Online Supplementary Materials

Contents

Appendix 1: Search Strategies

Table 1: Complete search strategy for all databases

Database	#	Search strategy	Result
PubMed	1	("health workforce"[MeSH Terms] OR nurse*[title/abstract] OR "emergency nurses"[tiab] OR doctor OR "emergency staff"[tiab] OR "emergency physicians" OR "emergency paramedics" OR "emergency medical technician"[MeSH Terms] OR staffing OR "human resource"[tiab] OR "medical staff" OR "health personnel"[MeSH Terms] OR "nursing staff"[MeSH Terms] OR workforce[MeSH Terms] OR manpower)	
	2	(outbreak[tiab] OR covid-19[MeSH Terms] OR crisis OR " COVID-19 pandemic"[tiab] OR coronavirus OR "SARS-COV-2"[MeSH Terms] OR "COVID-19 outbreak"[tiab] OR "coronavirus disease" OR " COVID-19 situation")	
	3	("emergency department nurse retention" OR "nursing turnover intention"[tiab] OR "intent to stay" OR "healthcare provider retention" OR "intention to leave nursing" OR "health worker retention" OR retention[tiab] OR turnover[tiab] OR "nursing staff retention" OR "personnel retention"[tiab] OR "personnel turnover"[MeSH Terms] OR "employee turnover"[tiab] OR "job retention" OR "leave the job" OR "intention to stay" OR "employee retention" OR "nurses turnover"[tiab] OR "nurses retention")	
		#1 AND #2 AND #3	523
Scopus	1	TITLE-ABS-KEY ("health workforce") OR TITLE-ABS(nurse*) OR TITLE-ABS ("emergency nurses") OR TITLE-ABS-KEY(doctor) OR TITLE-ABS-KEY("emergency staff") OR TITLE-ABS-KEY("emergency physicians") OR TITLE-ABS-KEY("emergency paramedics") OR TITLE-ABS-KEY("emergency medical technician") OR TITLE-ABS-KEY(staffing) OR TITLE-ABS("human resource") OR TITLE-ABS-KEY("medical staff") OR TITLE-ABS-KEY("health personnel") OR TITLE-ABS-KEY("nursing staff") OR TITLE-ABS-KEY(workforce) OR TITLE-ABS-KEY(manpower)	
	2	TITLE-ABS (outbreak) OR TITLE-ABS-KEY (covid-19) OR TITLE-ABS-KEY (crisis) OR TITLE-ABS ("covid-19 pandemic") OR TITLE-ABS-KEY (coronavirus) TITLE-ABS-KEY ("SARS-COV-2") OR TITLE-ABS-KEY ("COVID-19 outbreak") OR TITLE-ABS-KEY ("coronavirus disease") OR TITLE-ABS-KEY ("covid-19 situation")	
	3	TITLE-ABS-KEY ("emergency department nurse retention") OR TITLE-ABS ("nursing turnover intention") OR TITLE-ABS-KEY ("intent to stay") OR TITLE-ABS ("healthcare provider retention") OR TITLE-ABS-KEY ("intention to leave nursing") OR TITLE-ABS-KEY ("health worker retention") OR TITLE-ABS (retention) OR TITLE-ABS (turnover) OR TITLE-ABS-KEY ("nursing staff retention") OR TITLE-ABS ("personnel retention") OR TITLE-ABS-KEY ("personnel turnover") OR TITLE-ABS ("employee turnover") OR TITLE-ABS-KEY ("job retention") OR TITLE-ABS-KEY ("leave the job") OR TITLE-ABS-KEY ("intention to stay") OR TITLE-ABS-KEY ("employee retention") OR TITLE-ABS ("nurses turnover") OR TITLE-ABS-KEY ("nurses retention")	
		#1 AND #2 AND #3	177
Wos	1	TS= ("health workforce") OR TI=(nurse*) OR TI= ("emergency nurses") OR TS=(doctor) OR TS= ("emergency staff") OR TS= ("emergency physicians") OR TS= ("emergency paramedics") OR TS= ("emergency medical technician") OR TS=(staffing) OR TI= ("human resource") OR TS= ("medical staff") OR TS= ("health personnel") OR TS= ("nursing staff") OR TS=(workforce) OR TS=(manpower)	

	2	TS= (outbreak) OR TS= ("covid-19") OR TI=(crisis) OR TI= ("covid-19 pandemic") OR TS= (coronavirus) OR TS= ("sars-cov-2") OR TI= ("covid-19 outbreak") OR TI= ("coronavirus disease") OR TS= ("covid-19 situation")	
	3	TS= ("emergency department nurse retention") OR TI= ("nursing turnover intention") OR TI= ("intention to stay") OR TS= ("healthcare provider retention") OR TI= ("intention to leave nursing") OR TI= (retention) OR TS= (turnover) OR TS= ("nursing staff retention") OR TI= ("personnel retention") OR TS= ("personnel turnover") OR TS= ("employee turnover") OR TI= ("job retention") OR TS= ("leave the job") OR TS= ("intention to stay") OR TS= ("employee retention") OR TS= ("nurses turnover") OR TI= ("nurses retention") OR TS= ("health worker retention")	
		#1 AND #2 AND #3	133
Google Scholar	Retention OR turnover intention AND "COVID-19" OR outbreak AND "Emergency department staff" OR "nurse* retention" OR "physicians' retention"		4
	Review of the first 400 studies to complete the results		

Appendix 2: Characteristic of the selected studies

Table 2: Characteristics of the selected studies through systematic search

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Row	First author's name (year)	Study title	Place	Study design	Setting/participants	Findings	Quality appraisal status
1	(Abd-Ellatif et al., 2021)e	Fear of COVID-19 and its Impact on Job Satisfaction and Turnover Intention among Egyptian Physicians	Egypt	cross-sectional study	411 frontline Egyptian physicians during the COVID-19 pandemic	42% of those having a severe level of fear were dissatisfied with their job. Fear of COVID-19 was negatively associated with job satisfaction but positively significantly correlated with turnover scores, a positive significant predictor of turnover intention. Job satisfaction was negatively associated with turnover intention, which is a negative significant predictor of turnover intention.	13/20
2	(Alameddine, Bou-Karroum, et al., 2021)	Resilience of nurses at the epicenter of the COVID-19 pandemic in Lebanon	Lebanon	cross-sectional survey	The participants were 265 nurses practicing at the main COVID-19 referral center in Lebanon The questionnaire included five sections. Data were collected electronically in the spring of 2020 from 265 nurses using an online questionnaire.	The resilience of nurses was directly associated with job satisfaction and male gender and inversely associated with intention-to-quit and exposure to violence ($P < 0.05$). The study suggests that enhancing the resilience of nurses at the frontline of the COVID-19 pandemic improves their job satisfaction and retention and would help support the effectiveness and efficiency of care services.	13/20
3	(Sinsky et al., 2021)	COVID--related stress and work intentions in a Sample of US Health Care Workers	USA	cross-sectional survey	The study had 20,665 respondents from 124 institutions, with a median organizational response rate of 34%.	Approximately one-third of physicians, APPs, and nurses surveyed intend to reduce work hours in the next 12 months. One in five physicians and two in five nurses are moderately likely or higher to leave their current practice within two years. Burnout, fear of exposure, COVID-19-related anxiety/depression, and workload were independently related to intent to reduce work hours within 12 months and the intent to leave one's practice within two years.	12/20
4	(C. D. P. L. J. Labrague & Santos, 2020)	Fear of COVID-19, psychological distress, work satisfaction, and turnover intention among front line nurses	Philippines	cross-sectional design	This study used a convenience sampling method The study was conducted among frontline nurses in the Philippines from March 2020	The study found that fear of COVID-19 among frontline nurses was associated with decreased job satisfaction, increased psychological distress, and increased organizational and professional turnover intentions.	13/20

