The Impact of Shift Work, Stress, and Depression on Poor Sleep Quality Among Healthcare Workers: A Meta-Analysis

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Abstract

Poor sleep quality is a major risk factor for healthcare workers. Research suggests that psychological and occupational issues such as depression, stress, and shift work are major contributing factors. The purpose of this meta-analysis is to ascertain how shift work, stress, and depression affect healthcare professionals' risk of experiencing poor sleep quality. Based on the PICO framework, this meta-analysis included nine cross-sectional studies from Ethiopia, Turkey, Thailand, Somalia, and Saudi Arabia. Population: healthcare workers, with a total sample size of 6,135. Intervention: shift work, stress, and depression. Comparison: no shift work, no stress, and no depression. Outcome: poor sleep quality. The databases used included Google Scholar and PubMed. The inclusion criteria were full-text articles with observational study design using multivariate analysis that attaches aOR values and is published from 2019-2025. The keywords used in the primary data search were "Sleep quality" AND "Healthcare workers" OR "Health personnel" OR "Medical staff" AND "Cross-sectional study" AND "aOR" OR "Adjusted odds ratio". Statistical analysis was performed using a fixed-effects model to combine odds ratios in RevMan 5.3 software. The meta-analysis found that shift work significantly increases the odds of poor sleep quality (aOR= 1.42; CI 95%= 1.32 to 1.53; p< 0.001). High stress was associated with more than double the odds of poor sleep (aOR= 2.02; CI 95%= 1.46 to 2.79; p< 0.001). The most substantial effect was observed for depression, which nearly tripled the odds (aOR= 2.61; CI95%= 1.92 to 3.54; p< 0.001). Funnel plot indicated slight publication bias on shift work effect estimate. Shift work, stress, and depression were all significant and strong predictors of poor sleep quality among healthcare workers, with depression showing the strongest association. These findings suggest that healthcare institutions should implement better shift schedules, create mental health support programs, and add sleep health checks for their staff.

Keywords: shift work, stress, depression, sleep quality, healthcare workers

Introduction

Sleep is a basic need for the body that helps keep the mental focus, emotions balanced, and the physical health. But healthcare workers are more likely to have poor sleep quality because they often work long hours, during the night, and in stressful conditions. Not getting enough good sleep can lead to more mistakes at work, lower efficiency, worse judgment, and poorer mental health (Getu et al., 2022). Doctors, nurses, and other healthcare workers often report more problems with their sleep than people in general, which shows it's a big issue for both their jobs and public health (Segon et al., 2022).

Recent studies in various places have found that healthcare workers often have poor sleep quality. For example, a study in Ethiopia showed that over 80% of doctors working in critical care and operating rooms had poor sleep, which was linked to working nights and feeling depressed (Tsegay et al., 2023). In Thailand, 67.6% of nurses who worked shifts had poor sleep, compared to 32.4% of nurses who worked during the day (Sirinara et al., 2019). In Saudi Arabia, 61.3% of psychiatry doctors had poor sleep, and factors like being on call and depression were connected to this (Alshahrani et al., 2024). Studies in Turkey and Somalia also showed that work stress and mental health issues are connected to poor sleep among hospital staff (Güngördü et al., 2023; Mohamud et al., 2025). All these findings show that job-related stress and mental health issues are key factors affecting sleep in healthcare settings.

Even though there is a lot of research showing certain factors like shift work, depression, or stress can affect sleep, many studies do not look at how these things work together in different healthcare jobs (Abate et al., 2023; Alghamdi et al., 2024). This means there is still much to learn about what really causes poor sleep for healthcare workers. More detailed and comparative research is needed to better understand these issues and create better solutions for them.

Based on these gaps, this study aims to examine the relationship between shift work, stress, depression, and poor sleep quality among healthcare professionals. The research seeks to provide a more integrated perspective on how psychosocial and occupational factors interact in influencing sleep outcomes. The novelty of this study lies in its attempt to synthesize evidence from diverse healthcare roles and settings, thereby addressing the limitations of fragmented research and contributing to the development of targeted strategies to improve sleep health and overall well-being among healthcare workers.

Methods

1. **Study Design**

   The meta-analysis was carried out with a PRISMA flowchart using Google Scholar and PubMed databases for the 2015-2025 research period. The keywords used in the primary data search were "Sleep quality" AND "Healthcare workers" OR "Health personnel" OR "Medical staff" AND "Cross-sectional study" AND "aOR" OR "Adjusted odds ratio". There were 9 studies with cross-sectional research designs that met the inclusion criteria. The analysis was carried out with RevMan 5.3 software.

