

RESEARCH

Open Access



# Prevalence of turnover intention among emergency nurses worldwide: a meta-analysis

Hui Ren<sup>1†</sup>, Yingchun Xue<sup>1†</sup>, Pan Li<sup>1</sup>, Xin Yin<sup>1</sup>, Wenhao Xin<sup>1</sup> and Hongyan Li<sup>1\*</sup>

## Abstract

**Aim** To explore the prevalence of turnover intentions among emergency nurses across the globe, decision-makers should be offered evidence-based assistance.

**Background and introduction** Compared with those of general nurses, the unique work environment and pressure significantly impact emergency nurses' turnover intention. High personnel turnover intention often hinders the provision of high-quality emergency services.

**Methods** This study was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Published and unpublished papers were identified through electronic searches of PubMed, Web of Science, EMBASE, CINAHL, and the Cochrane Library from their establishment until February 1, 2023. The literature included in this study may encompass cross-sectional studies and longitudinal studies. Two researchers independently screened the literature, extracted data, and assessed the quality of the included studies while using the tool developed by Hoy and colleagues in 2012. Stata 17.0 was used for all the statistical analyses.

**Results** This study included 12 articles by screening 744 articles, which included a total of 4400 nurses. All studies included in the analysis were cross-sectional. The overall prevalence of turnover intention among emergency nurses was 45%. Further analysis revealed that the turnover intention prevalence among emergency nurses in Asia was 54%, whereas in other regions, it was 38%. The turnover intention among younger nurses (61%) was significantly greater than that among older nurses (30%). Compared with the published scale, the self-developed scale resulted in a higher turnover intention rate of 52%, which was 41%.

**Conclusion** The prevalence of emergency nurses' turnover intention is relatively high and shows an increasing trend, with noticeable variations across different regions and age groups. Notably, Asian nurses and those younger than 35.6 years exhibit a greater intention to turnover.

**Patient or public contribution** There is no patient or public involvement, as this article is a meta-analysis.

**Implications for nursing and health policy** Nursing managers, administrators, and policymakers must recognize the seriousness of high turnover intentions among emergency nurses and develop effective prevention strategies to address this issue globally.

<sup>†</sup>Hui Ren and Yingchun Xue contributed equally to this work and should be considered co-first authors.

\*Correspondence:

Hongyan Li  
hy\_li@jlu.edu.cn

Full list of author information is available at the end of the article



**Keywords** Meta-analysis, Emergency department, Nurses, Turnover intention, Prevalence

## What is already known

- Only a few studies have reported on the prevalence of turnover intentions among emergency nurses, and their findings are restricted to particular regions and countries.
- To date, there is no worldwide consensus regarding the prevalence of turnover intention among emergency nurses.

## What this paper adds

- The intention to turnover among emergency nurses is prevalent in almost all countries. The global prevalence of turnover intentions among emergency nurses is 45%, indicating a significant difference.
- The prevalence of turnover intentions among emergency nurses in Asia is relatively high.
- In the future, experts and scholars must develop a unified understanding of the definition and evaluation methods of nurses' turnover intention and develop and validate a turnover intention assessment tool that aligns with national circumstances.

## Introduction

Nurses constitute the most extensive professional community in the healthcare industry and carry immeasurable responsibility for attaining universal health coverage and sustainable development objectives [1]. With the rapid development of the social economy and changes in the population structure, there is a continuously growing public demand for nursing services. Especially in rapidly aging societies, the shortage and understaffing of nursing staff have become a global reality [2]. The World Health Organization's 2020 World Nursing Report revealed that the world is experiencing a grave scarcity of nurses. By 2030, the number of nurses in shortage is estimated to reach 5.7 million [3]. Among the numerous factors contributing to the severe shortage of nursing human resources, the high turnover rate is significantly important [4].

One of the most significant predictors of a high turnover rate is turnover intention (TI), which refers to an individual's desire or intent to leave their current job and seek another job due to dissatisfaction with their current job. This is a complex interaction of psychological, cognitive, and behavioral factors [5]. Numerous studies have revealed an increasing trend in nurses' intentions

to turnover their profession in recent years. This not only reflects the issues of job stress and burnout that nurses face but also highlights the significant impact of various factors, including the work environment, salary and benefits, career advancement opportunities, and the balance between work and personal life, on nurses' turnover intention rates [6, 7]. Concurrently, in healthcare settings characterized by high nurse turnover, patients are more likely to endure elevated levels of both physical and emotional distress [8]. The turnover intention of nurses has emerged as an urgent problem that needs to be addressed.

Among all types of nurses, emergency department nurses may have one of the highest turnover intentions, as they are exposed to more work pressure than nurses in general departments are [9]. For example, nurses working in the emergency department are confronted with a dynamic and challenging, inherently stressful work environment. They must manage rapidly changing, hectic, and unpredictable conditions, often involving exposure to violent incidents, the treatment of severe injuries, and witnessing the disabling effects of attacks on patients [10, 11]. This has likely contributed to a greater prevalence of emotional distress and job burnout among emergency department nurses than among those working in general wards [12, 13]. In addition, emergency nurses experience more significant time pressure and physical demands, lower decision-making power, and insufficient working procedures, leading to their eagerness to receive more attention and improved social support [14]. These characteristics of occupational stress essentially predict the intention to turnover among emergency nurses.

A meta-analysis of nurses' turnover intention in sub-Saharan Africa reported that the turnover intention of nurses in this region was as high as 50.74%, and that of nurses in East Africa reached 58.03% [15]. Nevertheless, there is currently a need for a summary of the prevalence of turnover intention among emergency nurses worldwide. Therefore, the objectives of this study are to gain a comprehensive understanding of the prevalence of turnover intentions among emergency nurses worldwide, to accurately identify the turnover intentions of emergency nurses in various regions and age groups, to evaluate the use of diverse assessment tools to analyse discrepancies in turnover intentions, to bring attention to the of health policy-makers, and to provide evidence-based support for decision-makers regarding the turnover intentions of emergency nurses on a global scale.

## Method

This study was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [16]. A thorough search of registration platforms confirmed that this study is the only protocol or ongoing review. This protocol has been registered with PROSPERO, whose registration number is crd4202342548.

### Data sources and search strategies

The PubMed, Web of Science, Embase, CINAHL, and Cochrane Library databases were searched for related articles from the inception of these databases to February 1, 2023. To conduct a comprehensive review, a search strategy was implemented that combined three keyword groups, specifically focusing on (a) turnover intention, (b) nurses, the study population, and (c) the emergency department occupational environment. The search terms included nurses [MeSH term] OR nurse \* OR nursing care OR nursing staff [Title/Abstract] AND (emergency services, hospital [MeSH term] OR (emergency department OR emergency unit OR emergency [Title/Abstract]) AND (Personnel Turnover [MeSH Terms] OR (Intention to leave OR Turnover intention OR Intention to quit OR Turnover [Title/Abstract])). Appendix A provides the search strategies used for each database. Furthermore, the comprehensiveness of the search was ensured by meticulously reviewing the reference lists of related articles and all included studies.

### Inclusion and exclusion criteria

**Inclusion criteria:** According to the PRISMA statement, the following inclusion criteria were established utilizing the PICOS framework: Participants (P): nurses in emergency settings; Intervention (I): not applicable; Comparison (C): not applicable; Outcomes (O): providing the overall turnover intention prevalence rate or containing sufficient original data to calculate the prevalence rate of turnover intention. Study design (S): cross-sectional study and longitudinal study. If there was a cohort of nurses with overlapping studies, the study that included the most significant number of nurses was chosen.

The exclusion criteria were as follows: (1) no peer review or original articles, including reviews, editorials, notes, letters, case reports, meeting minutes, books, news, unpublished papers, or dissertations; (2) unable to obtain full-text research; (3) research that cannot obtain complete data; and (4) articles published in languages other than English.

### Study selection and review process

The outcomes of the systematic search were incorporated into the reference manager (EndNote X9). After eliminating duplicate studies, XYC and XWH, two authors, independently assessed eligible publications by screening titles and abstracts following the inclusion and exclusion criteria. These articles were included in the full-text evaluation when at least one author deemed the abstract eligible. The articles' full texts were assessed independently by two authors for final inclusion, and any disagreements between them were reconciled by the third reviewer's (RH) opinions and the three authors' consensus.

### Data collection

The two reviewers independently extracted the following data via standardized data tables: author, publication year, survey time, country/region, research type, sampling method, survey method, sample size, prevalence of turnover intention, data source, and participant characteristics (average age). The extracted data were validated by a third reviewer (RH).

### Quality evaluation

The risk of bias assessment tool, developed by Hoy and colleagues to determine the internal and external validity of prevalence studies, was used by two investigators to assess the quality of each study reviewed [17]. The tool comprises 10 items and is segregated into two components: the external validity subscale (comprising 4 items) and the internal validity subscale (comprising 6 items). Each item was assigned a score of 1 ('yes' for 'high quality') or 0 ('no' for 'low quality'). The total score for each study was determined by adding the scores of all 10 items, which were ranked from 1 to 10. The studies were classified into three groups on the basis of the total score: high quality ( $\geq 9$ ), medium quality (6–8), and low quality (0–5).

### Statistical analysis

The primary finding of this systematic review was the prevalence of turnover intentions among emergency nurses, with a confidence interval of 95%. All the statistical analyses were performed via Stata (version 17.0). Heterogeneity between studies was assessed via  $I^2$  statistics, with  $I^2$  values of 25%, 50%, and 75% considered low, moderate, and high heterogeneity, respectively [18]. If any heterogeneity was present, a random effects model was employed to compute the pooled prevalence and 95% confidence interval of the turnover intentions of emergency nurses. Otherwise, a fixed effects model

was employed. The research results and characteristics are illustrated as a forest map. The publication bias was examined by applying a funnel plot, Egger test, and Begg test [19, 20].