						to May 2020. A total of 261 frontline nurses participated in the study Participants were selected on the basis of predetermined selection criteria		
5	(Shiao et al., 2007)	FACTORS PREDICTING THE NURSES' CONSIDERATION OF LEAVING THEIR JOB DURING THE SARS OUTBREAK	Taiwan	cross-sectional questionnaire survey		The participants were female nurses who were actively working and had a working tenure of more than six months. A total of 907 questionnaires were distributed to nurses, The sample size was justified. The study included 753 nurses who answered all items in the questionnaire, and the overall response rate was 83%.	7.6% of the nurses not only considered that they should not care for SARS patients but were also looking for another job or considering resignation. The main predictors of nurses' consideration of leaving their job were shorter tenure, increased work stress, perceived risk of fatality from SARS, and affected social relationships	10/20
6	(Sperling, 2021)	Ethical dilemmas, perceived risk, and motivation among nurses during the COVID-19 pandemic	Israel	descriptive correlative study		The study used a 53-section online questionnaire, including 4 open-ended questions. The study was conducted between 13 April 2020 and 9 May 2020	Correlating with their strong commitment to care, nurses did not convey intention to leave the profession despite their stress, perceived risk, and feelings of insufficient support and protection at work.	12/20
7	(Jung et al., 2020)	Assessing the Presence of Post-Traumatic Stress and Turnover Intention Among Nurses Post-Middle East Respiratory Syndrome Outbreak	South Korea	cross-sectional survey		They used descriptive statistics and multiple regression for the statistical analyzes. The participants were 147 nurses from three of the 15 isolation hospitals in South Korea who were directly involved in the care of confirmed or suspected MERS patients.	These findings suggest that nurses who experience high levels of PTSD after a fatal infectious disease outbreak such as MERS are more likely to show high intention to leave. The mean score of turnover intention was 16.3, with a score range of 4 to 20.	13/20
8	(H.-M. Chen et al., 2021)	Factors Related to Care Competence, Workplace Stress, and Intention to Stay among Novice Nurses during the Coronavirus Disease (COVID-19) Pandemic	Taiwan	cross-sectional		Data collection was conducted through this online survey. The sample size of the study was 400 registered nurses who had graduated from different nursing education systems.	Clinical stress, frequency of caring for people with infections, and taking a course on infectious nursing were significant predictors for intention to stay. Novice nurses' competencies depended on the experience of nursing care and nursing competence in their professional careers, which may have an impact on the nurses' intention to stay	13/20

9	(Magnavita et al., 2021)	Prolonged Stress Causes Depression in Frontline Workers Facing the COVID-19 Pandemic-A Repeated Cross-Sectional Study in a COVID-19 Hub-Hospital in Central Italy	Italy	cross-sectional	The participants of the study were intensivists, who are frontline healthcare workers responsible for treating patients affected by COVID-19. Of the 205 eligible workers, 152 responded to an online questionnaire designed to measure procedural justice	Occupational stress was a significant predictor of insomnia, anxiety, low job satisfaction, burnout, and the intention to leave the hospital. The number of workers manifesting symptoms of depression increased significantly to exceed 60%.	
10	(Gilles et al., 2021)	Workplace Well-Being and Intent to Stay by Healthcare Workers Reassigned during the First COVID-19 Wave: Results of a Swiss Survey	Swiss	cross-sectional survey	This study was conducted in the French-speaking part of Switzerland and involved 11 hospitals and clinics. Of the 2811 professionals who completed the survey, 436 were HCWs who constituted the analysis sample.	Lack of choice during reassignments can reduce the intent to stay and workplace well-being, especially if hospital management is not perceived to be responsive during the crisis. Hospital management responsiveness moderated the association between lack of choice and reassignment experience, indicating that the more HCWs perceived responsiveness, the less the lack of choice affected their experience of reassignment and thus their intent to stay and workplace well-being.	11/20
11	(Irshad et al., 2020)	How the perceived threat of COVID-19 causes turnover intention among Pakistani nurses: A moderation and mediation analysis	Pakistan	quantitative and cross-sectional	The researchers used a non-probability snowball sampling technique. The study was conducted among Pakistani nurses who treated COVID-19 patients. Data were collected through online questionnaires from 117 Pakistani nurses.	Perceived threat of COVID-19 is positively associated with nurses' turnover intentions. Psychological anxiety mediates the relationship between the perceived threat of COVID-19 and nurses' turnover intentions. Ideological contract moderates the relationship between psychological anxiety and nurses' turnover intentions	14/20
12	(L. J. Labrague et al., 2021)	Perceived COVID-19-associated discrimination, mental health and professional-turnover intention among frontline clinical nurses: The mediating role of resilience	Philippines	A cross-sectional descriptive study	The participants were 259 frontline nurses. The mean age and years of nursing experience were 34.86 and 10.67 years, respectively.	Frontline nurses who perceived a higher level of discrimination during the coronavirus pandemic reported poorer mental health and higher professional-turnover intention. Resilience acted as a mediator and reduced the effects of COVID-19-associated discrimination on nurses' mental health and professional-turnover intention.	13/20
13	(Cole et al., 2021)	Identifying Patterns of Turnover Intention Among Alabama Frontline Nurses in Hospital Settings During the COVID-19 Pandemic	USA	Cross-sectional survey	The survey was distributed through social media platforms and professional contacts, and 111 frontline nurse respondents were included in	A significant correlation was found between gender, marital status, and seniority and turnover intention. Perceived resource loss in task autonomy, PPE, and psychosocial support increased turnover intention among frontline nurses in Alabama.	12/20

