

# Sleep Quality Among Pregnant Women Amidst COVID-19: Association with Mental Wellbeing and Self-efficacy

Aman Dule<sup>1,\*</sup>, Zakir Abdu<sup>1</sup>, Mohammedamin Hajure<sup>1</sup>, Mustefa Mohammedhussein<sup>2</sup>

<sup>1</sup>Department of Psychiatry, Collage of Health Sciences, Mettu University, Mettu, Ethiopia

<sup>2</sup>Psychiatry Department, School of Health Science, Madda Walabu University, Goba, Ethiopia

## Email address:

amandule1993@gmail.com (A. Dule), zakirabdu45@gmail.com (Z. Abdu), sikoado340@gmail.com (M. Hajure), mustefamohammed1984@gmail.com (M. Mohammedhussein)

\*Corresponding author

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**Abstract:** *Background:* Currently, corona virus disease has imposed huge global burdens and psychological impacts. Although unpredicted stress from this outbreak resulted in disturbed sleep in general, its effect on sleep among pregnant women is not well explored yet. Thus, the main aim of this study was to explore quality of sleep among pregnant mothers amidst COVID-19 pandemic. *Methods:* Health facility-based cross-sectional study was carried out from April to May, 2020 among 228 pregnant women. Frequencies and related percentages were calculated for categorical variables, while continuous variables were computed by mean and standard deviation. Chi-square test was conducted and Pearson correlation coefficient (r) was calculated to assess relationship between variables. For statistical significance, p-value<.05 and 95% CI were considered. *Results:* For study subjects, the mean age was 30.79 (SD±7.57) and 57% of them had reported quality of sleep quality and mean sleep duration was 6.70 hours (SD±1.95). Among all participants, less than one-fifth (44, 19.3%) of them had reported very good subjective sleep quality. Perceived stress, depression and Anxiety have moderate to strong positive association with Pittsburgh Sleep Quality Index score (r=0.36, 0.37 and 0.57 respectively) at significant level. Self-efficacy was moderately linked in negative direction (r=0.32, p<0.001). *Conclusion:* As our finding revealed, the occurrence of poor quality of sleep was high among pregnant women during the era of COVID-19 and anxiety, depression and stress were identified as contributor factors. Routine assessment of sleep should be considered along with collaboration of antenatal care and psychiatry units.

**Keywords:** Anxiety, Depression, PSQI, Trimesters, Ethiopia

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## 1. Introduction

Currently, the corona virus disease (COVID-19) has imposed huge burdens and impacts globally [1]. Improperly overstated characteristics of the pandemic through media had risen the psychological instabilities of the individuals [2]. Specially, in such countries with feeble health-care system like Ethiopia, the outbreak has posed great panic [3] and has forced the country to insure the pandemic control in order to maintain the achievements of health-care improvements throughout the past decades [4]. On March 13, 2020, Ethiopia has reported the index case although Ethiopia is being on the top among East African countries at the late of December 2020 [5].

During the current pandemic, unpredicted stress concerning health issues and financial insecurity are likely to result in emotional dysregulations [6]. Disruptions in routine daily activities due to lockdown and additional parenting duties mainly for women [7] had resulted in sleep disturbances and reduced sleep quality [8]. In general population, 18.2% and 67.1% of poor quality of sleep has reported at the time of COVID-19 outbreak [9] and the higher rate has associated to female gender [10]. Poor sleep quality and disturbing mental well-being are common among women [11] and has increased during current pandemic [12]. Pandemic preventive measures such as home confinement have identified to cause early morning awakening and non-restorative sleep and high among women [13].

Sleep difficulties are common during pregnancy and known to increase mental health problems with super imposed stressful situation [14]. For instance, during current pandemic all components of sleep quality have been disturbed [15] and the presence of anxiety and depression has associated to the high poor quality of sleep [16]. Supportive findings had revealed that, pandemic related fear has raised the anxiety and depression which in turn affected sleep pattern [17, 18]. In similar manner, the status of stress amongst pregnant mothers has increased at the era of COVID-19 pandemic and associated with adverse outcomes [19]. The occurrence of psychological stress has amplified during this pandemic and has significantly related to female gender [20, 21].