To investigate possible sources of heterogeneity, a subgroup analysis was conducted in this study to explore the prevalence of turnover intentions among emergency nurses. The data were classified into subgroups on the basis of various factors, including sample size, age, region, survey time, publication time, and evaluation tools. Pooled estimates of the prevalence of turnover intention were subsequently calculated with 95% confidence intervals. According to the Cochrane Handbook, every subgroup should contain a minimum of four studies [21]. Hence, an analysis will only be conducted on a subset if it comprises more than four studies.

## Results

### Search result

This study identified 744 literature records from five databases and eliminated 201 duplicates. After the title abstracts were read, 241 out of the 543 studies were eligible for inclusion in the full-text evaluation. Among the 47 studies, the full texts could not be obtained, whereas 87 were excluded because they did not conform to the study types, 69 studies could not extract data, and 26 articles were of nonconforming language types. Finally, this study included 12 studies [9, 22–32]. The details of the screening process are shown in Fig. 1.

### Characteristics of the included studies

The basic information of the 12 studies included in this study is shown in Table 1. A total of 4400 participants

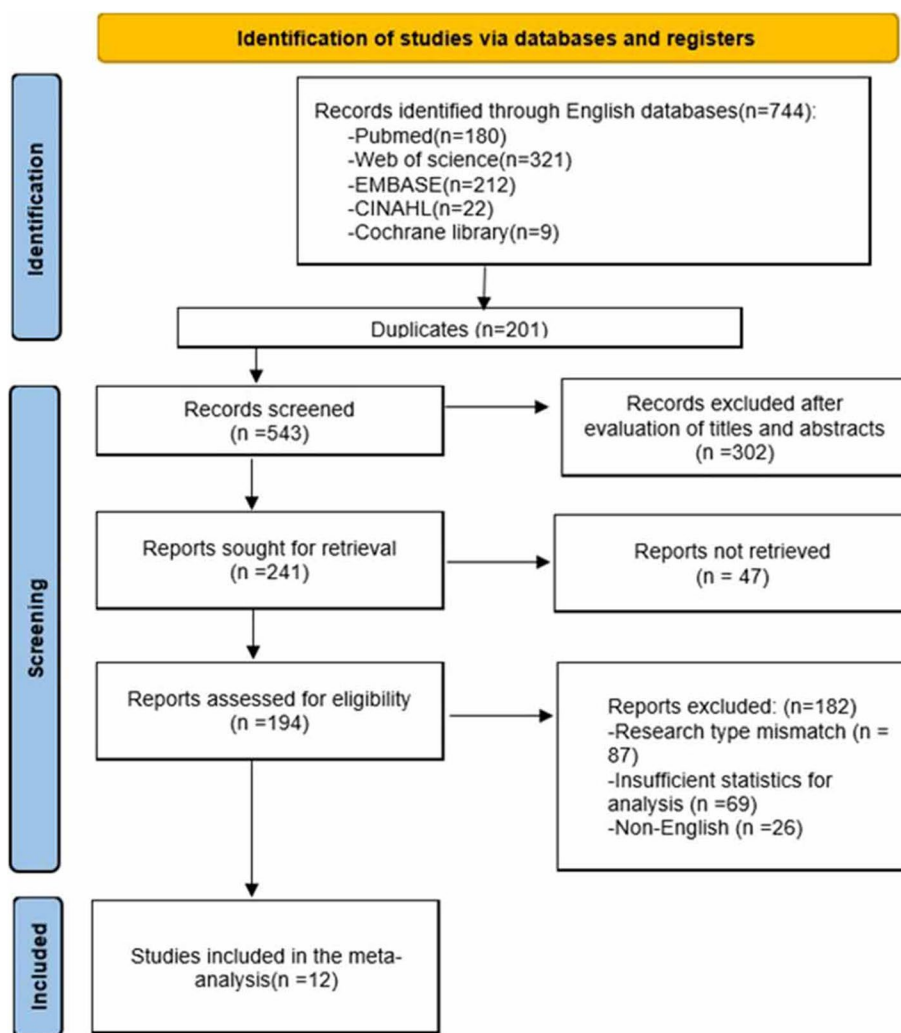


Fig. 1 Flow diagram of study selection

**Table 1** Characteristics of included studies

| No | Author (publication year)    | Country         | Study years | Sampling method            | Sample size | Turnover intention rate% | Assessment instrument   | Measurement standards (percentage of total) | Quality assessment score | Age (years)     | Female % |
|----|------------------------------|-----------------|-------------|----------------------------|-------------|--------------------------|---|---|--------------------------|-----------------|----------|
| 1  | Li et al., 2020 [22]         | China           | 2014        | Convenience sampling       | 385         | 90.2                     | Turnover intention questionnaire                                  | Total score/item $\geq 2.1$                 | 8                        | 29.5 $\pm$ 6.0  | 94.3     |
| 2  | Sawatzky and Enns, 2012 [23] | Canada          | 2009        | Convenience sampling       | 261         | 26                       | Price and Mueller's (1981) <sup>a</sup>                           | probably/definitely                         | 6                        | 41.1 $\pm$ 11.2 | 89.0     |
| 3  | Cornish et al., 2021 [24]    | Australia       | 2021        | Snowball sampling          | 398         | 48.2                     | self made   | Yes <sup>b</sup>                            | 7                        | NR              | 86.9     |
| 4  | Wubetie et al., 2020 [9]     | Ethiopia        | 2018        | Purposive sampling         | 102         | 77.5                     | self made   | Yes <sup>b</sup>                            | 6                        | 27.4 $\pm$ 3.8  | 58.8     |
| 5  | Trautmann et al., 2015 [25]  | USA             | 2013        | Convenience sampling       | 207         | 56                       | Moral Distress Scale  | Yes <sup>b</sup>                            | 6                        | 49.8 $\pm$ 9.7  | 81.0     |
| 6  | Hui et al., 2017 [26]        | China           | 2015        | Convenience sampling       | 976         | 23.0                     | self made   | Yes <sup>b</sup>                            | 7                        | 30.2 $\pm$ 6.8  | 97.3     |
| 7  | Bruyneel et al., 2017 [27]   | Belgium         | 2014–2015   | Convenience sampling       | 292         | 31.7                     | Leiden quality of work-life questionnaire for nurses              | Agree & totally agree                       | 6                        | 37.0 $\pm$ 10.5 | 46.2     |
| 8  | Ma et al., 2022 [28]         | China           | NR          | Stratified random sampling | 522         | 40.6                     | Turnover intention questionnaire                                  | Total score/item $> 2.5$                    | 9                        | NR              | 93.7     |
| 9  | Zhu et al., 2022 [29]        | China           | 2021        | NR                         | 110         | 62.7                     | Turnover Intention Scale  | Total score/item $> 1$                      | 6                        | 34.4 $\pm$ 5.8  | NR       |
| 10 | Wijn et al., 2022 [30]       | The Netherlands | 2017        | NR                         | 701         | 32.7                     | Leiden quality of work-life questionnaire for nurses              | Agree & totally agree                       | 7                        | 42.4 $\pm$ 11.4 | 76.0     |
| 11 | Jeong and Kim, 2018 [31]     | South Korea     | 2016        | Convenience sampling       | 214         | 61.0                     | self made   | Yes <sup>b</sup>                            | 7                        | 28.7            | 86.9     |
| 12 | Kiyamaz and Koc, 2022 [32]   | Turkey          | 2020–2021   | NR                         | 202         | 24.3                     | Scale Assessing the Intention to Resign or Remain at the Hospital | often & always                              | 7                        | 35              | 57.9     |

All studies included in the analysis were cross-sectional

Abbreviations: Study year Year of data collection, NR Not reported

<sup>a</sup> A five-point Likert item, to estimate the participants' intention to leave the profession of nursing in the coming year

<sup>b</sup> The answer to a Yes or No question

from nine countries were investigated, and the sample sizes of the 12 studies ranged from 102–976. Most of the included subjects were female nurses, 3575 out of 4290 (84%), except for one document that did not specify the sex ratio. All studies included in the analysis were cross-sectional, with no other types of studies meeting the eligibility criteria for inclusion. The included literature was published between 2012 and 2022. Among them, six (50.00%) were conducted in Western Pacific countries (China, South Korea, Australia), two (16.66%) were conducted in American countries (the United States, Canada), and three (25.00%) were conducted in European countries (Belgium, the Netherlands, Turkey). One study was conducted in Ethiopia, an African country. The prevalence of turnover intention was calculated via the following equation:

$$\text{The prevalence of turnover intention} = \frac{\text{the Number of people with intention to turnover}}{\text{sample size}}$$