					the study. The setting of this study was an Alabama hospital during the COVID-19 pandemic.		
14	(Bayer et al., 2021)	Job satisfaction, burnout, and turnover intention of nurses working in hospitals during the pandemic in Turkey	Turkey	Descriptive research design	The participants of the study were 251 nurses working in the hospital during the COVID-19 pandemic. It was observed that 77.69% of the nurses were women and 22.31% were men. Their average age was 30.53±7.69 years.	The emotional exhaustion subscale had the greatest effect on turnover intention. An increase in job satisfaction scores causes an average decrease in turnover intention scores. The low job satisfaction of nurses who take care of COVID-19-diagnosed patients has been determined to have a negative impact on their turnover intention and burnout.	13/20
15	(Sharif Nia et al., 2021)	A model of nurses' intention to care for patients with COVID-19: Mediating roles of job satisfaction and organizational commitment	Iran	cross-sectional study	648 Iranian nurses were surveyed during March 2020 using an online questionnaire consisting of two parts.	The study found that increased workload can be a deterrent to nurse's intent to care for patients.	12/20
16	(Li et al., 2022)	Effects of work conditions and organizational strategies on nurses' mental health during the COVID-19 pandemic	Taiwan	cross-sectional	The study was conducted in Taiwan and involved a sample size of 1499 full-time nurses who completed a web-based questionnaire between July and December 2020.	Caring for COVID-19 patients was associated with decreased risk of depression, which is inconsistent with the findings of previous studies. Redeployment and increased working hours were associated with burnout and intention to leave among nurses during the COVID-19 pandemic.	17/20
17	(Chang et al., 2006)	Nurses'' perceptions of Severe Acute Respiratory relationship between Commitment and intention to leave nursing	Taiwan	cross-sectional	The participants of the study were 330 nurses who were working in the hospital during the outbreak and completed the questionnaires between July and August 2003.	Perceived risk to life from may influence the commitment/intention-to-leave model in hospital nurses caring for patients with severe acute respiratory syndrome. All three components of occupational and organizational commitments were negatively associated with nurses' intentions to leave the nursing profession and the organization. Nurses' perceptions of the possibility of acquiring severe acute respiratory syndrome infection through caring for these patients had a moderating effect on the relationship between commitment and the intention to leave.	19/20
18	(S.-L. Chen et al., 2009)	Post-SARS Knowledge Sharing and Professional Commitment in the nursing profession	Taiwan	cross-sectional survey	The questionnaire was distributed by post to 8056 nurses nationwide, and 2833 nurses completed and returned	Knowledge sharing can effectively instill a sense of professional responsibility in nursing professionals.	13/20

					the questionnaire with a valid response rate of 39%.	The results showed that knowledge sharing correlated positively with professional commitment but negatively with the impact of SARS.	
19	(Al-Mansour, 2021)	Stress and turnover intention among healthcare workers in Saudi Arabia during the time of COVID-19: Can social support play a role?	Saudi Arabia	cross-sectional	This study was conducted among healthcare workers in primary healthcare centers in Saudi Arabia during the COVID-19 pandemic. A total of 1101 healthcare workers participated in the study, including 242 physicians, 340 nurses, 310 paramedics, and 209 administrative workers. Participants responded to an online questionnaire assessing their sociodemographic and occupational history.	The study found a significant association between stress and turnover intention among healthcare workers in Saudi Arabia during the COVID-19 pandemic. Social support had a mitigating effect on the relationship between stress and turnover intention. The study showed that support mediates the relationship between stress and turnover intention. The direct effect of stress on turnover in the presence of support was significant. The indirect effect of stress on turnover in the presence of support was significant.	20/20
20	(Nashwan et al., 2021)	Comparison of Impact of COVID-19 on Nurses' Turnover Intentions before and during the Pandemic in Qatar	Qatar	cross-sectional, survey-based descriptive	The study was conducted at Hamad Medical Corporation (HMC) The participants were nurses working in the HMC, and a convenience sample of 512 nurses was included in the final analysis.	Nurses in Qatar have higher turnover intentions during COVID-19 than before COVID-19. Nurses with 5-10 years of experience have higher turnover intentions during COVID-19 than nurses with less than 5 years of experience. Stress levels before COVID-19 were significantly associated with turnover intentions during COVID-19. This study highlights the importance of understanding the factors that contribute to turnover intentions, especially during pandemics, for workforce planning and nurses' well-being	14/20
21	(Khattak et al., 2021)	Impact of Fear of COVID-19 Pandemic on the Mental Health of Nurses in Pakistan	Pakistan	quantitative and cross-sectional	The study was conducted in Pakistan, and the participants were 380 nurses who were working on the frontline during the COVID-19 pandemic. The study contacted 700 nurses initially, but only 380 nurses responded to the survey questionnaire.	Fear of COVID-19 significantly affects the mental health of frontline nurses in Pakistan. Fear of COVID-19 is negatively associated with nurses' secondary trauma, turnover intention, and psychological distress. Leadership support can compensate for the negative impact of fear of COVID-19 on nurses' mental health.	15/20

22	(L. J. Labrague & De Los Santos, 2021)	Resilience as a mediator between compassion fatigue, nurses' work outcomes, and quality of care during the COVID-19 pandemic	Philippines	cross-sectional descriptive	The study conducted in the Philippines, and the participants were frontline nurses who were directly involved in caring for COVID-19 patients. The paper sample size was 401 nurses. The sample size was determined basis of power analysis	Compassion fatigue was found to have a negative impact on nurses' work outcomes, including work impairment and reduced capacity to provide quality care to patients. Psychological resilience was found to mediate the effects of compassion fatigue on nurses' work outcomes and patient safety outcomes.	12/20
23	(Ohue et al., 2021)	Mental health of nurses involved with COVID-19 patients in Japan, intention to resign, and influencing factors	Japan	cross-sectional questionnaire-based	The Patient Health Questionnaire-9 and the Generalized Anxiety Disorder-7, Impact of Event Scale-Revised, Maslach Burnout Inventory, and "intent to resign" were used to collect data from nurses working at hospitals treating patients with COVID-19 in Japan.	Cynicism" and "professional efficacy" affected the intention to quit being a nurse, while "cynicism" affected the intention to change hospitals/wards. The increase in the number of patients with COVID-19 was a factor affecting mental health and intention to resign. When the number of patients increased, anxiety disorders and intention to resign also increased.	11/20
24	(Liu et al., 2021)	Relationship between resilience and intent to stay among Chinese nurses to support Wuhan in managing COVID-19: Serial mediation effect of post-traumatic growth and perceived professional benefits	China	cross-sectional	The study included 200 participants, and nearly half of them were post-90s nurses. The study also used convenience sampling	Resilience has a positive effect on post-traumatic growth, perceived professional benefits, and intent to stay among Chinese nurses who were sent to Wuhan to fight COVID-19. Post-traumatic growth has a positive effect on perceived professional benefits and the intent to stay among Chinese nurses. Perceived professional benefits have a positive effect on the intent to stay among Chinese nurses. Post-traumatic growth and perceived professional benefits mediate the relationship between resilience and the intent to stay among Chinese nurses.	11/20
25	(Mirzaei et al., 2021)	Identifying predictors of turnover intention based on psychosocial factors of nurses during the COVID-19 outbreak	Iran	descriptive-analytical study	The participants of the study were 479 nurses recruited using the census method. The nurses were working in Ardabil pre-hospital emergency and educational and medical centers to fight COVID-19.	Multiple regression analysis showed that gender, marital status, work position, decision latitude, social support, job strain, general health, and post-traumatic stress disorder (PTSD) were predictors of turnover intention. Job stressors during the COVID-19 outbreak have increased nurses' turnover intentions. The mean turnover intention score of nurses was 41.73, with a standard deviation of 12.11.	17/20