2. **Steps of Meta-Analysis**

   Based on the provided methodological framework, the research process begins by formulating research questions using the PICO model, which involves clearly defining the target Population, the studied Intervention, the Comparison, and the measured Outcome. Subsequently, a search for primary study articles is conducted from trusted electronic databases such as Google Scholar, PubMed, and ScienceDirect. The gathered articles then undergo a screening stage using Critical Appraisal to assess the quality and validity of each study. Following this, data is extracted, and the impact estimates from each primary study are entered into the RevMan 5.3 software for further analysis. The final stage involves interpreting the analysis results and drawing comprehensive conclusions from the overall study findings.

3. **Inclusion Criteria**

   This research article is a full-text paper with a cross-sectional study design that analyzes the effect of sleep disorders on anxiety and depression in health workers. The analysis uses multivariate adjusted Odds Ratio (aOR) and publication of English-language articles.

4. **Exclusion Criteria**

   Articles were published before 2015, articles published in languages other than English, incomplate outcome data.

5. **Operational Definition of Variables**

   Shift Work: A work schedule that falls outside the conventional daytime hours, including evening, night, rotating, or irregular shifts.

   Stress: A state of psychological strain and tension in response to demanding circumstances, often manifested in feelings of tension, pressure, or emotional strain.

   Depression: Depression is a common mental health disorder characterized by persistent sadness and loss of interest, impairing daily function.

   Poor Sleep Quality: Poor sleep quality is defined as subjective dissatisfaction with sleep, characterized by problems with sleep onset, maintenance, and timing.

6. **Study Instruments**

   Research is guided by the PRISMA flow diagram and assessment of the quality of research articles using the Critical Appraisal Skills Program tool (CASP for Cross-sectional).

7. **Data Analysis**

   The articles in this study were collected using PRISMA diagrams and analyzed using the Review Manager 5.3 application (RevMan 5.3). The results are presented in the form of forest plots and funnel plots.

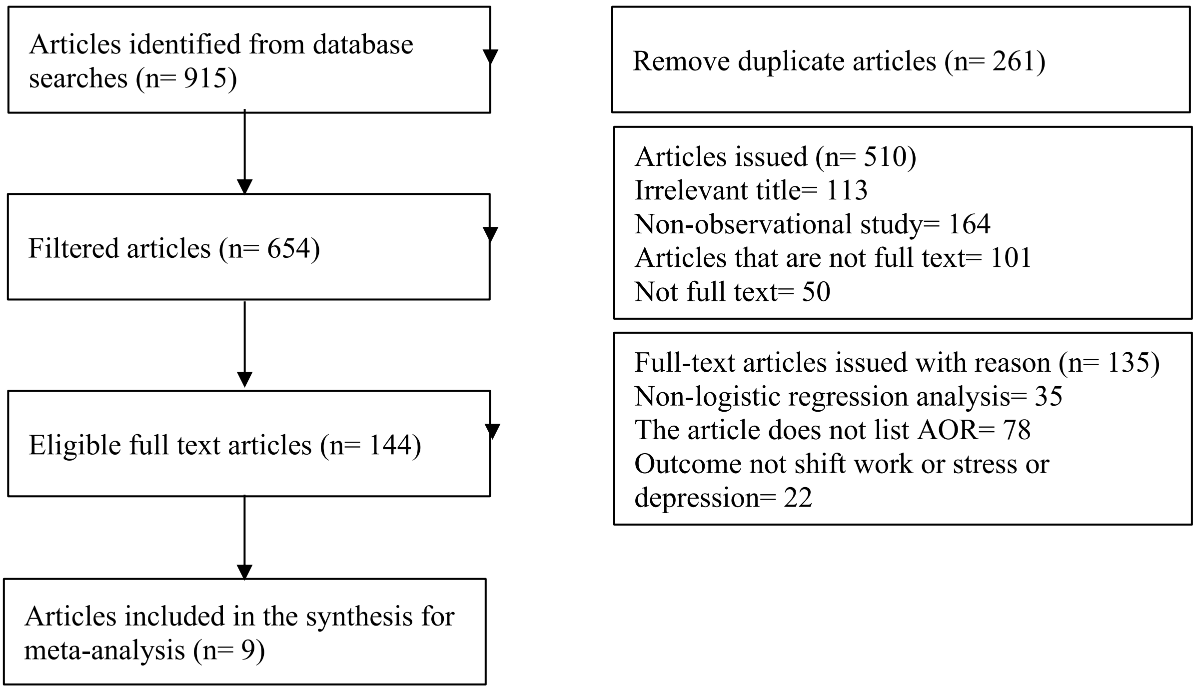

Figure 1. PRISMA flowchart

Result

The article search process was conducted through several journal databases, including Google Scholar and PubMed. The article review process can be seen in the PRISMA flowchart in Figure 1. A total of 9 cross-sectional studies whose research articles originated from Ethiopia, Turkey, Thailand, Somalia, and Saudi Arabia were selected for the systematic review and meta-analysis.