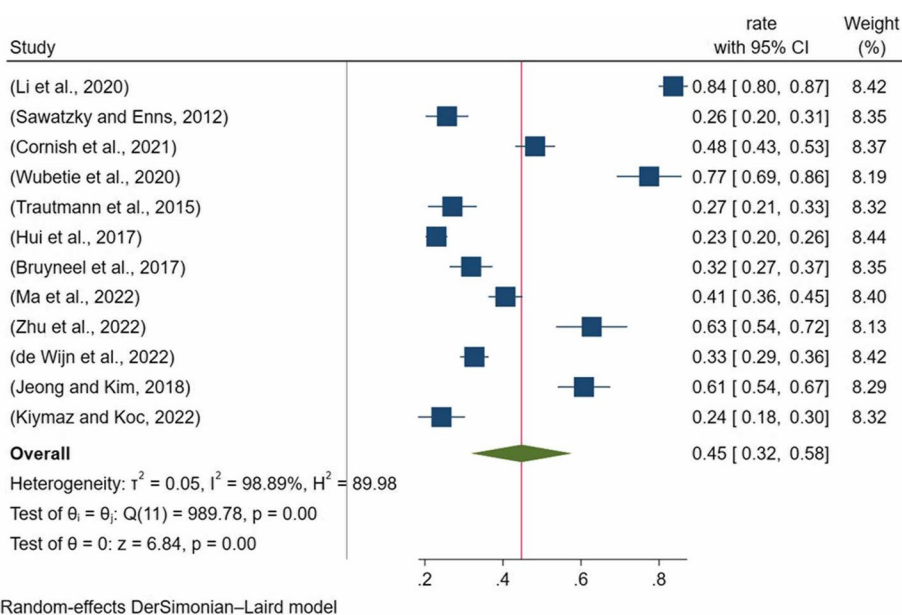
### Results of the meta-analysis on the prevalence of turnover intentions among emergency nurses

For the meta-analysis, 12 studies were included in total. There are numerous methods used to evaluate turnover intention, with the turnover intention questionnaire (TIQ) (16.7%) [22, 28] and Leiden quality of work–life questionnaire for nurses (LQWQ-N) (16.7%) [33, 34] being the most frequently utilized tools. On the basis of the references and the classification criteria for turnover intention, two researchers, a third researcher and two nursing management experts, distinguished individuals with turnover intention into ‘high’ and ‘extremely high’ groups [35]. One study objectively evaluated turnover intention and reported that 90.2% of emergency nurses, with an average age of 29.49 years, had turnover intention [22]. It represents the highest prevalence of turnover intention among the

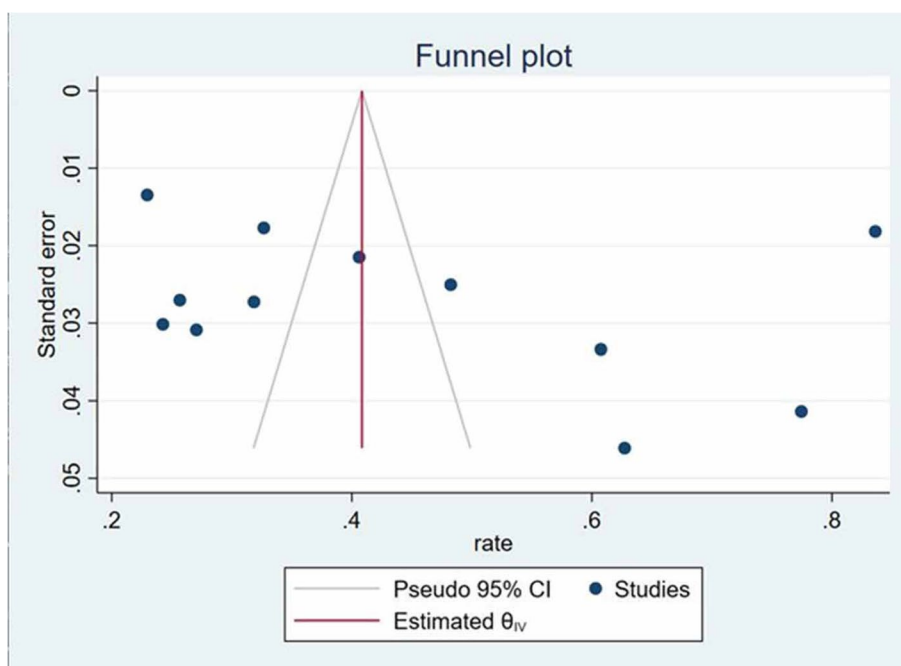
### Quality evaluation results

The bias risk assessment tool developed by Hoy and colleagues was used to assess the methodological quality of the 12 studies included in this study. The details of the assessment process are displayed in the appendix. One study was rated as high quality (9 points, 8.3%), whereas the other 11 were evaluated as moderate quality, with scores ranging from 6–8 points (91.7%).

included studies. When publicly available tools such as the TIQ [35], Price and Mueller’s [36], MDS [37], LQWQ-N [38], TIS [39], and Scale Assessing the Intention to Resign or Remain at the Hospital [40] are used to assess turnover intention objectively, the range of turnover intention varies from 24.3% to 90.2%. In contrast, the prevalence of turnover intention in studies utilizing homemade questionnaires ranges from 23.0% to 77.5%. A meta-analysis of the prevalence of turnover



**Fig. 2** Forest plot of the global prevalence of turnover intention among emergency nurses (n = 12)

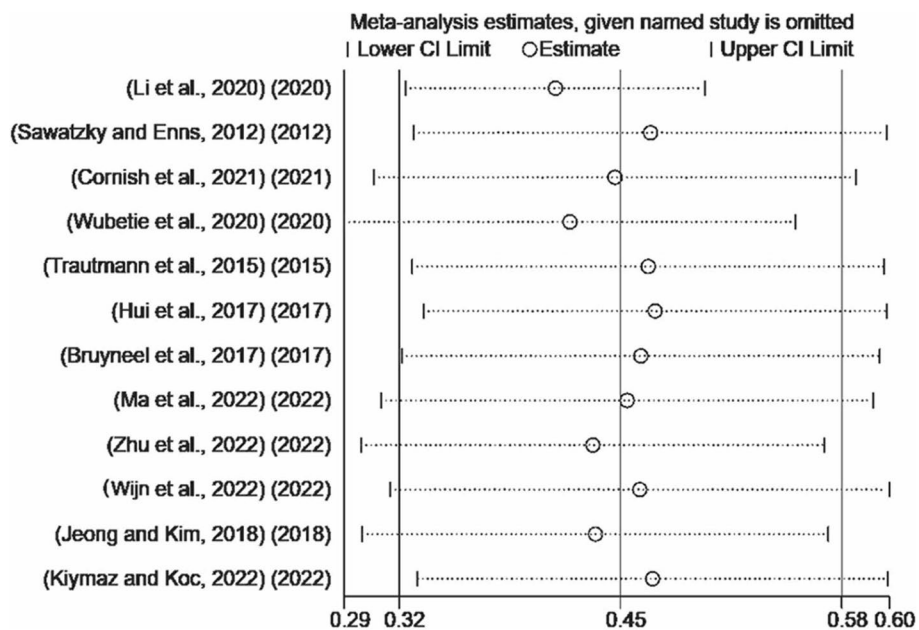


**Fig. 3** Funnel plot of the incidence of turnover intention

intentions among emergency department nurses can be conducted using data from 12 studies and 4400 participants.

The prevalence of turnover intentions among emergency nurses in 12 studies varied from 23.0% to 90.2%. A random effects model was employed because of the

substantial heterogeneity ( $I^2=98.89\%$ ,  $P<0.001$ ). The pooled prevalence of turnover intention among emergency nurses was 45% (95% CI: 0.32, 0.58). Figure 2 shows the forest plots obtained from the meta-analysis. The funnel plot (Fig. 3) appeared symmetrical during visual inspection, and the results of the Egger test



**Fig. 4** Forest plot of the sensitivity analysis

( $P=0.2541$ ) and Begg test ( $P=0.1926$ ) indicated the absence of publication bias.

### Sensitivity analyses

A sensitivity analysis was performed on the 12 included studies, as depicted in Fig. 4, and Stata 17 software was used to evaluate the robustness of the meta-analysis outcomes. By sequentially excluding each study, we observed no significant variation in the pooled effect size relative to the overall combined estimate. This consistency suggests that the findings of the present study exhibit a high degree of reliability and stability.

### Subgroup analysis

Subgroup analyses were conducted to investigate the origins of heterogeneity on the basis of factors such as age, sample size, publication time, survey time, region, and assessment instrument (Table 2).

The subgroup analysis of the sample size results indicated that the prevalence rate of turnover intentions among emergency nurses was 43% (95% CI: 24–63%) in studies with sample sizes greater than 277. In contrast, it was 46% (95% CI: 28–64%) in studies with a sample size of less than 277 (Fig. 5). The results of the subgroup analysis on the investigation time indicated that the prevalence rate of turnover intention from 2016–2022 was 55% (95% CI: 37–72%), whereas from 2009–2016, it was 37% (95% CI: 17–58%) (Fig. 6).

An analysis of subgroups based on region revealed that the prevalence of turnover intention was 54% (95% CI: 28–81%) in Asia, whereas in other areas, it was 38% (95% CI: 27–48%) (Fig. 7). The time frame of the publication revealed that the prevalence of turnover intentions among emergency nurses was 53% (95% CI: 35–71%) between 2020 and 2022 and 33% (95% CI: 22–45%) from 2012–2020 (Fig. 8). The subgroup analysis of assessment instrument revealed that the prevalence of turnover intention was 41% (95% CI: 24–58%) in studies utilizing published scales, whereas it was 52% (95% CI: 28–76%) in studies employing self-developed scales (Fig. 9).

Furthermore, subgroup meta-analysis revealed notable disparities in the age-based turnover intentions of emergency nurses. The prevalence of turnover intention reported by studies with an average age of 35.6 years or older (30%; 95% CI: 26–33%) was often lower than that reported by nurses with an average age of less than 35.6 years (61%; 95% CI: 31–92%), and there was a significant difference ( $P < 0.05$ ) (Fig. 10).