26	(Said & El-Shafei, 2021)	Occupational stress, job satisfaction, and intent to leave: nurses working on the front lines during the COVID-19 pandemic in Zagazig City, Egypt	Egypt	comparative cross-sectional	There were 210 nurses from Zagazig Fever Hospital (ZFH) which, is one of the COVID-19 Triage Hospitals (Group I) versus 210 nurses from Zagazig General Hospital (ZGH) (Group II), which is neither a triage nor isolation hospital and deals only with suspected COVID-19 patients in emergency.	Three quarters of nurses (75.2%) in ZFH had high stress levels versus 60.5% in ZGH. More than half of nurses (51.0%) in ZFH reported low satisfaction level versus 41.9% in ZGH. Only 4.8% of the nurses in ZFH definitely had no intention to leave their present job.	13/20
27	(Kim et al., 2020)	A Study on the Job Retention Intention of Nurses Based on Social Support in the COVID-19 Situation	Korea	quantitative cross-sectional	The study participants were 382 nurses who were working in various healthcare settings in South Korea during the COVID-19 pandemic. The study analyzed data from 377 participants. The study used a questionnaire to collect data from 382 nurses, and data from 377 of whom were analyzed in total.	Nurses' job engagement and job retention intention were high, depending on their age and work experience. Nurses who had experience in nursing patients infected with COVID-19 and those working in COVID-19 divisions had low job retention intentions. Differences in job engagement and job retention intention were found depending on the category and type of social support.	9/20
28	(Yáñez et al., 2020)	Anxiety, Distress, and Turnover Intention of Healthcare Workers in Peru by Distance to the Epicenter during the COVID-19 Crisis	Peru	Cross-sectional survey	The study collected data from healthcare workers of different ages, genders, family status, education levels, occupations, job levels, exercise hours per day in the past week, and chronic health issues.	21.7% of healthcare workers in Peru experienced severe anxiety, whereas 26.1% experienced severe mental distress during the COVID-19 pandemic. A higher level of education was associated with a lower level of anxiety among healthcare workers in Peru. Younger workers had a higher turnover intention than their older colleagues. Healthcare workers in the private sector had a higher turnover intention than those in the public sector.	10/20
29	(Alameddine, Clinton, et al., 2021)	Factors Associated with the Resilience of Nurses During the COVID-19 Pandemic	Lebanon	cross-sectional	The study included all registered nurses affiliated with the Order of Nurses in Lebanon and working in patient care positions in hospitals. Participants were surveyed using an online survey questionnaire. A total of	Resilience levels decreased with higher personal burnout, work-related burnout, and client-related burnout rates. Nurses reporting the intention to quit their job had lower resilience scores. Technical degree nurses were significantly more resilient then bachelor-prepared nurses.	13/20

					511 nurses responded to the questionnaire.		
30	(Zhang et al., 2022)	Succumbing to the COVID-19 Pandemic Healthcare Workers Not Satisfied and Intention to Leave Their Jobs	Bolivia	A cross-sectional online survey	The study included 240 healthcare workers who completed a cross-sectional online survey between April 10 and 30 2020.	The number of office days predicted job satisfaction positively for the older healthcare staff, but negatively for the younger staff. Similar patterns existed for the outcome variables of life satisfaction and turnover intention. This study demonstrates that healthcare workers' number of office days matters to their job satisfaction, life satisfaction, and turnover intention. However, the number of office days has different impacts on younger and older workers.	11/20
31	(Schug et al., 2022)	Sick Leave and Intention to Quit the Job among Nursing Staff in German Hospitals during the COVID-19 Pandemic	Germany	A cross-sectional online survey	The study included 757 nursing staff members who completed an online survey between May and July 2021.	Lower reward levels, having changed work departments during the pandemic, working part-time, and higher depression levels significantly predicted turnover intention.	12/20
32	(Y. Chen et al., 2022)	Hospital factors that predict the intention of health care workers to leave their job during the COVID-19 pandemic	Taiwan	A cross-sectional	The study was conducted in Taiwan from July to November 2020. The participants of the study were healthcare workers who were involved in the care of patients with COVID-19. The study included 1209 participants who completed the self-administered questionnaire.	The intention of healthcare workers to leave their job during the COVID-19 pandemic was related to potentially modifiable factors related to the infection itself and the work environment. High perceived risk, more affected social relationships, poor supportive administration/management, and high increased workload and job stress were positively associated with a serious intention to resign among healthcare workers. Practicing in primary or secondary hospitals instead of tertiary hospitals was another predictor of healthcare workers leaving their jobs. Mitigation of these risk factors might reduce the consideration of healthcare workers to leave to some extent, thus preventing workforce shortage and promoting patient safety.	14/20
33	(Poortaghi et al., 2021)	Exploring nursing managers' perceptions of nursing workforce management during the outbreak of COVID-19: a content analysis study	Iran	descriptive qualitative study	The study was conducted in hospitals from different cities in Iran. The participants of the study were 15 nursing managers who were selected using a purposeful sampling	The sub-categories under management of workforce retention are preventive measures, motivational measures, and psychological support.	8/10

| 34 | (Varasteh et al., 2022) | Factors affecting Iranian nurses' intention to leave or stay in the profession during the COVID-19 pandemic | Iran | qualitative-descriptive study | Participants were selected using a purposeful sampling strategy from four cities that had the highest number of patients with COVID-19 when data collection began. In total, 19 interviews were conducted with 16 participants. | Commitment and work conscience in pandemic conditions is one of the main factors in keeping nurses in their profession. Fear of family infection and protective equipment shortages were identified as significant factors that could lead nurses to leave their profession. Organizational factors such as the atmosphere of the hospital and motivational factors were also found to be important in determining nurses' intentions to stay or leave their profession during the pandemic. | 8/10 |

Appendix 3: Quality assessment.