Table 1. The Critical Appraisal of Articles with a Cross-Sectional Study

Author (Year)	Criteria													Total
	1a	1b	1c	1d	2a	2b	3a	3b	4	5	6a	6b	7	
Güngördü et al. (2023)	2	2	2	2	1	2	2	2	1	2	2	2	2	24
Alghamdi et al. (2024)	2	1	1	2	2	1	2	2	1	2	2	2	2	22
Sirinara et al. (2019)	2	2	2	2	1	2	2	2	1	2	2	2	2	24
Alshahrani et al. (2024)	2	2	2	2	1	2	2	2	1	2	2	2	2	24
Mohamud et al. (2025)	2	2	2	2	1	1	2	2	1	2	2	2	2	23
Abate et al. (2023)	2	2	2	2	2	1	2	2	1	2	2	2	2	24
Getu et al. (2022)	2	2	2	2	2	1	2	2	1	2	2	2	2	24
Tsegay et al. (2022)	2	2	2	2	2	2	2	2	1	2	2	2	2	25
Segon et al. (2022)	2	2	2	2	2	1	2	2	1	2	2	2	2	24

Description of question criteria:

Description: 2= Yes; 1= No

Question criteria descriptions:

1. **Formulation of research questions in the acronym PICO**

   To ensure the validity and homogeneity of the synthesized evidence, it is essential to critically evaluate the alignment between each primary study and the predefined PICO framework of the meta-analysis. This evaluation involves determining whether the population examined in the primary study matches the target population specified in the meta-analysis, and whether the operational definitions for both the intervention (the exposed group) and the comparison (the unexposed group) are consistent with the definitions intended for the synthesis. Furthermore, a direct correspondence must be established between the outcome variables measured in the primary study and the outcome definitions stipulated in the meta-analysis protocol. Assessing these elements is fundamental, as any discrepancy can introduce significant heterogeneity and bias, there by undermining the robustness and interpretability of the pooled results.

2. **Methods for selecting research subjects**

   When evaluating the methodological quality of analytical cross-sectional studies for inclusion in a systematic review, the sampling strategy is a critical consideration. The first is whether the researcher selected samples from the population using a random sampling method, which enhances the generalizability of the findings. Alternatively, if a random sampling approach was not employed, it is crucial to determine whether the researcher selected the sample based on the outcome status or based on the intervention/exposure status, as these non-random sampling methods can introduce significant selection bias and affect the validity of the observed associations.

3. **Methods for measuring exposure (intervention) and outcome.**

   A critical step in assessing the combinability of data for meta-analysis involves evaluating the measurement consistency of key variables across all included primary studies. First, it must be determined whether the exposure and outcome variables are measured using identical or highly comparable instruments and tools in every study. Second, for any variable measured on a categorical scale, it is essential to verify that the cut-off points or category definitions applied are uniform across all studies. Significant discrepancies in measurement tools or classification criteria introduce methodological heterogeneity, which can obscure the true effect and compromise the validity of the pooled results.

4. **Design-related bias**

   To assess the risk of selection bias in non-random sampling, it is critical to evaluate whether the researcher implemented specific strategies to prevent systematic error in subject selection. For instance, when sampling is based on outcome status, one must examine if the selection process was independent of exposure status, ensuring that exposed and unexposed individuals had an equal probability of being included if they had the outcome. Conversely, when sampling is based on exposure status, it must be determined whether the selection was independent of the outcome, guaranteeing that individuals with and without the outcome had an equal chance of being selected within each exposure group. The presence or absence of such safeguards directly impacts the internal validity of the observed associations.

5. **Methods for controlling confusion**

   A key criterion for evaluating a primary study's internal validity is determining whether the investigators implemented methods to control for confounding variables. This involves assessing if they employed analytical techniques, such as stratification or multivariate regression models, to statistically adjust for the influence of known or suspected confounders on the relationship between the exposure and outcome. The successful identification and adjustment for these factors are crucial for isolating the true effect and minimizing spurious associations in the study's conclusions.

6. **Statistical analysis methods**

   To assess the methodological rigor and the suitability of a study's data for a meta-analysis, two critical questions regarding its statistical approach must be considered. First, it is necessary to determine whether the researcher analyzed the data using a multivariate analysis model, such as multiple linear regression or multiple logistic regression. Second, if such an analysis was conducted, it is essential to confirm whether the study reports the corresponding effect sizes or relationship measures derived from that multivariate model, for example, an adjusted odds ratio (aOR) or an adjusted regression coefficient (β). These adjusted estimates are crucial as they account for potential confounding variables, providing a more accurate and isolated measure of the association between the exposure and outcome, which is the preferred data for synthesis in a meta-analysis.

