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# Sleep quality and shift work among Moroccan nurses: A cross-sectional study

Kaoutar Kabbadj, Youssra Amekran, Narjisse Damoun, Nora Taiek, Abdelkader Jalil El Hangouche

## Abstract:

**BACKGROUND:** Sleep is vital for physical and mental health. The nursing profession is often associated with unique challenges when it comes to sleep quality. Nurses are often faced with irregular work schedules, including night shifts and rotations, high-stress levels, and significant job demands that can contribute to sleep problems and hinder their productivity at work. This study aimed to assess sleep quality in Moroccan nurses and to investigate the relationship between sleep quality and shift work.

**MATERIALS AND METHODS:** This was a cross-sectional study carried out between August 8, 2022 and September 30, 2022 among 260 nurses working day or night shifts in the province of Tétouan, northern Morocco. The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality in day and night shift nurses. Data on sociodemographic characteristics and shift work were also collected. Descriptive and inferential statistical analyses were performed. Regression models were used to study the association between participant characteristics and sleep quality.

**RESULTS:** Among all participants, 60.4% had poor sleep quality. The results of the study revealed that there was no significant association between shift work and sleep quality among nurses in Morocco.

**CONCLUSION:** Given that the majority of nurses suffer from sleep disorders, an action plan to raise awareness and promote good sleep in this population should be implemented.

## Keywords:

Nurses, shift work, sleep quality

## Introduction

Despite the obvious importance of sleep in maintaining good physical, psychological, and cognitive health, many people around the world do not get enough sleep. For example, more than 50 million Americans do not sleep well.<sup>[1]</sup> In Asia, the average incidence of sleep problems varies from 26.4% to 39.4%.<sup>[2]</sup> Morocco's situation is not much better; the prevalence of sleep disorders has risen from 18.6% in 2004 to 56% by 2020.<sup>[3,4]</sup> This increase can lead to a variety of biological effects, including an increase in: insulin resistance, catecholamine secretion, oxidative stress,

and inflammatory processes. These different mechanisms may lead to various diseases such as type 2 diabetes, heart disease, and hypertension.<sup>[5,6]</sup>

With the rise in industrial and economic needs, shiftwork is becoming a necessity. Shift work is an inescapable reality in many sectors, including healthcare, where nurses are often faced with inconsistent shift rotations,<sup>[7,8]</sup> long workdays of 8–12 hours,<sup>[9]</sup> and physically demanding activities.<sup>[10,11]</sup> This organization of workplace nurses is at greater risk for decreased quantity and quality of sleep, as well as increased risk of contracting various diseases;<sup>[12,13]</sup> raising concerns about their well-being and ability to provide optimal care.

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Department of Physiology,  
Faculty of Medicine and  
Pharmacy of Tangier,  
Abdelmalek Essaadi  
University, Tangier,  
Morocco

### Address for correspondence:

Ms. Kaoutar Kabbadj,  
Department of Physiology,  
Faculty of Medicine and  
Pharmacy of Tangier,  
Abdelmalek Essaadi  
University, Tangier,  
Morocco.

E-mail: kabbadj.kaoutar@  
etu.uae.ac.ma

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Nursing is also a challenging work environment that requires a great deal of focus, complex tasks, and enormous responsibility. Pre-hospital emergency services employees, for example, who respond in a variety of critical scenarios and are on the front lines of the system responding to emergency requirements and treating and caring for patients and the injured, face significant psychological stress.<sup>[14,15]</sup> As a result, a lack of sleep can increase the risk of errors and accidents in the workplace, as well as the risk of low productivity at work.<sup>[16,17]</sup> Each year, approximately 1.3 million injuries and more than 100,000 deaths are caused by hospital-related errors or avoidable adverse events.<sup>[2,18]</sup> Addressing nurses' sleep issues and advocating solutions to ensure patient safety is therefore an urgent and critical first step in enhancing care quality and minimizing medical errors.<sup>[19]</sup> Patients' access to adequate, high-quality care and treatment is a right that must be guaranteed.<sup>[20]</sup>