### Discussion

To the best of our knowledge, this is the initial meta-analysis on the prevalence of turnover intention among emergency nurses. This meta-analysis included twelve studies involving 4400 emergency nurses from around the world. Generally, there is a belief that an increase in

**Table 2** Subgroup analyses according to the sample size, published year, assessment instrument, region, age, investigation

| Subgroup                     | Number of studies | turnover intention prevalence | 95%CI | $I^2$ (%) | P value | P-value across subgroups |
|------------------------------|-------------------|-------------------------------|-------|-----------|---------|--------------------------|
| <b>Sample size</b>           |                   |                               |       |           |         |                          |
| 277                          | 6                 | 43%                           | 24–63 | 99.4      | <0.001  | 0.833                    |
| 277                          | 6                 | 46%                           | 28–64 | 97.7      | <0.001  |                          |
| <b>Publication year</b>      |                   |                               |       |           |         |                          |
| 2020–2022                    | 7                 | 53%                           | 35–71 | 99        | <0.001  | 0.078                    |
| 2012–2020                    | 5                 | 33%                           | 22–45 | 96.5      | <0.001  |                          |
| <b>Assessment instrument</b> |                   |                               |       |           |         |                          |
| Published tools              | 8                 | 41%                           | 24–58 | 99        | <0.001  | 0.455                    |
| Self made questionnaire      | 4                 | 52%                           | 28–76 | 98.9      | <0.001  |                          |
| <b>Geographic region</b>     |                   |                               |       |           |         |                          |
| Asia                         | 5                 | 54%                           | 28–81 | 99.5      | <0.001  | 0.268                    |
| Others                       | 7                 | 38%                           | 27–48 | 96.4      | <0.001  |                          |
| <b>Age</b>                   |                   |                               |       |           |         |                          |
| 35.6                         | 4                 | 30%                           | 26–33 | 51.2      | 0.105   | 0.044                    |
| 35.6                         | 5                 | 61%                           | 31–92 | 99.5      | <0.001  |                          |
| <b>Investigation time</b>    |                   |                               |       |           |         |                          |
| ≥2016                        | 5                 | 55%                           | 37–72 | 97.0      | <0.001  | 0.211                    |
| 2016                         | 6                 | 37%                           | 17–58 | 99.4      | <0.001  |                          |



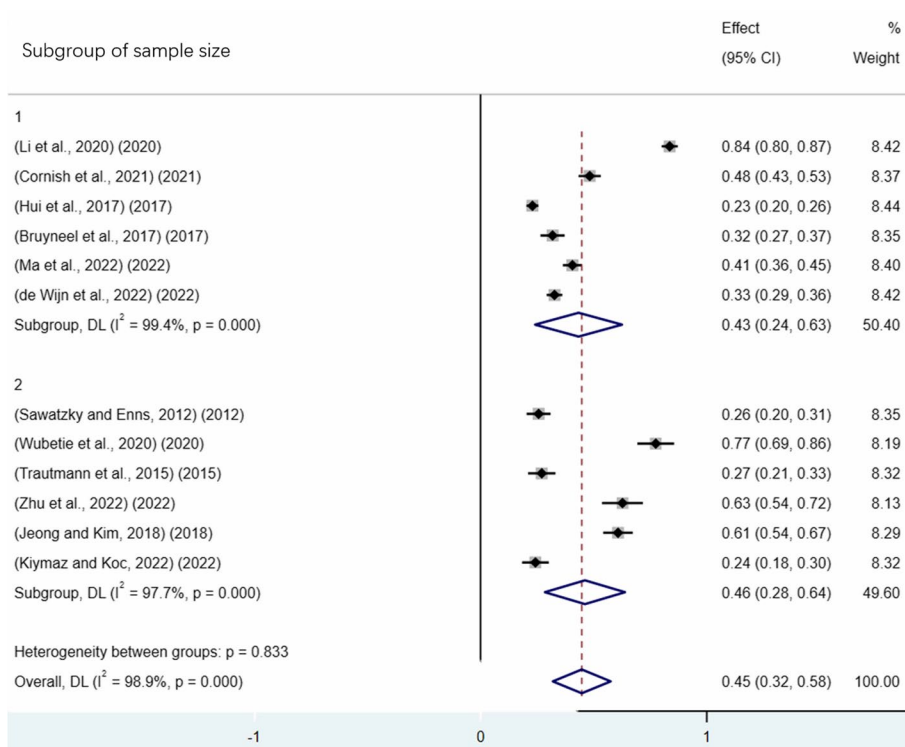


Fig. 5 Turnover rate of emergency nurses according to sample size

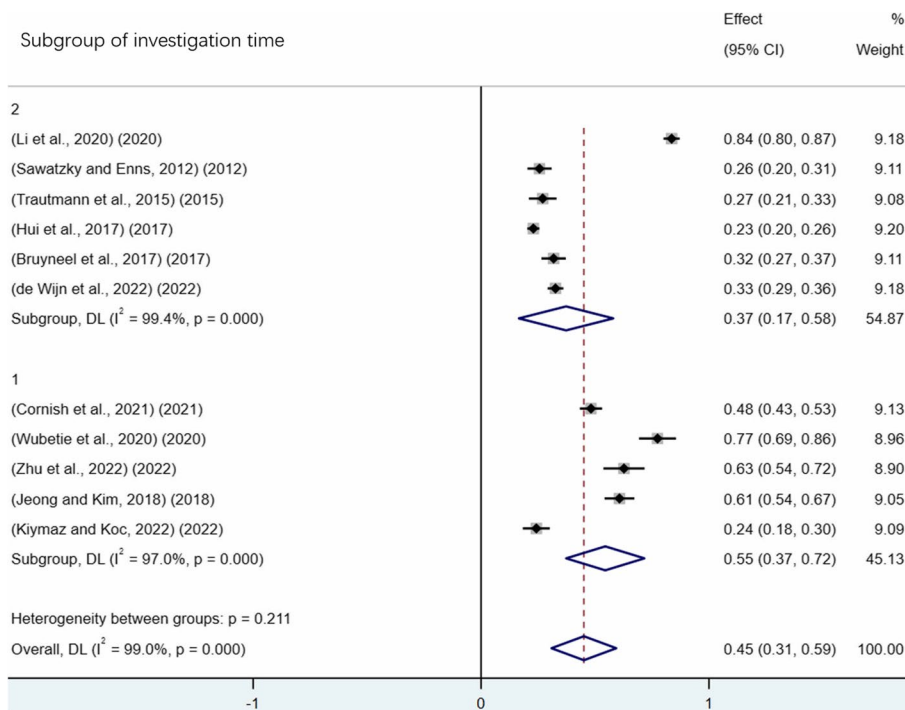
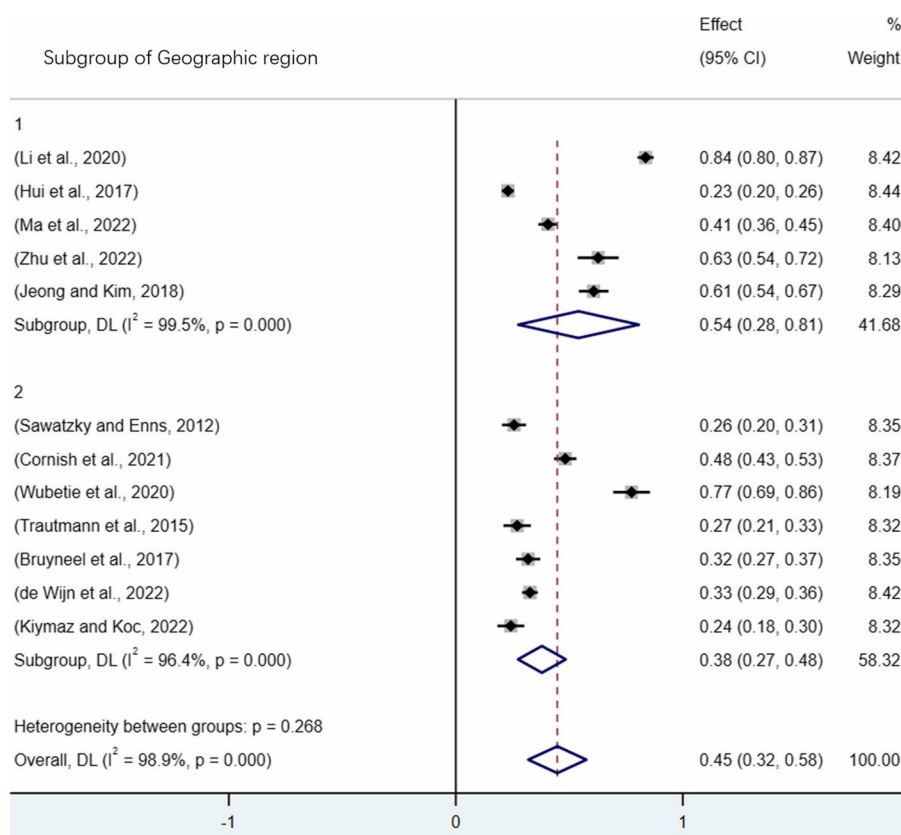