On the other hands, sleep quality has positively linked to self-efficacy [22] and higher self-efficacy has associated with minimum psychological disturbances [23]. Similarly, it was reported that, the better the self-efficacy, the more pleasing quality of sleep is [24].

The extensive changes in routine activities throughout the current pandemic beside eminent psychological disruptions could cause the significant disturbances in sleep quality of pregnant mothers. Therefore, understanding the levels of disturbances of sleep and underlining its linkage with mental well-beings and the significance of self-efficacy are so crucial to maintain the health mental well-beings and sleep quality. Despite this, no study was conducted so far in Ethiopia to measure the association of quality of sleep with mental well-beings and self-efficacy among pregnant women during the era of corona virus pandemic to the best of our knowledge. In this regards, the current study was aimed to evaluate the quality of sleep among pregnant mothers amidst this pandemic and its relation with mental well-beings and self-efficacy. In the regards of this intention, the findings from this study will assist as the base-line for upcoming studies on analogous topics. Additionally, it will contribute for clinical practitioners to deliver evidence-based services. Moreover, the findings of this study will help health service planners and influence policy creators in the circumstance of current and future pandemic.

## 2. Materials and Methods

### 2.1. Participants and Study Setting

The current study was carried out among 228 pregnant mothers who were on antenatal care (ANC) follow-up at health facilities of Mettu town, southwest Ethiopia. Mettu, the zonal town is located about 600 kilometers far away from Addis Ababa, the capital city of Ethiopia. There are two medium clinics and one referral hospital which providing antenatal care services from which the study samples were derived.

### 2.2. Study Design and Period

The cross-sectional study was conducted from April – May, 2020.

### 2.3. Inclusion and Exclusion Criteria

Pregnant mothers those who had regular and continuous follow-ups and who attained at least basic antenatal care services were involved. Those mothers with high-risk pregnancy and those with any condition that limit the ability of replying the interview were excluded out.

### 2.4. Source Population

All pregnant women availed at the time of data collection were considered source population.

### 2.5. Sample Size Determination and Sampling Technique

The required minimum sample for this study was obtained by proportion formula of single population considering the occurrence of anxiety, depression, stress and sleep disturbances during COVID-19 from previous studies and the largest sample was taken for this study. Accordingly, the occurrences of these conditions were 18.1%, 16.4%, 89.1% and 17.65% [25, 26] and the largest sample was 228. To get the intended sample, participants were included through consecutive sampling procedure.

### 2.6. Data Collection Instruments and Procedures

By keeping one meter (1m) minimum distance and using all necessary personal protective materials, face-to-face interview technique was employed to collect data. Initially, the original versions of English questionnaires were translated into local languages (Afan Oromo and Amharic). To ensure the consistency, questionnaires were translated back to English by language experts. The questionnaire includes: Socio-demographic characteristics of the participants and queries to assess sleep quality, depression, anxiety, perceived stress and self-efficacy.

The dependent variable, (sleep quality) was examined by Pittsburgh Sleep Quality Index (PSQI) which discriminates seven components (sleep disturbances, sleep duration, sleep latency, daytime dysfunction, subjective sleep quality, sleep efficiency and use of sleep medication) of sleep patten in the last month [27]. It scored on the Likert of 0-3 in which the greater score indicates poorer sleep and the tool was validated in Ethiopia [28].

Hospital Anxiety and Depression Scale (HADS) which scored on the Likert of 0-3 was employed to evaluate depression and anxiety. The tool has 7 items for each condition and the higher score indicates worsened condition, and the tool has validated in Ethiopian context [29].

Perceived stress was examined using 10-item perceived stress scale (PSS). The tool has scored on the scale of 0-4 and the higher the score, the heightened the stress and the tool is valid in adult Ethiopian population [30].

General Self-efficacy scale (GSE) was used to evaluate self-efficacy of the participants. The tool has 10 items which scored on 0-4 scale in Likert manner to yield a maximum of 40 points and the more self-efficacy has indicated by high score [31].

## 2.7. Operational Definition

Poor Quality of Sleep - Participants with PSQI score of above 5 were identified as poor sleepers.