Beyond the impact on patient safety, sleep deprivation among nurses in Morocco can also have consequences for their physical and mental health. Studies have shown that night shift nurses work irregular hours, which prevents them from getting as much sleep as a day shift worker,<sup>[21,22]</sup> and put them at a higher risk of developing sleep disorders such as insomnia,<sup>[23]</sup> as well as related health problems such as hypertension, cardiovascular disease, and diabetes.<sup>[24]</sup> In addition, sleep deprivation can contribute to chronic stress, burnout, and mental health problems such as anxiety and depression causing lasting damage to the nursing system.

Unfortunately, the issue of sleep quality among nurses in Morocco has not yet been explored and documented to our knowledge. Although studies in other countries have found a high prevalence of sleep disorders; 57.8% among Malaysian nurses,<sup>[25]</sup> and 75.8% among Chinese nurses;<sup>[2]</sup> it is crucial to understand the specific challenges faced by Moroccan nurses in this context.

The aim of this original article is therefore to fill this gap by assessing the sleep quality of nurses in Morocco and examining in detail the likely association between sleep quality and shift work among Moroccan nurses. We will seek to understand the factors influencing sleep quality in these nurses and propose intervention measures to improve sleep quality and mitigate associated negative effects. Raising nurses' awareness of the importance of sleep, and taking steps to help them manage their work schedules, is essential to ensure quality care and long-term well-being.

## Materials and Methods

### Study design and settings

This is a cross-sectional study targeting Moroccan nurses working in the province of Tétouan, northern Morocco.

Data were collected between August 8, 2022 and September 30, 2022, using an anonymous questionnaire distributed to nurses working at the provincial civil hospital of Tétouan and other health centers in the province. These healthcare facilities provide services in essential medical disciplines, as well as specialized care and services in the following medical specialties: ophthalmology, psychiatry, pneumo-physiology, gastroenterology, traumatology-orthopedics, stomatology-maxillofacial surgery, cardiology, pediatrics, and nephrology.

### Study participants and sampling

The study involved a sample of 260 nurses working day or night shifts in the province of Tétouan. We considered a 95% confidence level, 50% proportion, 5% degree of precision, and N (547) total nurses attached to the province of Tétouan for the determination of the sample size leading to a total number of 226 participants. Allowing for a non-response rate of 15%, the final sample size was 260.

A brief presentation of the study was made and anonymous questionnaires were distributed to nurses who agreed to participate in the study. Nurses were recruited from August 8, 2022 to September 30, 2022.

Ten participants with missing data were eliminated from the study, reducing the total number of participants to 250.

### Data collection tools and technique

All participants were asked to complete a self-administered questionnaire composed of two sections:

#### *Sociodemographic characteristics*

The first section concerned sociodemographic information: age, gender, marital status, BMI (calculated from self-reported height and weight), and shift work schedule (day shift vs. night shift).

#### *The Pittsburgh sleep quality index (PSQI)*

The second section evaluated participants' sleep quality using the quantitatively and qualitatively validated PSQI.<sup>[26,27]</sup> The questionnaire consists of 19 self-reported questions. Each question contains four response choices ranging from 0 (no sleep problems in the past month) to 3 (sleep problems three or more times per week). Participants choose the answer that best corresponds to their situation. The 19 self-reported questions are grouped into seven components of the overall score: subjective quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, medication use, and daytime dysfunction. Each of its components is evaluated by a score from 0 to 3, where 0 indicates the absence of difficulty while 3 means the existence of severe difficulty.

The global score of the questionnaire is determined by combining the scores of the seven components. The global score varies between 0 and 21. A score higher than five indicates poor quality of sleep.