Table 1. Checklist of quality appraisal of the selected studies through systematic review

Study title	Critical Appraisal Skills Program (CASP) for assessing the quality of qualitative research (1,.5,0)									
	Was there a clear statement regarding the aims of the research?	Is a qualitative methodology appropriate?	Was the research design appropriate to address the aims of the study? (Appropriate research design)	Was the recruitment strategy appropriate for the aims of the research? (Sampling)	Were the data collected in a way that addressed the research issue? (Data collection)	Has a relationship between the researcher and Participants were adequately considered? (Reflexivity)	Have ethical issues been taken into consideration? (Ethical Issues)	Was the data analysis sufficiently rigorous? (Data Analysis)	Is there a clear statement of the findings? (Findings)	How valuable is the research? (Value of the research)
Exploring nursing managers' perceptions of nursing workforce management during the outbreak of COVID-19: a content analysis study	1	1	1	1	1	0	1	.5	1	1
Factors affecting Iranian nurses' intention to leave or stay in the profession	1	1	1	1	1	0	0	1	1	1

during the COVID-19 pandemic

Study title	Appraisal tool for cross-sectional studies (AXIS tool) (yes/no/do not know)										
	Introduction	Methods									
	Were the aims/objectives of the study clear?	Was the study design appropriate for the stated aim(s)?	Was the sample size justified?	Was the target/reference population clearly defined? (Is it clear who the research was about?)	Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	Was the selection process likely to select subjects/participants representative of the target/reference population under investigation?	Were measures undertaken to address and categorize non-responders?	Were the risk factors and outcome variables measured in accordance with the aims of the study?	Were the risk factors and outcome variables measured correctly using instruments/measurements that had been piloted or published previously?	Is it clear what was used to determined statistical significance and/or precision estimates? (eg, p values, CIs)	Were the methods (including statistical methods) sufficiently described to enable them to be repeated?
Fear of COVID-19 and its Impact on Job Satisfaction and Turnover Intention among Egyptian Physicians	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes
Resilience of nurses at the epicenter of the COVID-19 pandemic in Lebanon	yes	yes	do not know	yes	yes	no	no	yes	no	yes	yes
COVID-Related Stress and Work Intentions in a Sample of US Health Care Workers	yes	yes	yes	yes	no	no	no	yes	no	yes	yes
Fear of COVID-19, psychological distress, work satisfaction, and turnover intention among front-line nurses	yes	yes	yes	yes	no	do not know	no	yes	yes	yes	do not know
FACTORS PREDICTING NURSES'	yes	yes	yes	yes	yes	yes	no	yes	no	no	no

CONSIDERATION OF LEAVING THEIR JOB DURING THE SARS OUTBREAK											
Ethical dilemmas, perceived risk, and motivation among nurses during the COVID-19 pandemic	yes	yes	yes	yes	no	no	no	yes	no	yes	yes
Assessing the Presence of Post-Traumatic Stress and Turnover Intention Among Nurses Post-Middle East Respiratory Syndrome Outbreak	yes	yes	yes	yes	no	no	no	yes	do not know	yes	yes
Factors Related to Care Competence, Workplace Stress, and Intention to Stay among Novice Nurses during the Coronavirus Disease (COVID-19) Pandemic	yes	yes	yes	yes	yes	do not know	no	yes	no	yes	yes
Prolonged Stress Causes Depression in Frontline Workers Facing the COVID-19 Pandemic-A Repeated Cross-Sectional Study in a COVID-19 Hub-Hospital in Central Italy	yes	yes	yes	yes	yes	do not know	no	yes	yes	yes	yes
Workplace Well-Being and Intent to Stay by Health Care Workers Reassigned during the First COVID-19 Wave: Results of a Swiss Survey	yes	yes	yes	yes	yes	no	no	yes	no	yes	yes
How perceived threat of Covid-19 causes turnover intention among Pakistani nurses: A moderation and mediation analysis	yes	yes	yes	yes	no	yes	no	yes	no	yes	yes
Perceived COVID-19-associated discrimination, mental health and professional-turnover	yes	yes	do not know	yes	no	no	no	yes	yes	yes	yes

intention among frontline clinical nurses: The mediating role of resilience											
Identifying Patterns of Turnover Intention Among Alabama Frontline Nurses in Hospital Settings During the COVID-19 Pandemic	yes	yes	yes	yes	no	no	no	yes	no	yes	yes
Job satisfaction, burnout and turnover intention of nurses working in hospital during the pandemic COVID-19 in Turkey	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes
A model of nurses' intention to care of patients with COVID-19: Mediating roles of job satisfaction and organisational commitment	yes	yes	do not know	yes	no	no	no	yes	yes	yes	yes
Effects of work conditions and organizational strategies on nurses' mental health during the COVID-19 pandemic	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	yes
Nurses' perceptions of severe acute respiratory syndrome: relationship between commitment and intention to leave nursing	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes
Post-SARS knowledge sharing and professional commitment in the nursing profession	yes	yes	yes	yes	do not know	yes	no	yes	do not know	yes	yes
Stress and turnover intention among healthcare workers in Saudi Arabia during the time of COVID-19: Can social support play a role?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Comparing the Impact of COVID-19 on Nurses' Turnover Intentions before and during the Pandemic in Qatar	yes	yes	yes	yes	yes	no	no	yes	no	yes	yes

Title											
Impact of Fear of COVID-19 Pandemic on the Mental Health of Nurses in Pakistan	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes
Resilience as a mediator between compassion fatigue, nurses' work outcomes, and quality of care during the COVID-19 pandemic	yes	yes	yes	yes	no	no	no	yes	no	yes	yes
Mental health of nurses involved with COVID-19 patients in Japan, intention to resign, and influencing factors	yes	yes	no	yes	no	no	no	yes	yes	yes	yes
The relationship between resilience and intent to stay among Chinese nurses to support Wuhan in managing COVID-19: The serial mediation effect of post-traumatic growth and perceived professional benefits	yes	yes	do not know	yes	no	no	no	yes	no	yes	yes
Identifying the predictors of turnover intention based on psychosocial factors of nurses during the COVID-19 outbreak	yes	yes	yes	yes	yes	no	no	yes	yes	yes	yes
Occupational stress, job satisfaction, and intent to leave: nurses working on front lines during COVID-19 pandemic in Zagazig City, Egypt	yes	yes	yes	yes	yes	do not know	no	yes	no	yes	yes
A Study on the Job Retention Intention of Nurses Based on Social Support in the COVID-19 Situation	yes	yes	yes	yes	no	no	no	yes	yes	no	yes
Anxiety, Distress, and Turnover Intention of Healthcare Workers in Peru by Their Distance to the	yes	yes	no	yes	no	no	no	yes	yes	yes	yes

Epicenter during the COVID-19 Crisis											
Factors Associated with the Resilience of Nurses During the COVID-19 Pandemic	yes	yes	do not know	yes	yes	no	no	yes	yes	yes	yes
Succumbing to the COVID-19 Pandemic-Healthcare Workers Not Satisfied and Intend to Leave Their Jobs	yes	yes	no	yes	no	no	no	yes	no	yes	no
Sick Leave and Intention to Quit the Job among Nursing Staff in German Hospitals during the COVID-19 Pandemic	yes	yes	yes	yes	no	no	no	yes	no	yes	yes
Hospital factors that predict intention of health care workers to leave their job during the COVID-19 pandemic	yes	yes	yes	yes	yes	yes	no	yes	no	do not know	yes

