

The Prevalence and Associated Factors of Short Sleep Duration Among Nurses in Tertiary Public Hospitals in China: Findings from a National Survey

Dan Liu¹
Yinuo Wu²
Feng Jiang³
Yuanli Liu¹
Yi-Lang Tang^{4,5}

¹School of Health Policy and Management, Chinese Academy of Medical Sciences & Peking Union Medical College, Beijing, People's Republic of China; ²Chinese Academy of Medical Sciences & Peking Union Medical College, Beijing, People's Republic of China; ³Hospital Management and Evaluation Research Center, Institute of Healthy Yangtze River Delta, Shanghai Jiao Tong University, Shanghai, People's Republic of China; ⁴Department of Psychiatry and Behavioral Sciences, Emory University, Atlanta, GA, USA; ⁵Atlanta VA Medical Center, Atlanta, GA, USA

Background: Sleep is an essential component of health and well-being. Short sleep duration may negatively affect nurses' health and patients' safety.

Objective: To investigate the sleep duration and subjective satisfaction with sleep duration among nurses in tertiary public hospitals in China and to explore the associated factors.

Methods: This cross-sectional study was conducted between December 18 and 31, 2017 in 136 major public hospitals from 31 provinces in mainland China. An online anonymous questionnaire was delivered through WeChat. Totally 27,575 nurses completed the survey.

Results: The response rate was 95.46%. The mean reported total sleep duration was 6.67 ± 0.97 hours per day. About 46.87% (n=12,924) reported having short sleep duration (SSD, less than 7 hours per day), and 27.63% (n=7618) were not satisfied with their sleep duration. In the SSD group, 45.67% (n=5902) were dissatisfied with their sleep duration. SSD was significantly associated with sociodemographic factors, including an older age, having more than one child, being divorced or separated, and job-related factors, including longer working hours, more night shifts and heavy workload.

Conclusion: Nearly half of the nurses in the public hospitals in China reported sleeping less than 7 hours, and more than one quarter were dissatisfied with their sleep duration. Interventions are needed to improve Chinese nurses' sleep, including reducing working hours, night shifts or workload.

Keywords: short sleep duration, prevalence, satisfaction, nurse, tertiary public hospitals

Background

Sleep is a critical determinant for human health and well-being.¹ As sleep duration is related to subjective sleep quality and subjective well-being,² a recent consensus statement suggests that general adults should have no less than 7 hours of sleep per night.³ Short sleep duration (SSD), defined as less than 7 hours of sleep per night, is associated with adverse health outcomes and increased medical costs,^{4,5} as SSD affects basic patterns of behavior that may negatively impact health and interpersonal relationships.⁶ Epidemiological evidence suggests that SSD is associated with mortality and a wide range of adverse health outcomes, including increased risks of hypertension, diabetes, depression, heart attack, and stroke.⁷⁻¹⁰ In order to implement appropriate strategies to reduce the harmful consequences caused by SSD, it is important to understand its risk factors. Several existing studies have identified a few factors to be associated with SSD, including female sex, older age, divorced or separated marital status, lower educational level, and psychiatric conditions.¹¹⁻¹³

Correspondence: Yuanli Liu
School of Health Policy and Management,
Chinese Academy of Medical Sciences &
Peking Union Medical College, No. 3
Dong Dan San Tiao, Dongcheng District,
Beijing, People's Republic of China
Email liuy_l_fpo@126.com

Previous reports also showed SSD may negatively affect nurses' health and patients' safety.¹⁴ One study found that the SSD prevalence was 75.9–76% in Thai nurses, and the SSD group experienced more fatigue and occupational errors.^{15,16} Another study included 2518 female nurses in Brazil and found 48.6% of them reported SSD, with poor self-rated health status.¹⁷ A study in China examined 799 nurses from three hospitals, and they found the total sleep time of nurses was 6.1 ± 1.1 hours per day. In short, SSD might be common in Chinese Nurses.¹⁸ However, the prevalence of short sleep duration and its correlates in Chinese nurses have not been examined.

This study aimed to determine (a) the sleep duration, (b) SSD prevalence and (c) the associated factors of SSD among nurses in tertiary public hospitals in China.

Materials and Methods

Study Design and Samples

The study was one part of the China's Healthcare Improvement Initiative Survey in 2017.¹⁹ The National Health Commission of China approved and supported this project. The project was conducted between December 18 and 31, 2017. We selected 136 tertiary public hospitals across 31 provinces in mainland China. All target hospitals were contacted individually and the survey background, significance, instructions, and survey pathway (not actual questions) were provided.