The Statistical Package for the Social Sciences version 21.0 was used for statistical analyses (SPSS, Chicago, IL, USA). Distributions of data were analyzed using the Kolmogorov-Smirnov test. Quantitative variables were presented by median and interquartile range (IQR) and categorical variables were presented by frequencies and percentages.

Univariate and multivariate binary logistic regression analyses were used to examine the association between participants' characteristics and sleep quality. The 95% confidence intervals (CIs) were provided. The significance level was set at 0.05.

### Ethical consideration

This study was approved by the Research Committee of the Faculty of Medicine and Pharmacy of Tangier, and complied with the principles of the Declaration of Helsinki. Participation in this study was entirely voluntary and every participant was informed that they could refuse or withdraw from the study at any moment.

## Results

Two hundred and sixty nurses were recruited into our study. The mean age of the participants was 33 (25–45) years; 80% were females. A total of 40.4% of the nurses were involved in the night shift and 52.8% were married. The median sleep quality of the participants was 6 (3–2) hours per day. Table 1 summarizes the basic characteristics of the participants.

The results show that 60.4% of participants had poor sleep quality. In terms of sleep subscales, 59% of the

participants slept <7 hours per day. Daytime dysfunction was severe in 25% of the participants and very severe in nearly one-third. The majority (85%) of participants had no habitual sleep efficiency problems, whereas 79% of them had sleep disturbances of varying severity. Subjective sleep quality was relatively good in 47% of participants and 96% of them had not used sleeping medications Figure 1.

Adjusted regression analysis revealed that the likelihood of getting good sleep was negatively associated with BMI, however, no significant association was found between sleep quality and shift work, nor between sleep quality and other characteristics. Unadjusted and adjusted analyses of the association between participants' characteristics and sleep are presented in Table 2.

## Discussion

Nurses are one of the main pillars of any healthcare system in the world. They are often the first to make contact with patients and the last to see them before they leave. They are on the front line 24 hours a day, every day of the week. Due to the circumstances of their work, they are at a high risk of developing mental and physical problems that can be linked to inadequate sleep. Therefore, assessing sleep quality and its likely association with shift work is crucial to the implementation of strategies and programs aimed at improving nurses' sleep quality, and hence their mental and physical health. To the best of our knowledge, this study is the first attempt to assess sleep quality in Moroccan nurses using a standardized questionnaire.

Our results show that the median score sleep quality is 6 (3–8) hours, indicating that 60% of the participants had poor sleep quality. This result is in agreement with those of Akbari *et al.* in Iran, Feng *et al.* in California, and Hsu *et al.* in Taiwan;<sup>[28-30]</sup> who all found that nurses

**Table 1: Basic characteristics of participants (n=250)**

| Characteristics                            | n (%)      | 95% CIs   | Median (IQR)  | 95% CIs  |
|--|------------|-----------|---------------|----------|
| Age (years)                                |            |           | 30,5 (25–45)  | 30–34    |
| Gender                                     |            |           |               |          |
| - Male                                     | 50 (20)    | 15,2–25,6 |               |          |
| - Female                                   | 200 (80)   | 74,8–84,4 |               |          |
| Body mass index (kg/m <sup>2</sup> )       |            |           | 25,36 (25–45) | 25–25,78 |
| Marital status                             |            |           |               |          |
| - Single                                   | 118 (47,2) | 40,8–53,2 |               |          |
| - Married                                  | 132 (52,8) | 46,4–59,2 |               |          |
| Shift work                                 |            |           |               |          |
| - Fixed day shift                          | 175 (70)   | 64–75,6   |               |          |
| - Fixed night shift                        | 75 (30)    | 24,4–36   |               |          |
| PSQI global score                          |            |           | 6 (3–8)       | 5–6      |
| PSQI global score among night shift nurses |            |           | 7 (4–9)       | 5–7      |
| PSQI global score among day shift nurses   |            |           | 5 (3–8)       | 5–6      |

95% CIs=95% confidence intervals for proportions and median; IQR=Interquartile rang