## 2.8. Statistical Analysis

All the data were analyzed by SPSS version 23.0 (IBM, Armonk, NY, USA). Frequencies and respective percentages were computed for categorical variables, while mean and standard deviation were used for continuous variables. Chi-square test was conducted and Pearson correlation coefficient ( $r$ ) was calculated to assess relationship between variables. For statistical significance,  $p$ -value  $< .05$  and 95% CI were considered.

## 3. Results

### 3.1. Socio-demographic Characteristics of Study Participants

Overall, 228 pregnant women were involved in this study. The mean age of the participants was 30.79 ( $SD \pm 7.57$ , Range=18 - 44 years) and the majority (124, 54.4%) of the respondents had followed primary education and below. Majority of the participants were from urban, primiparous and have no pregnancy related complication (Table 1).

**Table 1.** Socio-demographic characteristics of study participants ( $N=228$ ).

Variables	Category	Frequency	Percentage
Age*	$\leq 30$	130	57.0
	$> 30$	98	43.0
Educational status	Primary and below	124	54.4
	Above primary	104	45.6
	Government employee	68	29.8
Occupation	Self employed	83	36.4
	House-wife	77	33.8
Parity	Primiparous	121	53.1
	Multiparous	107	46.9
Trimester	First	84	36.8
	Second	68	29.8
	Third	76	33.4
Residence	Urban	137	60.1
	Rural	91	39.9
Pregnancy complication	Yes	38	16.7
	No	190	83.3
Family size <sup>#</sup>	$< 5$	123	53.9
	$\geq 5$	105	46.1

Notes:

\*Age was classified according to previous study [48].

<sup>#</sup>Number of family member living in one house

### 3.2. Status of Sleep Variables Among Study Subjects

From a total of 228 respondents, 130 (57%) of them were poor sleepers and the mean score of global PSQI was 8.63 ( $SD \pm 5.18$ ). Among all participants, only less than one-fifth (44, 19.3%) of them had reported very good subjective

quality of sleep and about one-third of pregnant women had  $> 85\%$  sleep efficiency. The sleep duration was found to be 6.70 hours ( $SD \pm 1.95$ ) and mean time of sleep onset was  $29.23 \pm 20.95$  minutes. The mean score for sleep latency and habitual sleep efficiency was  $1.11 \pm 1.07$  and  $1.34 \pm 1.12$  respectively (Table 2).

**Table 2.** Individual scores of PSQI components for study participants ( $N=228$ ).

Components of PSQI		Min-Max	M $\pm$ SD
Component-1	Subjective sleep quality	0-2	1.10 $\pm$ 0.69
Component-2	Sleep latency	0-3	1.11 $\pm$ 1.07
Component-3	Sleep duration	0-3	1.21 $\pm$ 1.13
Component-4	Habitual sleep efficiency	0-3	1.34 $\pm$ 1.12
Component-5	Sleep disturbances	0-3	1.32 $\pm$ 1.14
Component-6	Use of sleep medication	0-3	1.13 $\pm$ 1.00
Component-7	Daytime dysfunction	0-3	1.43 $\pm$ 1.08
Global PSQI score		0-18	8.63 $\pm$ 5.18

Notes:

PSQI – Pittsburgh Sleep Quality Index

Min – Minimum Max – maximum

M – Mean SD – standard deviation

### 3.3. Association of Sleep Quality with Participant's Socio-demographic Characteristics

As tested by chi-square, educational status of the pregnant women has significantly associated to sleep quality with small effect size. Accordingly, participants who followed above primary education had higher proportion of poor sleep quality

( $p=0.009$ , Cramer's V-test=0.17) compared to those followed primary school and below. On the other hands, the proportion of poor sleep quality was lower for urban residents at significant level ( $p=0.013$ , Cramer's V-test=0.17). Even though some other social-demographic variables had shown proportional difference, none of them had reached significant level (Table 3).

**Table 3.** Chi-square test for socio-demographic variables of study participants in relation to quality of sleep (N=228).