7. **Conflict of interest**

   A fundamental component of critical appraisal is assessing whether any declared or undeclared conflicts of interest exist, particularly with the research sponsor, that could introduce bias and compromise the impartiality of the study's conclusions.

Table 2. Description of primary studies on the effect of shift work on poor sleep quality (N= 5,189)

Author (Year)	Country	Sample	P	I	C	O
Güngördü et al. (2023)	Turki	368	Hospital Office Workers	Shift Work	No Shift Work	Sleep Quality
Alghamdi et al. (2024)	Saudi Arabia	395	Physicians and Nurses	Shift Work	No Shift Work	Poor Sleep Quality
Sirinara et al. (2019)	Thailand	2,765	Nursing Staff	Shift Work	No Shift Work	Sleep Quality
Mohamud et al. (2025)	Somalia	280	Nurses	Shift Work	No Shift Work	Poor Sleep Quality
Getu et al. (2022)	Ethiopia	418	Health-Care Workers	Shift Work	No Shift Work	Sleep Deprivation

Tsegay et al. (2022)	Ethiopia	421	Clinicians	Shift Work	No Shift Work	Sleep Quality
Segon et al. (2022)	Ethiopia	542	Nurses	Shift Work	No Shift Work	Sleep Quality

Table 3. Data adjusted Odds Ratio (aOR) on the effect of shift work on poor sleep quality

Author (Year)	**aOR**	**CI 95%**	
		Lower Limit	**Upper Limit**
Güngördü et al. (2023)	1.73	1.02	2.91
Alghamdi et al. (2024)	1.866	1.010	3.447
Sirinara et al. (2019)	1.369	1.270	1.479
Mohamud et al. (2025)	4.76	2.06	11.02
Getu et al. (2022)	5.7	2.3	14.3
Tsegay et al. (2022)	3.372	1.75	6.484
Segon et al. (2022)	1.39	0.69	1.75

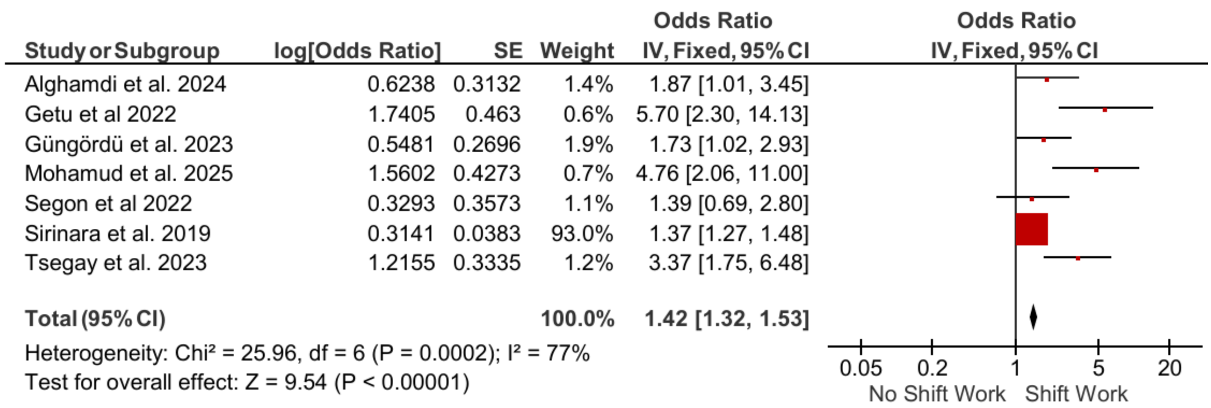

Figure 2. Forest Plot of the effect of shift work on poor sleep quality

The forest plot in Table 3 shows that health workers who do shift work have a 1.42 times higher risk of poor sleep quality compared to those who don't do shift work (aOR = 1.42; 95% CI = 1.32 to 1.53; p = 0.00001). The forest plot in Figure 2 shows that there is a lot of difference in the results from different studies (I^2 = 77%; p < 0.0002). Because of this, the average effect was calculated using a random effects model.