Fig. 6 Turnover rate of emergency nurses according to investigation time



**Fig. 7** Turnover rate of emergency nurses according to geographic region

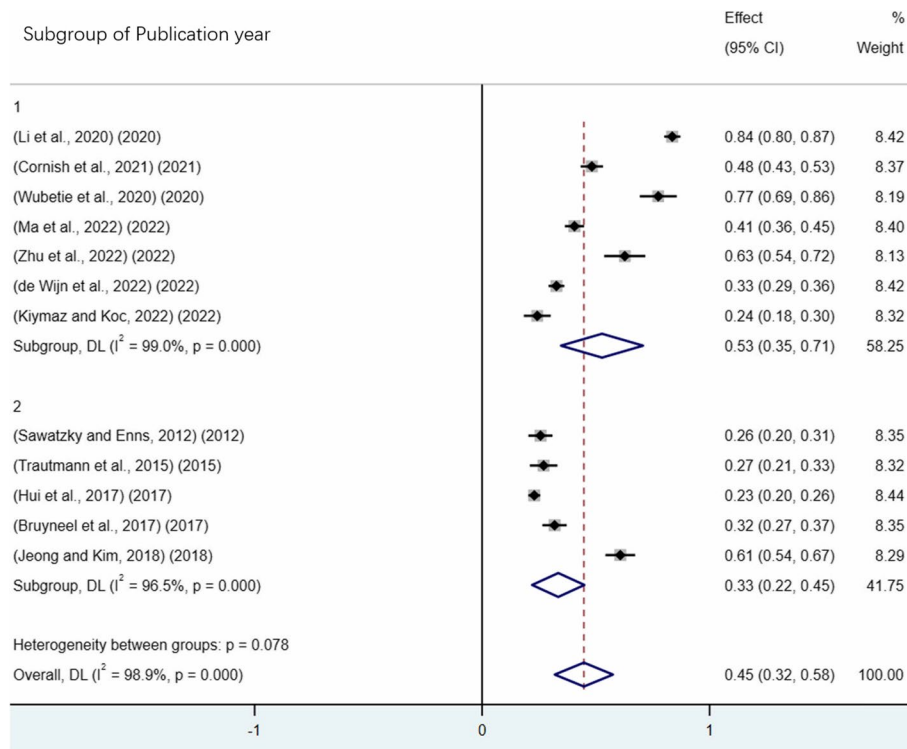
nurse turnover intention is not satisfactory, as it leads to higher operating costs and negative impacts on patients and nurses [41]. As crucial members of the hospital's emergency team are tasked with saving the lives of needy patients, emergency nurses must prioritize their turnover intentions [42].

The findings of this study indicate that the prevalence of turnover intentions among emergency nurses across different countries is notably high, reaching 45% (95% CI: 32–58%). Furthermore, the prevalence of this intention ranges from 23.0% to 90.2%, which is higher than that reported in other studies. For example, original research conducted in Italy revealed that over 35% of medical and surgical nurses expressed their intention to turnover within the next year [43]. Essa et al. [44] reported that 31.7% of nurses have turnover intentions. Furthermore, the findings of a 2021 investigation into the rate of turnover intention among nurses in sub-Saharan Africa were somewhat higher than those recorded in this study (51.96%) [15]. This may be attributed to the unique working environment of the emergency department, characterized by prolonged periods of high-intensity work, irregular shifts, including night and overtime work, and sustained high-stress conditions, which can

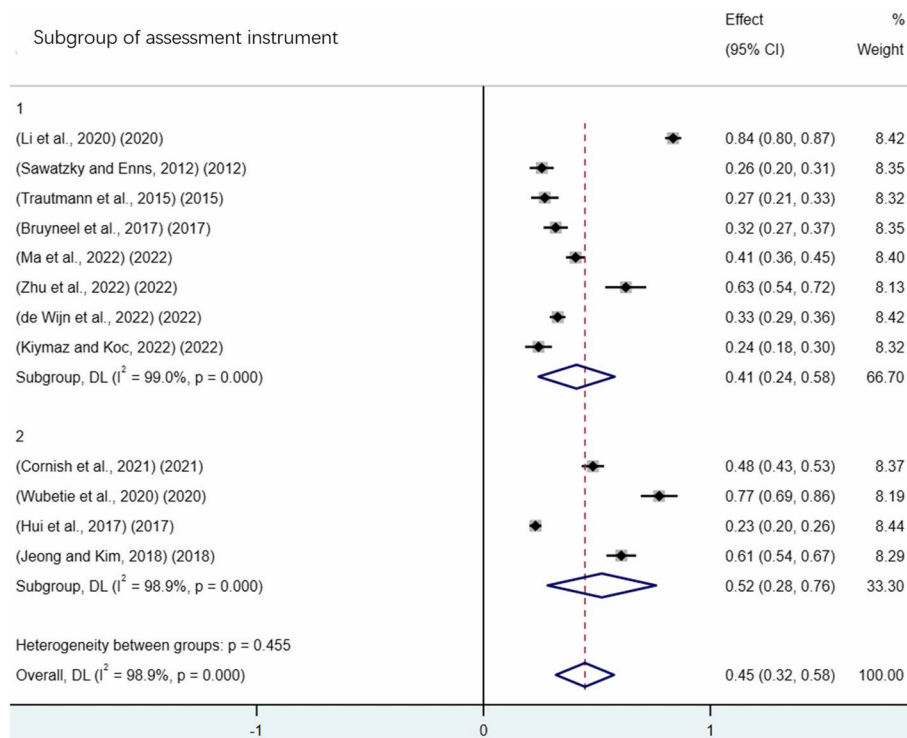
lead to professional burnout and, consequently, a greater propensity for nurses to consider leaving their positions [45]. In recent years, turnover intention has gradually increased, which has attracted the attention of nursing managers worldwide [46]. This study also highlighted the high variability (23.0–90.2%) of turnover intentions reported in different studies. This finding may be attributed to the working environment, the economic level of the country, and the average age of the nurses participating in the study. However, considering the high overall prevalence, the turnover intention of nursing staff is a matter of concern regardless of the country and clinical environment, and more efforts are urgently needed to reduce turnover intention in this population. Considering the high heterogeneity between the included studies, the prevalence estimates of combined turnover intention should be interpreted cautiously.

**Geographic region**

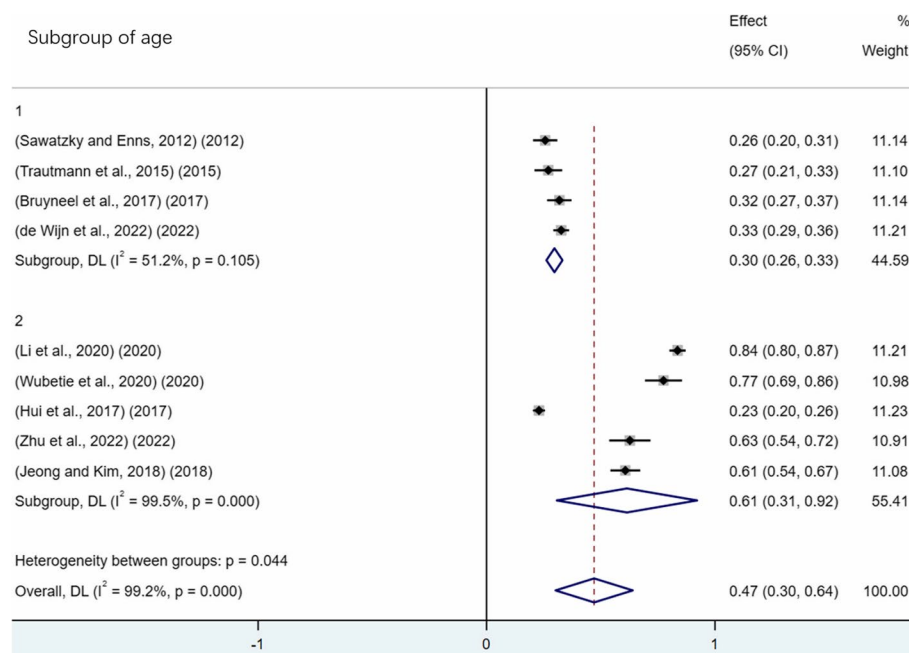
Because of the significant heterogeneity observed among the studies included, subgroup analysis was employed in this meta-analysis to investigate the potential sources of differences. Subgroup analysis revealed that Asian nurses had the highest combined prevalence of turnover



**Fig. 8** Turnover rate of emergency nurses according to publication time



**Fig. 9** Turnover rate of emergency nurses according to assessment instrument



**Fig. 10** Turnover rate of emergency nurses according to average age

intention (54%), whereas other regions (Europe, North America, Australia, and Africa) presented considerable heterogeneity, with only 38% prevalence. Nurses in the Americas demonstrate a comparatively lower propensity for turnover intention, which may be attributed to the robust economic conditions and the high priority placed on nurse retention management in developed countries, such as the United States and Canada [47]. Notably, only one study was conducted in Africa, revealing relatively high turnover intention (77%). Moreover, only a single study was carried out in Oceania, indicating significant turnover intention (48%), and no studies conducted in South America were identified in the search. This suggests that the demand for research into the prevalence of nurse turnover intentions in this region remains unmet. To assess the global prevalence of turnover intentions among emergency nurses more accurately, further exploration informed by existing research will be necessary for future studies.

The results of the subgroup analysis by region indicated that the prevalence of turnover intention among emergency nurses in Asia was somewhat higher than that in other regions. This phenomenon may be intricately linked to regional economic advancement and the development and establishment of healthcare infrastructure. In numerous developing and resource-poor countries, skilled and adequately trained nurses tend to migrate to developed nations in search of improved salaries, working conditions, and professional growth

opportunities, thereby influencing the mobility of nurses within a particular geographical region [48]. The prevalence of turnover intentions among emergency nurses in Asian countries was significant. Economic underdevelopment and the development of healthcare systems in Asia, compounded by its large population, pose substantial challenges for providing adequate medical and nursing services [49, 50]. Moreover, Asia has been the epicenter for most emerging and reemerging infectious diseases, including rotavirus, SARS, and the novel coronavirus (COVID-19) [51, 52]. These health threats have further taxed an already strained healthcare system, exacerbating the need for robust and resilient medical and nursing services [53, 54]. Additionally, compared with the Americas, Europe, Oceania, and Africa, there is a relative abundance of research on the turnover intentions of emergency nurses in Asia, which may introduce a certain degree of bias. Therefore, future studies should aim to carry out more multicenter cross-sectional studies, thereby increasing the number of original studies and exploring the variations among different geographical regions or countries.