Variables	Category	Sleep Quality (F, %)		PSQI M±SD	X <sup>2</sup> -Value	p-value	V-test
		Good	Poor				
Age	≤30	62 (47.7)	68 (52.3)	8.30±5.36	2.74	0.098	0.11
	>30	36 (36.7)	62 (63.3)	9.07±4.92			
Educational status	≤ Primary	63 (50.8)	61 (49.2)	8.02±5.59	6.79	0.009*	0.17
	>primary	35 (33.7)	69 (66.3)	9.37±4.57			
Occupation	Gov't employee	36 (52.9)	32 (47.1)	7.87±4.67	4.40	0.111	0.14
	Self employed	30 (36.1)	53 (63.9)	9.06±5.39			
Parity	House-wife	32 (41.6)	45 (58.4)	8.84±5.36	1.79	0.181	0.09
	Primiparous	57 (47.1)	64 (52.9)	7.88±4.78			
Trimester	Multiparous	41 (38.3)	66 (61.7)	9.49±5.50	3.51	0.173	0.12
	First	31 (36.9)	53 (63.1)	8.45±3.90			
Residence	Second	28 (41.2)	40 (58.8)	9.62±4.75	6.20	0.013*	0.17
	Third	39 (51.3)	37 (48.7)	7.95±6.54			
Regular exercise	Urban	68 (49.6)	69 (50.4)	8.16±5.15	0.92	0.338	0.06
	Rural	30 (33.0)	61 (67.0)	9.34±5.18			
Family size	Yes	19 (50.0)	19 (50.0)	6.71±5.29	3.66	0.056	0.13
	No	79 (41.6)	111 (58.4)	9.02±5.08			
Family size	<5	60 (48.8)	63 (51.2)	7.90±5.13	3.66	0.056	0.13
	≥5	38 (36.2)	67 (63.8)	9.49±5.13			

Notes:

\* Significant p-value at  $p<0.05$

F – Frequency X<sup>2</sup>- chi-square Gov't – Government

PSQI – Pittsburgh Sleep Quality Index

M – Mean SD – Standard deviation

### 3.4. Correlation of Global Sleep Quality Score with Mental Well-beings and Self-efficacy

The mean score of anxiety symptoms was 8.43 (SD±5.13) and 9.92 (SD±3.81) for depression which indicates border line anxiety and depression respectively. As evaluated by perceived stress scale, participants had moderate stress with 22.82 (SD±10.08) mean score.

To weigh the relationship between sleep quality and continuous independent variables (anxiety, depression,

perceived stress and self-efficacy), Pearson correlation coefficient (r) was computed. Consequently, there was positive strong correlation between global score of PSQI and the score of anxiety symptoms ( $r=0.57$ ,  $p<0.001$ ). In similar manner, the score of global sleep quality has significant moderate positive relationship with depressive symptoms score ( $r=0.37$ ,  $p<0.001$ ) and scale of perceived stress ( $r=0.36$ ,  $p<0.001$ ). General self-efficacy has negative moderate association with overall PSQI score ( $r=0.32$ ,  $p<0.001$ ) which revealed that, higher self-efficacy indicates better quality of sleep (Table 4).

**Table 4.** Descriptive statistics and correlation of mental well-beings and self-efficacy with sleep quality among study participants (N=228).

Variables	1	2	3	4	5	M±SD
1. Global sleep quality score <sup>§</sup>	-					8.63±5.18
2. Anxiety symptoms	.57*	-				8.43±5.13
3. Depressive symptoms	.37*	.51*	-			9.92±3.81
4. Perceived stress**	.36*	.22*	.13	-		22.82±10.08
5. General self-efficacy <sup>#</sup>	-.32*	-.19*	-.13 <sup>#</sup>	-.82*	-	24.06±8.49

Notes:

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

<sup>#</sup>. Correlation is significant at the 0.05 level (2-tailed)

M – Mean SD – Standard Deviation

<sup>§</sup>Measured by Pittsburgh Sleep Quality Index (PSQI) and high score indicates worsened sleep quality.

||Assessed by Hospital Anxiety and Depression Scale (HADS) and increased score implies elevated anxiety and depression.

\*\*As measured by perceived stress scale (PSS), lower score indicates minimum perceived stress.

<sup>#</sup>Examined by General Self-efficacy scale (GSE) and the higher the score, the better the self-efficacy is.