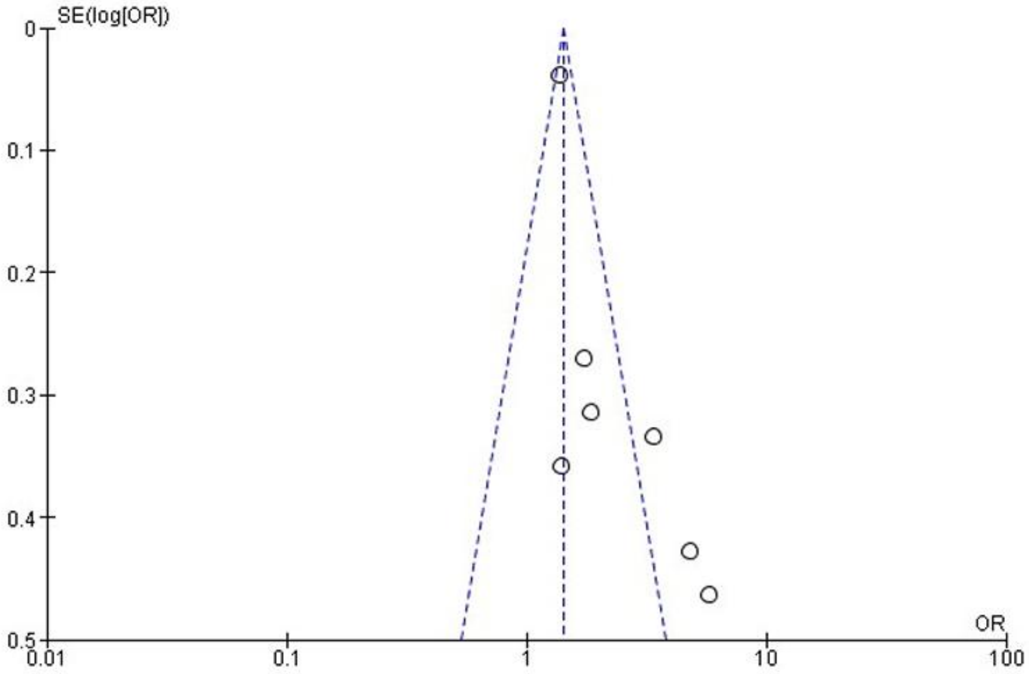

Figure 3. Funnel Plot of the effect of shift work on poor sleep quality

The funnel plot shows an asymmetrical distribution of study points. Smaller studies (with larger standard errors) are scattered more widely at the bottom, while larger studies are concentrated at the top. This asymmetry suggests the presence of publication bias, a conclusion supported by the high heterogeneity observed ($I^2 = 77\%$).

Table 4. Description of primary studies on the effect of stress on poor sleep quality (N= 2,003)

Author (Year)	Country	Sample	P	I	C	O
Güngördü et al. (2023)	Turki	368	Hospital Office Workers	Stress	No Stress	Sleep Quality
Mohamud et al. (2025)	Somalia	280	Nurses	Stress	No Stress	Poor Sleep Quality
Abate et al. (2023)	Ethiopia	392	Nurses	Stress	No Stress	Sleep Disorder
Tsegay et al. (2022)	Ethiopia	421	Clinicians	Stress	No Stress	Sleep Quality
Segon et al. (2022)	Ethiopia	542	Nurses	Stress	No Stress	Sleep Quality

Table 5. Data adjusted Odds Ratio (aOR) on the effect of stress on poor sleep quality

Author (Year)	aOR	CI 95%	
		Lower Limit	Upper Limit
Güngördü et al. (2023)	2.59	1.37	4.87
Mohamud et al. (2025)	3.92	1.11	13.90
Abate et al. (2023)	0.77	0.32	1.86
Tsegay et al. (2022)	1.045	0.512	2.132
Segon et al. (2022)	2.85	1.67	4.82

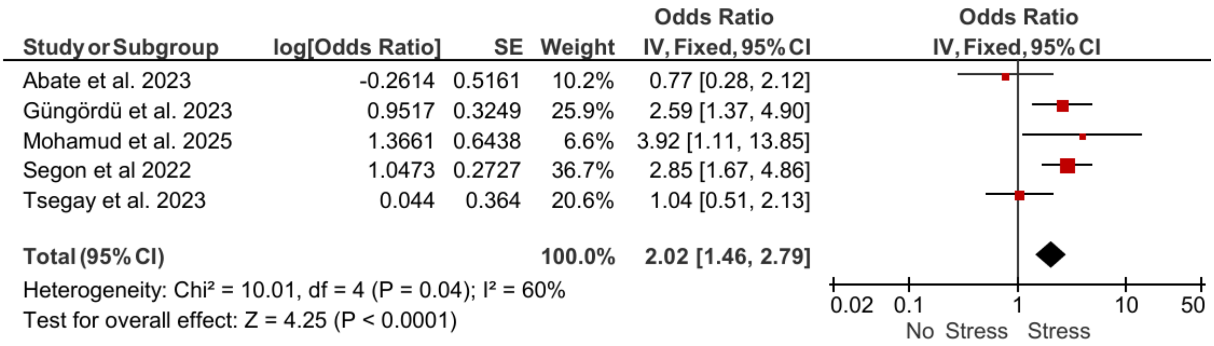

Figure 4. Forest Plot of the effect of stress on poor sleep quality

The forest plot in Table 5 shows that the risk of stress caused by poor sleep quality in health workers is 2.02 times compared to health workers who do not experience poor sleep quality (aOR = 2.02; CI 95% = 1.46 to 2.79; p = 0.0001). The forest plot in Figure 4 shows a very large heterogeneity of effect estimates between studies ($I^2 = 60\%$; $p < 0.04$). Thus, the calculation of the average effect estimate is carried out using a random effect model approach.