	Results					Discussion		Other			
	Were the basic data adequately described?	Does the response rate raise concerns about non-response bias?	If appropriate, was information about non-responders described?	Were the results internally consistent?	Were the results for the analyses described in the methods, presented?	Were the authors' discussions and conclusions justified by the results?	Were the limitations of the study discussed?	Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?	Was ethical approval or consent of participants attained?		
Fear of COVID-19 and Its Impact on Job Satisfaction and Turnover Intention Among Egyptian Physicians	yes	no	no	yes	yes	yes	yes	no	no		
Resilience of nurses at the epicenter of the COVID-19 pandemic in Lebanon	yes	no	no	yes	yes	yes	yes	no	yes		
COVID-Related Stress and Work Intentions in a Sample of US Health Care Workers	yes	no	no	yes	yes	yes	yes	no	no		

Fear of COVID-19, psychological distress, work satisfaction and turnover intention among front line nurses	yes	no	no	yes	yes	yes	yes	no	yes		
FACTORS PREDICTING NURSES' CONSIDERATION OF LEAVING THEIR JOB DURING THE SARS OUTBREAK	do not know	do not know	no	no	yes	yes	yes	no	no		
Ethical dilemmas, perceived risk, and motivation among nurses during the COVID-19 pandemic	do not know	no	no	do not know	yes	yes	yes	yes	yes		
Assessing the Presence of Post-Traumatic Stress and Turnover Intention Among Nurses Post-Middle East Respiratory Syndrome Outbreak	yes	no	no	yes	do not know	yes	yes	no	yes		
Factors Related to Care Competence, Workplace Stress, and Intention to Stay among Novice Nurses during the Coronavirus Disease (COVID-19) Pandemic	no	no	no	no	yes	yes	yes	yes	yes		
Prolonged Stress Causes Depression in Frontline Workers Facing the COVID-19 Pandemic-A Repeated Cross-Sectional Study in a COVID-19 Hub-Hospital in Central Italy	yes	do not know	no	yes	yes	yes	yes	yes	yes		
Workplace Well-Being and Intent to Stay by Health Care Workers Reassigned during the First COVID-19 Wave: Results of a Swiss Survey	no	no	no	no	yes	do not know	yes	no	yes		
How perceived threat of Covid-19 causes turnover	yes	no	no	yes	yes	yes	yes	yes	no		

intention among Pakistani nurses: A moderation and mediation analysis											
Perceived COVID-19-associated discrimination, mental health and professional-turnover intention among frontline clinical nurses: The mediating role of resilience	yes	no	no	no	yes	yes	yes	yes	yes		
Identifying Patterns of Turnover Intention Among Alabama Frontline Nurses in Hospital Settings During the COVID-19 Pandemic	yes	no	no	no	yes	yes	yes	yes	do not know		
Job satisfaction, burnout and turnover intention of nurses working in hospital during the pandemic COVID-19 in Turkey	yes	no	no	yes	yes	yes	no	yes	no		
A model of nurses' intention to care of patients with COVID-19: Mediating roles of job satisfaction and organizational commitment	yes	no	no	no	yes	yes	yes	no	yes		
Effects of work conditions and organizational strategies on nurses' mental health during the COVID-19 pandemic	yes	yes	no	no	yes	yes	yes	yes	yes		
Nurses' perceptions of severe acute respiratory syndrome: relationship between commitment and intention to leave nursing	yes	yes	yes	yes	yes	yes	yes	yes	yes		
Post-SARS knowledge sharing and professional commitment in the nursing profession	yes	no	no	yes	yes	yes	yes	no	no		
Stress and turnover intention among healthcare workers in Saudi Arabia during the time of COVID-	yes	yes	yes	yes	yes	yes	yes	yes	yes		

19: Can social support play a role?											
Comparing the Impact of COVID-19 on Nurses' Turnover Intentions before and during the Pandemic in Qatar	yes	yes	yes	no	yes	do not know	yes	no	yes		
Impact of Fear of COVID-19 Pandemic on the Mental Health of Nurses in Pakistan	yes	yes	no	yes	yes	yes	yes	no	yes		
Resilience as a mediator between compassion fatigue, nurses' work outcomes, and quality of care during the COVID-19 pandemic	do not know	no	no	yes	yes	yes	yes	no	yes		
Mental health of nurses involved with COVID-19 patients in Japan, intention to resign, and influencing factors	yes	no	no	do not know	yes	yes	yes	no	no		
The relationship between resilience and intent to stay among Chinese nurses to support Wuhan in managing COVID-19: The serial mediation effect of post-traumatic growth and perceived professional benefits	yes	no	no	no	yes	yes	yes	no	yes		
Identifying the predictors of turnover intention based on psychosocial factors of nurses during the COVID-19 outbreak	yes	yes	no	yes	yes	yes	yes	yes	yes		
Occupational stress, job satisfaction, and intent to leave: nurses working on front lines during COVID-19 pandemic in Zagazig City, Egypt	yes	no	no	yes	yes	yes	yes	no	yes		
A Study on the Job Retention Intention of	no	no	no	no	yes	do not know	yes	no	do not know		

Nurses Based on Social Support in the COVID-19 Situation											
Anxiety, Distress, and Turnover Intention of Healthcare Workers in Peru by Their Distance to the Epicenter during the COVID-19 Crisis	yes	no	no	no	no	do not know	yes	no	yes		
Factors Associated with the Resilience of Nurses During the COVID-19 Pandemic	yes	no	no	yes	yes	yes	yes	no	no		
Succumbing to the COVID-19 Pandemic-Healthcare Workers Not Satisfied and Intend to Leave Their Jobs	yes	no	no	yes	yes	yes	no	yes	yes		
Sick Leave and Intention to Quit the Job among Nursing Staff in German Hospitals during the COVID-19 Pandemic	yes	no	no	no	yes	yes	yes	yes	no		
Hospital factors that predict intention of health care workers to leave their job during the COVID-19 pandemic	yes	yes	no	no	yes	yes	yes	yes	no		