**Assessment instrument**

Despite the use of a range of tools with established reliability and validity to measure turnover intentions, there is currently no consensus on the assessment tools for turnover intentions. Among them, the Turnover Intention Questionnaire (TIQ) developed by Michaels and

Spector in 1982 and the Leiden Quality of Work Life Questionnaire for Nurses (LQWLQ-N) developed by Maes and others in 1999 are the most widely used. For subgroup analysis, this study categorizes turnover intentions into two distinct groups: those assessed with published scales that have been validated and are widely used and those evaluated through self-devised questionnaires. The results showed that, compared with studies using published scales (41%), studies using self-developed questionnaires had a slightly greater prevalence of turnover intention (52%). The possible reason for this result may be that the homemade questionnaire may not have undergone rigorous testing for reliability and validity, thus leading to a biased calculation of the prevalence of turnover intention among this population. Owing to the uncertainty in the definition of intention to turnover and the differences in evaluation tools, more generalizable and reliable tools may be developed in the future [55]. This scale accurately assesses the turnover intention of the emergency nurse population.

### Age

The subgroup analysis results by age indicated that the turnover intention prevalence among emergency nurses in studies older than 35.6 years was 30%. In contrast, in studies younger than 35.6 years, the prevalence was 61%, with a significant difference observed ( $P < 0.05$ ). These findings are similar to those of a previous study on the prevalence of turnover intention among nurses in the intensive care unit [56]. A survey indicated that young, newly graduated nurses consistently exhibit a high intention to turnover, with potential reasons including heavy workload; poor communication with patients, family members, or team members; and a lack of skills and knowledge [57]. For young nurses, balancing work and personal life is equally important. Suppose that work interferes with their family life, social activities, or other personal interests. This can lead to decreased job satisfaction and increased turnover intention [58]. Young nurses often harbor high expectations for professional development and advancement opportunities early in their careers. If they perceive a lack of developmental opportunities or unclear avenues for promotion in their current work environment, they may contemplate leaving to pursue more favourable platforms for career growth [59]. This penchant for exploring career advancements may contribute to the higher prevalence of turnover intentions observed among this demographic. If many young nurses leave the nursing profession early in their careers, the hospital will suffer significantly because of unfavourable staff turnover and the high costs it entails [60]. Therefore, nursing leaders should pay greater attention to this phenomenon and implement affirmative measures.

### Investigation time

The findings of this study reveal a significant upwards trend in the prevalence of nurses' intention to leave in recent years, increasing from 37 to 55%. This surge reflects the complex interplay between individual, professional, and systemic factors that warrant comprehensive examination. First, as professional demands for mastering new technologies increase, some nurses may feel that their intrinsic motivation and sense of professional accomplishment are being overlooked, directly affecting their job satisfaction and willingness to remain in the nursing profession [61]. Second, the COVID-19 pandemic has highlighted systemic weaknesses in healthcare and exacerbated existing stressors within the nursing industry [62]. The dramatic increase in workload, the complexity of patient conditions, heightened individual infection risks, and increased emotional stress are realities that nurses faced during the pandemic [63]. This global health crisis has subjected nurses to prolonged exposure to high-stress environments, leading to burnout, emotional exhaustion, and a greater propensity to leave their jobs [64, 65]. Moreover, chronic understaffing in many healthcare facilities forces nurses to work longer hours with heavier patient loads, lowering the quality of patient care and increasing job dissatisfaction and physical fatigue. These conditions make it increasingly difficult for many nurses to continue in such demanding roles [66, 67]. Additionally, demanding schedules, including night shifts and overtime, disrupt nurses' personal and family lives. The inability to achieve sustainable work-life balance may drive nurses to seek employment in less demanding, more flexible environments [65, 68]. Furthermore, despite the pivotal role that nurses play in healthcare services, many nurses feel undercompensated and undervalued in their work, coupled with limited career advancement opportunities, which in turn affects their professional commitment and intention to stay [66, 69–71]. Finally, the generational shift in the workforce has led to different expectations and career aspirations. Compared with previous generations, the current cohort of younger nurses, including Millennials and Generation Z nurses, typically places greater emphasis on work-life balance, job satisfaction, and career advancement opportunities [69, 72, 73]. If these needs are not met, they are more likely to seek better opportunities elsewhere by leaving their current positions [66].

### Publication year

Subgroup analysis by publication date revealed a significant increase in nurses' intent to leave, with a prevalence rate of 33% in studies published before 2020, which increased to 53% after 2020. This increase may be attributed to the intensified pressures of the COVID-19

pandemic, which thrust nurses into managing surging patient loads and the emotional distress of patient families. The high-pressure context has led to a surge in professional burnout, anxiety, and depression, driving the heightened intent to turnover [74]. The early pandemic phase's PPE shortage forced nurses to work at increased infection risk, impacting their health and mental well-being and furthering their consideration of leaving the profession [75]. Prolonged and irregular work hours, a consequence of pandemic-induced uncertainties, have disrupted nurses' family lives, causing feelings of guilt and dissatisfaction that contribute to their intent to turnover [76]. Despite being lauded as 'heroes,' nurses may have experienced a shortfall in tangible support and recognition, leading to isolation, reduced job satisfaction, and a stronger desire for turnover [77]. Rapid medical policy and protocol adjustments have added to nurses' workload, increasing the risk of burnout and turnover [78]. Moreover, a job's physical demands, including chronic fatigue and musculoskeletal disorders from sustained high-intensity work, have exacerbated the situation, prompting more nurses to contemplate turnover [79].

Addressing these issues necessitates a comprehensive approach. This approach encompasses but is not limited to improving working conditions, offering competitive compensation, distributing reasonable workloads, ensuring adequate rest periods, fostering a healthy work environment, and providing opportunities for professional growth and development [80, 81]. Furthermore, societal perceptions and attitudes toward nursing work also need to evolve to better recognize that nursing work also needs to evolve to better recognize and respect the professional value of nurses [82]. Additionally, relevant departments should formulate contingency plans for special situations such as pandemics to alleviate nurses' workload, provide necessary personal protective equipment, and implement infection control measures. Policymakers, healthcare administrators, and society must work together to increase nurses' job satisfaction, reduce the intention to leave, and ensure the stability of the healthcare system and the continuity of nursing services by developing and implementing effective strategies [69, 83]. Personalized nursing management programs that align with the developmental trends of young nurses should be implemented [73]. This is not only an investment in the individual career trajectories of nurses but also an investment in the sustainable development of the entire healthcare system.

### Implications for nursing and health policy

The high prevalence rate of turnover intentions among emergency nurses is an issue that urgently requires attention. Therefore, nursing administrators, executives, and

policymakers must recognize the seriousness of this problem and actively implement strategies, such as fostering a supportive work environment, providing opportunities for professional development, offering clear career paths, and engaging in proactive workforce planning, among others, to confront this challenge effectively.

### Advantages and limitations of this article

In general, the literature was extensively searched in this study to minimize the likelihood of study omission (selection bias), and the results indicate low publication bias. Furthermore, a subgroup analysis was performed to explore potential sources of heterogeneity, thereby enhancing the rigor of the findings from this study.

Furthermore, there are still certain limitations within this meta-analysis. The level of heterogeneity between studies was high in the present study. We estimate that the high heterogeneity may be related to the study design, sample size, and socioeconomic, cultural, and demographic characteristics of the countries. Second, it should be noted that all studies included in the analysis were published in English; thus, the results should be interpreted with caution. Simultaneously, one quarter of the articles failed to mention the average age of the nurses involved. The subgroup analysis of age in this study is subject to errors; hence, its results must be handled cautiously. Additionally, the 12 studies included in this research employed diverse definitions and assessment methods for turnover intention, potentially resulting in a minor variation in the preliminary study's outcomes. Moreover, the evaluation of turnover intention depends on self-reports, thus increasing the likelihood of recall bias in the results.

Therefore, future research should include more detailed demographic information, especially the prevalence of turnover intentions of emergency nurses in different age groups, which will help to more accurately evaluate the occurrence of turnover intentions of emergency nurses by age. In addition, experts and scholars should reach a consensus on the definition and evaluation tools of nurses' turnover intention, which will help to make a more comprehensive comparison between primary studies. In addition, researchers, nursing administrators, and policymakers should adjust management strategies to accommodate the work demands of emergency nurses, enhance job satisfaction, and consequently reduce the propensity for turnover to improve the quality of nursing from the source.

### Conclusion

Studies indicate that the prevalence rate of turnover intentions among emergency nurses is 45%. Subgroup analysis revealed that nurses in Asia and those who are

younger are more likely to leave their positions. Concurrently, increasing evidence suggests a rising trend in the prevalence of turnover intentions within the emergency nursing workforce in recent years. The results of this meta-analysis provide both empirical and theoretical support, enabling nursing managers, administrators, and policymakers to recognize the prevalence of turnover intentions among emergency nurses and devise preventive strategies. These strategies aim to reduce turnover among emergency nurses working in unique clinical settings, thereby enhancing the stability and sustainable development capacity of the emergency nursing workforce and ultimately enhancing the quality of patient care. However, research on this cohort's turnover intentions is relatively nascent, with few studies conducted on some continents; thus, further research is necessary to accurately quantify the prevalence of turnover intentions in this population.

### Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12912-024-02284-2>.

Supplementary Material 1.

### Acknowledgements

We would like to acknowledge everyone who contributed to this research in any way.

### Authors' contributions

LHY: Conceptualization, Methodology. RH, XYC: Data curation, Writing- Original draft preparation. YX: Supervision, Software. LP: Software, Validation. XWH: Writing-Reviewing and Editing. We would like to acknowledge everyone who has contributed to this research in any way.