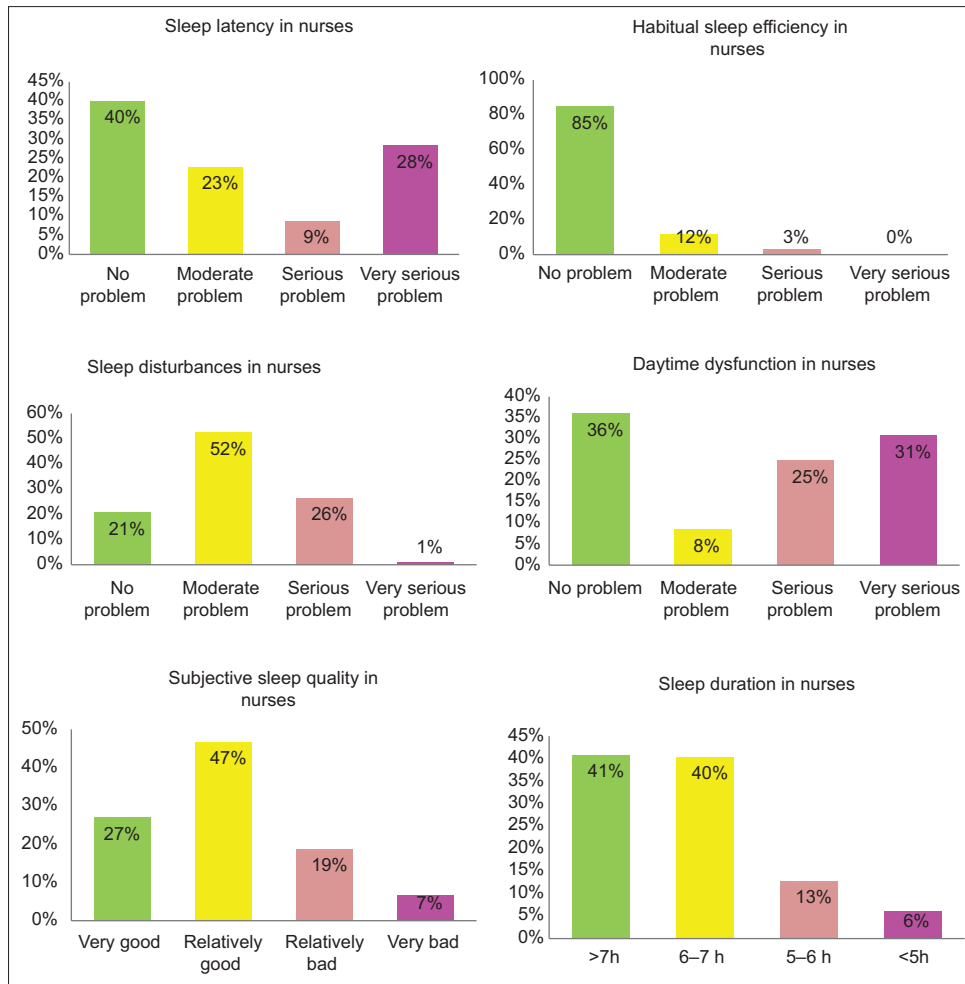


Figure 1: Sleep quality and its subscales in nurses (n = 250)

Table 2: Logistic regression analysis for the association between participants' characteristics and good sleep quality

| Variables                            | Unadjusted OR (95% CIs) | Adjusted OR (95% CIs)   |
|--------------------------------------|-------------------------|-------------------------|
| Age (years)                          | 1 (0,98–1,02)           | 0,99 (0,96–1,02)        |
| Gender                               |                         |                         |
| - Male                               | 1                       | 1                       |
| - Female                             | 0,65 (0,34–1,21)        | 0,68 (0,34–1,33)        |
| Body mass index (kg/m <sup>2</sup> ) | <b>0,92 (0,86–0,99)</b> | <b>0,91 (0,84–0,98)</b> |
| Marital status                       |                         |                         |
| - Single                             | 1                       | 1                       |
| - Married                            | 1,57 (0,94–2,63)        | 1,91 (0,94–3,85)        |
| Shift work                           |                         |                         |
| - Fixed day shift                    | 1                       | 1                       |
| - Fixed night shift                  | 0,68 (0,38–1,20)        | 0,67 (0,37–1,21)        |