	Author,year,Country	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	Total	Qualité
1	(Abd-Ellatif et al., 2021) Egypt	+	+	+	+	-	-	-	-	+	+	+	+	+	-	-	+	+	+	+	-	13	Moderate
2	(Alameddine et al., 2021) Lebanon	+	+	u	+	+	-	-	+	-	+	+	+	-	-	-	+	+	+	-	+	13	Moderate
3	(Sinsky et al., 2021) USA	+	+	+	+	-	-	-	+	-	+	+	+	-	-	-	+	+	+	+	-	12	Moderate
4	(Labrague & Santos, 2020) Philippines	+	+	+	+	-	u	-	+	+	+	u	+	-	-	+	+	+	+	-	+	13	Moderate
5	(Shiao et al., 2007) Taiwan	+	+	+	+	+	+	-	+	-	-	-	u	u	-	-	+	+	+	-	-	10	Moderate
6	(Sperling, 2021) Israel	+	+	+	+	-	-	-	+	-	+	+	u	-	-	u	+	+	+	+	+	12	Moderate
7	(Jung et al., 2020) South Korea	+	+	+	+	-	-	-	+	u	+	+	+	-	-	+	u	+	+	-	+	13	Moderate
8	(Chen et al., 2021) Taiwan	+	+	+	+	+	u	-	+	-	+	+	-	-	-	-	+	+	+	+	+	13	Moderate
9	(Magravita et al., 2021) Italy	+	+	+	+	+	u	-	+	+	+	+	+	u	-	+	+	+	+	+	+	16	High
10	(Gilles et al., 2021) Swiss	+	+	+	+	+	-	-	+	-	+	+	-	-	-	-	+	u	+	-	+	11	Moderate
11	(Irshad et al., 2020) Pakistan	+	+	+	+	-	+	-	+	-	+	+	+	-	-	+	+	+	+	+	-	14	High
12	(L. J. Labrague et al., 2021) Philippines	+	+	u	+	-	-	-	+	+	+	+	+	+	-	-	-	+	+	+	+	13	Moderate
13	(Cole et al., 2021) USA	+	+	+	+	-	-	-	+	-	+	+	+	-	-	-	+	+	+	+	u	12	Moderate
14	(Bayer et al., 2021) Turkey	+	+	+	+	-	-	-	+	+	+	+	+	-	-	-	+	+	+	+	+	13	Moderate
15	(Sharif Nia et al., 2021) Iran	+	+	u	+	-	-	-	+	+	+	+	+	-	-	-	+	+	+	-	+	12	Moderate
16	(Li et al., 2022) Taiwan	+	+	+	+	+	+	-	+	+	+	+	+	+	-	-	+	+	+	+	+	17	High
17	(Chang et al., 2006) Taiwan	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	19	High
18	(S.-L. Chen et al., 2009) Taiwan	+	+	+	+	u	+	-	+	u	+	+	+	-	-	+	+	+	+	-	-	13	Moderate
19	(Al-Mansour, 2021) Saudi Arabia	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	20	High
20	(Nashwan et al., 2021) Qatar	+	+	+	+	+	-	-	+	-	+	+	+	+	+	-	+	u	+	-	+	14	High
21	(Khattak et al., 2021) Pakistan	+	+	+	+	-	-	-	+	+	+	+	+	+	-	+	+	+	+	-	+	15	High
22	(L. J. Labrague & De Los Santos, 2021) Philippines	+	+	+	+	-	-	-	+	-	+	+	u	-	-	+	+	+	+	-	+	12	Moderate
23	(Ohue et al., 2021) Japan	+	+	-	+	-	-	-	+	+	+	+	+	-	-	u	+	+	+	-	-	11	Moderate
24	(Liu et al., 2021) China	+	+	u	+	-	-	-	+	-	+	+	+	-	-	-	+	+	+	-	+	11	Moderate
25	(Mirzaei et al., 2021) Iran	+	+	+	+	+	-	-	+	+	+	+	+	+	-	+	+	+	+	+	+	17	High
26	(Said & El-Shafei, 2021) Egypt	+	+	u	+	+	u	-	+	-	+	+	+	-	-	+	+	+	+	-	+	13	Moderate
27	(Kim et al., 2020) Korea	+	+	+	+	-	-	-	+	+	-	+	-	-	-	-	+	u	+	-	u	9	Moderate
28	(Yáñez et al., 2020) Peru	+	+	-	+	-	-	-	+	+	+	+	+	-	-	-	-	u	+	-	+	10	Moderate
29	(Alameddine, Clinton, et al., 2021) Lebanon	+	+	u	+	+	-	-	+	+	+	+	+	+	-	-	+	+	+	-	-	13	Moderate
30	(Zhang et al., 2022) Bolivia	+	+	-	+	-	-	-	+	-	+	-	+	-	-	+	+	+	-	+	+	11	Moderate
31	(Schug et al., 2022) Germany	+	+	+	+	-	-	-	+	-	+	+	+	-	-	-	+	+	+	+	-	12	Moderate
32	(Y. Chen et al., 2022) Taiwan	+	+	+	+	+	+	-	+	-	u	+	+	+	-	-	+	+	+	+	-	14	High

Figure 1: Methodological quality assessment of quantitative articles using the AXIS checklist in cross-sectional studies. (Negative denotes no ethical approval or consent of participants attained); +: yes (criterion is met), −: no (criterion is not met), U: unknown if criterion is met, n/a: not applicable; High-quality paper: Scores ≥ 14, Moderate-quality paper: Scores 8-High-quality paper: Scores ≥ 14, Moderate-quality paper: Scores 8-14, Low-quality paper: Less than 8.

Author, year, Country	A	B	C	D	E	F	G	H	I	J	Total	Quality
(Poortaghi et al., 2021) Iran	1	1	1	1	1	0	1	0.5	1	1	8	Moderate
(Varasteh et al., 2022) Iran	1	1	1	1	1	0	0	1	1	1	8	Moderate

Figure 2: Methodological quality assessment of qualitative articles using the Critical Appraisal Skills Programmed (CASP) checklist. Quality criteria: (1: Yes, 0.5: Unsure, 0: No; High-quality paper: Scores 9.0–10.0, Moderate-quality paper: Scores 7.0-9, Low-quality paper: Less than 7.0).

Appendix 4: PRISMA 2020 CHECKLIST

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	4
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	5
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	6
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	5
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	5

Section and Topic	Item #	Checklist item	Location where item is reported
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	6,7
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	6,7
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g., for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	6
	10b	List and define all other variables for which data were sought (e.g., participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	5,6
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	6,7
Effect measures	12	Specify for each outcome the effect measure(s) (e.g., risk ratio, mean difference) used in the synthesis or presentation of results.	-
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g., tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	5
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	7
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	7
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	7
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g., subgroup analysis, meta-regression).	7
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	-
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	5,6,7
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	6,7

Section and Topic	Item #	Checklist item	Location where item is reported
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	7
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	8,15
Study characteristics	17	Cite each included study and present its characteristics.	8,9
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	9
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimates and its precision (e.g., confidence/credible interval), ideally using structured tables or plots.	12,13,14
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	8,9,15
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g., confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	-
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	8,9
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	-
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	9
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	9
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	9,10
	23b	Discuss any limitations of the evidence included in the review.	11
	23c	Discuss any limitations of the review processes used.	10,11
	23d	Discuss implications of the results for practice, policy, and future research.	11
OTHER INFORMATION			
Registration	24a	Provide registration information for the review, including register name and registration number, or state that the review was not	5

Section and Topic	Item #	Checklist item	Location where item is reported
and protocol		registered.	
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	5
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	-
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	2
Competing interests	26	Declare any competing interests of review authors.	2
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	2

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: http://www.prisma-statement.org/

Appendix 5: Studies included

Table 2. Characteristics of 34 included studies.