According to employees' ID codes, 220 nurses were sampled through a systematic sampling method in each participating hospital.¹⁹ We conducted the survey anonymously through WeChat, a popular social media application in mainland China. The questionnaires were answered anonymously by participants on their cell phones or computers.

Ethics Statement

This study was conducted in accordance with the Declaration of Helsinki. The Ethics Committee (IRB) of the School of Public Health of Peking Union Medical College approved the study protocol. All participants provided written informed consent before they can respond to the questionnaires.

Measures

Sleep duration was evaluated using a self-report question.²⁰ "In the previous month, how many hours do you sleep in a typical night during the working week?" We also assessed the sleep duration satisfaction (How satisfied

are you with your sleep duration), using a 3-point Likert scale (1-dissatisfied, 2-neutral, 3-satisfied). Workload was evaluated using a self-report 3-point Likert scale (1-mild, 2-moderate, 3-heavy). The Cronbach's alpha value of these items was larger than 0.70, suggesting a good reliability.²¹

Additionally, we also collected participants' socio-demographic data, including age, gender, marital status, number of children, education, region; as well as job-related factors, including department, administration position, number of night shifts per month, and hospital type. In these hospitals, nurses generally worked in shifts, including day shifts (8am to 4pm), evening shifts (4pm to 12am), and night shifts (12am to 8am) and they often rotate according to a weekly schedule.

Statistical Analysis

Descriptive analyses were conducted for the variables. According to the cut-off point, participants were divided into SSD group (<7 hours) and non-SSD group (≥ 7 hours). Other appropriate cut-off points were selected to ensure subgroups were balanced in variables.

We used the multiple logistic regression to examine the association between SSD and demographic/job-related factors. These statistical analyses were conducted through Stata 15 (StataCorpLP, College Station, TX, USA). We defined the statistical significance as $p < 0.05$, and all of the tests were two-sided.

Results

Description of Sample Characteristics and Related Factors

Totally 29,920 nurses were invited to participate in the survey, and 27,575 completed, with a response rate of 95.46%. Table 1 demonstrated their sociodemographic characteristics.

Description of Sleep Duration and Satisfaction

The average sleep duration was 6.67 ± 0.97 hours per day. Nearly half of nurses ($n=12,924$, 46.87%) reported SSD. In all of participants, 27.63% ($n=7618$) were dissatisfied with their sleep duration. In SSD group, 45.67% ($n=5902$) were dissatisfied with their sleep duration.

Table 1 Characteristics of Participants (N = 27,575)

Characteristic	Frequency	Percentage (%)
Sex		
Male	690	2.50
Female	26,885	97.50
Age (year)		
≤29	12,678	45.98
30–39	10,678	38.72
40–49	3296	11.95
≥50	923	3.35
Marital status		
Not married	8616	31.25
Married	18,382	66.66
Devoiced or separated	577	2.09
Children		
None	11,748	42.60
One child	13,593	49.29
More than one	2234	8.10
Education		
Associate degree	7857	28.49
Bachelor's degree	19,132	69.38
Master's or doctorate degree	586	2.13
Working hours		
≤40 hours/week	19,430	70.46
41–44 hours/week	1476	5.35
45–48 hours/week	3298	11.96
>48 hours/week	3371	12.22
Department		
General medicine	6780	24.59
General surgery	4914	17.82
Gynecology and obstetrics	3992	14.48
General pediatrics	2215	8.03
Emergency medicine	1509	5.47
Internal medicine subspecialty	5239	19.00
General surgery subspecialty	2926	10.61
Administration position		
Yes	2369	8.59
No	25,206	91.41
Night shifts per month		
None	8947	32.45
1–4 shifts	7414	26.89
5–10 shifts	9301	33.73
>10 shifts	1913	6.94
Hospital type		
General Hospitals	11,797	42.78
Traditional Chinese Medicine Hospitals	6411	23.25

(Continued)

Table 1 (Continued).

Characteristic	Frequency	Percentage (%)
Maternal and Child Healthcare Hospitals	9367	33.97
Region		
East China	10,341	37.50
Central China	6944	25.18
West China	10,290	37.32
Workload		
Heavy	10,565	38.31
Moderate	11,317	41.04
Mild	5693	20.65

Logistic Regression Analysis of SSD and Associated Factors

The multivariate logistic regression model demonstrated that nurses who were elder, divorced or separated, having more than one child, longer working hours, working in special departments, more night shifts, heavy workload, and in East China were more likely to suffer SSD (see [Table 2](#)).