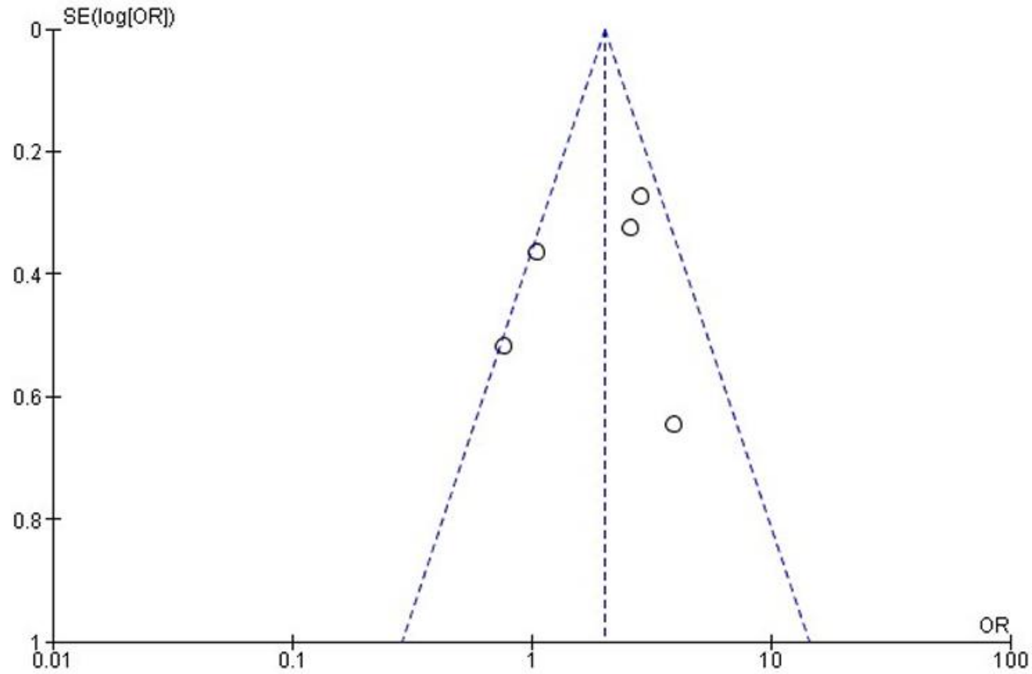

Figure 5. Funnel Plot of the effect of stress on poor sleep quality

The funnel plot displays a largely symmetrical pattern. Although there is a minor imbalance, most studies cluster around the mean effect line. This indicates no evidence of publication bias, consistent with the moderate heterogeneity ($I^2 = 60\%$).

Table 6. Description of primary studies on the effect of depression on poor sleep quality (N= 2,607)

Author (Year)	Country	Sample	P	I	C	O
Alshahrani et al. (2024)	Saudi Arabia	554	Psychiatry Physicians	Depression	No Depression	Poor Sleep Quality
Mohamud et al. (2025)	Somalia	280	Nurses	Depression	No Depression	Poor Sleep Quality
Abate et al. (2023)	Ethiopia	392	Nurses	Depression	No Depression	Sleep Disorder

Getu et al. (2022)	Ethiopia	418	Health-Care Workers	Depression	No Depression	Sleep Deprivation
Tsegay et al. (2022)	Ethiopia	421	Clinicians	Depression	No Depression	Sleep Quality
Segon et al. (2022)	Ethiopia	542	Nurses	Depression	No Depression	Sleep Quality

Table 7. Data adjusted Odds Ratio (aOR) on the effect of depression on poor sleep quality

Author (Year)	aOR	CI 95%	
		Lower Limit	Upper Limit
Alshahrani et al. (2024)	3.46	1.60	7.48
Mohamud et al. (2025)	5.32	2.22	12.88
Abate et al. (2023)	0.74	0.28	1.95
Getu et al. (2022)	2.6	1.3	6.8
Tsegay et al. (2022)	1.045	0.512	2.132
Segon et al. (2022)	2.24	1.24	3.85

