sleep quality and associated factors among prisoners of the Diredawa correctional facility in eastern Ethiopia. *Ann Gen Psychiatr* 2020;19(1):1–9.
- [21] Anjum A, Bajwa MA, Saeed R. Sleep patterns: among medical and non-medical students of University of Lahore, 2010–11. *Prof Med J* 2014;21(1):148–56.
- [22] Zimberg IZ, Crispim CA, Diniz RM, et al. Gender differences in the relationship of sleep pattern and body composition in healthy adults. *Sleep Sci*. 2011;4(2):39–44.
- [23] Madrid-Valero JJ, Martínez-Selva JM, Couto BRd, et al. Age and gender effects on the prevalence of poor sleep quality in the adult population. *Gac Sanit* 2017;31:18–22.
- [24] Lohsoonthorn V, Khidir H, Casillas G, et al. Sleep quality and sleep patterns in relation to consumption of energy drinks, caffeinated beverages, and other stimulants among Thai college students. *Sleep Breath* 2013;17(3):1017–28.
- [25] Sepahvand E, Jalai R, Mirzaei M, Jahromi MK. Association between short sleep and body mass index, hypertension among acute coronary syndrome patients in coronary care unit. *Global J Health Sci* 2015;7(3):134.
- [26] Liu J, Hay J, Faght BE. The association of sleep disorder, obesity status, and diabetes mellitus among US adults—the NHANES 2009–2010 survey results. *Int J Endocrinol* 2013;2013.
- [27] Kottwitz MU, Gerhardt C, Pereira D, Iseli L, Elfering A. Teacher's sleep quality: linked to social job characteristics? *Ind Health* 2017.
- [28] Freitas AMC, Araújo TMD, Pinho PdS, et al. Sleep quality and associated factors among professors. *Revista Brasileira de Saúde Ocupacional* 2021;46:29.
- [29] Songkham Wanpen, et al. Sleep quality among industrial workers: related factors and impact. *J Health Res* 2019;33(2):119–26.
- [30] Uehli K, Mehta AJ, Miedinger D, et al. Sleep problems and work injuries: a systematic review and meta-analysis. *Sleep Med Rev* 2014;18(1):61–73.
- [31] Teker AG, Luleci NE. Sleep quality and anxiety level in employees. *Northern Clinic Istanbul* 2018;5(1):31.
- [32] CSA. Population and housing census of Ethiopia: administrative report. Addis Ababa 2007;2012.
- [33] Patil A, Chaudhury S, Srivastava S. Eyeing computer vision syndrome: awareness, knowledge, and its impact on sleep quality among medical students. *Ind Psychiatr J* 2019;28(1):68.
- [34] Francis B, Klebanoff M, Oza-Frank R. Racial discrimination and perinatal sleep quality. *Sleep Health* 2017 Aug 1;3(4):300–5.
- [35] Almojali AI, Almalki SA, Althman AS, Masuadi EM, Alaqeel MK. The prevalence and association of stress with sleep quality among medical students. *J Epidemiol Global Health* 2017 Sep 1;7(3):169–74.
- [36] Gessesse DN, Tsega NT, Akilil MB, et al. Prevalence and associated factors of poor sleep quality among postpartum women in North West Ethiopia: a community-based study. *BMC Psychiatr* 2022 Aug 8;22(1):538.
- [37] Lankrew Ayalew T, Wale BG, Haile KE. Prevalence and associated factors of sleep deprivation among Haramaya University students, Ethiopia, 2021: cross-sectional study. *Sleep Sci Practice* 2022 Sep 30;6(1):11.
- [38] Afonso P, Fonseca M, Pires J. Impact of working hours on sleep and mental health. *Occup Med* 2017 Jul 1;67(5):377–82.
- [39] Bannai A, Ukawa S, Tamakoshi A. Long working hours and sleep problems among public junior high school teachers in Japan. *J Occup Health* 2015 Sep;57(5):457–64.
- [40] Pham HT, Chuang HL, Kuo CP, Yeh TP, Liao WC. Electronic device use before bedtime and sleep quality among university students. In: *Healthcare*, 9. MDPI; 2021 Aug 24. p. 1091. 9.
- [41] Lastella M, Rigney G, Browne M, Sargent C. Electronic device use in bed reduces sleep duration and quality in adults. *Sleep Biol Rhythm* 2020 Apr;18:121–9.
- [42] Snyder Cynthia K, Chang Anne-Marie. Mobile technology, sleep, and circadian disruption. In: *Sleep and health*. Academic Press; 2019. p. 159–70.
- [43] Brown K, Bierman A. Work dissatisfaction and sleep problems among Canadians in the latter half of life. *Canadian J Aging/La Revue Canadienne du Vieillessement* 2017 Sep;36(3):351–65.
- [44] Li YL, Qiu D, Hu C, Ouyang FY, et al. Stressful life events and poor sleep quality: a cross-sectional survey in the Chinese governmental employees. *Sleep Med* 2021 Sep 1;85:123–30.