Discussion

This study was among the first reports of sleep duration, the prevalence of SSD and its correlates in a very large national sample covering 31 provinces in mainland China.

The mean total sleep time in our study was overall consistent with findings from other studies.^{16,18} The prevalence of SSD in our study is very close to the survey in Brazil, which demonstrated that 48.6% of nurses had SSD,¹⁷ but is much lower than in Thailand, in which they found about 76% nurses slept less than 7 hours.^{15,16} This gap may be due to the differences of the healthcare systems and characteristics of participants. For example, 57.7% of Thai nurses in the studies were single,^{15,16} while only 31.25% nurses were not married in our sample. While further studies are needed to understand the gap among different countries.

We found that nearly half of the nurses in SSD group were not satisfied with their sleep duration. While most studies in this area have focused on sleep (quality) satisfaction,²² few focused on sleep duration satisfaction. Our survey may provide additional information about sleep assessment in professionals.

Table 2 Logistic Regression Analysis of SSD

Characteristic	Odds Ratio	95% CI (Lower)	95% CI (Upper)
Female (ref. male)	1.14	0.97	1.34
Age (ref. ≤29)			
30–39	1.23 **	1.15	1.32
40–49	1.82 **	1.64	2.01
≥50	1.75 **	1.50	2.04
Marital status (ref. not married)			
Married	1.01	0.93	1.10
Devoiced or separated	1.36 *	1.12	1.64
Children (ref. None)			
One	1.08	0.99	1.18
More than one	1.19 *	1.06	1.34
Education(ref. Below bachelor's degree)			
Bachelor's degree	1.03	0.97	1.09
Master's or doctorate degree	1.10	0.91	1.32
Working hours (ref. ≤40 hours/week)			
41–44 hours/week	1.15 *	1.03	1.29
45–48 hours/week	1.26 **	1.16	1.36
>48 hours/week	1.40 **	1.29	1.52
Department (ref. General pediatrics)			
General medicine	1.19 *	1.07	1.32
General surgery	1.17 *	1.05	1.31
Gynecology and obstetrics	1.23 **	1.10	1.37
Emergency medicine	1.06	0.92	1.22
Internal medicine subspecialty	1.14 *	1.02	1.27
General surgery subspecialty	1.17 *	1.04	1.31
Administration position (ref. No)	1.04	0.95	1.15
Night shift per month (ref. No)			
1–4 times/month	1.13 **	1.05	1.21
5–10 times/month	1.47 **	1.37	1.57
>10 times/month	1.80 **	1.62	2.01
Hospital type (ref. General)			
Traditional Chinese Medicine Hospitals	1.06	0.99	1.13
Maternal and Child Healthcare Hospitals	1.04	0.98	1.11
Region (ref. West China)			
East China	1.36 **	1.28	1.44
Central China	0.99	0.93	1.06
Workload (ref. Mild level)			
Moderate	2.33 **	2.17	2.51
Heavy level	4.11 **	3.81	4.43

Notes: * $p < 0.05$, ** $p < 0.001$.

We found that age, marital status, number of children, and job-related factors were significantly associated with SSD, which was consistent with previous reports.^{23,24}

Meanwhile the location of hospitals was also an independent significant factor, which suggested other geographical factors may play a role in sleep duration.

Limitations

There are several limitations about this study. First, as is the case in almost all cross-sectional studies, the causal relationship of SSD and other factors cannot be established. Second, we did not include the measures of sleep quality, as sleep duration and sleep quality have modest overlap. Third, the sample was from tertiary public hospitals, so the findings may not be generalizable to all nurses in China, especially those working in rural areas. Finally, the instrument in our survey was not a standardized tool, which may be limited in reliability and validity.

Conclusions

In conclusion, we found that SSD was prevalent among Chinese nurses working in tertiary public hospitals, and nearly half of SSD nurses were dissatisfied with their sleep duration. Hospital administrators and policymakers need to be aware of this important issue. Changes are clearly required to improve the sleep duration of nurses, including reducing working hours, number of night shifts or workload.

Data Sharing Statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Disclosure

The authors declare that they have no competing interests.

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