CIs=Confidence intervals, OR=Odds ratio for the association between sleep quality and participants' characteristics. Bold values indicate statistical significance at P<0.05

suffer from poor sleep quality. Hsu *et al.* surveyed 393 nurses working at a medical center in Taiwan and found that 96% of them had poor sleep quality.<sup>[30]</sup> In addition, Feng *et al.* surveyed 113 nurses working at a large hospital in Los Angeles and found that more than half

of the nurses (63.7%) did not sleep well.<sup>[29]</sup> Furthermore, studies of nurses in Spain and China showed that the mean level of sleep quality was  $6.8 \pm 3.39$  and  $7.32 \pm 3.24$ , respectively, indicating that sleep quality is not good in more than 63% of nurses.<sup>[31,32]</sup> Therefore, our results, as well as those of other studies conducted in other countries around the world, support that nurses suffer from poor sleep quality.

Regarding the association between sleep quality and shift work, our results revealed that there are no statistically significant differences between day and night shift nurses in terms of sleep quality. Despite the lack of statistically significant differences between the two groups, night shift nurses tended to have a higher mean sleep score than day nurses (7 vs. 5). These results are consistent with those of another study reporting poor sleep quality among nurses, with no significant difference between day and night shift nurses.<sup>[33]</sup> However, contradictory results have been observed in other studies.<sup>[34,35]</sup> In a study among Chinese nurses, a significant association was observed between night shift work and sleep quality.<sup>[34]</sup> These differences can be attributed to

contextual elements specific to the Moroccan culture and work environment, which may mitigate the negative effects of shift work on sleep quality. For example, individual adaptation strategies, strong social support, and a more flexible shift work system (many healthcare professionals adopt a variety of consensual shift schedules due to family and personal constraints (such as 12h–72h, instead of 12h–36h)). All these factors may explain the lack of relationship between sleep quality and shift work reported in our study.

However, this study found a statistically significant association between BMI and sleep quality, which is consistent with the results of other studies.<sup>[33,36]</sup>

The absence of a clear relationship between shift work and sleep quality in Moroccan nurses should not be interpreted as an absence of potential problems. Irregular and staggered work schedules may still pose problems for nurses' sleep and health, but our results suggest that other factors, such as obesity, individual coping mechanisms, and specific working conditions, may play a greater role in nurses' sleep quality. These findings have important implications for managing nurses' work schedules and promoting well-being within the profession.

This study is the first to our knowledge to provide information on the sleep quality of Moroccan nurses. However, our study has some limitations: first, the questionnaire used in this cross-sectional study does not allow for an objective assessment of sleep quality over time. Second, although the questionnaire used has been widely validated, self-report measures run the risk of over- or underestimating sleep quality. It may be interesting in future studies to objectively assess sleep quality and compare it with the PSQI to obtain more accurate results.

## Conclusion

Considering the importance of good sleep on the physical and mental health of nursing professionals, it is essential to assess its quality and to look for factors that may influence it. According to our results, no significant association was found between shift work and sleep quality. These findings highlight the importance of continuing to explore factors that may influence sleep quality in Moroccan nurses. The ultimate goal is to ensure that nurses benefit from adequate and restorative sleep, which is essential for their health, well-being, and ability to provide quality patient care. The results of this study call for further research to explore other factors that may influence sleep quality in Moroccan nurses and to evaluate the effectiveness of interventions to promote healthy, quality sleep among Moroccan nurses.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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