Study number	Author, year, and origin	Study type	Sample size (n)	Response rate	Study population	Key findings	Quality score
1	Abd-Ellatif et al., 2021; Egypt[36]	Cross-sectional study	411	100%	Physicians	There is a relationship between a high level of fear lower job satisfaction and higher turnover intention.	13
2	Alameddine, Bou-Karroum, et al., 2021; Lebanon[38]	Cross-sectional survey design	265	86%	Nurses	Resilience of nurses on the front lines of epidemics improves job satisfaction and retention	15
3	Sinsky et al., 2021; USA[33]	Cross-sectional	20664, at 124 institutions	The median organizational response rate was 34%.	Frontline healthcare workers	Improving the sense of worth and reducing job burnout can be helpful in employees retention in healthcare organizations	12

4	Labrague & Santos, 2020; Philippines[30]	Cross-sectional research design	261	87%	Frontline registered nurses	Paying attention to nurses' fear of COVID-19 may reduce stress, increase job satisfaction and retention	13
5	Shiao et al., 2007; Taiwan[20]	Cross-sectional questionnaire survey	753	83%	Nurses	Increased workload, stress, and damage to social relationships caused by SARS were strong predictors of turnover intention among nurses.	10
6	Sperling, 2021; Israel[43]	The study implemented a descriptive correlative study	261	53.70%	Nurses	Despite experiencing personal risks and considerable emotional burdens, still have a strong commitment to service, but they seek a supportive atmosphere for their needs.	12
7	Jung et al., 2020; South Korea[39]	Cross-sectional study	300	49%	Nurses working in emergency rooms	After the outbreak of MERS, the level of stress disorder increased in nurses, after which they stated a higher turnover intention	13
8	Chen et al., 2021; Taiwan[21]	A cross-sectional study using a nationwide survey	333	83.25%	Nurses	Clinical stress, workload, and completion of training courses were associated with the retention of novice nurses	13
9	Magnavita et al., 2021; Italy[44]	Repeated cross-sectional study	205	74.10%	Frontline healthcare workers	Job stress is a significant predictor of insomnia, anxiety, decreased job satisfaction, job burnout, and increased turnover intention	16
10	Gilles et al., 2021; Swiss[45]	A cross-sectional survey	2811	32.50%	Frontline healthcare workers	The more healthcare workers understand managers' accountability, the more they will be affected by their retention and the well-being of the workplace.	11

11	Irshad et al., 2020; Pakistan[41]	This study is cross-sectional	117	none	Nurses	The safety and mental health of nurses are essential for continuing to serve patients without fear of losing their lives	14
12	Labrague et al., 2021; Philippines[31]	Cross-sectional study	259	86%	Frontline clinical nurses	Nurses' perception of higher levels of workplace discrimination during the pandemic is associated with poorer mental health and higher turnover intentions, whereas resilience is a mediator.	13
13	Cole et al., 2021; USA[34]	A cross-sectional survey	111	78.72%	Frontline Nurses	Loss of independence in work, personal protective equipment, and reduction of social support increased turnover intention among nurses.	12
14	Bayer et al., 2021; Turkey[46]	Cross-sectional study	251	52.70%	Nurses	The manager should provide the conditions that reduce turnover intention during the COVID-19 pandemic by increasing job satisfaction and reducing depression	13
15	Sharif Nia et al., 2021; Iran[27]	Cross-sectional study	648	81%	Nurses	Job satisfaction and organizational commitment help to understand nurses' workload, supervisor quality, outsourcing behaviors, and satisfaction with payment to care during the pandemic.	12
16	Li et al., 2022; Taiwan[22]	Cross-sectional study	1444	100%	Nurses	Pandemic-related work conditions are associated with adverse mental health and turnover intention, and organizational strategies mitigate this adverse effect.	17
17	Chang et al., 2006; Taiwan[23]	Cross-sectional study	330	82.50%	Nurses	The use of full protection against infection and regular in-service training related to SARS leads to	19

						better retention of nurses after SARS.	
18	Chen et al., 2009; Taiwan[24]	Cross-sectional study	8056	39%	Nurses	By encouraging knowledge sharing, hospitals increase professional commitment and staff retention	13
19	Al-Mansour, 2021; Saudi Arabia[47]	Cross-sectional study	1101	73.40%	Healthcare workers	Stress increases t turnover intention, and social support decreases the relationship between stress and turnover intention	20
20	Nashwan et al., 2021; Qatar[48]	A cross-sectional study	512	none	Nurses	Nurse characteristics and stress levels are associated with turnover intention during the COVID-19 pandemic	14
21	Khattak et al., 2021; Pakistan[42]	A cross-sectional research design	700	54.28%	Nurses	Leadership support offsets the negative effect of fear of the COVID-19 turnover intention	15
22	Labrague & De Los Santos, 2021; Philippines[32]	Cross-sectional study	300	90%	Frontline Nurses	Psychological resilience moderates the negative effect of compassion fatigue on satisfaction and turnover intention	12
23	Ohue et al., 2021; Japan[49]	Cross-sectional questionnaire-based study	54	46%	Frontline Nurses	The increase in the number of patients increased anxiety disorders, which led to a rise in turnover intention. In addition, it increased the harmful rumors of psychiatric injuries.	11
24	Liu et al., 2021; China[50]	Cross-sectional questionnaire survey	200	none	Frontline Nurses	Strong resilience and perceived professional benefits directly affect retention	11

25	Mirzaei et al., 2021; Iran[26]	This present descriptive-analytical study was conducted in June 2020	479	none	Nurses	Job stress during the COVID-19 pandemic increased turnover intention among nurses	13
26	Said & El-Shafei, 2021; Egypt[35]	A comparative cross-sectional study	420	none	Nurses	A stressful work environment leads to dissatisfaction and turnover among nurses	17
27	Kim et al., 2020; Korea[40]	Cross-sectional study	377	98.06%	Nurses	The retention of frontline nurses depends on their social characteristics and support	9
28	Yáñez et al., 2020; Peru[53]	A cross-sectional survey	303	75%	Healthcare workers	Younger employees have higher turnover intentions than older colleagues	10
29	Alameddine, Clinton, et al., 2021; Lebanon[38]	Cross-sectional study	511	none	Nurses	There is an inverse relationship between resilience, burnout, and turnover intention	13
30	Zhang et al., 2022; Bolivia[51]	Cross-sectional online survey	240	59.07%	Frontline healthcare workers	Number of working days is related to job satisfaction, life satisfaction, and turnover intention	11
31	Schug et al., 2022; Germany[52]	Online survey distributed between May 28 and July	757	none	nursing staff	Perceived reward at work disrupts turnover intention	12
32	Chen et al., 2022; Taiwan[25]	Cross-sectional study	1029	88.09%	Healthcare workers	Factors related to self-infection and the work environment are associated with turnover intention	14
Qualitative studies							

33	Poortaghi et al., 2021; Iran[28]	This descriptive qualitative study with a conventional content analysis approach was conducted in 2020.	15	None	Nurses	Principles of flexible and situational management are necessary to maintain the workforce	8
34	Varasteh et al., 2022; Iran[29]	A qualitative study using a conventional content analysis approach	16	none	Frontline nurses	Work commitment and conscientiousness are the main factors related to the retention of nurses during epidemics, along with personal and organizational factors	8

References

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