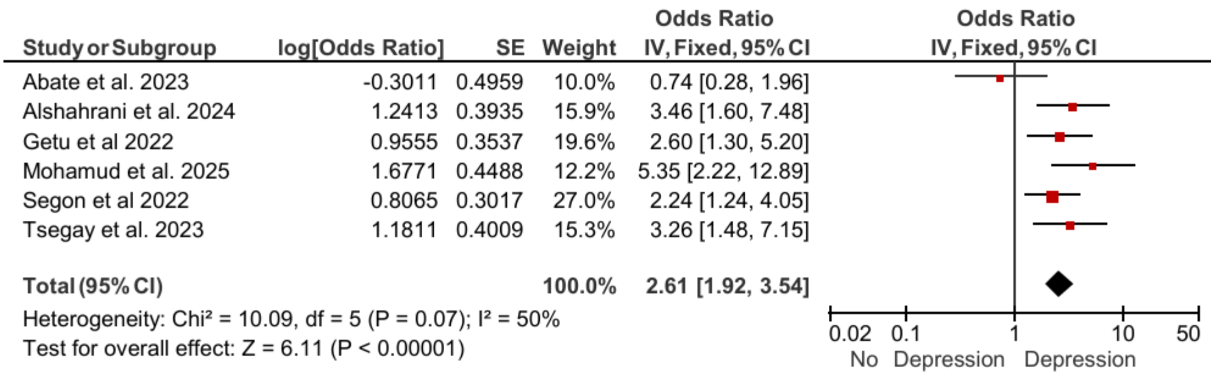

Figure 6. Forest Plot of the effect of depression on poor sleep quality

The forest plot in Table 7 shows that the risk of depression caused by poor sleep quality in health workers is 2.6 times compared to health workers who do not experience poor sleep quality (aOR = 2.61; CI 95% = 1.92 to 3.54; p = 0.00001). The forest plot in Figure 6 shows a very large heterogeneity of effect estimates between studies (I^2 = 50%; p < 0.07). Thus, the calculation of the average effect estimate is carried out using a random effect model approach.

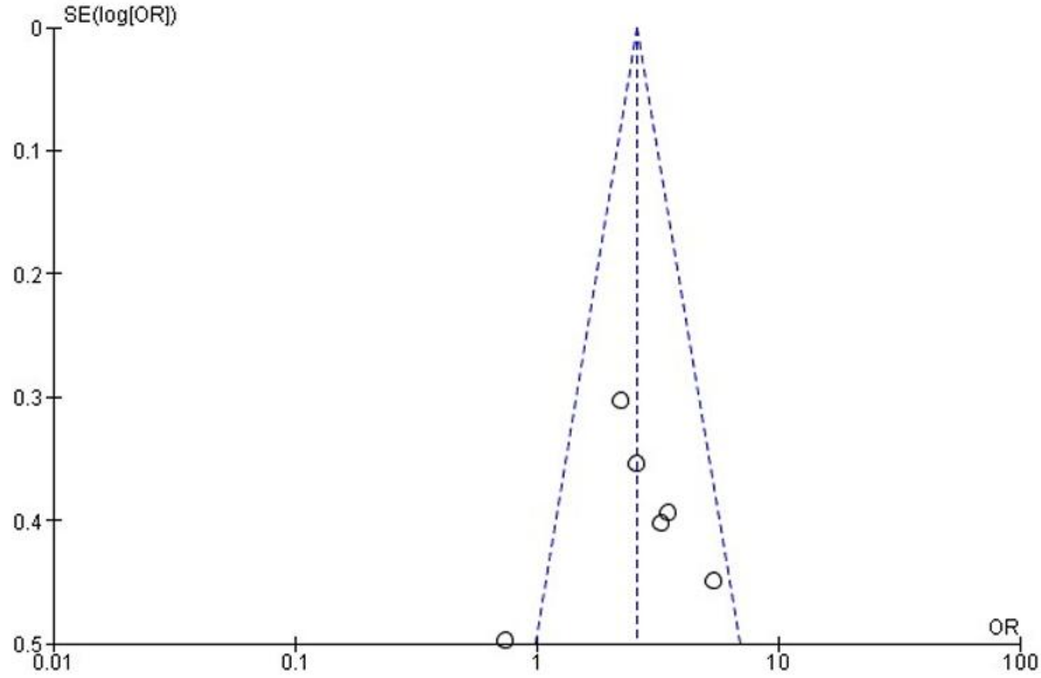

Figure 7. Funnel Plot of the effect of depression on poor sleep quality

The funnel plot demonstrates a relatively symmetrical distribution, with study points evenly dispersed on both sides of the overall effect line. This pattern suggests an absence of significant publication bias, which aligns with the moderate heterogeneity (I^2 = 50%).