### Funding

There was no funding associated with this study.

### Availability of data and materials

The datasets supporting this meta-analysis are from previously reported studies and datasets, which have been cited. The processed data are available from the corresponding author upon request.

### Declarations

#### Ethics approval and consent to participate

Not applicable.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare no competing interests.

#### Author details

<sup>1</sup>The First Hospital of Jilin University, No. 71 Xinmin Street, Changchun, Jilin 130021, China.

Received: 15 May 2024 Accepted: 22 August 2024

Published online: 11 September 2024

### References

- Lancet T. 2020: unleashing the full potential of nursing. *Lancet*. 2019;394(10212):1879.
- Collaborators GHRFH. Measuring the availability of human resources for health and its relationship to universal health coverage for 204 countries and territories from 1990 to 2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*. 2022;399(10341):2129–54.
- World Health Organization, International Council of Nurses. Nursing now state of the world's nursing 2020: investing in education, jobs and leadership. 2020. <https://www.who.int/publications/i/item/9789240003279>. Accessed 5 May 2021. <https://www.paho.org/en/documents/state-worlds-nursing-report-2020>.
- Wu F, Lao Y, Feng Y, Zhu J, Zhang Y, Li L. Worldwide prevalence and associated factors of nursing staff turnover: a systematic review and meta-analysis. *Nurs Open*. 2024;11(1):e2097.
- Fontes KBA, Santana ACJ, Pelloso RG, Carvalho SMB, Dalva M. Relationship between leadership, bullying in the workplace and turnover intention among nurses. Health Science Center, Universidade Estadual de Maringá, Maringá Brazil Department of Post-Graduation in Statistics, Universidade Estadual de Maringá, Maringá Brazil Department of Post-Graduation i. *J Nurs Manag*. 2019;27(3):535–42.
- Sungbun S, Naknoi S, Somboon P, Thosingha O. Impact of the COVID-19 pandemic crisis on turnover intention among nurses in emergency departments in Thailand: a cross sectional study. *BMC Nurs*. 2023;22(1):337.
- Park JE, Song MR. Effects of emergency nurses' experiences of violence, resilience, and nursing work environment on turnover intention: a cross-sectional survey. *J Emerg Nurs*. 2023;49(3):461–9.
- Weninger Henderson M. The economic case for meeting employees' needs. Health Science Center, Universidade Estadual de Maringá, Maringá Brazil Department of Post-Graduation in Statistics, Universidade Estadual de Maringá, Maringá Brazil Department of Post-Graduation i. *J Nurs Manag*. 2020;28(1):17–23.
- Wubetie A, Taye B, Girma B. Magnitude of turnover intention and associated factors among nurses working in emergency departments of governmental hospitals in Addis Ababa, Ethiopia: a cross-sectional institutional based study. *BMC Nurs*. 2020;19(1):97.
- Al-Ghabeesh SH, Qattom H. Workplace bullying and its preventive measures and productivity among emergency department nurses. *BMC Health Serv Res*. 2019;19(1):1–9.
- Stafford S, Avsar P, Nugent L, O'Connor T, Moore Z, Patton D, Watson C. What is the impact of patient violence in the emergency department on emergency nurses' intention to leave? *J Nurs Manag*. 2022;30(6):1852–60.
- Koksal K, Mert IS. The role of courage and interactional justice in emotional exhaustion of emergency nurses: a cross-sectional study in Turkey. *Int Nurs Rev*. 2024;71(1):54–61.
- Ahorsu DK, Lin C-Y, Marznaki ZH, Pakpour AH. The association between fear of COVID-19 and mental health: the mediating roles of burnout and job stress among emergency nursing staff. *Nurs Open*. 2022;9(2):1147–54.
- Song N, Wang CL, Zhang LQ, Wang XM. A study on the correlation between work stressors and the coping styles of outpatients and emergency nurses in 29 pediatric specialty hospitals across China. *Front Psychol*. 2022;13:951671.
- Ayalew E, Workineh Y, Semachew A, Woldgiorgies T, Kerie S, Gedamu H, Zeleke B. Nurses' intention to leave their job in sub-Saharan Africa: a systematic review and meta-analysis. *Heliyon*. 2021;7(6):e07382.
- Moher D, Liberati A, Tetzlaff J, Altman DG. Reprint—preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Phys Ther*. 2009;89(9):873–80.
- Hoy D, Brooks P, Woolf A, Blyth F, March L, Bain C, Baker P, Smith E, Buchbinder R. Assessing risk of bias in prevalence studies: modification of an existing tool and evidence of interrater agreement. *J Clin Epidemiol*. 2012;65(9):934–9.
- Sterne JAC, Egger M. Funnel plots for detecting bias in meta-analysis: guidelines on choice of axis. MRC Health Services Research Collaboration, Department of Social Medicine, University of Bristol, Canynge Hall, White-ladies Road, Bristol BS8 2PR, United Kingdom. *J Clin*. 2001;54(10):1046–55.
- Egger M, Davey Smith G, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. *BMJ*. 1997;315(7109):629–34.