## 4. Discussion

Although underdiagnosed [32], disturbances in sleep parameters like long sleep latency, frequent insomnia and poor quality of sleep are common throughout all three trimesters during pregnancy [33]. Insufficient and poor sleep in pregnant women has not only negative health outcomes for maternal well-beings, but also affects fetal growth and development [34, 35]. Thus, the current study was aimed to measure the status of sleep quality amid COVID-19 crisis in this population and assumed to be the pioneer study nationally to best of our knowledge.

In this study, 130 (57%) pregnant women were found to be poor sleepers. In comparing to this finding, the previous studies conducted at ordinary time in Germany [33], Finland [32], China [34], Iran [36] and Egypt [37] had reported lower results, while our current finding was lower than the study done in Spain [11] and Turkey [38]. Probably, the discrepancies among these findings can be accounted by variation of study participants in socio-economic status, living standards and advancement in health care services. On the other hand, the study specific factors such as different assessment tool [32], determination of cut-off point [37], study year and sample size variation [11, 38] may be contribute for this observed differences. Moreover, the impact of current pandemic is unavoidable risk of worsened sleep parameters [10, 13].

Among socio-demographic variables, educational status of the participants has significantly associated with sleep quality in which participants with higher education has greater proportion of poor sleep quality. Although we didn't get previous supportive findings, this probably because of that people with higher educational status have better knowledge about pandemic [39, 40] which can expose them to different sources of information and in turn to fear and stress [41].

Furthermore, rural residents had higher proportion of poor sleepers at significant level ( $X^2=6.20$ ,  $P=0.013$ ,  $Cramer's\ v=0.17$ ). One supportive finding was reported from China in which older people living in rural had reported high poor sleep quality [42]. The living standard and poor housing of rural population may be accounted for this as Machado et al had reported that the poor sleep quality among rural population has associated with housing conditions like bed and bedroom quality [43].

The finding of the current study also revealed that, PSQI score has strongly associated with anxiety symptoms and moderately correlated to depression and perceived stress in positive direction. This was in agreement with many previous studies [15, 44–47]. This probably due to the fact that anxiety, depression and stress have the capacity to disturb individual's quality of life and leads to sleep disturbances [48] specifically during pandemic crisis [13]. Additionally, unpredictable anxiety, depression and chronic stress can interfere with personal role and cause mental and physical problems [49] which possibly lead to poor sleep [50].

Modest negative relationship was found between the scores of PSQ and general self-efficacy. This may be due to decreased fear of pandemic among people with high self-efficacy [51] which perhaps protective against poor sleep. Similar findings were reported from previous studies. For instance, higher self-efficacy was linked to lower sleep problems like insomnia and nightmares [52, 53] and better sleep quality [45, 54, 55].

As far as our knowledge, this is the first study conducted at national level which can be considered as its strength. The other strength of this study is that we had used widely used standard tools to assess both outcome and independent variables. Despite these strengths, we identified some limitations. First, the cross-sectional nature of the study was not allowed to examine cause-effect relationships between variables. Secondly, the study was conducted at health facilities of single town which may be difficult to generalize the findings. Thirdly, objective sleep parameters were not assessed. To address the above mentioned limitations, we would like to recommend additional future studies including some uncovered variables.

## 5. Conclusions

As expected, the finding of this study has revealed high poor quality of sleep among pregnant women at the time of COVID-19 pandemic. The presence of depression, anxiety and perceived stress was positively related to poor quality of sleep; while, participants with higher self-efficacy were reported better sleep quality. More inclusive study should be conducted to clarify the causal relations of these factors by including objective measures of sleep. Moreover, it is so interesting to assess routinely the sleep status of pregnant women to take timely actions. Finally, it would be better to make collaboration between antenatal care clinics and psychiatry unit of the hospital to provide a holistic care.

## Author Contributions

All authors had contributed substantially to conceptualization, designing this study, collection of data, data analysis and interpretation; participated in reviewing, drafting, and approving the final version to be published; and have agreed to submission to this journal and to be accountable for all aspects of this work.

## Ethical Approval and Informed Consent

The written informed consent was signed by all study participants and all information was confidentially kept. Ethical approval was obtained from the ethical review committee of Mettu University, College of Health Sciences and the study was performed as per the principles of Declaration of Helsinki.

## Data Availability Statement

The data to support the results are accessible from corresponding author on necessary request.

## Conflict of Interest

The authors declare that they have no competing interests.

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