Discussion

This meta-analysis was conducted to estimate the effects of shift work, stress, and depression on poor sleep quality. The analysis combined a total of 9 primary studies, 7 studies for shift work, 5 studies for stress, and 6 studies for depression to examine the association between these and poor sleep quality. These findings provide quantitative evidence supporting the significant role of these occupational and psychological factors in disrupting sleep quality in the studied population.

The Effect of Shift Work on Poor Sleep Quality

The results of this meta-analysis indicate that shift work statistically significantly increases the risk of poor sleep quality. The pooled analysis of 7 studies showed that individuals engaged in shift work had 1.42 times higher odds of experiencing poor sleep quality compared to those who did not work shifts (aOR = 1.42; 95% CI = 1.32 to 1.53; $p < 0.00001$). However, a high degree of heterogeneity was observed among the studies (I^2 = 77%; p = 0.0002), indicating substantial variation in the effect sizes across different settings and populations. Consequently, a random effects model was deemed appropriate.

Shift work might disrupt the body's natural daily rhythm, leading to poor sleep and long-term tiredness in healthcare workers, which matches what other studies have found (Sirinara et al., 2019). One reason for this link could be that too much light at night reduces melatonin, a hormone that helps you sleep. Another reason might be that an irregular sleep schedule messes up the body's internal clock, especially for those working nights. This suggests that having a regular sleep schedule is important because it helps the body's clock stay in line with the sleep pattern (Tsegay et al., 2023).

The Effect of Stress on Poor Sleep Quality

The meta-analysis of 5 studies revealed a strong association between stress and poor sleep quality. The combined effect indicated that individuals experiencing stress had 2.02 times higher odds of reporting poor sleep quality compared to those without significant stress (aOR = 2.02; 95% CI = 1.46 to 2.79; $p < 0.0001$). The test for overall effect was highly significant. A moderate level of heterogeneity was present among the studies ($I^2 = 60\%$; p = 0.04).

Healthcare workers who are under a lot of stress for a long time might feel burned out, frustrated, irritated, and really tired. They might also have trouble sleeping well. Stress can cause a drop in slow-wave sleep and rapid eye movement sleep, and it can lead to more sleep deprivation (Segon et al., 2022). One possible reason for this connection is that stress affects the hypothalamic-pituitary-adrenal (HPA) axis, which is responsible for the body's response to stress and also controls sleep patterns. When someone is under constant stress, their body produces more cortisol, especially during the night, which makes it harder for them to relax and fall asleep. Many studies have shown that higher job stress is linked to worse sleep quality. Nurses often have disrupted sleep because of work stress, like dealing with a lot of patients, long shifts, and mental fatigue (Mohamud et al., 2025).

The Effect of Depression on Poor Sleep Quality

The analysis of 6 studies established a significant effect of depression on poor sleep quality. The pooled odds ratio showed that individuals with depression had 2.61 times higher odds of suffering from poor sleep quality compared to their non-depressed counterparts (aOR = 2.61; 95% CI = 1.92 to 3.54; $p < 0.00001$). The overall effect was highly significant. The heterogeneity among the studies was moderate ($I^2 = 50\%$; p = 0.07).

One possible reason is that circadian preferences might have a big effect on how sleep and depression are connected (Alshahrani et al., 2024). Depression can reduce or delay the release of melatonin, a hormone made by the pineal gland that helps control when we feel sleepy and wake up, which is triggered by light and darkness (Tsegay et al., 2023). This study also found that people with depressive symptoms were twice as likely to have worse sleep quality compared to those who weren't depressed (Segon et al., 2022).

Conclusion

This meta-analysis conclusively demonstrates that shift work, stress, and depression are significant and strong predictors of poor sleep quality among healthcare workers. The findings provide a quantitative hierarchy of these risk factors, showing that depression has the most substantial association, followed by stress and then shift work. By providing pooled, adjusted effect estimates from multinational studies, this research advances the field by quantifying and comparing the magnitude of these key occupational and mental health risk factors, thereby informing priority-setting for institutional interventions.

Healthcare institutions should prioritize the design of ergonomic shift schedules, integrate mental health screening and support systems, and incorporate sleep health into occupational health protocols. Future research should utilize longitudinal designs to establish causality and evaluate the effectiveness of targeted interventions, such as sleep hygiene programs for shift workers and psychological support for those with depression.

This study has some limitations. The generalizability of these findings is constrained by the cross-sectional design of the included studies, which prevents causal inference. There was also evidence of slight publication bias for the effect of shift work. The variability in the tools used to measure sleep quality, stress, and depression across the primary studies may have introduced measurement bias.

Acknowledgment

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Author Contribution

Afrita Nurlaylia conceived the study, conducted data extraction, and wrote the manuscript. Bhisma Murti supervised the analysis and revised the manuscript. Both authors approved the final version.

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