20. Sterne JA, Egger M. Funnel plots for detecting bias in meta-analysis: guidelines on choice of axis. *J Clin Epidemiol*. 2001;54(10):1046–55.
21. Cumpston M, Ffleming E, Thomas J, Higgins JPT, Deeks JJ, Clarke MJ. Chapter I: Introduction [last updated August 2023]. In: Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA, editors. *Cochrane Handbook for Systematic Reviews of Interventions* version 6.5. Cochrane; 2024. Available from <https://training.cochrane.org/handbook>.
22. Li N, Zhang L, Xiao G, Chen ZJ, Lu Q. Effects of organizational commitment, job satisfaction and workplace violence on turnover intention of emergency nurses: a cross-sectional study. *Int J Nurs Pract*. 2020;26(6):e12854.
23. Sawatzky JAV, Enns CL. Exploring the key predictors of retention in emergency nurses. *J Nurs Manag*. 2012;20(5):696–707.
24. Cornish S, Klim S, Kelly AM. Is COVID-19 the straw that broke the back of the emergency nursing workforce? *Emerg Med Australas*. 2021;33(6):1095–9.
25. Trautmann J, Epstein E, Rovnyak V, Snyder A. Relationships among moral distress, level of practice independence, and intent to leave of nurse practitioners in emergency departments: results from a national survey. *Adv Emerg Nurs J*. 2015;37(2):134–45.
26. Jiang H, Ma L, Gao C, Li T, Huang L, Huang W. Satisfaction, burnout and intention to stay of emergency nurses in Shanghai. *Emerg Med J*. 2017;34(7):448–53.
27. Bruyneel L, Thoelen T, Adriaenssens J, Sermeus W. Emergency room nurses' pathway to turnover intention: a moderated serial mediation analysis. *J Adv Nurs*. 2017;73(4):930–42.
28. Ma Y, Chen F, Xing D, Meng Q, Zhang Y. Study on the associated factors of turnover intention among emergency nurses in China and the relationship between major factors. *Int Emerg Nurs*. 2022;60:101106.
29. Zhu S, Sun K, Ye L, Jiang F, Wang R. Study on the relationship and correlation between turnover tendency of emergency nursing staff and social and work factors. *Contrast Media Mol Imaging*. 2022;2022:4183072.
30. Wijn AND, Fokkema M, Doef MPvd. The prevalence of stress-related outcomes and occupational well-being among emergency nurses in the Netherlands and the role of job factors: a regression tree analysis. *J Nurs Manag*. 2022;30(1):187–97.
31. Jeong I-Y, Kim J-S. The relationship between intention to leave the hospital and coping methods of emergency nurses after workplace violence. *J Clin Nurs*. 2018;27(7–8):1692–701.
32. Kiyamaz D, Koc Z. Workplace violence, occupational commitment and intention among emergency room nurses: a mixed-methods study. *J Clin Nurs*. 2023;32(5–6):764–79.
33. Gelsema TI, van der Doef M, Maes S, Akerboom S, Verhoeven C. Job stress in the nursing profession: the influence of organizational and environmental conditions and job characteristics. *Int J Stress Manag*. 2005;3(12):222–40.
34. van der Doef M, Maes S. The Leiden Quality of Work Questionnaire: its construction, factor structure, and psychometric qualities[J]. *Psychol Rep*. 1999;85(3):954–62.
35. Michaels CE, Spector PE. Causes of employee turnover: a test of the Mobley, Griffeth, Hand, and Meglino model. *J Appl Psychol*. 1982;67(1):53–9.
36. Price JLU, Mueller CW. A causal model of turnover for nurses. *Acad Manag J*. 1981;24(3):543–65.
37. Hamric AB, Blackhall LJ. Nurse-physician perspectives on the care of dying patients in intensive care units: collaboration, moral distress, and ethical climate. *Crit Care Med*. 2007;35(2):422–9.
38. van der Doef MLU, Maes S. The Job Demand-Control (-Support) Model and psychological well-being: a review of 20 years of empirical research. *Work Stress*. 1999;13(2):87–114.
39. Sun C, Hu H, Wang L, Wang X. The relationship between nurses' occupational commitment and turnover tendency. *J Nurs Adm*. 2018;18(6):391–5.
40. Erigüç KG. Hastanelerde Personelin işle ilgili Tutumları PersonelDevri: Ankara ili Örneği. Doktora Tezi. Hacettepe üniversitesi Sağlık Bilimleri Enstitüsü. *Calisma Ekonomisi ve Endüstri ilişkileri*Ankara. 1994.
41. Oweidat I, Shosha GA, Dmaid K, Nashwan AJ. The association of patient safety culture with intent to leave among Jordanian nurses: a cross-sectional study. *BMC Nurs*. 2023;22(1):227.
42. Pei J, Wang X, Chen H, Zhang H, Nan R, Zhang J, Dou X. Alexithymia, social support, depression, and burnout among emergency nurses in China: a structural equation model analysis. *BMC Nurs*. 2021;20(1):194.
43. Sasso L, Bagnasco A, Catania G, Zanini M, Aleo G, Watson R. Push and pull factors of nurses' intention to leave. *J Nurs Manag*. 2019;27(5):946–54.
44. Al Muharraq EH, Baker OG, Alallah SM. The prevalence and the relationship of workplace bullying and nurses turnover intentions: a cross sectional study. *SAGE Open Nurs*. 2022;8:23779608221074656.
45. Jiang N, Zhou X, Gong Y, Tian M, Wu Y, Zhang J, Chen Z, Wang J, Wu J, Yin X, Lv C. Factors related to turnover intention among emergency department nurses in China: a nationwide cross-sectional study. *Nurs Crit Care*. 2023;28(2):236–44.
46. Sun C, Xing Y, Wen Y, Wan X, Ding Y, Cui Y, Xu W, Wang X, Xia H, Zhang Q, et al. Association between career adaptability and turnover intention among nursing assistants: the mediating role of psychological capital. *BMC Nurs*. 2023;22(1):29.
47. Gaudin S, Yazbeck AS. Identifying major health-system challenges in developing countries using PERs: equity is the elephant in the room. *Health Syst Reform*. 2021;7(2):e1902671.
48. Omar K, Halim MASA, Yusoff YM, Ahmad A, Ibrahim RZAR. Assessing intention to leave among public hospital nurses in Malaysia. *J Appl Fundam Sci*. 2018;10(35):294–305.
49. Yormirzoev M. Human capital and economic growth in Central Asia. Department of Economics, University of Central Asia, Khorog, Tajikistan. *Post-communist Econ*. 2023;35(6):533–45.
50. Dhillon I, Jhalani M, Thamarangsi T, Siyam A, Singh PK. Advancing universal health coverage in the WHO South-East Asia Region with a focus on human resources for health. WHO Regional Office for South-East Asia, Delhi, India. *Lancet Reg Health-Southeast Asia*. 2023;18:100313.
51. Tan S, Khor SK. Public health in Asia during the COVID-19 pandemic: global health governance, migrant labour, and international health crises. National University of Singapore, Singapore; Chatham House, UK and National University of Singapore, Singapore. *Int Aff*. 2023;99(2):863–5.
52. Li J, Lai S, Gao GF, Shi W. The emergence, genomic diversity and global spread of SARS-CoV-2. *Nature*. 2021;600(7889):408–18.
53. Xie W, Chen L, Feng F, Okoli CTC, Tang P, Zeng L, Jin M, Zhang Y, Wang J. The prevalence of compassion satisfaction and compassion fatigue among nurses: a systematic review and meta-analysis. *Int J Nurs Stud*. 2021;120:103973.
54. Huijing Z, Dan L, Lu Y, Zhu H, Li M. Growth and challenges of China's nursing workforce from 1998 to 2018: a retrospective data analysis. *Int J Nurs Stud*. 2021;124(Suppl C):104084.
55. Lee J. Nursing home nurses' turnover intention: a systematic review. *Nurs Open*. 2022;9(1):22–9.
56. Xu G, Zeng X, Wu X. Global prevalence of turnover intention among intensive care nurses: a meta-analysis. *Nurs Crit Care*. 2021;28(2):159–66.
57. Ulupinar S, Aydogan Y. New graduate nurses' satisfaction, adaptation and intention to leave in their first year: a descriptive study. *J Nurs Manag*. 2021;29(6):1830–40.
58. Sampaio F, Salgado R, Antonini M, Delmas P, Oulevey Bachmann A, Gilles I, Ortoleva Bucher C. Workplace well-being and quality of life perceived by Portuguese nurses during the COVID-19 pandemic: the role of protective factors and stressors. *Int J Environ Res Public Health*. 2022;19(21):14231.
59. Su Y, Jiang Z, Meng R, Lu G, Chen C. The effect of organizational justice on young nurses' turnover intention: the mediating roles of organizational climate and emotional labour. *Nurse Educ Pract*. 2023;72:103723.
60. Koch P, Zilezinski M, Schulte K, Strametz R, Nienhaus A, Raspe M. How perceived quality of care and job satisfaction are associated with intention to leave the profession in young nurses and physicians. *Int J Environ Res Public Health*. 2020;17(8):2714.
61. Vasquez B, Moreno-Lacalle R, Soriano GP, Juntasoopeeun P, Locsin RC, Evangelista LS. Technological machines and artificial intelligence in nursing practice. *Nurs Health Sci*. 2023;25(3):474–81.
62. Tolksdorf KH, Tischler U, Heinrichs K. Correlates of turnover intention among nursing staff in the COVID-19 pandemic: a systematic review. *BMC Nurs*. 2022;21(1):174.
63. Poon Y-SR, Lin YP, Griffiths P, Yong KK, Seah B, Liaw SY. A global overview of healthcare workers' turnover intention amid COVID-19 pandemic: a systematic review with future directions. *Hum Resour Health*. 2022;20(1):70.
64. Lavoie-Tremblay M, Gélinas C, Aubé T, Tchouaket E, Tremblay D, Gagnon MP, Côté J. Influence of caring for COVID-19 patients on nurse's turnover, work satisfaction and quality of care. *J Nurs Manag*. 2022;30(1):33–43.



65. Mousavi SM, Yazdanirad S, Naeini MJ, Khoshakhlagh A, Haghghat M. Determining the effect of selected mental factors on turnover intention through two modulators - stress and resilience over COVID-19 period. *BMC Health Serv Res.* 2023;23(1):366.
66. Lu X, Yang J, Bai D, Cai M, Wang W, He J, Gong X, Hou C, Gao J. The effect of psychological contract on turnover intention among nurses: a meta-analytic review. *BMC Nurs.* 2023;22(1):358.
67. Tang C, Zhou S, Liu C, Min R, Cai R, Lin T. Turnover intention of nurses in public hospitals and its association with quality of working life: a cross-sectional survey in six provinces in China. *Front Public Health.* 2023;11:1305620.
68. An M, Heo S, Hwang YY, Kim J, Lee Y. Factors affecting turnover intention among new graduate nurses: focusing on job stress and sleep disturbance. *Healthcare.* 2022;10(6):1122.
69. Hu H, Wang C, Lan Y, Wu X. Nurses' turnover intention, hope and career identity: the mediating role of job satisfaction. *BMC Nurs.* 2022;21(1):43.
70. Blau A, Sela Y, Grinberg K. Public perceptions and attitudes on the image of nursing in the wake of COVID-19. *Int J Environ Res Public Health.* 2023;20(6):4717.
71. Pattali S, Sankar JP, Al Qahtani H, Menon N, Faizal S. Effect of leadership styles on turnover intention among staff nurses in private hospitals: the moderating effect of perceived organizational support. *BMC Health Serv Res.* 2024;24(1):199.
72. Jung SY, Kim JH. The experience of good mentoring focused on overcoming turnover intention among millennial nurses. *Front Med.* 2024;11:1288829.
73. Lee SA, Lee J. Differences in occupational values, communication types, job satisfaction, and organisational commitment among clinical nurses across generations. *Front Psychol.* 2023;14:1174197.
74. Kedmi-Shahar E, Morag I, Hallevi H, Arad D. Caring for COVID-19 patients: nurses' perceptions of the most critical issues and their impact on their well-being and performance. *Int Nurs Rev.* 2023;70(4):578–88.
75. Galanis P, Vraka I, Fragkou D, Bilali A, Kaitelidou D. Nurses' burnout and associated risk factors during the COVID-19 pandemic: a systematic review and meta-analysis. *J Adv Nurs.* 2021;77(8):3286–302.
76. Yasin YM, Alomari A, Al-Hamad A, Kehyayan V. The impact of COVID-19 on nurses' job satisfaction: a systematic review and meta-analysis. *Front Public Health.* 2024;11:1285101.
77. Leodoro JL, Janet Alexis ADLS. COVID-19 anxiety among front-line nurses: predictive role of organisational support, personal resilience and social support. *J Nurs Manag.* 2020;28(7):1653–61.
78. Aydogdu ALF. Work engagement among nurses in the context of the COVID-19 pandemic: a systematic review. *Nurs Ethics.* 2024. <https://doi.org/10.1177/09697330241257570>.
79. Dall'Ora C, Ball J, Reinius M, Griffiths P. Burnout in nursing: a theoretical review. *Hum Resour Health.* 2020;18:1–17.
80. Yu X, Li M, Du M, Wang Y, Liu Y, Wang H. Exploring factors that affect nurse staffing: a descriptive qualitative study from nurse managers' perspective. *BMC Nurs.* 2024;23(1):80.
81. Bae S-H. Comprehensive assessment of factors contributing to the actual turnover of newly licenced registered nurses working in acute care hospitals: a systematic review. *BMC Nurs.* 2023;22(1):31.
82. Zhang Y, Peng Q, Dong W, Hou C, Chen C. Professional identity and sense of coherence affect the between compassion fatigue and work engagement among Chinese hospital nurses. *BMC Nurs.* 2023;22(1):472.
83. Niskala J, Kanste O, Tomietto M, Miettunen J, Tuomikoski AM, Kyngäs H, Mikkonen K. Interventions to improve nurses' job satisfaction: a systematic review and meta-analysis. *J Adv Nurs.* 2020;76(7):1498–508.

## Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.